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Conservation Strategy for Bull Trout on USFS lands in Western Montana

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USDA Forest Service, Northern Region
U. S. Fish and Wildlife Service, Montana Field Office
Lolo National Forest
Bitterroot National Forest
Flathead National Forest
Beaverhead-Deerlodge National Forest
Kootenai National Forest
Helena National Forest

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Executive Summary

Bull trout numbers continue to decline in much of their range in the western United States, including many core populations in Western Montana. The two greatest threats to their continued existence are curtailment and degradation of their habitat, and competition with introduced species (USFWS, 2008). The Bull Trout Conservation Strategy for Forest Service (FS) lands in Western Montana (BTCS or "strategy") has been created in response to ongoing bull trout population declines occurring on and near National Forests in Western Montana, despite efforts to improve habitat quality. The strategy has been written with both biologists and line officers in mind. Completion of this strategy also helps meet agency responsibility under 7(a)(1) of the Endangered Species Act, and interim planning guidance originally provided by the INFISH strategy.

The introduction and document summary to the strategy describes the purpose of the strategy and why the strategy is needed. The introduction also contains methods used in development of some of the products (like the baseline assessment), as well as a description of the format and how it can be used in a variety of Forest Service planning efforts. Lastly, this section summarizes baseline habitat conditions for bull trout populations and identifies habitat remedies by priority for specific local population and across bull trout Core Areas of Western Montana.

The BTCS has been developed by members of the Level 1 consultation team with oversight from management in both agencies (USFWS and USFS). Regarding the purpose and expected use, the BTCS provides a standard process to update bull trout population and habitat status, a structured and consistent assessment of fish habitat conditions including stressors on populations, and prioritized needs by core area on National Forest Lands to give line officers the best available information prior to making decisions on bull trout restoration opportunities. The strategy is not intended to be a decision document and it is anticipated that the document will be updated and improved over time.

The strategy is expected to improve consultation efficiency and help direct resources to the most important opportunities, where FS management has the potential to increase habitat quality and connectivity. It also provides a method for the FS to document contributions to bull trout recovery on National Forest Lands. Creative planning and funding solutions paired with this strategy will be needed to help increase bull trout restoration actions per the Forest Service Chief's goal for accelerated restoration (USDA Forest Service 2012).

After the introductory section, the BTCS goes into greater detail for each of the core populations in Western Montana. The detailed information in later sections is expected to be used in multiple efforts such as restoration planning, transportation planning, forest plan revision, and watershed condition framework updates.

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Conservation Strategy for Bull Trout on USFS Lands in Western Montana

Introduction and Document Summary

Purpose of the Strategy: The Bull Trout Conservation Strategy on USFS lands in western Montana (BTCS) has been completed to guide Forest Service conservation activities for bull trout on National Forest Service lands. The BTCS has a three-fold purpose for the services (USFS and USFWS):

- Provides a standard process for updating bull trout habitat and population baselines that can be documented in the consultation process.
- Provides a structured assessment of fish populations and habitat conditions, stressors, needs.
- Identifies opportunities that will further guide the location, type, and extent of projects on FS lands intended to conserve, restore, and ultimately contribute to bull trout recovery.

In addition to identifying high priority areas, it also identifies places where our management may have only a limited influence on population or habitat condition. For example, FS management will have little influence in many situations where non-native fish in lakes are thought to be the key driver for bull trout population status or in many cases where National Forest lands comprise a minority of the watershed. The strategy also identifies a list of important conservation measures for given geographic areas and can be used as a means to track accomplishment of needed improvements. It can also be used in broad efforts such as the Travel Planning Rule, and can inform future plan revisions.

The BTCS addresses all lands managed by the Kootenai, Flathead, Lolo, and Bitterroot National Forests, and lands west of Continental Divide that are managed by the Helena and Beaverhead Deerlodge National Forests including portions of the Flathead, the Clark Fork, and the Kootenai river systems and their constituent bull trout Core Areas. The BTCS also looks in less detail at some habitat conditions and limitations to bull trout outside of the FS administrative boundaries. This helps address the larger conservation and recovery context by presenting the relative importance of improvement needs on FS lands versus off. Similarly the BTCS highlights actions that may not be under the sole purview of the FS, thus in need of cooperative actions and coordination. For instance any non-native Fish management actions pursued on FS lands will require close coordination and permitting with Montana Fish, Wildlife, and Parks (MT FWP), the lead fish management entity.

The BTCS is intended to support the draft USFWS Bull Trout Recovery Plan for the Montana portion of the proposed Columbia Headwaters Recovery Unit- a unit that includes all of western Montana's bull trout waters west of the Continental Divide and portions of northern Idaho (Coeur d'Alene, Pend Oreille and Priest). The BTCS helps clarify bull trout conservation needs by identifying the most important areas and treatments that are expected to provide the greatest benefit to bull trout on FS lands. Recommended actions in the BTCS are expected to improve habitat conditions that contribute to bull trout conservation and recovery within the Columbia Headwaters Recovery Unit. The BTCS, however, does not set recovery goals for specific populations of bull trout, nor does it present population levels needed for recovery. The BTCS provides the following specific uses: input for consideration in integrated restoration planning efforts; a platform to inform other efforts such as Watershed Condition Framework and associated restoration action plans and essential projects; and stand-alone aquatic restoration efforts supported by the forest and partners. As described below, the BTCS uses a systematic approach to evaluate local populations of bull trout and then aggregates local populations up into their respective bull trout core areas, similar to the Draft USFWS Recovery Plan. In addition to population status and trends (where data are available) the BTCS presents limiting factors, and opportunities for treatment, and their relative importance to recovery. The BTCS is not a decision document. Nor does it dictate only one solution, or a specific set of actions. It provides a framework for planning and implementing actions intended to improve local bull trout habitat and populations. Potential action efficacy runs the gamut, from those actions/action types of marginal benefit to those locality-specific proposals expected to provide the greatest benefit to bull trout if those actions were to be implemented. Any potential action pursued under the strategy would be required to pass through standard internal and external Forest Service scoping, environmental compliance and funding processes and mechanisms. The BTCS does not replace existing Forest Plan guidance. It may, however, provide an opportunity to examine plan guidance and increase effectiveness of plan direction.

Developers of the strategy The Bull Trout Conservation Strategy (BTCS) was developed by fisheries biologists on the Western Montana Level 1 Bull Trout Consultation Team. Conservation Strategy elements for individual Forests were generated by Forest and District fisheries biologists, with review by MT FWP fisheries biologists. Individual Forest efforts were then organized according to USFWS designated core areas that often cross over Forest boundaries.

Each Forest assembled information related to specific local populations (described below), as well as narratives related to baseline habitat conditions and needed remedies based on limiting factors. Multiple authors, time limitations and unevenness of available information have inevitably led to some differences in detail across units. Units such as the Beaverhead-Deerlodge, Bitterroot, and Lolo were very specific in addressing known stressors on FS land and estimated costs to remedy. Similarly, some FS units provided specific monitoring data (temperature, sediment, fish monitoring) that was used to better describe fish and habitat conditions or as rationale for overriding a baseline habitat condition call; these units include the Bitterroot, Lolo, Flathead, and Kootenai. Other units were much more general in identifying factors related to degraded habitat condition and potential remedies. For example, on the Kootenai and the Flathead, general arguments are made that off-forest issues currently drive bull trout population trends (e.g., dams and introduced competitive species). On the Flathead, a case is made that adfluvial populations are largely regulated by non-native fish interactions, specifically, lake trout in Flathead Lake. They also point to substantial past road removal and storage efforts that have occurred, largely owed to grizzly bear requirements that have reduced road effects to aquatic habitat. For these two examples less detail specific to National Forest lands is provided.

Although the Bureau of Land Management (BLM) is a party to the Level 1 consultation process, along with the FS and USFWS, they have had minimal participation in this BTCS development. First, they have addressed many opportunities to improve bull trout habitat on their lands since listing. Second, based on the fragmented nature of BLM ownership and minimal overlap with bull trout distribution in Western Montana, there was little utility in their involvement.

Reason for the Strategy The Conservation Strategy has been developed for several reasons. First, many bull trout core area populations continue to decline (USFWS: 2005a, 2005b, 2008). The current project-by-project approach to bull trout restoration has often been opportunistic and to date has not demonstrated noticeable population responses. Second, threats both on and off FS lands largely remain, with only minimal changes since the initial 1998 listing (USFWS, 2008). However, a few notable threat removals or improvements include the removal of Milltown Dam near the confluence of the Blackfoot and Upper Clark Fork River, the removal of the Emily A dam on the Clearwater River, and passage improvements at Thompson Falls dam on the Lower Clark Fork

River. Third, the FS is encouraged to develop such a strategy via Forest Plan direction as amended by INFISH, as well as under Section 7(a)(1) of the Endangered Species Act. Finally, the conservation strategy is expected to help Forests focus precious resources strategically to have the greatest possible influence on conditions that will support recovery. Each of these four reasons is discussed below in greater detail.

Bull trout core populations in western Montana continue to decline. The most recent bull trout 5 year status review (USFWS, 2008) supported maintaining the bull trout listing as threatened throughout its range noting that with few exceptions, core populations are not increasing and threats have not been removed. Exceptions occur where populations had reduced harvest and few or no other threats were present.

The 5 year status review also found habitat condition is still a substantial threat: "Along with the nonnative species threat, the present or threatened destruction, modification, or curtailment of bull trout habitat or range must be considered the most significant determinant of the status of bull trout core areas into the foreseeable future (USFWS, 2008, p. 39)."

USFWS managers further stated in their review, "…bull trout's reliance on the 4C's (i.e., clean, cold, complex, and connected habitats); fragmentation of the species' range by various threats at multiple scales, impacting the ability of the species to persist; invasive species such as lake trout that are a direct and increasing threat to many strong populations; anticipated ongoing and likely additional threats expected to create local extirpation in core areas; and low likelihood that existing threats will be eliminated and species status will improve. Evolutionarily, the bull trout uses multiple life history forms to reduce risk, but fragmentation of its habitat by dams, water diversions, and culverts has adversely affected this life history expression. Roads present an additional threat (USFWS, 2008, p. 42)."

The Strategy helps the Forest Service address Forest Plan Amendment requirements under INFISH. Specifically, the INFISH Biological Assessment/Biological Opinion and Forest Plan amendment did not advance a restoration strategy because of the anticipated short tenure of the document, yet INFISH clearly pointed out the importance and need for such a strategy. This Conservation Strategy helps address these articulated INFISH needs. In addition to INFISH, the Endangered Species Act, Section 7(a)(1) requires federal agencies to use their authorities to conserve species listed under the Act. Specifically, Section 7(a)(1) states: "All other Federal agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act." Although bull trout are the focus of the Conservation Strategy, the species is also keystone to healthy forest and aquatic systems. In addressing Section 7(a)(1), the Conservation Strategy can be used to promote the integration of other resource activities with bull trout restoration activities. In general, strong bull trout populations correspond well with strong populations of westslope cutthroat trout populations and other sensitive or listed species, both aquatic and terrestrial, and associated watershed conditions. Managing for strong bull trout populations and habitat in many cases will lead to better overall land management.

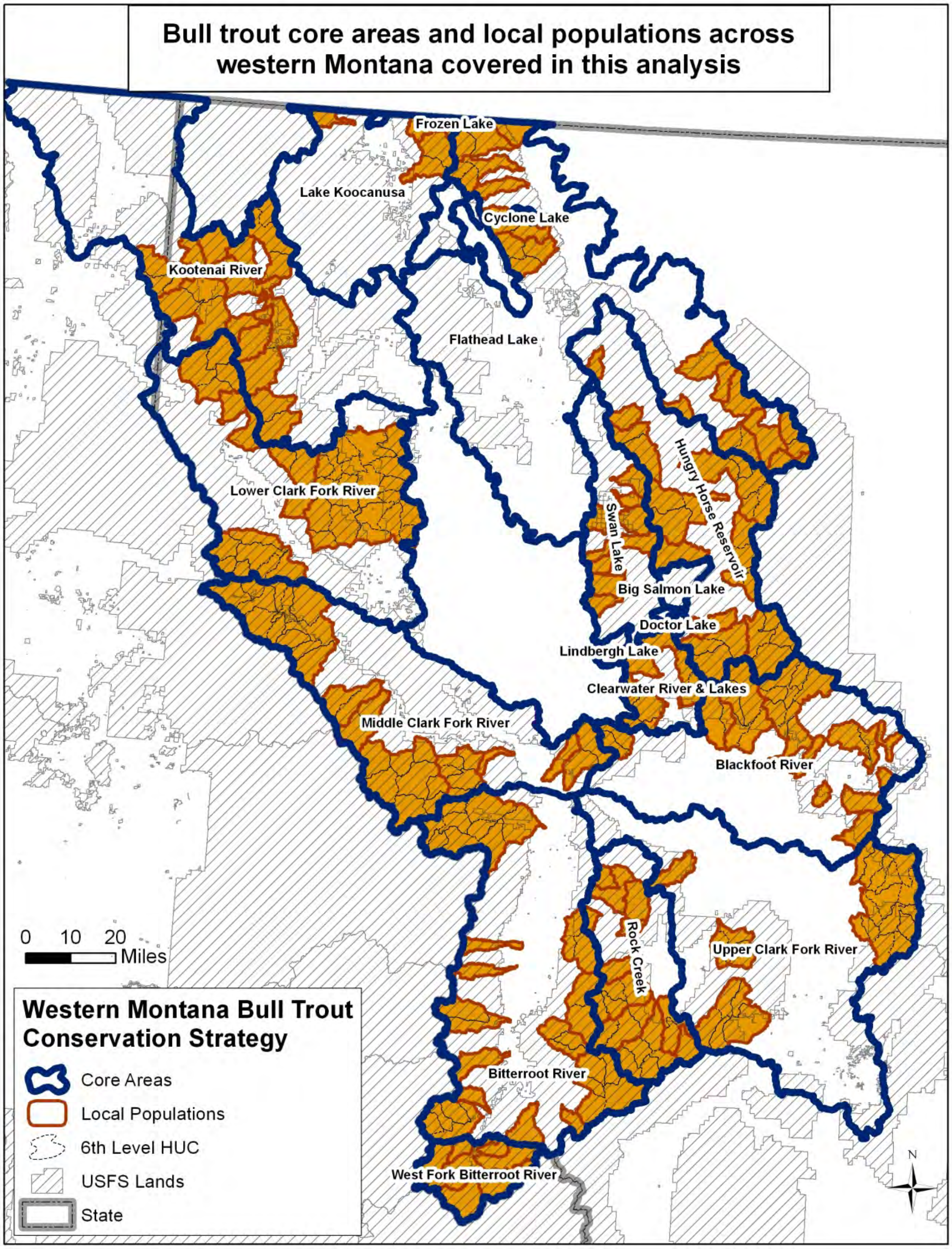
Finally, the strategy helps focus resources in the most important areas to maintain and improve stream habitat that important populations rely upon. The strategy has been developed to highlight bull trout conservation and recovery and is intended to bring aquatic species conservation front and center in a unit's project planning deliberations and considerations. This not only allows the most effective use of our conservation resources, it also allows the Region to demonstrate that funding is being used strategically in areas of conservation importance. The Strategy will also facilitate consultation on individual projects. It is anticipated to help direct emphasis on associated INFISH Standards and Guidelines and Riparian Management Objectives. Heightened focus resulting from this strategy will apply to both integrated and stand-alone fish and watershed restoration projects. The strategy forms the basis for an aquatic conservation approach during Forest Plan revisions.

Analysis process used in the strategy: A systematic approach was developed to provide this information for each local bull trout population, the habitat conditions that support and limit bull trout production, and opportunities to improve physical or biological conditions for this portion of the species. The BTCS draws on Forest-level experience, expertise, and information about Forest habitat conditions coupled with how these conditions interact with off-Forest factors to influence both habitat and population status.

The BTCS information is presented in a hierarchical format focused on two key biological building blocks of bull trout population structure. The finest level of biological discrimination is at the local population level. **Local populations** are considered the smallest group of fish presumed to reproductively interact on a consistent basis (Rieman and McIntyre, 1993). A local population may be represented and supported by a single headwater tributary (one 6th field Hydrologic Unit Code or HUC), or a complex of headwater tributaries (multiple 6th field HUCs) that provide spawning and rearing habitat, and sometimes portions of migratory corridors.

Networks of local populations are aggregated into **core areas**. Core areas can be defined as "complex" and "simple". A complex core area contains more than one local population, and a simple core area contains only one local population. A core area is assumed to provide habitat elements necessary for a group of populations to persist. Complex core Areas provide for replication of multiple local populations (typically 5-10) and are assumed large enough to incorporate genetic and phenotypic diversity but small enough to ensure that component local populations effectively connect. The Western Montana conservation planning area is comprised of 13 complex core areas that contain 108 local populations and 6 simple core areas with 6 associated local populations (Figure I-1). All simple core areas are typically made up of small lake systems, separated from other local populations. The BTCS analysis area of Western Montana makes up the majority of the USFWS's proposed draft Columbia Headwaters Recovery Unit; however, it does not specifically cover the Idaho portions of the draft Recovery Unit that include some tributaries to the Lake Pend Oreille Core Area, the Priest Lakes Core Area, and the Coeur d'Alene Lake Core Area.

Figure I-1. Bull trout core areas, local populations, and 6th field HUCs.



Main components of Conservation Strategy: Each core area is described in an introduction that discusses recent local population trends and key historical factors that may have influenced reduction or increase in current populations (see status and distribution of populations section below). Standard tabular and textual formats were developed for assessment, reporting on each bull trout local population and habitats that support them. This format is intended to facilitate analysis, interpretation, reporting consistency, and reader access.

The BTCS format is presented as a series of tables that 1) characterize a local population and 2) characterize habitat conditions by 6th field HUC or HUCs that support the local population. Status (Functioning Appropriately or **FA**, Functioning at Risk or **FAR**, and Functioning at Unacceptable Risk or **FUR**) of four key habitat indicators: temperature, sediment, pools and barriers is used to describe current habitat condition, or "baseline", for each HUC that supports a local bull trout population (see **Appendix 1** for description and conservation strategy tables and attributes).

A narrative is also sometimes provided with these ratings. If a GIS-derived indicator is proposed for change based on site specific information, the narrative discusses the rationale for the modification. The narrative also addresses key habitat or biological conditions in greater detail that GIS outputs may not capture. For instance, the narrative sometimes includes information on limiting factors when they are present: the influence of water diversion and dewatering, migratory corridor interruption created by impassable dams, predation effects, and interactions with aquatic invasive species. The narrative also provides context for key actions thought important to restoration of physical habitat locally on FS lands, or those physical and biological conditions and needs outside the direct purview of the FS. A more complete description of habitat baselines is addressed later in this introduction.

Recommendations from the strategy: Recommendations in the Western Montana BTCS generally incorporate tenets of conservation and restoration by recognizing not all Core Areas or local populations are of equal value for investment and attention. Emphasis for action or conservation is given to Core Areas, local populations and habitat networks that are currently the most extensive and diverse and have the potential to be expanded from (Williams et al. 2011) and provide the greatest potential for expression of meta-population dynamics (Rieman and McIntyre 1993). At the same time, the BTCS recognizes the need to acknowledge the lack of clear understanding of metapopulations dynamics at multiple temporal and spatial scales (Rieman and Dunham 2000) such that maintenance of some local populations considered isolated with little or no exchange or interactions with other populations in a network is also advanced in the strategy in order to maintain existing diversity. Also, the BTCS advances habitat improvements in places where bull trout currently do not occupy, or were they previously occupied, in an attempt to create a template for future occupancy that may result from disturbances, improved connectivity, and a changing environment (Rieman and Dunham 2000 and Whitesel et al. 2004).

The BTCS recognizes that not all landscape impairments affecting bull trout persistence equal direct impairments to bull trout or bull trout habitat, but that in "sum" they may impair and limit processes essential to maintenance and persistence of bull trout and their habitat (Williams et al. 2011). For instance, factors and processes that create habitat complexity and diversity often occur in headwaters above occupied habitats. Thus a watershed approach is needed to re-establish or maintain those factors thought to be essential to native fish persistence such as flow, sediment and coarse wood routing (Williams et al. 2011 and Reeves et al. 1995). This approach advanced in the BTCS is expected to contribute to a watershed network where habitat disturbance-creation process can be expressed in a way that facilitates native salmonid persistence.

Bull Trout Background and Ecology

The following discussion is taken from the USFWS Proposed Critical Habitat Rule for Bull Trout, (USFWS 2010).

Space for Individual and Population Growth and for Normal Behavior

Bull trout have more specific habitat requirements than most other salmonids (Rieman and McIntyre 1993). Habitat components that particularly influence their distribution and abundance include water temperature, cover, channel form and stability, spawning and rearing substrate conditions, and migratory corridors (Fraley and Shepard 1989, Goetz 1989, Watson and Hillman 1997).

The decline of bull trout is primarily due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices, impoundments, dams, water diversions, and the introduction of nonnative species (63 FR 31647; June 10, 1998; 64 FR 17112; April 8, 1999).

Bull trout exhibit a number of life-history strategies. Stream-resident bull trout complete their entire life cycle in the tributary streams where they spawn and rear. Most bull trout are migratory, spawning in tributary streams where juvenile fish usually rear from one to four years before migrating to either a larger river (fluvial) or lake (adfluvial) where they spend their adult life, returning to the tributary stream to spawn (Fraley and Shepard 1989). These migratory forms occur in areas where conditions allow for movement from upper watershed spawning streams to larger downstream waters that contain greater foraging opportunities (Dunham and Rieman 1999, p. 646). Resident and migratory forms may be found together, and either form can produce resident or migratory offspring (Rieman and McIntyre 1993).

The ability to migrate is important to the persistence of bull trout local populations (Rieman and McIntyre 1993, Gilpin 1997, Rieman and Clayton 1997, Rieman et al. 1997). Bull trout rely on migratory corridors to move from spawning and rearing habitats to foraging and overwintering habitats and back. Migratory bull trout become much larger than resident fish in the more productive waters of larger streams and lakes, leading to increased reproductive potential. Stream resident populations are associated with headwater streams in mountainous regions where cold water and velocity barriers are common. Typically, these streams are smaller and have higher gradients than those occupied by adfluvial and fluvial populations. In these headwater streams, resident bull trout are associated with deep pools and in-stream cover, and most stream-resident populations are dwarfed (McPhail and Baxter 1996). The use of migratory corridors by bull trout also results in increased dispersion, facilitating gene flow among local populations (interbreeding groups) when individuals from different local populations interbreed, stray, or return to non-natal streams. Also, local populations that have been extirpated by catastrophic events may become reestablished because of movements by bull trout through migratory corridors (Rieman and McIntyre 1993, MBTSG 1998).

Lakes and reservoirs also figure prominently in meeting the life-cycle requirements of bull trout. For adfluvial (migrating between lakes and rivers or streams) bull trout populations, lakes and reservoirs provide an important component of the core foraging, migration, and overwintering (FMO) habitat and are integral to maintaining the adfluvial life-history strategy that is commonly exhibited by bull trout. When juvenile bull trout emigrate downstream to a lake or reservoir from the spawning and rearing streams in its headwaters, they enter a more productive lentic (still or slow-moving water) environment that allows them to achieve rapid growth and energy storage.

Some reservoirs may have adversely affected bull trout, while others have provided benefits. For example, the basin of Hungry Horse Reservoir has functioned adequately for 50 years as a surrogate home for stranded Flathead Lake bull trout trapped upstream of the dam when it was completed. While this is an artificial impoundment, the habitat the reservoir provides and the presence of an enhanced prey base of native minnows, suckers, and whitefish within the reservoir sustain a large adfluvial bull trout population. Additionally, while barriers to migration are often viewed as a negative consequence of dams, the connectivity barrier at Hungry Horse Dam has served an important, albeit unintended, function in restricting the proliferation of nonnative *Salvelinus* species (including brook trout (*Salvelinus fontinalis*) and lake trout (*Salvelinus namaycush*)) from gaining access to the reservoir.

Food, Water, Air, Light, Minerals, or Other Nutritional or Physiological Requirements

Bull trout are opportunistic feeders that prey upon other organisms. Prey selection is primarily a function of size and life-history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macro-zooplankton, and small fish (Donald and Alger 1993, McPhail and Baxter 1996). Adult migratory bull trout feed almost exclusively on other fish (Rieman and McIntyre 1993). Habitats must provide the necessary aquatic and adjacent terrestrial conditions to harbor prey species in sufficient quantity and diversity to meet the physiological requirements necessary to maintain bull trout populations. An abundant food base, including a broad array of terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish, supports individual and population growth and allows for normal bull trout behavior.

Cover or Shelter

At all life stages, bull trout require complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Fraley and Shepard 1989, Watson and Hillman 1997). Juveniles and adults frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997). McPhail and Baxter (1996) reported that newly emerged fry are secretive and hide in gravel along stream edges and side channels. They also reported that juveniles are found mainly in pools but also in riffles and runs, maintain focal sites near the bottom, and are strongly associated with instream cover, particularly overhead cover such as woody debris or riparian vegetation. Bull trout have been observed overwintering in deep beaver ponds or pools containing large woody debris (Jakober 1995). Adult bull trout migrating to spawning areas have been recorded as staying two to four weeks at the mouths of spawning tributaries in deeper holes or near logs or cover debris (Fraley and Shepard 1989, Knotek 2011). Bull trout may also use lotic (swift-flowing water) environments seasonally for reasons that include use as cover. Riparian vegetation, large wood, variable stream channel morphology including deep pools, side-channels, undercut banks and substrates, and in some cases access to downstream environments provides cover and shelter, which supports individual and population growth and allows for normal bull trout behavior.

Sites for Breeding, Reproduction, or Rearing (or Development) of Offspring

Bull trout typically spawn from August to November during periods of decreasing water temperatures (Swanberg 1997). However, migratory forms are known to begin spawning migrations as early as April and to move upstream as much as 250 km (155 mi) to spawning areas (Fraley and Shepard 1989, Swanberg 1997). Watson and Hillman (1997) concluded watersheds must have specific physical characteristics to provide the necessary habitat requirements for bull trout spawning and rearing, and that the characteristics are not necessarily ubiquitous throughout the watersheds in which bull trout occur. The preferred spawning habitat of bull trout consists of low-gradient stream reaches with loose, clean gravel (Fraley and Shepard 1989).

Fraley and Shepard (1989) reported that initiation of spawning by bull trout in the Flathead River system appeared to be related largely to water temperature, with spawning initiated when water temperatures dropped below 10 Celsius (°C) (50 Fahrenheit (°F)). Goetz (1989) reported a temperature range from 4 to 10 C (39 to 50 F). Such areas often are associated with cold-water springs or groundwater upwelling (Rieman et al. 1997, Baxter et al.1999). Fraley and Shepard (1989) also found that groundwater influence and proximity to cover are important factors influencing spawning site selection. They reported the combination of relatively specific requirements resulted in a restricted spawning distribution in relation to available stream habitat.

Depending on water temperature, egg incubation is normally 100 to 145 days (Pratt 1992). Water temperatures of 1.2 to 5.4 C (34.2 to 41.7 F) have been reported for incubation, with an optimum (best embryo survivorship) temperature reported to be from 2 to 4 C (36 to 39 F) (Fraley and Shepard 1989, McPhail and Baxter 1996). Juveniles remain in the substrate after hatching, such that the time from egg deposition to emergence of fry can exceed 200 days. During the relatively long incubation period in the gravel, bull trout eggs are especially vulnerable to fine sediments and water quality degradation (Fraley and Shepard 1989). Increases in fine sediment appear to reduce egg survival and emergence (Pratt 1992). Juveniles are likely also affected. High juvenile densities have been reported in areas characterized by a diverse cobble substrate and a low percent of fine sediments (Shepard et al. 1984). Habitats with cold water temperature, appropriately-sized stream substrate, and stream substrate with a low level of fine material (i.e., less than 12 percent of fine substrate less than 0.85 millimeter (mm) (0.03 inch (in.)) in diameter) are necessary factors for egg incubation and juvenile rearing that supports individual and population growth (WFPB 1997).

Habitats Protected from Disturbance or Representative of the Historic, Geographical, and Ecological Distributions of the Species

There are some habitats throughout the range of the species that are well protected from anthropogenic disturbance and representative of ideal ecological conditions of the species. These areas mainly include wilderness, national parks, and other public lands specifically protected from most human disturbance (e.g., State parks), and often constitute bull trout "strongholds" with robust, well-distributed populations. Some populations outside of these areas may still be well protected for other reasons (e.g., conservation easements, Habitat Conservation Plans, Safe Harbor Agreements), but many other populations are threatened by human actions.

Water diversion and reservoir development can reduce stream flow, reduce the amount of water available in a stream channels, change water quality, and alter groundwater regimes. These changes may collectively impact habitat and passage for bull trout and can cause increases in water temperatures.

Impoundments may also increase nonnative species predation and competition, which can significantly affect bull trout populations. Some nonnative fish species that prey on bull trout include lake trout, walleye (*Sander vitreum*), northern pike (*Esox lucius*), smallmouth bass (*Micropterus dolomieu*), and brown trout (*Salmo trutta*). Brown trout or other introduced salmonids such as rainbow trout (*Onchorhynchus mykiss*), as well as smallmouth bass, northern pike, walleye, and other species also compete with bull trout for limited resources. Brook trout commonly hybridize with bull trout (Ratliff and Howell 1992, Leary *et al.* 1993).

The stability of stream channels and stream flows are important habitat characteristics for bull trout populations (Rieman and McIntyre 1993). The side channels, stream margins, and pools with suitable cover for bull trout are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in the fall may disrupt bull trout during the spawning period, and channel instability may decrease survival of eggs and young juveniles in the gravel during winter through spring (Fraley and Shepard 1989, Pratt 1992, Pratt and Huston 1993). Streams with a natural hydrograph (those with normal discharge variations over time as a response to seasonal precipitation), permanent water, and an absence of nonnative species are representative of the highest quality ecological habitat of the species.

Threats to the Species within the Columbia Headwaters Recovery Unit

The US Fish and Wildlife Service (USFWS) has completed a five part threats analysis compiled from the original listing, draft recovery plans, critical habitat findings, and template reviews completed for each core area. Standard threat categories under the ESA are: Factor A: The present or threatened destruction, modification, or curtailment of its habitat or range; Factor B: Overutilization for commercial, recreational, scientific or educational purposes; Factor C: Disease or predation; Factor D: The inadequacy of existing regulatory mechanisms; and Factor E: Other natural or manmade factors affecting its continued existence (Factor E includes introduced species). In their five year review, the USFWS stated, “Along with the nonnative species threat, the present or threatened destruction, modification, or curtailment of bull trout habitat or range must be considered the most significant determinant of the status of bull trout core areas into the foreseeable future (USFWS, 2008, p. 39.)”. In western Montana, multiple threats are present in many core areas. These threats are addressed in core area write-ups in the BTCS. In addition, natural environmental stochasticity (unpredictable spatiotemporal fluctuation in environmental conditions, e.g., fire and floods) has always been important in affecting bull trout populations and ecological processes, and these impacts continue in addition to those created by humans.

Factor A: Destruction or curtailment of habitat and Range

Bull trout habitat has changed considerably over the last 150 years as a result of human activities. Natural resource based economies have long been important in western Montana, and road construction, logging, grazing, mining, energy production, and transportation/energy corridors have significantly affected streams and rivers where bull trout once thrived.

Some spawning and rearing streams outside of protected areas are wider, shallower, contain fewer large deep pools, and are less complex than conditions in which bull trout evolved and adapted. In many instances, past management has removed large trees from the riparian corridor and from the stream itself. Large Woody Debris (LWD) may be most important for its ability to control the routing of sediment and water, to shape the formation and placing of pools, riffles, and cover, and to act as a substrate for biological activity (Swanson et al. 1982). Large wood often provides important areas for fish to find refuge during high water and provides hiding cover during low water periods. Existing or past management in riparian zones adjacent to these streams often has simplified vegetative communities with younger and smaller trees. Smaller trees are not as effective creating and sustaining channel complexity. As a result, some stream corridors have less shade and less woody debris. The resulting habitats are less diverse. In addition to riparian areas altered by past management, roads are considered a threat (USFSWS, 2008), especially those that cross or border streams (Gucinski et al, 2001).

Activities that manipulate vegetation near streams, even when streams buffers are applied, typically have some effect on stream temperature. Vegetation management can alter temperature by increasing solar input, altering groundwater inputs, and increasing wind speed and exposure to air advected from clearings (Moore et al, 2005). Humidity and air temperature over the stream is also modified. Resulting water temperatures are warmer in the summer and colder in the winter than they were historically (Poole and Berman, 2001). Where present, these conditions negatively impact bull trout populations (Dunham et al, 2003).

Habitat in larger rivers has also been altered. Fragmentation of habitat from dams, water withdrawals, diversion structures, culverts, thermal barriers, and other conditions continues to be a concern in the Upper Columbia (USFWS, 2008). In addition, upstream changes in tributaries such as altered sediment budgets will influence and alter sediment conditions downstream in larger rivers. Water withdrawals during low flow months can reduce available habitat and increase water temperature (Poole and Berman, 2001). Changes like those mentioned cumulatively have isolated previously wide-ranging populations into smaller functional units where access to necessary life-stage requirements is not always available. In addition, degraded larger rivers can affect the overall physiology of bull trout, and periodically result in situations that threaten the short-term persistence of individuals and populations that rely on them.

Factor B: Overutilization (Angling)

With expanding human populations during the 20th century, concentrations of large, spawning migratory bull trout have been susceptible to over-exploitation – both legal and illegal. With the listing of bull trout in 1998, most legal fishing for bull trout was discontinued. However, poaching of bull trout still occurs, and in populations with low numbers of returning migratory spawners, this can have significant effects (Knotek 2011). Recent information suggests that poaching may be a bigger threat than previously acknowledged (USFWS 2011 draft Bull Trout Recovery Plan). In addition, angler by-catch of bull trout (and some associated mortality) occurs in nearly all core areas as a byproduct of legal fishing for other species. Regulation of this is problematic in heavily fished waters like the mainstems of many rivers.

The efficacy of fishing regulations also relies on anglers knowing and understanding fishing regulations. Less than half of anglers in Montana can correctly identify bull trout (Schmetterling and Long 1999). Therefore, loss to populations from mis-identification likely is occurring. The loss of individual fish from small populations can significantly affect recovery efforts. Improving populations to levels that can withstand losses of a few individuals will help alleviate these issues.

Factor C: Disease or predation

The USFWS has been concerned about disease and predation since the original listing in 1998. “The status of these threats has not been changed since listing but remain threats to be monitored. Some predation threats are identified under Factor ‘E, other natural or manmade factors affecting its continued existence.’(USFWS, 2008)”

Factor D: The inadequacy of existing regulatory mechanisms

Bull trout were originally listed for their entire range. That range covered under the listing occurs in multiple western states with varying laws as related to activities near streams. In their 2008 status review, USFWS stated, “The implementation and effectiveness of regulatory mechanisms vary across the coterminous range. Some State Forest practices rules have been updated for the protection of threatened, endangered, and sensitive species“ In Montana, state laws have been enacted since the 1970’s that regulate activities near streams, lakes and wetlands.

Factor E: Other manmade or natural factors (Non-Native Species Interactions)

Non-native species interactions are considered to be one of the most important limiting factors along with destruction and curtailment of habitat (USFWS, 2008). Primary effects generally occur through interactions with introduced fish and include hybridization, competition and/or predation.

The main non-native fish species currently impacting bull trout populations in Western Montana are lake trout, brown trout, brook trout, and northern pike. Walleye, a fish eating predator, have been introduced into western Montana water bodies in recent years (USFWS, 2008).

Lake trout are prominent in large lakes and reservoirs such as Flathead Lake and Swan Lake, where they have significant effects on bull trout populations. In these systems, lake trout populations are probably the main limiting factor to bull trout recovery. They are even a threat to relatively strong populations in Koocanusa and Hungry Horse Reservoirs should they get introduced and established in these systems.

Another exotic species, the opossum shrimp (*Mysis diluviana),* has been linked to food chain interactions that led to drastic bull trout declines that have occurred in Flathead Lake. Relying on analysis of old reports and archive records from the Flathead Lake Biological Station, Ellis et al (2011) assert that the introduction of *Mysis* allowed the low density population of introduced lake trout to escape their recruitment bottleneck and flourish in recent decades. *Mysis* reside in deep water and provided a food source to rearing lake trout. Since *Mysis* introduction, food webs have changed, lake trout have flourished, kokanee have been extirpated and bull trout and westslope cutthroat numbers had rapidly declined. *Mysis*, in the absence of lake trout, do not appear to have negative impacts and may even benefit bull trout as an alternative food source.

Northern pike are now common in many western Montana lakes and river systems such as the Clearwater Lakes, Lower and Middle Clark Fork Rivers, and the Bitterroot River system, following illegal introductions that became prevalent beginning in the 1970's. Prior to the Milltown Dam removal, some native trout species were radio tagged and released above the dam. Some of these trout were documented being eaten by northern pike (Schmetterling, 2003). In systems like the Clark Fork, pike can exert a chronic downward pressure on bull trout populations through predation and competition. They are not likely the main limiting factor but rather one of several factors that limit populations.

Alterations to natural habitat conditions may also increase non-native species predation and competition, which can significantly affect bull trout populations (U.S. Fish and Wildlife Service 2010). Nonnative species have been introduced in many watersheds currently occupied by bull trout. Depending on local conditions, bull trout recovery may be either reduced or precluded by the presence of nonnative (and competitive) species. Brown trout or other introduced salmonids, such as rainbow trout (*Oncorhynchus mykiss*), as well as smallmouth bass, northern pike, walleye, and other species, also compete with bull trout for limited resources. Brook trout commonly hybridize with bull trout and are better adapted to compete with bull trout when they occur together, particularly in degraded habitat. Brook trout and bull trout hybrids are not uncommon where they are sympatric, and it usually is a cross of a female bull trout and a male brook trout, which is more costly, genetically, to the bull trout population. Presence of brook trout, lake trout, and potentially brown trout frequently lead to declines in abundance and distribution of bull trout (U.S. Fish and Wildlife Service 2010).

Overall

As just discussed, numerous threats are present and documented to occur in western Montana (USFWS, 2008). In many tributaries, multiple threats are acting upon, or have acted upon a single local population. When multiple threats are present, it is often difficult to attribute which threats have the greatest negative influence, which in turn makes restoration planning critical. To be successful at restoration, a clear goal must be developed that identifies the biological objectives, addresses underlying causes for habitat degradation, and recognizes social, economic and land use objectives that may limit actions (Beechie et al, 2008). The following sections of the introduction summarize additional information about status and distribution of populations, and habitat condition in core areas. Ultimately, the Conservation Strategy identifies which threats are most significant to each local population, thereby providing a blueprint for the Forest Service to pursue habitat restoration activities that contribute to the shared goals of bull trout habitat restoration and population recovery.

Status and Distribution of Populations within the Columbia Headwaters Recovery Unit

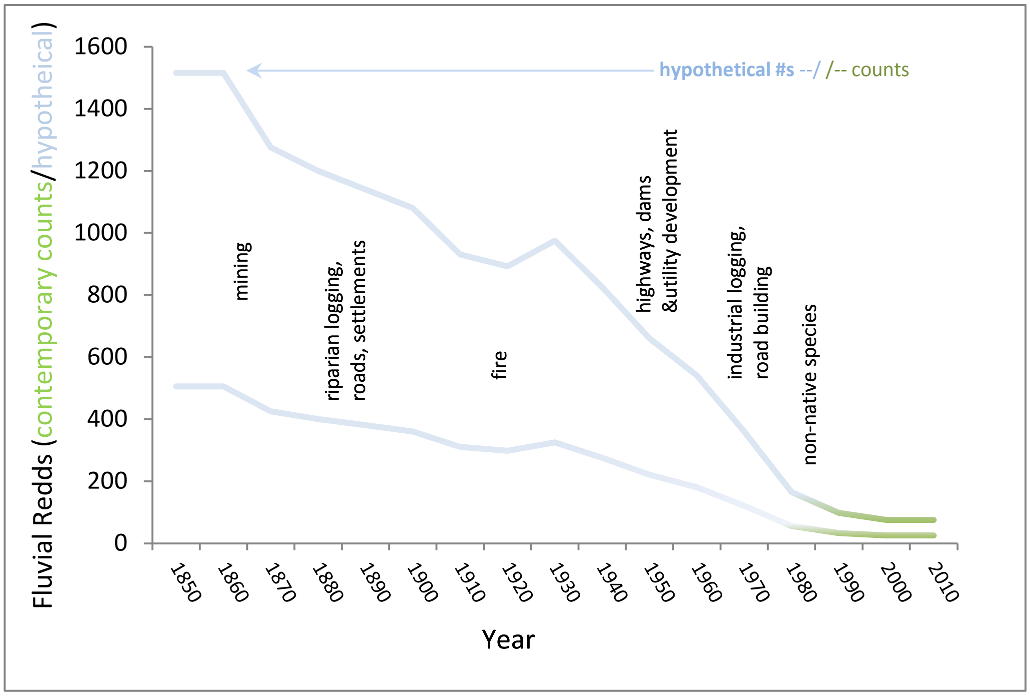
One of the issues encountered while developing this Conservation Strategy for bull trout was a lack of historical population data. Consequently, it was difficult to describe current population densities relative to what they were historically. There is little data to draw from prior to about 1950, as quantitative fisheries science was in its infancy, sampling methods were often simplistic, and few populations of any species were monitored consistently at the time. Some information exists in archived newspaper articles from as far back as the late 1800s, in anecdotal observations of local residents, and through the oral history of the Native American tribes in the area. Pratt and Huston (1993) conducted interviews of long-time residents of the Lower Clark Fork River providing perhaps the most complete summary of accounts from 1920 through 1950. Most of this information is qualitative, but it generally describes native fish numbers, including bull trout, as being much greater than they are currently throughout virtually all of the streams and rivers within the conservation area.

Developing Estimates of Historic Migratory Bull Trout Densities

It is believed that historic distribution and abundance of bull trout have been greatly reduced across much of the range (USDI Fish and Wildlife Service 1998). However, in the absence of numerical fish counts that describe historic bull trout populations, we developed a protocol to estimate historic population numbers of migratory bull trout. The protocol was based on assumptions to arrive at the estimated number of bull trout redds (egg nests built in the gravel by spawning individuals) that each local population or complex of streams within a local population could support in the absence of angling, habitat degradation, and non-native species interactions. Once estimated base population levels were developed, we reviewed known historical events by core area in an attempt to chronologically describe actions that likely impacted bull trout populations. The graphs, especially the early record, were theoretical reconstructions and meant to illustrate likely population trajectory and relative fluctuations over 150 years in time. Following the development of the graph of estimated historical bull trout numbers for each core area, local biologists familiar with those areas used available information as a consistency check to see if the numbers they came up with seemed reasonable. Theoretical reconstruction is unable to fully capture historic variation and patterns of occupancy (Rieman and McIntyre 1993 and Whitesel et al. 2003) that would have resulted from natural patterns of habitat variability and suitability, in part, moderated by past disturbances.

After review, we could not reach consensus regarding the speculative nature of the historical estimates. Estimates of historic fluvial population and trends through time appeared to follow a general pattern, but many of the adfluvial populations did not fit this general pattern. In some cases, adfluvial populations may be higher than they were historically, and in some cases they adfluvial populations didn’t exist in 1850 (prior to dam construction) and therefore accurate reconstructions were difficult. All of the Core Area-specific historical graphs were therefore omitted, and a more generic version of potential population trends over time was developed **for fluvial populations only** (Figure I-2).

Figure I-2. This graph shows conceptual high and low estimates (light blue lines) for what historic bull trout populations may have generally been like in individual fluvial Core Areas across Western Montana. Major watershed developments and changes are shown approximately when they may have affected populations. The intent of historic re-construction is not to estimate absolute numbers of bull trout redds for a given Core Area, or to establish recovery targets, rather to provide context for recent fluvial redd counts (green lines), and in this example are from index reaches for the Middle Clark Fork Core Area.



USFS and USFWS Fisheries Biologists estimate that most fluvial (river dwelling) bull trout populations are less than 10 percent of their historic levels; however bounds of certainty cannot be placed on these estimated reductions. Significant mining, road construction, logging, grazing, and angling impacts over the last 150 years have resulted in systemic changes to habitat that has caused populations to decline. Non-native fish species and climate changes have more recently created additional impacts on populations. While not all populations have responded similarly to these impacts, the sustained decline is concerning, especially with such low numbers currently present in many areas. Contrary to fluvial populations, some adfluvial (reservoir/lake dwelling) populations appear to be maintaining or even increasing (Koocanusa, Hungry Horse). Adfluvial populations have greater resources available to them, but can be exposed to other threats from non-native species, so their long-term security is uncertain.

It is important to re-emphasize that this graph is not intended to display *actual* bull trout redd densities for the time periods shown, but rather to give an approximate relative comparison of how much bull trout populations may have decreased from historic levels, and when the activities that are thought to have affected habitat were likely to have occurred. By showing these changes, we are able to describe the historical context for the current population levels and suggest temporal population responses.

In the absence of estimates and graphs by specific Core Area, some specific cases bear further discussion. For example, the Upper Clark Fork River core area current population is believed to be only a small fraction of what it was historically, while those in the Swan Lake core area are thought to be not far below their historic levels. Bull trout populations in the Upper Clark Fork are believed to have been depressed for nearly a century and are continuing to decline, while those in the Swan

Lake core area were actually lowest in the 1980's and (until recent lake trout invasion) had rebounded in the last 30 years. In the overall context of the bull trout conservation strategy, this type of information is important in describing the current status of populations in each core area. It is also important in determining which populations have more (or less) likelihood of contributing toward recovery and where resources can be most beneficially applied.

Several other key points are also important to consider. First, of the 13 complex Core Areas in western Montana, only four have significant numbers of bull trout remaining (Hungry Horse, Swan Lake, Flathead Lake, and Lake Koocanusa – most of the spawning in the Lake Koocanusa core area occurs in Canada). The Flathead Lake and Swan Lake populations are currently at high risk due to the presence of lake trout, although efforts are underway to reduce the lake trout populations. For most of the fluvial core populations, abundance levels are currently believed to be less than 10 percent of estimated historic numbers. Only five of the 13 core areas have more than 100 redds per year on average. These numbers suggest that restoration and conservation actions are necessary at a broad scale. Further, low numbers underscore the need to identify priority actions and strategically implement them as quickly as possible to help prevent further declines.

Second, all of the populations with significant numbers of fish remaining are in lakes or reservoirs. This is likely because these larger water bodies provide more productive and resilient habitats and inherently support larger populations that are less susceptible to environmental and demographic changes in the short-term. All of the river-dependent or fluvial populations are at unsustainably low levels. The total number of migratory bull trout redds in the entire Clark Fork River basin (within Western Montana) is less than 500 annually. This includes all of the major river systems (Clark Fork, Blackfoot, Bitterroot, Rock Creek, etc.) that historically provided the habitat that supported spawning and rearing for all bull trout upstream of Lake Pend Oreille.

The Hungry Horse Reservoir, West Fork Bitterroot River, and Lake Koocanusa core areas are special cases. The historic conditions for the larger systems of which they are a part contained these numbers in their estimates (i.e., Flathead Lake included the South Fork Flathead River upstream of Hungry Horse Dam; Bitterroot River included the West Fork Bitterroot River upstream of Painted Rocks Dam, and the Kootenai River included the area within the U.S. upstream of Libby Dam). These dams isolated the upstream populations and created new core areas.

Finally, it is important to remember that the discussion only includes the **remaining** populations as some local populations have been lost. Therefore total population declines within the area of the Conservation Strategy are likely greater than what is discussed. The redds in current Core Areas are the best of what's left – there are additional rivers and streams that historically were occupied by bull trout that are now not considered suitable habitat (e.g., Little Blackfoot River, Ninemile Creek, Saint Regis River).

The following map (Figure I-3) shows what we consider to be current bull trout strongholds in the Middle Clark Fork River Core Area. This figure is provided as an example of how core populations continue to fragment in Clark Fork and Bitterroot core areas. We identify **bull trout strongholds** as drainages (i.e., local populations) where countable numbers of fluvial spawners remain. We consider populations to be **remnant** when primarily only smaller resident bull trout are spawning and migratory bull trout are no longer present. **Absent** populations are those drainages where bull trout existed 15 – 30 years ago, but are no longer found there according to recent surveys. Populations in the Flathead and Kootenai River systems, along with the Rock Creek Core Area have maintained distributions more representative of historic patterns. Blackfoot/Clearwater River population distributions appear to be generally stable at the current time, with some historically occupied areas now unoccupied.

Figure I-3. Current bull trout population status in the Middle Clark Fork River Core Area. This map also shows road densities corresponding to population status.

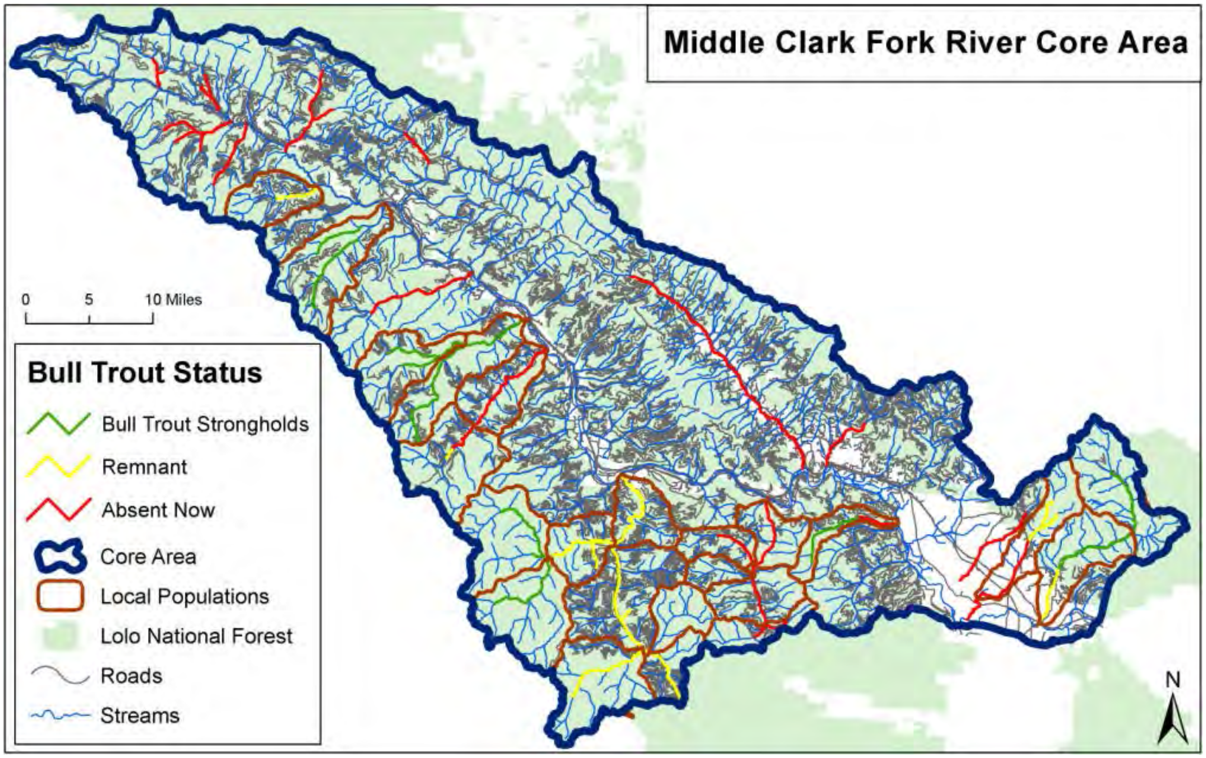


Figure I-3 displays several streams that have supported documented local bull trout populations. In the last 30 years, the status for many of these streams has changed to **remnant** or **absent** (Riggers et al 1997, MBTSG, MT FWP and FS unpublished data). Restoration efforts that have occurred in this core area have not offset local population rapid declines. This pattern – small populations disappearing at a rapid rate – is also occurring in locations that were not identified as bull trout Core Areas or Local Populations. The effects of losing these smaller populations are not completely known. At a minimum, losing a portion of a local population reduces available genetic diversity and could mean that options to recover the species are limited. Losing small local bull trout populations in less suitable habitat could have another consequence; bull trout residing in less favorable habitat may have the potential to maximize within-species biodiversity, retain important evolutionary legacies, and supply important genetics for future adaptation under changing climate scenarios (Haak et al 2010 and Channell and Lomolino 2000). Therefore losing these local populations could make the remaining populations in the core area less resilient.

There is one more important condition displayed by Figure I-3; the Middle Clark Fork core area is extensively roaded in most of the headwater spawning reaches. As discussed previously in the Threats section, road interactions and activities associated with roads are a high concern. Road densities have been demonstrated as an effective proxy for departure from historic condition, the state of current condition, and ostensibly past management (Rieman et al, 2000). The correlation of higher road densities with fewer bull trout is repeated throughout the planning area, the Columbia River Basin, and other areas where native fisheries and land management issues overlap (Ripley et al, 2005, UCRB 1997, Riggers et al, 1997). For this core area, extensive past forest management has occurred, as well as channel manipulation, construction of dams beginning in the early 20th century, and many other human activities. **Ultimately, the geographic pattern of population fragmentation shown in this graphic illustrates the need for ever more strategic planning of focused restoration**.

Model Development and Establishing the Environmental Baseline

A key component of the Conservation Strategy is the environmental baseline. Baselines were originally established to facilitate the consultation process soon after the bull trout was listed in 1998. The baseline assessment rates the state and/or condition of a suite of 18 habitat indicators or watershed processes thought to be linked to bull trout and their needs for persistence (USDI Fish and Wildlife Service 1998). The objective of rating the indicators was to arrive at a determination of the potential effect from management activities and disturbance events on bull trout habitat, and ultimately, to contribute understanding to bull trout population status and risk. The matrix of habitat indicators is divided into six overall diagnostics/pathways plus an integrated diagnostic. Following are the six habitat pathways that contain one or more of the 18 “diagnostic indicators”.

Pathway 1= Water Quality [Indicators =1) **temperature**, 2) **sediment**, 3) chemical contamination and nutrients];

Pathway 2= Habitat Access [Indicator=4) **physical barriers**];

Pathway 3= Habitat Elements [Indicators= 5) substrate, 6) wood, 7) **pools**, 8) large pools, 9) off-channel habitat, 10) refugia];

Pathway 4= Channel Condition and Dynamics [Indicators= 11) width:depth ratio, 12) stream-bank condition, 13) floodplain connectivity];

Pathway 5= Flow/Hydrology [Indicators= 14) change in peak and base flows, 15) increase in drainage network];

Pathway 6= Watershed Conditions [Indicators= 15) road density, 16) disturbance history, 17) riparian conservation areas, 18) disturbance regimes; plus an Integration of habitat indicators].

Each of the 18 indicators is rated at the 6^{th} field HUC scale and given one of the following ratings: **FA** (functioning appropriately), **FAR** (functioning at risk), and **FUR** (functioning at unacceptable risk) based on data, professional judgment, or a combination of the two. There are no bright lines for specific diagnostic indicator classification. Guidance by the USDI Fish and Wildlife Service (1998) provides the following description is provided: “In concept, indicators in a watershed are “FA” when they maintain strong and significant populations that are interconnected and promote recovery of a proposed or listed species or its critical habitat to a status that will provide self-sustaining and self-regulating populations. When the indicators are “FAR”, they provide for persistence of the species but in more isolated populations and may not promote recovery of a proposed or listed species or its habitat without active or passive restoration effort. “FUR” suggests the proposed or listed species continues to be absent from historical habitat, or is rare or being maintained at a low population level; although the habitat may maintain the species at this low persistence level, active restoration is needed to begin recovery of the species. Example ranges for habitat indicators are provided ((USDI Fish and Wildlife Service 1998) to help classify each of the 18 diagnostic habitat indicators in a given HUC as FA, FAR, FUR.

An update to the original 1998 baselines in western Montana was pursued by the Level One team. The intent was to create a more automated starting point for determining FA, FAR, FUR determinations for each diagnostic habitat indicator in the baseline. This was done for each 6^{th} field HUC associated with a bull trout local population in the 13 complex and six simple core areas. This Conservation Strategy uses four of the baseline habitat indicators (temperature, barriers, pools and fine sediment) from the suite of 18 diagnostic habitat indicators (see above) as a starting point to gage potential need for habitat change in any given 6^{th} field HUC. These four indicators are also used to generate an overall integrated status call for each HUC. In many cases the Conservation Strategy identifies watershed-specific conditions and impairments, and in some cases specific actions or suites of actions, aimed at improving the conditions of one or more of the four primary habitat indicators listed above.

For the baseline update, a suite of standard GIS data layers were selected as proxies. Rule-sets were developed by the Level 1 team that relied on surrogate data-derived indices to represent the habitat components of the Framework indicators. These were then combined to produce watershed level data and baseline condition determinations of FA, FAR, or FUR for each 6th level HUC, by Forest. More information on this GIS information used and rule-sets is presented in a separate **Appendix 2**. It is understood that this baseline approach has strengths and limitations. The model may be adjusted over time based on peer review. Baseline outputs may also be modified (i.e. overridden) or updated by biologists using field data that actually characterize stream and riparian conditions (discussed below).

Strengths of the Baseline Model

Strengths of the standardized baselines include the ability to rate watersheds using a consistent approach. Baselines for a broad landscape can be updated in batch with any overridden data and rationale being maintained through all future update efforts. Tracking baseline condition changes by 6th field HUC can be easily done by FS biologists or USFWS staff to track changes in conditions over time at the 6th field HUC level, at the local population scale, up to the Core Area and beyond (draft Recovery Unit). Rationale for overrides that are based on data and observations can be noted and maintained in the baseline spreadsheets for those who replace existing biologists. The baselines are intended to be a standard starting place from which 6th field HUC-specific modifications can be made based on data that are available or that are collected in preparation for a project in that location. This approach is viewed as an efficient starting point that can be updated on project by project basis or as new data come are generated. This is similar the Forest Service's approach to travel management and minimum roads analysis (US Forest Service, March 29, 2012 Letter from Deputy Chief of the National Forest System, Leslie Weldon). In a time of decreasing budgets, reduced staffing, increased target accomplishment expectation, and less ability to stay broadly current with stream and fish monitoring, this approach presents a solution for moving forward.

Limitations of the Baseline Model

First, GIS data are the main source of information used to produce habitat baselines. Outputs or "status calls" for each baseline indicator are generally surrogates for instream and riparian conditions. Baseline model results rely especially heavy on different types of road data (road stream crossings, total road density, roads within a different distances from a stream course), which depending on other interacting and interrelated factors may or may not have the same disturbance outcome to a given stream or riparian area (see discussion above in the threats and status and distribution sections). This is a challenge faced by other large scale Forest Service initiatives such as the Watershed Condition Framework, and its associated watershed condition ratings.

Secondly, updated baselines may not fully capture and integrate environmental conditions on non-Forest Service lands within mixed-jurisdictional 6th field HUCs. This is a greater concern in HUCs that are dominated by non-Forest Service ownership because the magnitude of Forest Service influence typically is reduced and concentrated in the upper watersheds. Therefore, in watersheds that are not predominantly managed by the Forest Service, the baseline conditions described through this analysis should only be attributed to the Forest Service- owned parcels. The NRCS has used a similar baseline protocol to characterize baseline conditions in 6th field HUCs with 50% or greater non-

Federal ownership. Using the NRCS baselines for private land to complement Forest Service baseline information in areas of large mixed ownership may help characterize bull trout habitat conditions across ownerships.

Lastly, the baseline status calls (FA, FAR, and FUR) for each of the 18 diagnostic indicators should only be seen as starting points for refinement. Refinement is intended to occur through use of data when available (Pacfish and Infish Biological Opinion (PIBO), forest-monitoring, or other). Also, units can use project-level assessments to collect additional watershed, stream and management data that can either confirm or support the automated baseline calls. As new analytical tools become available to better characterize road-specific influences on channel and aquatic habitat effects and mechanisms for these affects, baseline characterization and updates will continue to be made. Presently the Region is working with US Geological Survey scientists to clarify relationships between PIBO data collected from numerous streams in western Montana to management signals. This may also contribute to baseline refinement. And as noted above, the Region is interested in peer review and feedback on the baseline model and its application.

Overriding GIS Data

In developing a GIS-based baseline, the Western Montana Level 1 team recognized that there will be locally derived data that better characterize watershed baseline conditions in some situations. Therefore, the baseline update process includes to the ability to adjust the GIS-derived indicators to incorporate stream and riparian data. In general, the baseline data will not be changed unless there is a body of evidence suggesting that the GIS-based indicator is not representative. Generally, to change a baseline indicator, data must be both spatially and temporally robust enough to justify a baseline call override. Data that may be available to justify an override will likely come from one of two sources – either PIBO data or Forest-level monitoring data. Walk through qualitative data generally will not override baseline calls, but can be used to stimulate effort to collect more field data. Because the model is intentionally conservative, most overrides will be based on data that indicate status is more favorable than the model indicated (e.g., change FUR to FAR).

PIBO data are one of the most robust and consistent datasets for stream channel condition and water temperature found across the Interior Columbia River Basin. PIBO sites are located with the intention of integrating upstream conditions and processes, at roughly the 6th level HUC scale. The limitation of PIBO data is that it is not collected everywhere. PIBO sites have recently revisited for a second round of repeat measures. This will begin to help characterize temporal variability in stream channel condition.

Forest-level monitoring data used to update baseline calls will be temporally and spatially robust enough that they characterize the overall HUC condition or suite of indicator conditions. This will include using proven survey methods similar to PIBO to measure metrics such as pool quantity or quality, fine sediment, stream temperature, or fish passage surveys (or in the case of barriers surveys not captured in existing regional databases).

Biologists will document and track baseline overrides and rationale. This will include notes in the baseline spreadsheet to indicate an override to either a specific indicator state or an integrated call. A comment inserted at the point of change will capture the rationale for the change and include: Name of modifier, date modified, and justification for the change. Justification will include PIBO “plus” other info, or other Forest data such as extensive temperature monitoring or other spatially explicit stream channel survey data noting the method.

Updates to the new Baselines

Annual updates of the baselines in Western Montana will occur as a component in this Conservation Strategy. This will be facilitated by the Regional Office with advance data calls and GIS support. Also, if science or other information indicates that a given indicator threshold need to be modified, it can be achieved quickly and universally via modification of the baseline database.

Current Status of Habitat within the Columbia Headwaters Recovery Unit on National Forest Lands

Results of the 2010 Baseline Assessment

The following series of graphs (Figure I-4) show updated baseline calls for the four primary habitat indicators (barriers, sediment, pools, and temperature) on Forest Service lands, as well as an overall call integrating these four indicators (integrated) for each ore area within the Conservation Strategy. In most cases, the overall average percentage of each indicator in a given category (FA, FAR, FUR) does not change significantly between the core area and the Forest unit that manages the majority of the core area. The exception is in watersheds where a core area spans two or more Forests. The Lolo NF has the most instances where this occurs. Information on habitat conditions in a spanning core area separated out by Forest can be found under the individual forest section of the Conservation Strategy.

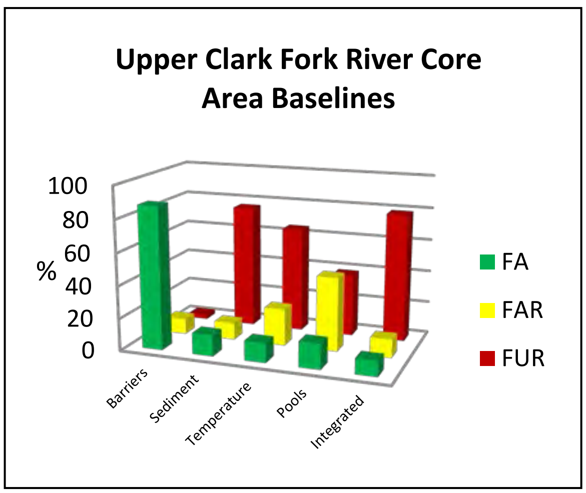
The baseline graphs below demonstrate several key points. First, the integrated column shown for all of the core areas (with the exception of the Hungry Horse Reservoir Core Area) have at least 50% of the core area rated as Functioning at Unacceptable Risk (FUR). While there are areas as large as an entire 6th level HUC that provide high quality habitat, the overall indication of conditions shown here is bull trout are clearly threatened by habitat limitations across most of their range in western Montana.

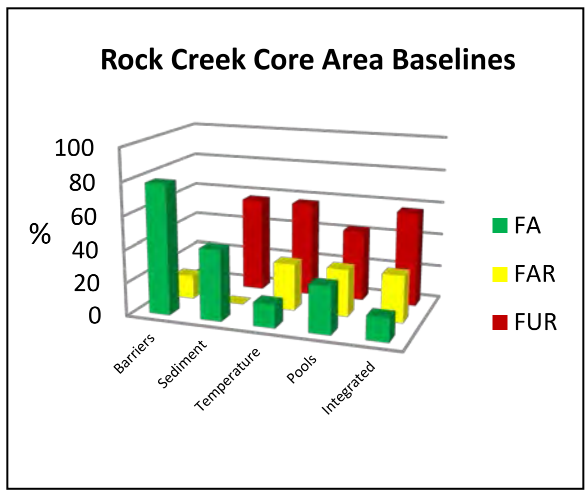
The second key point illustrated by the graphs is that the barrier indicator shows that fish access in all core areas (with the exception of the Middle Clark Fork River) is generally good. Again, there are important bull trout habitats – some of which have significant impacts on populations – that are currently blocked by dams, diversions, culverts, etc., but overall more HUCs show access in the Functioning Appropriately (FA) category than in the other two condition categories. Much of this can be attributed to the focus on restoring connectivity that has occurred on Forest Service managed landscapes over the last decade. We expect additional improvement in the remediation of physical barriers in the future because impairments are readily observable, technologically is straight-forward, and public sentiment is generally in support of these passage projects.

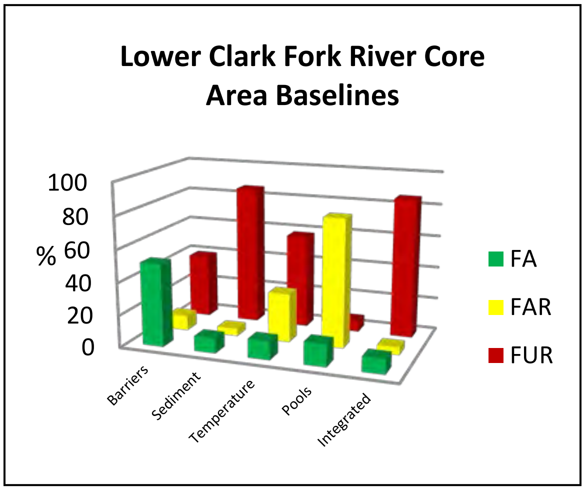
The third key point shown in the graphs is that the three remaining habitat indicators (sediment, temperature, and pools) are often in fair or poor (FAR and FUR) condition in most core areas (except Hungry Horse Reservoir, which is primarily Wilderness). Baseline calls for these indicators are influenced heavily by riparian conditions, which in the baseline model are influenced heavily by roads. In essence, the higher the amount of roads near streams, the lower the call for these indicators. In the field, this is often what is observed, although there are obviously exceptions. Addressing these indicators and strategically increasing the proportion of Functioning Appropriately (FA) calls will require an aggressive and focused approach. Importantly, however, disturbance ecology and process (fire, landslides, etc.) fundamental to habitat creation will vary over space and time (Al-Chokhachy et al. 2010 and Reeves et al. 1995) in both managed and in minimally managed systems. Therefore habitat condition is expected to vary over time and space and should not be expected to be static.

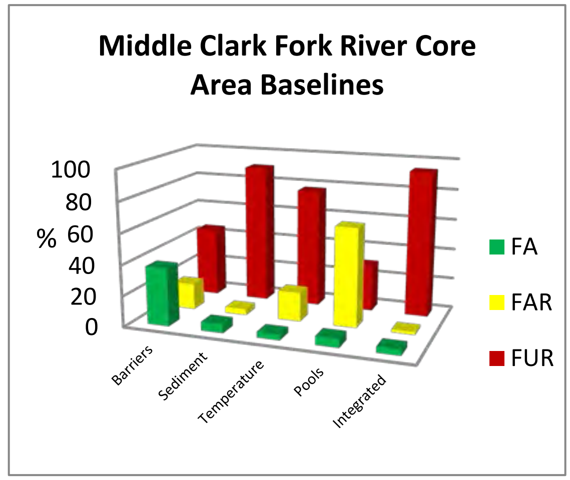
Finally, the last important point shown below is that there is considerable variability in habitat conditions between core areas. Bull trout habitat in the Upper, Middle, and Lower Clark Fork core areas, the Clearwater River core area, and the Kootenai River and Lake Koocanusa core areas is generally poor; habitat in the Blackfoot, Bitterroot, Flathead Lake, and Rock Creek Core Areas is fair; and habitat in the West Fork Bitterroot and Hungry Horse Reservoir Core Areas is generally fair to good. (Habitat in the Swan Lake Core Area shows up rated poor in the baseline assessment for reasons previously mentioned. However, local biologists believe that this does not accurately represent on the ground conditions in some cases and will be pursuing changes in future updates). Similar variability exists within each of the core areas, and this is analyzed and described in detail by individual 6th level HUC in following sections of this Conservation Strategy. The variability within HUCs along with patches of functioning habitat still present has helped many of the local bull trout populations continue to persist. Bull trout life history attributes, as with all of the salmonids, have evolved to make the species relatively adaptable to short-term changing habitat conditions so long as certain key elements (Cold, Clean, Complex and Connected) are maintained. They are highly mobile, and inherently adapted to seek out available habitats that provide suitable conditions to meet their physiological needs. However, the current amount of functioning habitat, and fragmented nature of functioning habitat patches available to this wide-ranging species appears to be insufficient to sustain robust populations. Therefore there is a need to improve conditions and increase connectivity between patches at a broader scale (Williams et al. 2011) thereby supporting greater biological resilience to a mosaic of habitat in varying degrees of disturbance (Reeves et al. 1995).

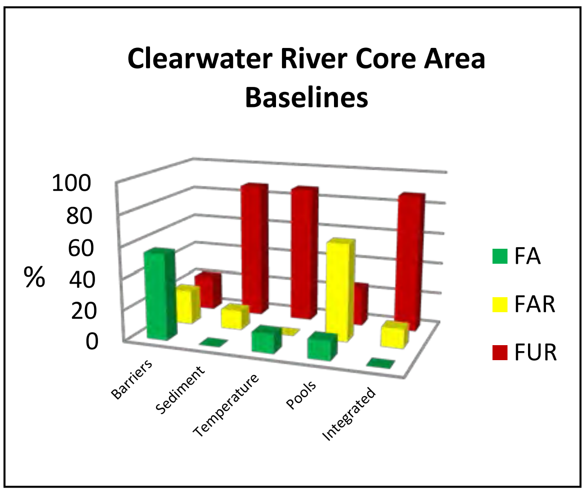
Figure I-4. Individual graphs for each Core Area showing Functional Condition Classes (FA = Functioning Appropriately; FAR = Functioning At Risk; FUR = Functioning at Unacceptable Risk) for the four primary habitat indicators (barriers, sediment, temperature, and pools) and the integrated call from the 2010 Baseline update.

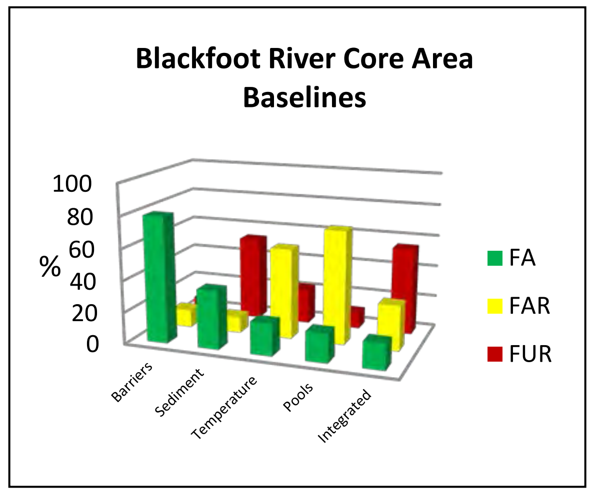


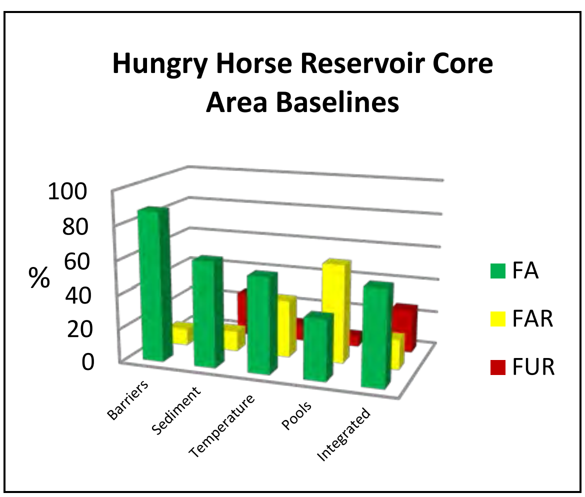


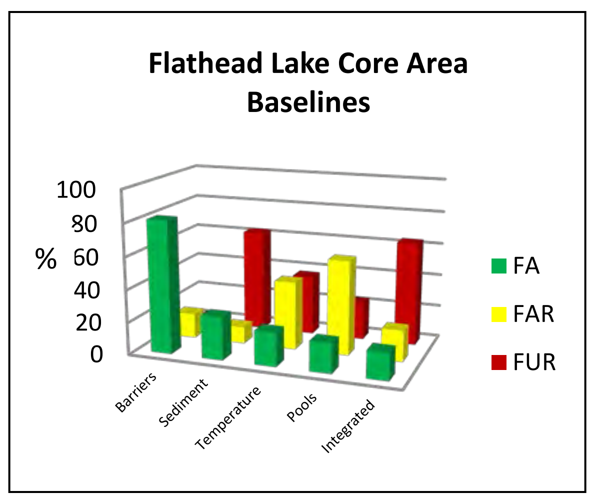

Lower Clark Fork River Core
Area Baselines
100
80
% 60
40
20
0
Barriers
Sediment
Temperature
Pools
Integrated
FA
FAR
FUR

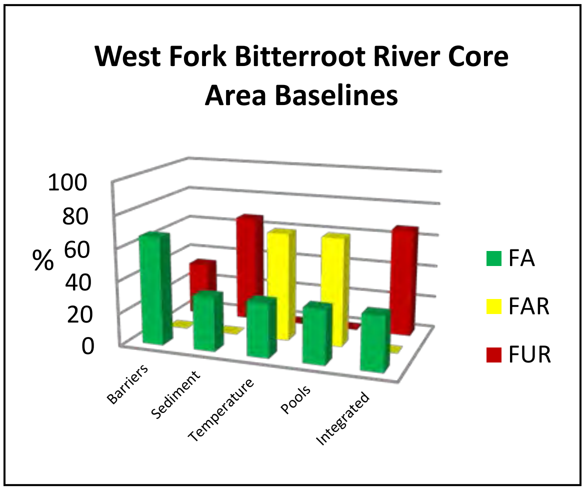

Middle Clark Fork River Core
Area Baselines
100
80
% 60
40
20
0
Barriers
Sediment
Temperature
Pools
Integrated
FA
FAR
FUR

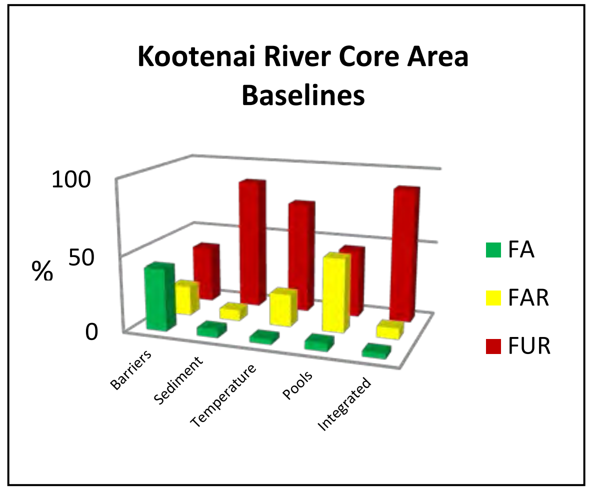

Clearwater River Core Area
Baselines
100
80
60
% 40
20
0
Barriers
Sediment
Temperature
Pools
Integrated
FA
FAR
FUR

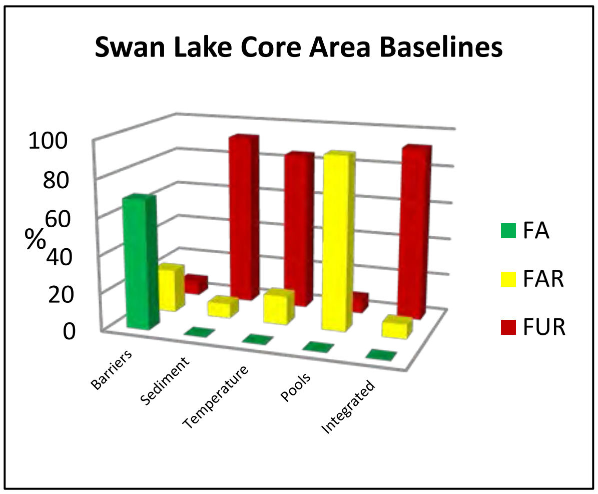

Blackfoot River Core Area
Baselines
100
80
% 60
40
20
0
Barriers
Sediment
Temperature
Pools
Integrated
FA
FAR
FUR

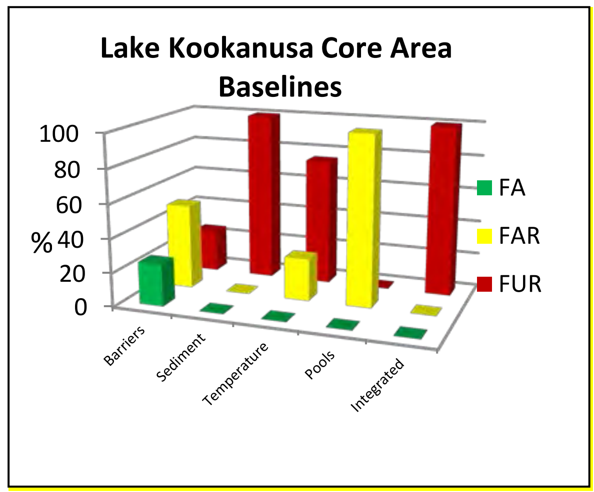

Hungry Horse Reservoir Core
Area Baselines
100
80
% 60
40
20
0
Barriers
Sediment
Temperature
Pools
Integrated
FA
FAR
FUR

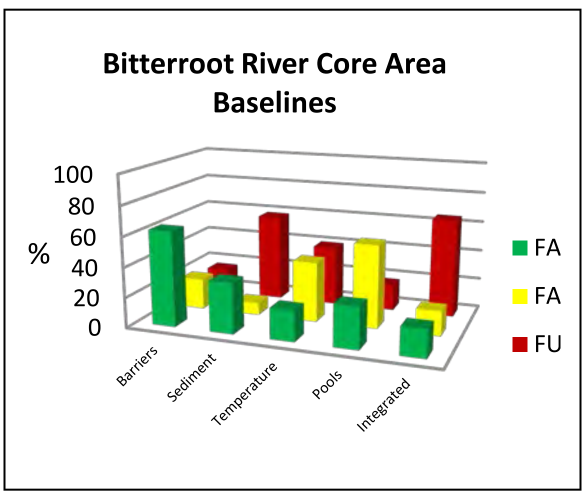

Flathead Lake Core Area
Baselines
100
80
% 60
40
20
0
Barriers
Sediment
Temperature
Pools
Integrated
FA
FAR
FUR











Summary of Indicators for all Core Areas in western Montana

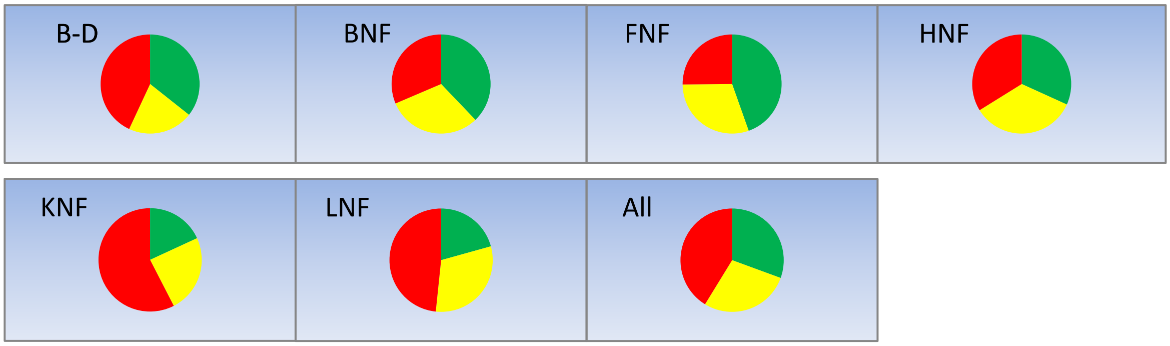
A total of 731 HUCs from all western Montana bull trout core areas were analyzed across six National Forests in western Montana. The following table shows the baseline calls, by HUC, in each category by Forest.

Table I-1. Summary of indicator status call (FA, FAR, FUR) for barriers, sediment, temperature, pools indicators and the integrated call.

Forest	*Call*	*Barriers*	*Sediment*	*Temperature*	*Pool Freq/Qual*	*Integrated*
B-D	FA	104	22	15	23	12
	FAR	9	13	27	49	16
	FUR	2	80	73	43	87
BNF	FA	47	26	19	20	18
	FAR	15	3	30	43	10
	FUR	12	45	25	11	46
FNF	FA	149	63	52	41	47
	FAR	22	20	68	97	35
	FUR	0	88	51	33	89
HNF	FA	36	10	7	8	5
	FAR	9	6	24	27	11
	FUR	3	32	17	13	32
KNF	FA	70	10	9	14	7
	FAR	20	9	34	75	8
	FUR	52	123	99	53	127
LNF	FA	96	23	14	18	11
	FAR	30	11	52	133	17
	FUR	61	147	115	30	153
All	FA	502	154	116	124	100
	FAR	105	62	235	424	97
	FUR	130	515	380	183	534

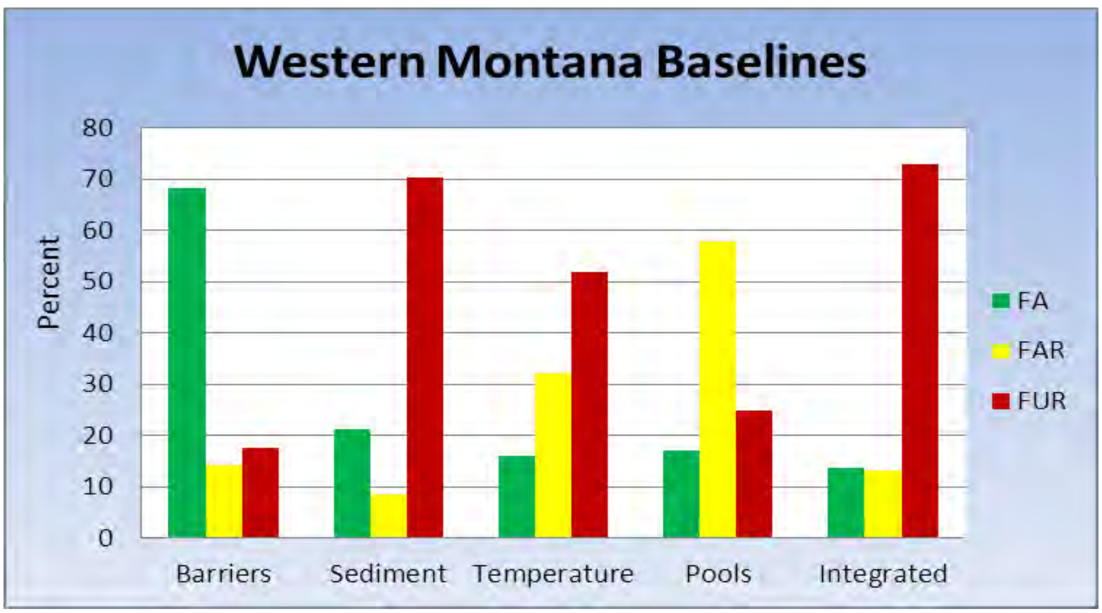
Table I-1 demonstrates that Forests are relatively similar in terms of the distribution of calls between FA, FAR, and FUR, with the possible exception of the Flathead and Kootenai National Forests. These Forests show more habitat in good condition (Flathead) and poor condition (Kootenai) than the other Forests. The most likely reason for the high number of FA calls on the Flathead National Forest is the large amount of Wilderness. This corresponds with the relative strength of bull trout populations across Western Montana as well (largest populations overall on the Flathead). Poor conditions on the Kootenai National Forest in the baseline assessment are likely the result of high road densities and steep topography (which has resulted in more roads near streams). This situation is similar to the Lolo National Forest, which shows the second worst conditions overall. Figure I-5 gives a visual depiction of the cumulative number of calls per forest for all four indicators combined (it does not include the integrated call).

Figure I-5. Cumulative status of all four indicators (barriers, temperature, sediment, and pools) by forest (FA is green, FAR is yellow, and FUR is red).



Based on the assessment, 69 percent of all 6th level HUCs in the unit had overall habitat conditions rated as "Functioning at Unacceptable Risk (FUR)", 16 percent of the HUCs were rated as "Functioning at Risk (FAR)", and the remaining 15 percent were rated as "Functioning Appropriately (FA)". Figure I-6 shows the percent of each of the four primary habitat indicators in each functional class (FA, FAR, FUR) across all USFS lands in western Montana.

Figure I-6. Integrated and individual indicator calls across all USFS lands in western Montana from the baseline update. A total of 731 HUCs associated with bull trout local populations are incorporated in the analysis.



As with the previous discussion of individual core areas, the overall rating is a combination of four primary indicators most important to bull trout – temperature, barriers, pools, and sediment – however it is not an average of these. In addition, the four indicators making up the overall rating are not necessarily equally important to bull trout, and they do not show the same general pattern in terms of functional status. Following is a discussion of each.

Temperature: Approximately half of the 6th level HUCs show temperature as FUR, approximately 1/3 are FAR, and the remaining 18 percent are FA. There is some concern that the temperature call may show different conditions than actually exist on the ground, especially where groundwater influences are significant. Further refinement of this indicator, combined with additional data collection and large-scale temperature modeling (in progress) will likely result in updates to the baseline over time.

Barriers: While barriers at road/stream crossings are common across the analysis area, connectivity on streams important to bull trout is generally good. Approximately 77 percent of the 6th level HUCs are rated as FA, with only 11 percent and 13 percent FAR and FUR, respectively. Mainstem barriers still present challenges at larger spatial scales between core areas. Some of those (e.g., Hungry Horse and Libby Dams) are unlikely to be modified and may also benefit bull trout by creating large, cold, deep lakes that are isolated from potential invasion by downstream non-native fish populations.

Pools: Pool frequency and quality is generally fair across the basin, with slightly over half of the HUCs (51 percent) being rated as FAR. Of the remaining HUCs, 30 percent have poor pool frequency/quality (FUR), and 20 percent have good (FA) pool frequency/quality (these are generally in wilderness or other protected watersheds where extensive management activity and development has not occurred).

Sediment: The baseline analysis showed sediment to be FUR in 65 percent of the 6th level HUCs, FAR in 12 percent of the HUCs, and FA in 24 percent of the HUCs. This call is largely driven by how road density and location affects model outcomes. However, the team acknowledges the nuances and site specific nature of sediment production and routing in watersheds and therefore expects some refinement of this indicator over time.

The following section provides general summaries on past restoration actions and a summary of strategic needs for future action. Successive chapters after the introduction list high priority locations for treatment and restoration actions needed in greater detail. Importantly, these chapters present and discuss actions that are expected to improve and restore habitat expected to support bull trout recovery on National Forest lands. Threats to local populations are presented and treatments are discussed in the context of relative benefits to the local population and identified urgency.

Restoration Actions within the Conservation area

Past

Bull trout restoration activities have been ongoing in the western Montana area for some time, with varying degrees of intensity and focus. Nonetheless, bull trout populations continue to decline in many areas. One of the difficulties in recovering the species is that many of the land management restoration activities that are implemented are incremental and may require years to result in detectable changes to aquatic habitat. Also, degraded local habitat is but one of the threats regulating populations (discussed in threats section above). In some cases, bull trout populations may not persist by the time habitats improve. In other cases, conceivably, if improvements are made that allow core populations to expand, unoccupied habitat may be re-founded. This reinforces the importance of maintaining and improving bull trout habitat even where populations are reduced or absent. However, all things considered, strategic and focused improvements in priority conservation and restoration habitats supporting priority local populations should be an essential focus. This document should help guide actions in some of these identified areas.

Large-scale watershed restoration projects like road obliteration and crossing removals can eliminate low-grade chronic impacts and reduce risks so that watersheds are more resilient to natural disturbance processes and over time provide increasingly better quality instream and riparian habitat. They also begin to address risks associated with climate change – watersheds that have the capacity to respond less abruptly to stochastic disturbance events provide more stable environments for bull trout. Often these changes and avoided impacts are difficult to detect, but they form the cornerstones for recovery of watersheds and aquatic systems that bull trout depend on. Thus, the Forest Service has a key role to play in bull trout conservation and recovery through continued and increased strategic implementation of actions that will maintain, improve, or expand functional, resilient, and secure watersheds that provide high quality spawning and rearing habitat. Other activities, such as changes in fishing regulations and dam removals can result in more immediate and direct benefits to bull trout, but they are generally not the direct responsibility of the Forest Service and they are often not enough by themselves to provide long-term security to the population.

Table I-2 displays a summary of restoration activities completed on Forest Service lands in Western Montana over the past six years (the period that we have relatively accurate data for) that directly or indirectly benefitted bull trout.

Table I-2. Restoration activities benefitting bull trout that have been completed on NFS lands since 2004 (all FS funding sources and including partner funding).

Activity	Amount	Cost	% of restoration dollars spent
Crossings Removed	368	$1,459,000	37%
Crossings Replaced	85		
Miles Road Decommissioned	461	$887,000	23%
Miles Road Stored	146		
Miles Road Relocated	5		
Miles Channel Constructed	18.4	$778,000	20%
Miles Riparian Restored	7.5	$33,000	1%
Non-native fish removal	N/A	$606,000	16%
Surveys/Monitoring	N/A	$115,000	3%

An estimated total of nearly $4,000,000 was spent on habitat restoration since 2004, averaging approximately $650,000 per year. Funds contributing to these accomplishments come from a variety of sources including Fish and Wildlife funds (NFWF), engineering and roads funds (CMLG), and vegetation and fire management funds as part of larger integrated projects. The majority (37%) of the bull trout restoration funding has focused on culvert replacements (approximately ¾ of the $1,459,000 spent has been on replacements, while ¼ has been on culvert removals). This corroborates passage improvements noted in the section above on current status of habitat and baseline improvements related to fish passage. Nearly $1,000,000 has been spent on reducing the effects of road prisms by decommissioning, storing, or relocating the roads. In total, nearly 60 percent of the total funds spent on bull trout restoration have been directly related to reducing road effects (including barriers) on bull trout habitat, which has beneficial effects to many other resources (wildlife, weeds, non-motorized recreation, etc.) as well. This table does not display projects implemented on other lands, or fisheries management projects implemented by Montana Fish Wildlife and Parks, Plum Creek Timber Company, or other private landholders that benefit bull trout.

The data above indicate that beneficial work has been done for bull trout, but much more remains to be done. For instance, despite the amount of work done this work has occurred on only a fraction of the existing road system. Approximately 2.5% of the 25,000 miles of system road in this planning area have recently been stored or removed. However, many more problem stream crossing and roads persist in need of treatment and remedy. The Conservation Strategy identifies specific restoration treatments, or at least watersheds with the greatest restoration and conservation need, where actions are expected to provide the greatest benefit for bull trout. This is important as the USFWS's 10-year baseline review revealed little change in baseline conditions from when the species was first listed. This combined with the rate at which some populations have declined suggest more strategic investments and improvements are needed, both on and off Forest Service-administered lands. Increased and creative funding solutions will be needed to help increase restoration focus and implementation per the Forest Service Chief's goal for accelerated restoration (USDA Forest Service 2012). Partnerships will need to continually be fostered and supported to help achieve improvements both on and off Forest lands. Forest Service initiatives such as the Watershed Condition Framework should be one avenue for helping implement essential conservation actions for bull trout. Also, increased National and Regional Forest Service emphasis on travel management and identification of a minimum road system at an individual Forest scale (36 CFR 212.5 (b)(1), also known as "Subpart A" of the Travel Management Rule) is expected to provide greater emphasis and opportunity in highlighting problem road-based solutions. Finally, new budgeting processes being piloted here in the Northern Region may also provide for greater flexibility in applying pooled restoration funds strategically to benefit bull trout.

Conservation Strategy Actions- Future

One challenge in conserving bull trout is to identify restoration activities most important given the status and resiliency of the population and the likelihood of anticipated benefits of a particular suite of restoration activities. The following maps summarize core area and local population assessments (supported by detailed information in the body of this strategy. Figure I-7 presents relative importance of local habitat (at the field HUC scale) in supporting local bull trout populations. HUCs colored red are those that are critical to the local bull trout population (due to spawning areas, refugia, high current fish densities, etc.). Those colored yellow are moderately important to supporting the local population, and HUCs colored green are less important. Figure I-8 follows with a depiction of where habitat is presumed to be the most limiting to bull trout local populations. Areas colored red are those where habitat conditions are presumed a major factor limiting the local population. Areas in yellow indicate that habitat is somewhat limiting, while areas in green indicate that habitat is not likely the major factor currently limiting the population. Lastly, Figure I-9 identifies those 6th field HUCs in western Montana where actions identified to improve baseline habitat condition in one of the four key baseline habitat indicators (temperature, barriers, pools, and sediment) are expected to lead to a population response. It's important to point out here that this is a relative scale – the entire range of bull trout has already been reduced with some portions of watersheds (the blank HUCs) and historic bull trout streams no longer support the species – so even the less important watersheds should be considered relatively important in terms of overall conservation and likely recovery needs.

By identifying the most important HUCs supporting local bull trout populations, and then filtering a subset of those where habitat is a major limiting factor to bull trout production we can identify those HUCs where urgent restoration projects are needed. This approach should help Forests and partners as they plan for out-year projects and strategic investments. Table I-3 summarizes much of the conservation strategy information provided later for each bull trout core area, local population and 6th field HUC. The table also summarizes the habitat indicator(s) derived from the baseline as most limiting and likely to result in a change in the population if remedied. Finally, it provides a summary of estimated costs, urgency for implementation, and importance of restoration activities for the entire Western Montana Bull Trout Conservation Area within the borders of the relevant National Forests.

An example of using Figure I-7 through 9 and Table I-3 is as follows. Oregon Gulch (a 6th field HUC in the middle Clark Fork Core Area) provides important habitat to the Cedar Creek Local Population

(Figure I-7). Plus, condition of habitat in this 6th field HUC is thought to be one of the key limitations to the local population (Figure I-8). Finally, actions identified to remedy habitat degradation are anticipated to lead to a positive population response (Figure I-9). By looking up Oregon Gulch in in the Middle Clark Fork River core area chapter, (also in Table I-3 in the 3rd to last column) we see that temperature, barriers, and sediment are all considered limiting habitat components and with associated rough estimates of anticipated costs (Table I-3 last column) identified based on the current understanding of impairments and opportunities.

Figure I-7. Significance of 6th field HUC to local population by Core area.

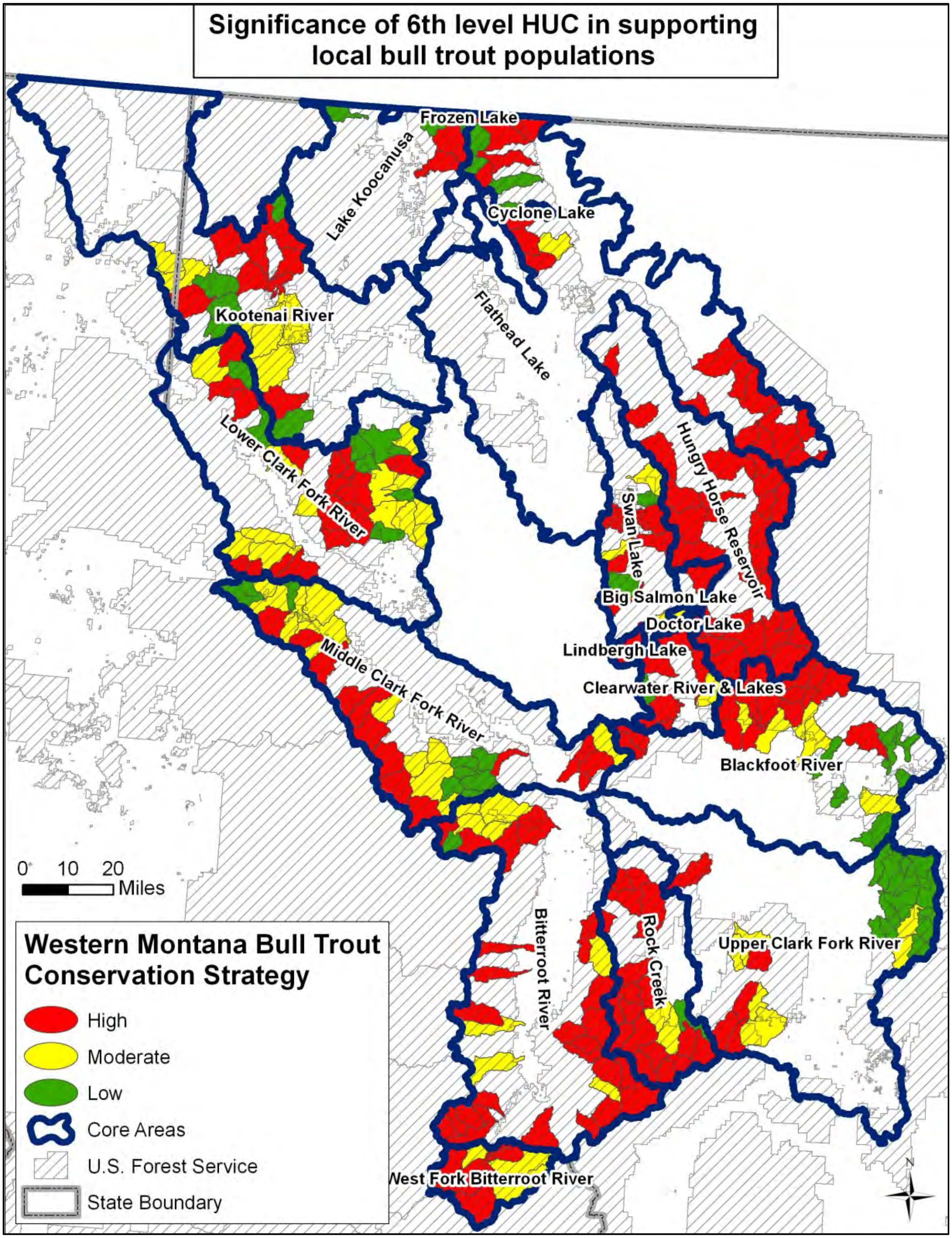


Figure I-8. Habitat limitation by HUC for local populations.

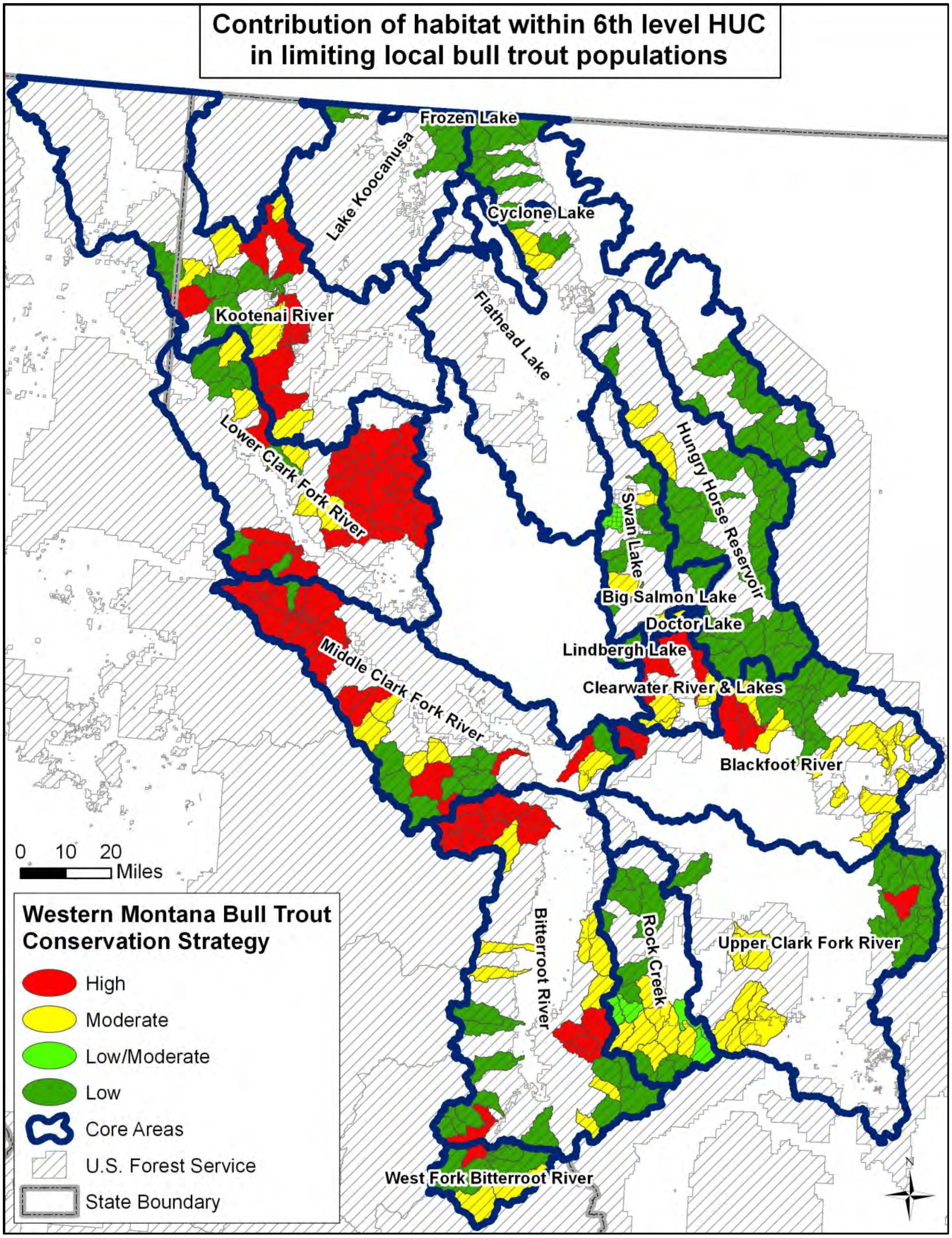


Figure I-9. HUCs with habitat limitation and associated actions that are anticipated to improve one of four key baseline indicators and expected improvement response from the local population.

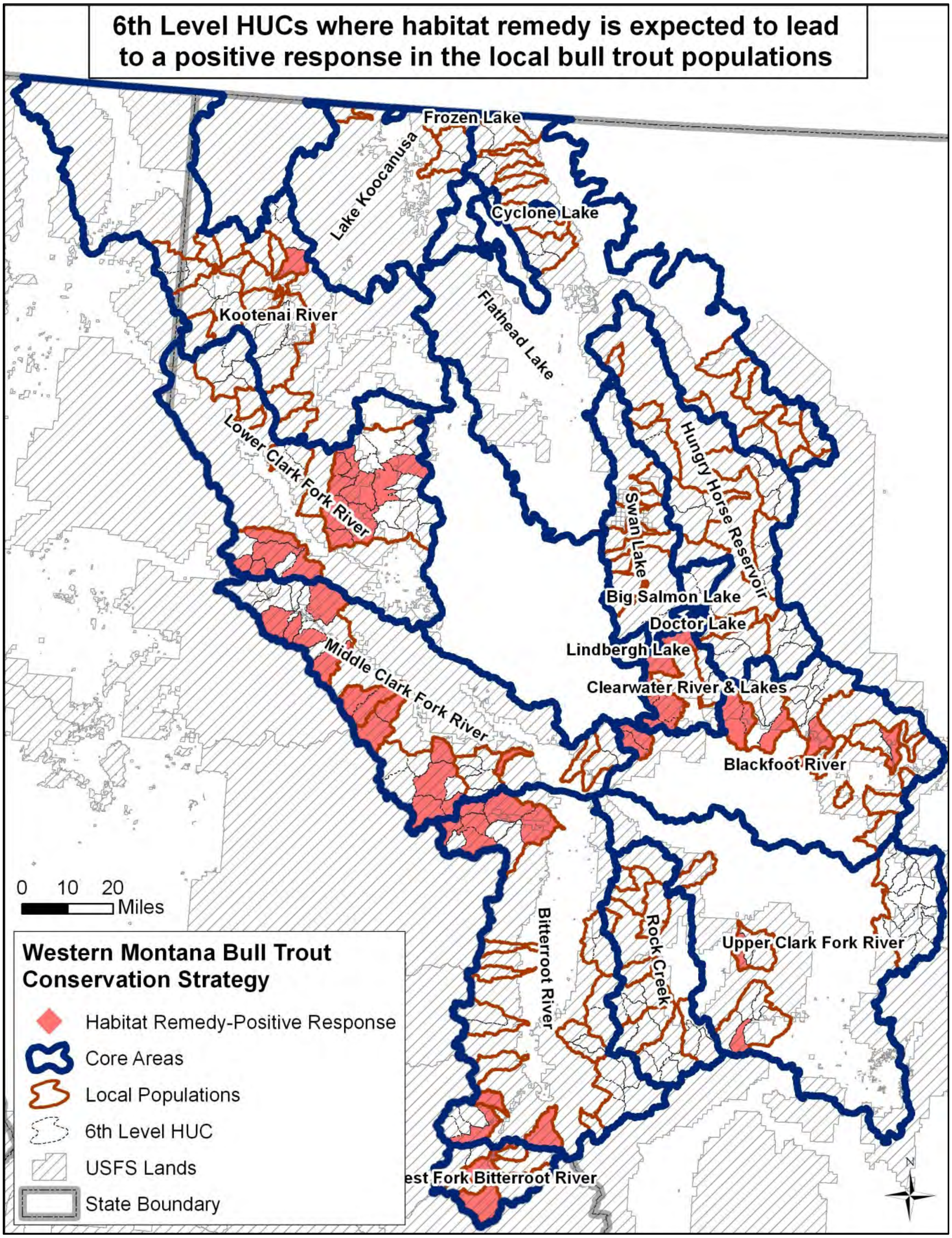


Table I-3. Summary of important 6th level HUC attributes and conservation recommendations for each Local Population within each Core Area.

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
Upper Clark Fork River Core Area								
Warm Springs/Twin Lakes	Silver Lake	170102020101	High	Moderate	Active	-	-	-
	Warm Springs Cr Headwaters	170102010302	High	Moderate	Active	-	-	-
	Twin Lakes Cr	170102010301	High	Moderate	Active	Barriers	Unknown	$300,000
	Foster Cr	170102010303	Low	Moderate	Active	-	-	-
	West Valley Cr	170102010304	Moderate	Moderate	Active	-	-	-
Boulder Creek	Upper Boulder Cr	170102020301	High	Moderate	Active	-	-	-
	South Boulder/Wyman	170102020302	Moderate	Moderate	Active	Barriers	2012	$300,000
	Lower Boulder Cr	170102020303	Moderate	Moderate	Active	-	-	-
Harvey Creek*	Harvey Cr*	170102020610	High	Low	Conserve	-	-	-
Little Blackfoot River*	Larabee Cr*	170102010502	Moderate	Low	Conserve	-	-	-
	Hat Cr*	170102010507	Moderate	Low	Conserve	-	-	-
	Ontario/Monarch Cr*	170102010501	Low	Low	Active	-	-	-
	Elliston Cr*	170102010603	Low	High	Active	-	-	-
	Mike Renig Cr*	170102010504	Low	Low	Passive	-	-	-
	Telegraph Cr*	170102010503	Low	Low	Active	-	-	-
	Lower Dog Cr*	170102010506	Low	Low	Passive	-	-	-
	Upper Dog Cr*	170102010505	Low	Low	Active	-	-	-
	North Trout Cr*	170102010601	Low	Low	Active	-	-	-
	Snowshoe Cr*	170102010602	Low	Low	Passive	-	-	-
	Carpenter Cr*	170102010604	Low	Low	Passive	-	-	-
	Trout Cr*	170102010605	Low	Low	Passive	-	-	-
	South Fork Spotted Dog Cr*	170102010606	Low	Low	Passive	-	-	-

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
	Upper Spotted Dog Cr*	170102010607	Low	Low	Passive	-	-	-
	Threemile Cr*	170102010610	Low	Low	Passive	-	-	-
Rock Creek Core Area								
Middle Fork Rock Creek	Upper Middle Fork Rock Cr	170102020802	High	Low	Conserve	-	-	-
	Copper Cr	170102020801	High	Low	Conserve	-	-	-
	Carpp Cr	170102020803	High	Low	Conserve	-	-	-
	Middle Middle Fork Rock Cr	170102020804	High	Moderate	Active	-	-	-
	Lower Middle Fork Rock Cr	170102020805	Moderate	Moderate	Active	-	-	-
East Fork Rock Creek	Meadow Cr	170102020702	High	Moderate	Active	-	-	-
	East Fork Rock Cr	170102020703	Low	Low/Moderate	Active	-	-	-
	East Fork Reservoir	170102020701	High	Low/Moderate	Conserve/ Active	-	-	-
West Fork Rock Creek	West Fork Rock Cr Headwaters	170102021001	High	Low/Moderate	Passive	-	-	-
	Upper West Fork Rock Cr	170102021002	High	Low/Moderate	Passive	-	-	-
	Middle West Fork Rock Cr	170102021003	High	Low/Moderate	Passive	-	-	-
	Lower West Fork Rock Cr	170102021004	High	Moderate	Active	-	-	-
Ross Fork Rock Creek	Upper Ross Fork Rock Cr	170102020901	High	Moderate	Conserve	-	-	-
	Middle Ross Fork Rock Cr	170102020902	High	Moderate	Conserve	-	-	-

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
	Lower Ross Fork Rock Cr	170102020903	Moderate	Moderate	Passive	-	-	-
Stoney Creek	Stoney Cr	170102021204	High	Low	Active	-	-	-
Hogback Creek	Hogback Cr	170102021207	High	Low	Conserve	-	-	-
Butte Cabin Creek	Rock Cr – Cinnamon Bear Cr	170102021303	High	Low	Conserve	-	-	-
Welcome Creek	Welcome Cr	170102021302	High	Low	Conserve	-	-	-
Ranch Creek	Ranch Cr	170102021301	High	Low	Active	-	-	-
Alder Creek*	Alder Cr*	170102021209	High	Low	Passive	-	-	-
Blackfoot River Core Area								
Landers Fork	Copper Cr	170102030103	High	Moderate	Active/ Conserve	-	-	-
	Lower Landers Fork	170102030104	Low	Moderate	Passive	-	-	-
Poorman Creek	Poorman Cr	170102030302	Moderate	Moderate	Active	-	-	-
Group of Streams that Contribute to Core Area*	Arrastra Cr*	170102030309	Low	Moderate	Active	-	-	-
	Sauerkraut Cr*	170102030307	Low	Moderate	Active	-	-	-
	Hogum Cr*	170102030205	Low	Low	Active	-	-	-
	Alice Cr*	170102030204	Low	Moderate	Passive	-	-	-
Nevada Creek Headwaters*	Nevada Cr Headwaters*	170102030401	Low	Moderate	Active	-	-	-
North Fork Blackfoot River	Canyon Cr	170102030503	High	Low	Conserve	-	-	-
	Cabin Cr	170102030502	High	Low	Conserve	-	-	-
	Dry Fork North Fork Blackfoot River	170102030501	High	Low	Conserve	-	-	-
	North Fork Blackfoot River – Headwaters	170102030604	High	Low	Conserve	-	-	-
	Lake Cr	170102030701	High	Low	Passive	-	-	-

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
	North Fork Blackfoot – Jakey	170102030702	Moderate	Low	Passive	-	-	-
	Rock Cr	170102030703	Moderate	Low	Passive	Pools	10 years	$100,000
Monture Creek	Upper Monture Cr	170102030801	High	Low	Conserve	-	-	-
	Dunham Cr	170102030802	High	Moderate	Active	-	-	-
	Dick Cr	170102030803	Moderate	Moderate	Active	Barriers & Pools	5-10 years	$125,000
	Lower Monture Cr	170102030804	High	High	Active	-	-	-
Cottonwood Creek	Cottonwood Cr	170102030909	High	High	Active	Temperature & Pools	10 years	$300,000
	Shanley Cr	170102030908	Moderate	High	Active	Barriers & Pools	5 years	$300,000
Gold Creek	Upper Gold Cr	170102031301	High	High	Active	Temperature, Pools & Sediment	20 years	$3,000,000
	West Fork Gold Cr	170102031302	High	High	Active	Temperature, Pools & Sediment	20 years	$3,000,000
Clearwater River Core Area								
East Fork Clearwater River	Upper Clearwater River	170102031001	High	High	Active	Barriers	5 years	$100,000
West Fork Clearwater River	West Fork Clearwater River	170102031002	High	High	Active	Temperature, Pools & Sediment	3-5 years	$300,000
Morrell Cr	Morrell Cr	170102031006	High	High	Active	-	-	-
	Trail Cr	170102031005	Moderate	Moderate	Active	-	-	-
Placid Creek	Boles Cr	170102031203	High	Moderate	Active	Temperature, Pools & Sediment	10 years	$150,000
	Lower Placid Cr	170102031202	High	Moderate	Passive	Temperature	10 years	$50,000
	Upper Placid Cr	170102031201	Low	High	Passive	Temperature & Barriers	10 years	$400,000
West Fork Bitterroot River Core Area								
West For Bitterroot River (upper)	West Fork Bitterroot River – Beaver Creek	170102050102	High	Moderate	Active	Barriers	30 years	$500,000

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
Deer Creek	Deer Cr	170102050101	High	Low	Conserve	-	-	-
Hughes Creek	Hughes Cr	170102050103	Moderate	Moderate	Passive	-	-	-
Overwhich Creek	Overwhich Cr	170102050104	Moderate	Low	Passive	-	-	-
Blue Joint Creek	Upper Blue Joint Cr	170102050105	High	Low	Conserve	-	-	-
	Lower Blue Joint Cr	170102050106	Moderate	High	Passive	-	-	-
Slate Creek	Slate Cr	170102050107	High	Low	Passive	-	-	-
Little Boulder Creek	West Fork Bitterroot River – Painted Rocks Reservoir	170102050108	High	Low	Passive	Barriers	20 years	$930,000
Bitterroot River Core Area								
East Fork Bitterroot River (headwaters)	Moose Cr	170102050401	High	Low	Passive	-	-	-
	Martin Cr	170102050402	High	Low	Passive	-	-	-
	East Fork Bitterroot – Clifford Cr	170102050403	High	Low	Conserve	-	-	-
	Meadow Cr	170102050404	High	Low	Active	-	-	-
	East Fork Bitterroot River – Bertie Lord Cr	170102050405	Moderate	Moderate	Passive	-	-	-
Tolan Creek	Tolan Cr	170102050501	High	Moderate	Passive	-	-	-
Warm Springs Creek	Warm Springs Cr	170102050505	High	Low	Passive	Barriers	1 years	$100,000
Nez Perce Fork	Sheephead Cr	170102050201	High	Low	Conserve	-	-	-
	Watchtower Cr	170102050202	High	Low	Conserve	-	-	-
	Little West Fork	170102050203	High	Low	Conserve	-	-	-
	Nez Perce Fork – Nelson Lake	170102050204	High	High	Active	Temperature, Pools & Sediment	80 years	$1,500,000
Boulder Creek	Boulder Cr	170102050302	High	Low	Conserve	Barriers	30 years	$500,000
Tin Cup Creek	Tin Cup Cr	170102050804	Moderate	Low	Conserve	-	-	-
Lost Horse Creek	Lost Horse Cr	170102050601	High	Low	Conserve	-	-	-

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
	South Lost Horse Cr	170102050602	Moderate	Low	Conserve	-	-	-
Sleeping Child Creek	Divide Cr	170102050701	High	High	Active	-	-	-
	Upper Sleeping Child Cr	170102050702	High	High	Active	-	-	-
	Middle Sleeping Child Cr	170102050703	High	High	Active	-	-	-
Skalkaho Creek	Daly Cr	170102050901	High	Moderate	Active	-	-	-
	Upper Skalkaho Cr	170102050902	High	High	Active	-	-	-
Blodgett Creek	Blodgett Cr	170102051005	High	Moderate	Conserve	-	-	-
Fred Burr Creek	Fred Burr Cr	170102051102	High	Moderate	Conserve	-	-	-
Burnt Fork of the Bitterroot River	Upper Burnt Fork Bitterroot River	170102051303	Moderate	Moderate	Passive	-	-	-
	Lower Burnt Fork Bitterroot River	170102051304	High	Moderate	Passive	-	-	-
Lolo Creek	South Fork Lolo Cr	170102051407	High	Moderate	Active	-	-	-
	Granite Cr	170102051403	High	High	Active	Barriers & Pools	5-10 years	$350,000
	Lower Lolo Cr	170102051409	High	High	Active	Temperature & Barriers	10 years	$200,000
	West Fork Lolo Cr	170102051401	Low	High	Passive	-	-	-
	East Fork Lolo Cr	170102051402	High	High	Active	Temperature, Pools & Sediment	10 years	$400,000
	Howard Cr	170102051404	Moderate	High	Active	Barriers	20 years	$100,000
	Upper Lolo Cr	170102051405	Moderate	High	Passive	Temperature & Pools	10-20 years	$150,000
	West Fork Butte Cr	170102051406	Moderate	High	Active	-	-	-
	Grave Cr	170102051408	Moderate	High	Passive	Temperature & Pools	10 years	$150,000
Middle Clark Fork River Core Area								
Rattlesnake Creek	Upper Rattlesnake Cr	170102040101	Moderate	Low	Conserve	-	-	-
	Lower Rattlesnake Cr	170102040102	High	Moderate	Conserve	-	-	-

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
Grant Creek	Grant Cr	170102040103	High	High	Passive	-	-	-
Albert Creek	Albert Cr	170102040207	High	High	Passive	Barriers	10 years	$200,000
Petty Creek	Upper Petty Cr	170102040401	Low	Low	Passive	-	-	-
	Eds Cr	170102040402	Low	Low	Passive	-	-	-
	Middle Petty Cr	170102040403	Low	Low	Passive	-	-	-
	West Fork Petty Cr	170102040404	Low	Low	Passive	-	-	-
	Lower Petty Cr	170102040405	Low	Low	Passive	-	-	-
Fish Creek	Burdette Cr	170102040502	Low	Low	Conserve	-	-	-
	Cache Cr	170102040503	High	Low	Active	Barriers	5 years	$50,000
	Upper South Fork Fish Cr	170102040501	Moderate	High	Active	Temperature & Pools	5-10 years	$150,000
	Lower South Fork Fish Cr	170102040507	Moderate	High	Active	Temperature, Barriers & Pools	5-10 years	$450,000
	Lower Fish Cr	170102040508	Moderate	Moderate	Active	Pools	5 years	$50,000
	Upper Fish Cr	170102040506	Moderate	Moderate	Active	-	-	-
	West Fork Fish Cr	170102040504	High	Low	Conserve	-	-	-
	North Fork Fish Cr	170102040505	High	Low	Conserve	-	-	-
Trout Creek	Lower Trout Cr	170102040608	Moderate	Moderate	Active	Temperature	5 years	$250,000
	Upper Trout Cr	170102040607	High	Moderate	Active	Temperature	5 years	$150,000
Cedar Creek	Cedar Cr	170102040611	High	High	Active	Temperature & Sediment	10 years	$300,000
	Oregon Gulch	170102040610	High	High	Active	Temperature, Barriers & Sediment	5-10 years	$550,000
St. Regis River	Little Joe Cr	170102040811	High	High	Active	Temperature, Barriers, Pools & Sediment	10-15 years	$800,000
	Ward Cr	170102040809	High	High	Active	Temperature, Pools & Sediment	10-15 years	$550,000

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
	Upper St. Regis River (Big Cr)	170102040804	High	High	Active	Temperature, Barriers, Pools & Sediment	15 years	$450,000
	St. Regis River Headwaters	170102040801	Low	High	Passive	-	-	-
	Packer Cr	170102040802	Moderate	High	Passive	-	-	-
	Big Cr	170102040803	Moderate	High	Passive	-	-	-
	Savenac Cr	170102040805	Low	Low	Passive	-	-	-
	Deer Cr	170102040806	Moderate	High	Active	Pools	20 years	$100,000
	Middle St. Regis River	170102040807	Moderate	High	Passive	-	-	-
	Twelvemile Cr	170102040808	Moderate	High	Active	Temperature & Pools	20 years	$300,000
	Twomile Cr	170102040810	Moderate	High	Passive	-	-	-
	Lower St. Regis River	170102040812	Moderate	High	Passive	-	-	-
Flathead Lake Core Area								
Trail Creek	Tuchuck Cr	170102060101	Low	Low	Conserve	-	-	-
	Trail Cr	170102060102	High	Low	Conserve	-	-	-
Whale Creek	Upper Whale Cr	170102060404	Low	Low	Conserve	-	-	-
	Shorty Cr	170102060405	High	Low	Conserve	-	-	-
	Lower Whale Cr	170102060406	High	Low	Conserve	-	-	-
Red Meadow Creek	Red Meadow Cr	170102060208	Low	Low	Conserve	-	-	-
Coal Creek	Upper Coal Cr	170102060305	Low	Low	Conserve	-	-	-
	South Fork Upper Coal Cr	170102060304	High	Low	Conserve	-	-	-
Big Creek	Hallowat Cr	170102060403	High	Moderate	Active	-	-	-
	Upper Big Cr	170102060404	High	Moderate	Active	-	-	-
	Lower Big Cr	170102060405	Moderate	Low	Active	-	-	-
Strawberry Creek	Strawberry Cr	170102070101	High	Low	Conserve	-	-	-

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
Bowl Creek	Bowl Cr	170102070103	High	Low	Conserve	-	-	-
Clack Creek	Clack Cr	170102070107	High	Low	Conserve	-	-	-
Schafer Creek	Schafer Cr	170102070105	High	Low	Conserve	-	-	-
	Dolly Varden Cr	170102070106	High	Low	Conserve	-	-	-
Morrison Creek	Morrison Cr	170102070201	High	Low	Conserve	-	-	-
Granite Creek	Granite Cr	170102070203	High	Low	Conserve	-	-	-
Long Creek	Long Cr	170102070205	High	Low	Conserve	-	-	-
Bear Creek	Bear Cr	170102070301	High	Low	Conserve	-	-	-
Frozen Lake#	Frozen Cr#	170102060103	High	Low	Passive	-	-	-
Hungry Horse Reservoir Core Area								
Danaher Creek	Lower Danaher Cr	170102090107	High	Low	Conserve	-	-	-
	Upper Danaher Cr	170102090101	High	Low	Conserve	-	-	-
	Basin Cr	170102090103	High	Low	Conserve	-	-	-
	Rapid Cr	170102090102	High	Low	Conserve	-	-	-
Youngs Creek	Lower Youngs Cr	170102090106	High	Low	Conserve	-	-	-
	Upper Youngs Cr	170102090105	High	Low	Conserve	-	-	-
	Babcock Cr	170102090104	High	Low	Conserve	-	-	-
Gordon Creek	Lower Gordon Cr	170102090202	High	Low	Conserve	-	-	-
White River	Upper White River	170102090207	High	Low	Conserve	-	-	-
	Middle White River	170102090208	High	Low	Conserve	-	-	-
	South Fork White River	170102090209	High	Low	Conserve	-	-	-
	Lower White River	170102090210	High	Low	Conserve	-	-	-
Little Salmon Creek	Little Salmon Cr	170102090303	High	Low	Conserve	-	-	-
Bunker Creek	Middle Fork Flathead – Lower Bunker Cr	170102090504	High	Low	Passive	-	-	-
	Upper Bunker Cr	170102090503	High	Low	Passive	-	-	-

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
	Gorge Cr	170102090502	High	Low	Conserve	-	-	-
Spotted Bear River	Lower Spotted Bear River	170102090406	High	Low	Passive	-	-	-
	Dean Cr	170102090404	High	Low	Conserve	-	-	-
	Middle Spotted Bear River	170102090403	High	Low	Conserve	-	-	-
	Wall Cr	170102090401	High	Low	Conserve	-	-	-
	Spotted Bear River Headwaters	170102090402	High	Low	Conserve	-	-	-
Sullivan Creek	Sullivan Cr	170102090601	High	Moderate	Active	-	-	-
Wheeler Creek	Wheeler Cr	170102090604	High	Moderate	Active	-	-	-
Wounded Buck Cr	Wounded Buck Cr	170102090702	High	Low	Passive	-	-	-
Doctor Lake#	Upper Gordon Cr – Doctor Lake#	170102090201	High	Low	Conserve	-	-	-
Big Salmon Lake#	Big Salmon Lake#	170102090302	High	Low	Conserve	-	-	-
Swan Lake Core Area								
Elk Creek	Elk Cr	170102110201	High	Low	Conserve	-	-	-
Cold Creek	Cold Cr	170102110202	Low	Moderate	Active	-	-	-
Jim Creek	Jim Cr	170102110204	High	Low	Active	-	-	-
Piper Creek	Piper Cr	170102110207	Moderate	Low	Conserve	-	-	-
Lion Creek	Lion Cr	170102110206	High	Low	Conserve	-	-	-
Goat Creek	Goat Cr	170102110303	High	Low	Conserve	-	-	-
Woodward Creek	Woodward Cr	170102110304	High	Low-Moderate	Passive	-	-	-
Soup Creek	Soup Cr	170102110305	Low	Moderate	Conserve	-	-	-
Lost Creek	Lost Cr	170102110306	Moderate	Low	Conserve	-	-	-
Lindbergh Lake#	Headwaters Swan River – Lindbergh Lake#	170102110102	High	Low	Active	-	-	-

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
Holland Lake#	Holland Lake#	170102110103	Moderate	Moderate	Passive	-	-	-
Lake Pend Oreille/Lower Clark Fork River Core Area								
Thompson River	West Fork Thompson River	170102130405	High	Moderate	Active	Barriers & Pools	5 years	$150,000
	Lower Fishtrap Cr	170102130404	High	High	Active	Temperature, Pools & Sediment	5-20 years	$650,000
	West Fork Fishtrap Cr	170102130403	High	High	Active	Pools	5 years	$50,000
	Radio Cr	170102130401	High	High	Active	Pools & Sediment	5-10 years	$550,000
	Upper Fishtrap Cr	170102130402	High	High	Active	Temperature, Pools & Sediment	5-10 years	$600,000
	Big Rock Cr	170102130201	High	High	Active	Sediment	15 years	$200,000
	Murr Cr	170102130103	Moderate	High	Passive	-	-	-
	Lazier Cr	170102130104	Low	High	Passive	-	-	-
	Thompson River – Twin Lakes Cr	170102130105	Low	High	Passive	-	-	-
	Meadow Cr	170102130202	Low	High	Passive	-	-	-
	Chippy Cr	170102130203	Moderate	High	Passive	-	-	-
	Marten Cr	170102130204	Low	High	Passive	-	-	-
	Middle Thompson River	170102130205	Moderate	High	Active	Temperature & Pools	5-15 years	Unknown
	Upper Little Thompson River	170102130301	Moderate	High	Passive	-	-	-
	McGinnis Cr	170102130302	Moderate	High	Passive	-	-	-
	Middle Little Thompson River	170102130303	Moderate	High	Passive	-	-	-
	Mudd Cr	170102130304	Low	High	Passive	-	-	-
	Lower Little Thompson River	170102130305	Moderate	High	Passive	-	-	-

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
	Thompson River – Deerhorn Cr	170102130406	High	High	Active	Temperature, Barriers, Pools & Sediment	5-15 years	$400,000
	Thompson River – Goat Cr	170102130407	High	High	Active	Temperature, Pools & Sediment	5-15 years	$300,000
Prospect Creek	Clear Cr	170102130605	Moderate	High	Active	Temperature	20 years	$300,000
	Cooper Gulch	170102130601	High	High	Active	Temperature, Pools & Sediment	5-10 years	$600,000
	Crow Cr	170102130603	High	High	Active	Temperature, Pools & Sediment	5-10 years	$600,000
	Lower Prospect Cr	170102130607	Moderate	High	Active	Temperature & Pools	5-10 years	$300,000
	Upper Prospect Cr	170102130602	Moderate	Low	Passive	-	-	-
	Wilkes Cr	170102130604	High	Low	Conserve	-	-	-
	Dry Cr	170102130606	High	High	Active	Temperature, Barriers, Pools & Sediment	5-10 years	$1,000,000
Graves Creek	Graves Cr	170102130701	Moderate	Moderate	Passive	-	-	-
Vermillion River	Middle Vermillion River	170102130802	High	Moderate	Active	-	-	-
	Lower Vermillion River	170102130803	Moderate	Low	Active	-	-	-
Swamp Creek	Swamp Cr	170102131005	Low	High	Passive	-	-	-
Rock Creek	Rock Cr	170102131301	High	Moderate	Active	-	-	-
Bull River	Bull River Headwaters	170102131101	High	Moderate	Active	-	-	-
	Middle Bull River	170102131103	Low	Low	Active	-	-	-
	Lower Bull River	170102131104	High	Low	Active	-	-	-
	Upper Bull River	170102131102	Moderate	Low	Active	-	-	-
Lake Koocanusa Core Area								
Wigwam River	Wigwam River	170102010101	Low	Low	Conserve	-	-	-

Local Population[1]	6th Level HUC Name	6th Level HUC Number	Significance to Local Pop.[2]	Contribution of Habitat in Limiting Pop.[3]	Conservation Strategy[4]	Indicators[5] with Expected "High" Population Response	Timeframe[6] (range) (for "High Response" activities)	Cost Estimate[7] (for "High Response" activities)
Grave Creek	Lower Grave Cr	170102010302	High	Low	Conserve	-	-	-
	Upper Grave Cr	170102010301	High	Low	Conserve	-	-	-
Young Creek*	Young Cr*	170101010403	Low	Low	Active	-	-	-
Kootenai River Core Area								
West Fisher River	West Fisher River	170101020401	High	High	Active	-	-	-
Libby Creek	Lower Libby Cr	170101010805	Moderate	High	Active	-	-	-
	Upper Libby Cr	170101010801	Moderate	High	Active	-	-	-
	Granite Cr	170101010803	Moderate	Low	Passive	-	-	-
	Big Cherry Cr	170101010804	Moderate	Moderate	Passive	-	-	-
Pipe Creek	Lower Pipe Cr	170101010903	High	High	Active	Barriers	5 years	$1,500
	Upper Pipe Cr	170102010902	High	High	Active	-	-	-
	East Fork Pipe Cr	170101010901	Low	Moderate	Active	-	-	-
Quartz Creek	Quartz Cr	170101011004	High	High	Conserve	-	-	-
O'Brien Creek	O'Brien Cr	170101011201	High	Moderate	Passive	-	-	-
Callahan Creek	Callahan Cr	170101011204	Moderate	Moderate	Passive	-	-	-
	North Callahan Cr	170101011203	Moderate	Low	Passive	-	-	-
	South Callahan Cr	170101011202	Moderate	Low	Passive	-	-	-
Middle Kootenai River*	Middle Kootenai River*	170101011005	High	Low	Conserve	-	-	-
Silver Butte Fisher River*	Silver Butte Fisher River*	170101020202	Low	Moderate	Passive	-	-	-
Bull Lake#	Keeler Cr#	170101011104	High	High	Active	-	-	-
	Lower Lake Cr#	170101011105	Low	Low	Passive	-	-	-
	Upper Lake Cr#	170101011103	Low	Low	Passive	-	-	-

* These watersheds do not contain a designated local population of bull trout. They are included here due to their location in the core area and their potential to contribute to recovery of the core area population.
#Simple Core Area

[1] Groups of bull trout that spawn in various tributaries are generally characterized by relatively small amounts of genetic diversity within a tributary, but high levels of genetic divergence between tributaries. For the purposes of this conservation strategy the geophysical scale generally refers to the spawning and rearing habitat that a local population occupies, and typically constitutes, one to several 6th field Hydrologic Unit Codes or HUCs.

[2] How importance of the HUC to spawning and rearing habitat for bull trout within the local population.

[3] The importance of local limitations in physical stream habitat condition (i.e., substrate, stream temperature, passage, pools, etc.) affecting the local population status, thus providing improvement opportunities where the Forest Service has at least partial control.

[4] **Active restoration** is management intervention systematically focused on improving a degraded habitat condition or dysfunctional watershed processes such that the improved habitat can be maintained via restored processes and removal of impairments; **Passive restoration** is restoration process more typified by simply reducing or eliminating the sources of degradation that may allow recovery over time. For instance, INFISH standards and guidelines are intended to reduce new or ongoing management pressures to riparian areas that can degrade or maintain a de-graded to riparian and stream conditions; **Conservation** is a strategy intended to maintain one or more existing local populations, habitats and processes that, compared to other areas in the Core, are functioning well enough to provide a foundation from which other populations can anchor to and reconnect with as active improvements occur in other Core Area locations.

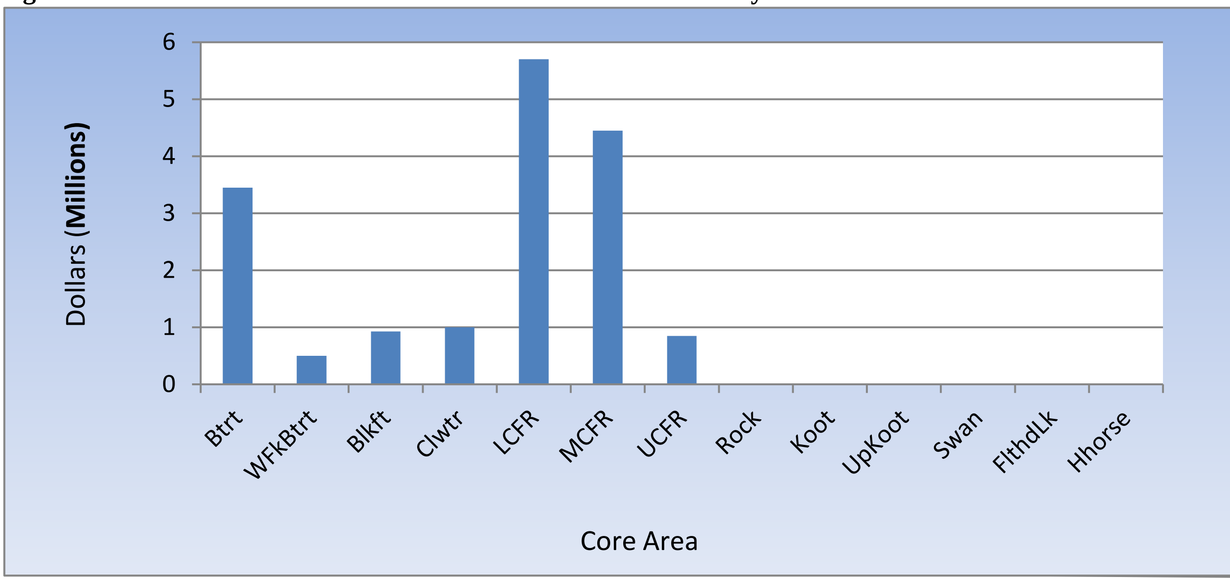
[5] Hightlights the indicator in the baseline (T=temperature, B=barriers, P=pools, and S=sediment) that have the greatest probability of influencing a population response.

[6] Time frames reflect a sense of urgency for a given population based on population trends, the potential influence of habitat on the population, and the overall importance of that local population to the Core Area and Recovery Unit. Shorter timeframes indicate the most urgent implementation needs for bull trout persistence and population improvement. Time frames may also be influenced by feasibility. The timeframes do not set management direction but are expected to help establish priorities for action.

[7] An estimated cost to implement activities expected to result in the greatest benefit to bull trout. For some “high” significance local populations where contributions of habitat limitations are also identified as high there are no cost estimates. This is the result specific actions not identified as indicated in the write-up, or in some cases the feasibility of remedy was considered infeasible at this time so no dollar amount assigned.

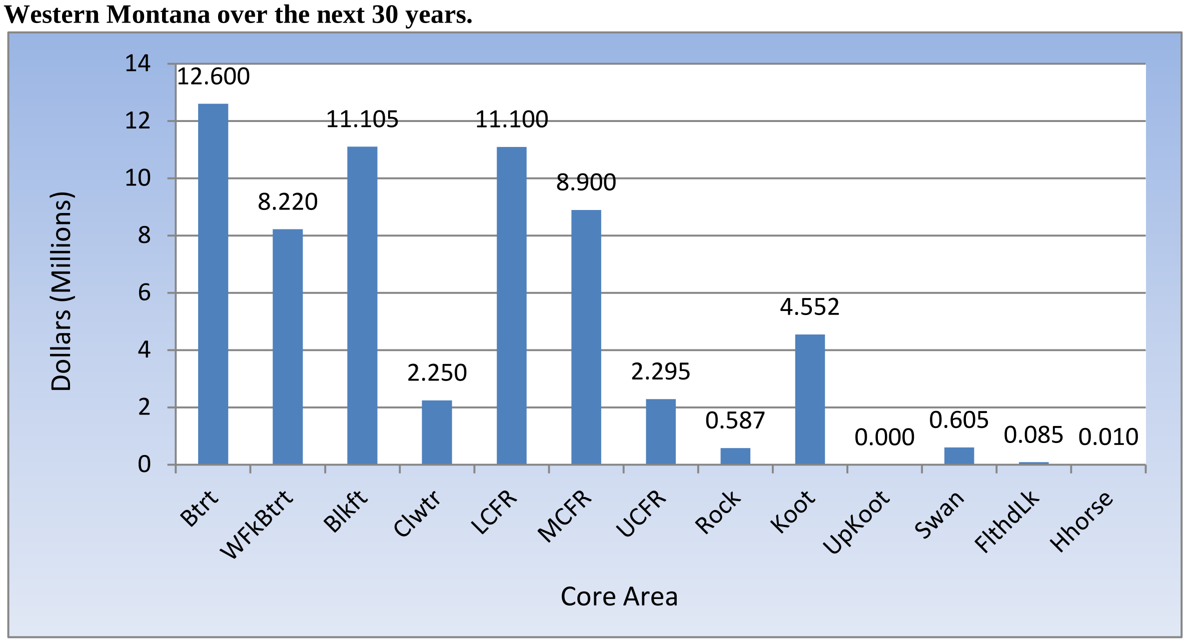
Over the Western Montana Forests covered by the Conservation Strategy, the restoration activities in the most important bull trout watersheds where habitat is the major limiting factor would require approximately $17 million in restoration funding over the next 10 – 20 years (Figure I-10). Most of the funding is needed in the Bitterroot, Lower Clark Fork, and Middle Clark Fork Core Areas.

Figure I-10. Cost estimates for critical habitat restoration needs by Core Area.



It is important to note, that this funding level and commitment would not address any restoration needs for populations rated as "moderate" or "low" importance or any 6th level HUC where habitat is not the main limiting factor to the population, regardless of how critical the population is to overall recovery of the species. Therefore, it should be viewed as an absolute minimum, not a target for full implementation of the Conservation Strategy. Implementing all restoration activities identified in the Strategy would require approximately $62 million over the next 30 years (Figure I-11). The majority of this funding (approximately $52 million) is needed in the Bitterroot, West Fork Bitterroot, Blackfoot, and Lower and Middle Clark Fork Core Areas.

Figure I-11. Estimated funding required to implement all habitat restoration activities for bull trout in Western Montana over the next 30 years.



Monitoring Implementation of the Conservation Strategy

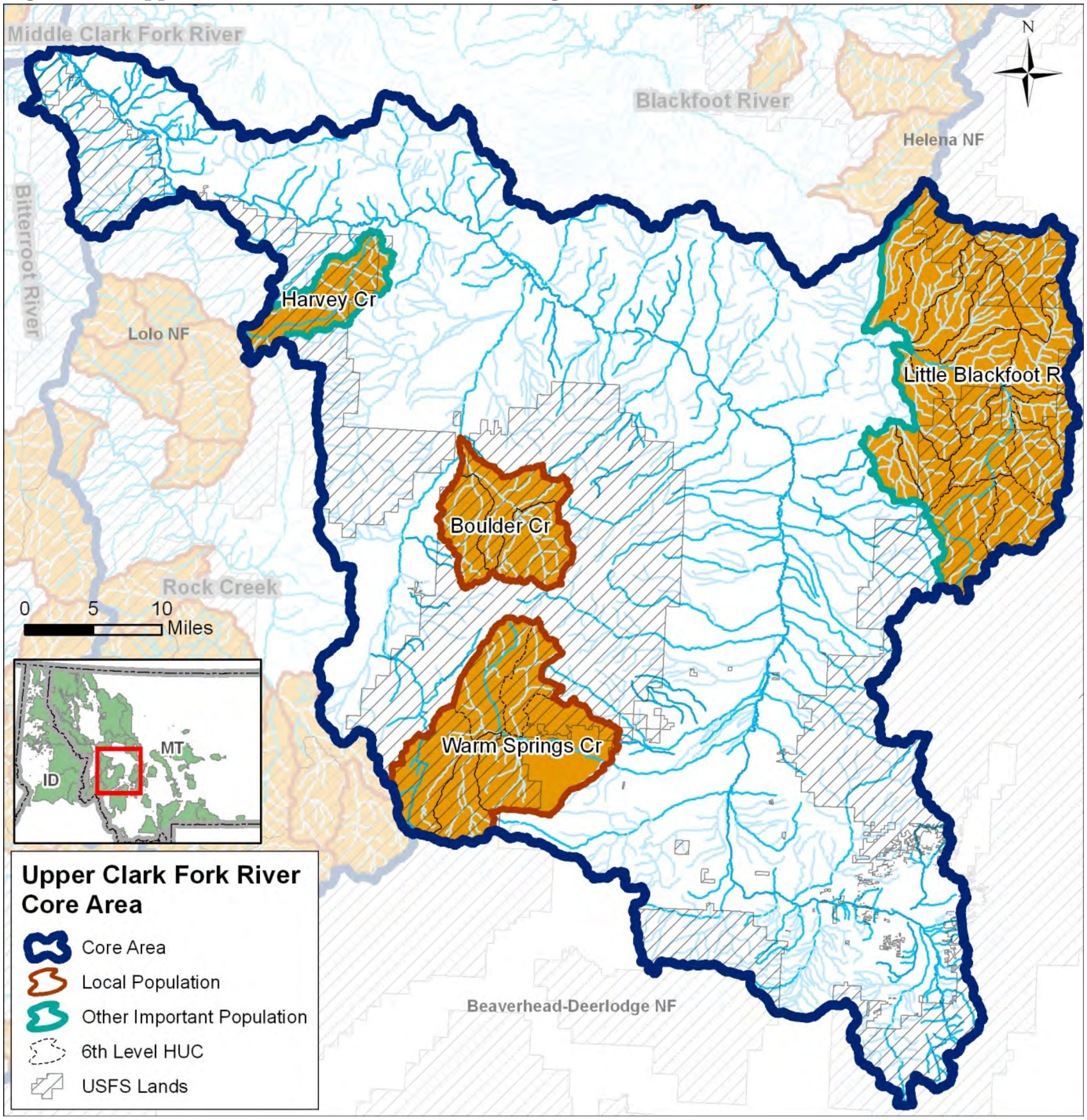
Monitoring is a critical component of the Conservation Strategy. It will document and track implementation of restoration actions. Monitoring can also be used to help the Forest Service and US FWS determine the effectiveness of recovery actions. Finally, monitoring records are expected to improve the consultation process between the services.

Monitoring, at a minimum, will consist of:

1. Annual updates to the Baseline calls. This will be completed in January of each year by the Level 1 Team, with staff support for GIS and all necessary database management activities from the Regional Office.
2. Updates to the status and trend information contained within the Conservation Strategy every 5 years. This will be completed by the Level 1 Team, using data from the MTFWP bull trout redd count database. Individual biologists are responsible for ensuring consistent coordination and completion of redd surveys with their MTFWP counterparts.
3. Biennial review of the Conservation Strategy by the Level 1 Team to determine if changes need to be made based on new science on the species or individual populations.

Chapter 1: Upper Clark Fork River

Figure 1-1. Upper Clark Fork River and Surrounding Core Areas



Core Area Discussion:

The Upper Clark Fork River Core Area (UCFCA) includes all of the Clark Fork River and all tributaries upstream of the Blackfoot River (this Core Area was previously described as everything upstream of Milltown Dam, however, with the removal of the dam in 2008 the new lower boundary is the Blackfoot River). Milltown Dam, constructed in 1906, had isolated bull trout populations in the UCFCA from the rest of the basin for over a century. Bull trout in the UCFCA probably originated historically as adfluvial spawning fish from Lake Pend Oreille in northern Idaho. Following construction of Milltown Dam, bull trout stocks in the UCFCA effectively became either fluvial or resident.

Currently, there are believed to be approximately 100 – 200 adult bull trout in the Upper Clark Fork River system. Most of the bull trout in the Core Area are resident, and there is a high degree of fragmentation between populations. Much of the mainstem of the river as well as the lower reaches of many tributaries are unsuitable for bull trout (warm and dewatered) in midsummer. There are also numerous barriers and irrigation diversions which further isolate remaining populations. Connectivity is a major concern in the core area. The proximity of local population to each other and the condition of migratory corridors (FMO) is also a concern. However, efforts are underway to arrest and clean up metal contamination in the upper reaches. Impacts to aquatic organisms in the upper Clark Fork River are expected to be greatly reduced, which is anticipated to result in a substantial improvement in water quality and bull trout habitat (USDI 2004 p. 56).

The Upper Clark Fork River Core Area, like the Bitterroot River Core Area, is an example of a watershed where systematic decline of the migratory life history form of bull trout has resulted in the increased prominence of isolated and fragmented residual populations of resident fish. The fluvial migratory component of this population exists at low abundance, although documentation is poor. Adult bull trout to 21 inches total length are occasionally still observed in the Core Area, which may indicate a remnant migratory component that is too small to reliably monitor. Bull trout have essentially been reduced to resident populations in the headwaters of the Warm Springs, Boulder, and Harvey Creek drainages. Twelve bull trout were sampled in the upper Clark Fork River between 1989 and 1994; eight of these fish were found in vicinity of Warm Springs Creek and Racetrack Creek (PTS 2002). Intensive sampling by the Forest Service in headwater reaches of the Little Blackfoot River between 2008 and 2010 yielded two adult bull trout. These fish were later determined to by hybridized with brook trout (J. Lindstrom, pers. Com. 2013). Montana FWP initiated shocking in the Little Blackfoot River in 2007 – no bull trout have been found in these efforts (J. Lindstrom, pers. Com. 2013).

Some bull trout likely out-migrate from tributary streams into the main channel of the upper Clark Fork River. The degree to which this occurs or is influenced by the level of metals and arsenic in the principal channel of the Clark Fork River is speculative. Results of recent population monitoring, completed by MFWP in the lower portion of the core area (near Harvey Creek), indicate that migratory bull trout numbers are low (less than 1 fish per mile). For the Little Blackfoot River, migratory bull trout may be extinct. No bull trout have been identified in recent shocking efforts. If any bull trout are still present, they are likely resident forms in headwater reaches that haven't been sampled.

Current densities of bull trout are likely much lower than their historic levels (Forest Service Biologists estimate an overall 90-95% reduction). The distribution of populations throughout the core area is probably significantly different from historic patterns, as many streams which may have historically contained bull trout now have none, or if they do have bull trout they are typically limited to a very short reach of the stream system. Life form expression is different than historically existed, although the recent removal of Milltown Dam and passage projects at the lower Clark Fork River dams now provides limited potential for adfluvial access from Lake Pend Oreille.

We believe that the Upper Clark Fork Core Area may have supported 1000 to 1500 redds prior to the 1850's. As with most bull trout populations, overall numbers were likely highly variable from year to year, based on natural climatic and disturbance patterns. Streams in the Upper Clark Fork River basin support an abundance of low gradient spawning habitat and are high elevation, suggesting that the area was historically prime habitat for bull trout.

Bull trout populations in Upper Clark Fork were likely first exposed to human-caused impacts in the late 1800's/early 1900's in the form of mining-related impacts, ranching, and some fishing. Gold was discovered in Silver Bow Creek in 1864. In Anaconda, construction of the first of a series of three smelters began in 1883 and by 1903 the Washoe Smelter was daily processing thousands of tons of ore from the Butte area, 26 miles away (MacMillan 2000). Evermann (1891) "…seined the river very thoroughly in the vicinity of Deer Lodge and did not find any fish whatever." He attributed this to suspended solids emanating from the "…concentrators and reduction works at Anaconda and Butte." Human population growth also increased substantially in this period, resulting in increased exploitation of bull trout.

Major impacts to bull trout continued between 1887 and 1908, as six major floods routed silt-sized tailings down Silver Bow and Warms Springs creeks to the upper Clark Fork River (USDI 1998d). In 1908, an estimated 370 year flood event (the largest on record for the Clark Fork River) occurred as a result of rain falling on snow and frozen ground (USDI 2002b). The 1908 flood lasted 10 days and transported mine waste in sufficient quantity to substantially reduce the long term storage capacity of Milltown Reservoir (USDI 1998d).

Three sedimentation ponds were completed in Silver Bow Creek near the confluence of Warm Springs Creek between 1918 (2) and 1959 (1). Sedimentation ponds intercepted much of the mine tailings routed down Silver Bow Creek immediately prior to flowing into the upper reach of the Clark Fork River. Since the mid-1970s, contaminant contribution to the principle channel of the Clark Fork River has occurred primarily through the redistribution of previously deposited sediment and tailings within the channel and floodplain. Significant impacts to fish and aquatic life were documented throughout the 1900's.

Widespread livestock ranching in the Butte/Deerlodge valley began in the early 1900's and has pervasive impacts on bull trout habitat to this day. Many stream channels have been straightened, and riparian corridors have been overgrazed in the wide upper valley of the UCFCA for over a century. Unnaturally wide stream channels and poor riparian vegetation conditions, combined with irrigation diversions that reduce mid-summer flows, have created disconnected stream segments and warm water temperatures. Lack of instream flows in the lower reaches of tributaries, and the affect the reduced flows have on the suitability of the river is a major limiting factor for bull trout in the UCFCA (MBTSG 1995). Many of these impacts are still occurring, and they have become so familiar that they represent the "norm" for many long-time residents of the valley such that there isn't a healthy benchmark for what people perceive as "good" stream health or fish habitat.

The expansion of transportation systems from the 1960's through the 1980's also had a large impact on the UCFCA. Interstate 90 confines much of the main river channel for approximately 40 miles between Missoula and Garrison, cutting off meanders and creating unnaturally straightened channel segments that have eliminated large amounts of juvenile rearing habitat and healthy riparian zones that provide shade and moderate water temperatures. Emergency riprap repairs on the interstate, railroad, and access roads results in frequent localized impacts to the channel as well. For the Little Blackfoot portion of the core area, US Highway 12 and the railroad confine the stream along a substantial portion of the reach between Garrison and Elliston.

During the 1970's and early 1980's, the next significant era impacting Upper Clark Fork River bull trout came about when extensive road building and timber harvest in tributary watersheds resulted in higher sediment levels, less stream cover, and higher water temperatures throughout the system. Finally, a decade of successive drought years in the late 1990's caused even warmer water temperatures that facilitated the upstream expansion of brown trout into the upper watershed and tributary streams, further impacting bull trout populations. The degree to which warm water temperatures, non-native species, or synergistic effects of both have impacted bull trout is unclear.

Although with the dominance of the nonnative brown trout throughout much of the mainstem reaches of the UCF and the lower Little Blackfoot it seems reasonable to presume the impacts of habitat and species changes to bull trout have been major.

In 2008, the removal of Milltown Dam brought about perhaps the first significant positive change in the habitat to benefit bull trout populations in over a century. Bull trout are now able to move freely between the Lower, Middle, and Upper Clark Fork Core Areas. Despite the restored connectivity through Milltown Dam, the UCFCA remains heavily fragmented and dominated by remnant resident populations due to water quality issues (thermal and chemical), and connectivity concerns in the tributaries. The proximity of local population to each other and the condition of migratory corridors (Foraging, Migrating, and Overwintering = FMO habitat) is a concern.

Some of the past direct impacts have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. For instance, new road construction is very limited and many times only temporary roads are used then obliterated, and timber harvest is at very low levels (although this does appear to be changing – at least temporarily -- with current mountain pine beetle outbreaks and increased logging). Fishing regulation changes do not allow people to keep, or intentionally fish for, bull trout. Other impacts, such as ranching, and the legacy effects of transportation systems and mining, still exert significant negative pressures on bull trout populations and overall aquatic ecosystem health in the Core Area.

The high frequency of resident bull trout populations in this drainage makes interpretation of status and trend information difficult. Regular redd count monitoring has been conducted since 1999 for 4 local populations (Boulder Creek, Foster Creek, Twin Lakes Creek, and Warm Springs Creek). Redd counts in Twin Lakes and Warm Springs Creeks are generally in the teens to lower twenties, while those in Boulder and Foster Creek are about half that, in the single digits and low teens (MFWP, unpublished data).

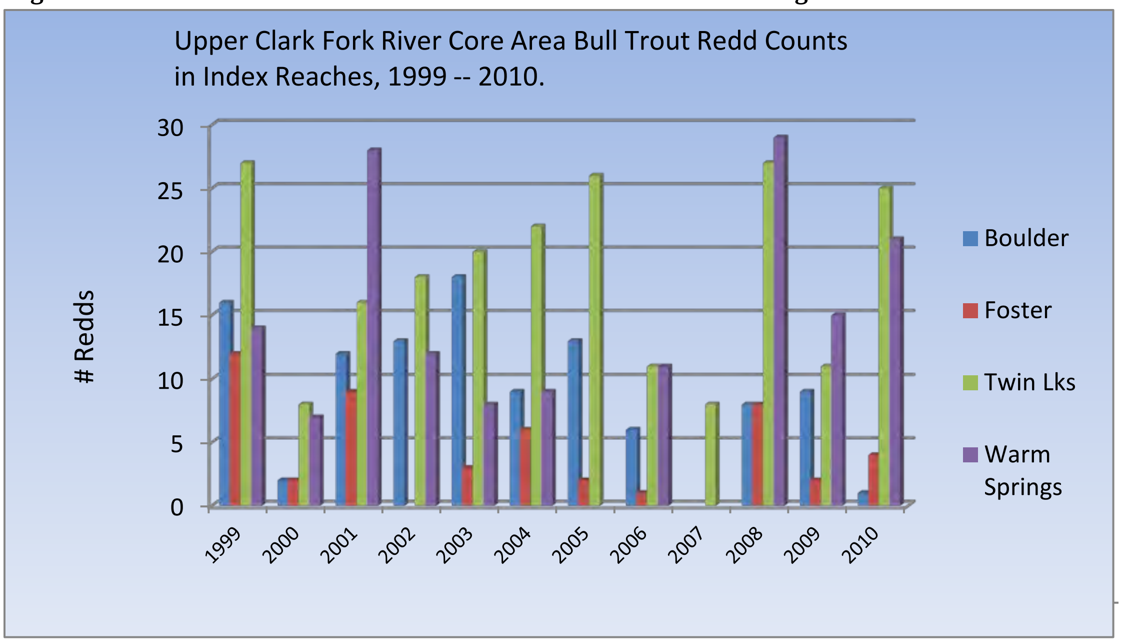
Principal tributaries in the upper reaches of the Clark Fork River that may have had or continue to have some capacity to support bull trout include(d) Warm Springs, Lost, Racetrack, Schwartz, Rock, Harvey, and Flint creeks, and the Little Blackfoot River. Harvey Creek contains resident bull trout, but a fish passage barrier prevents fish from the Clark Fork River from using this stream for spawning. Warm Springs Creek and its tributaries contain bull trout in the upper portion of this watershed. Bull trout habitat in Warm Springs Creek has been fragmented by a series of water structures (Meyers Dam, Twin Lake Diversion, Sliver Lake, Foster Creek Diversion) for nearly 100 years. Schwartz Creek also contains bull trout. The Flint Creek drainage has been considerably impacted from human activity, and currently bull trout densities are considered very low. The Little Blackfoot River drainage historically contained bull trout but recent surveys between 2007 and 2010 indicate abundance is extremely low and they have hybridized with brook trout. Water temperatures and flow conditions, but mostly nonnative species abundance limits the potential for recovery. In general throughout the UCFCA, bull trout populations are mainly resident, at very low levels of abundance, and isolated from one another by human-created barriers to fish migration (MBTSG 1995).

Due to the high degree of fragmentation and the preponderance of mainly resident life forms of bull trout, the UCFCA is highly susceptible to losing further populations as changes in climate bring warmer temperatures and lower summer stream flows. Populations are already highly fragmented and reverting to the resident life history form, often restricted to small isolated headwater patches of habitat. A major portion of the mainstem habitat is largely unsuitable for occupancy by bull trout in summer. All of these factors combine to greatly increase vulnerability of this core area to extirpation.

Current monitoring indices for this core area are considered largely inadequate for monitoring trend, due in part to the fragmented resident populations of bull trout, sparse migratory contribution, and prevalence of non-natives (brook and brown trout) throughout the system. From the available data, the trend in the two monitored local populations (Warm Springs and Boulder Creeks) appears to be at best stable at low levels, possibly declining, but with overall low confidence in this assessment (USDI 2005).

Only four local populations are surveyed for bull trout redds on a semi-regular basis. Collectively, these three reaches are believed to represent habitat and spawning conditions for bull trout within the Core Area. It is unclear what proportion of the total spawning is measured in these four streams. Figure 1-2 shows bull trout redd numbers in the reaches from 1999 through 2009 (FWP and USFS unpublished data). Note that blank years are typically when no survey was conducted – they do not indicate zero redds found.

Figure 1-2. Bull trout redd numbers in the UCFCA from 1999 through 2009.



Currently, the UCFCA appears to support a relatively stable, although very much reduced bull trout population. This population is likely less secure than many populations within the Conservation Strategy.

Upper Clark Fork River Core Area - Beaverhead-Deerlodge and Lolo National Forests

There are three monitored local populations within the core area on the Beaverhead-Deerlodge National Forest. They include: Warm Springs, Twin Lakes and Boulder Creek. Harvey Creek (Lolo NF) and Little Blackfoot River (Helena NF) are also included in this discussion, but are not designated as local populations by the FWS. It is still considered critical habitat and important for bull trout recovery. While bull trout do spawn in other tributaries, these four streams support the majority of the spawning, and redd numbers within them likely represent over 85 percent of the total spawning that occurs in the basin.

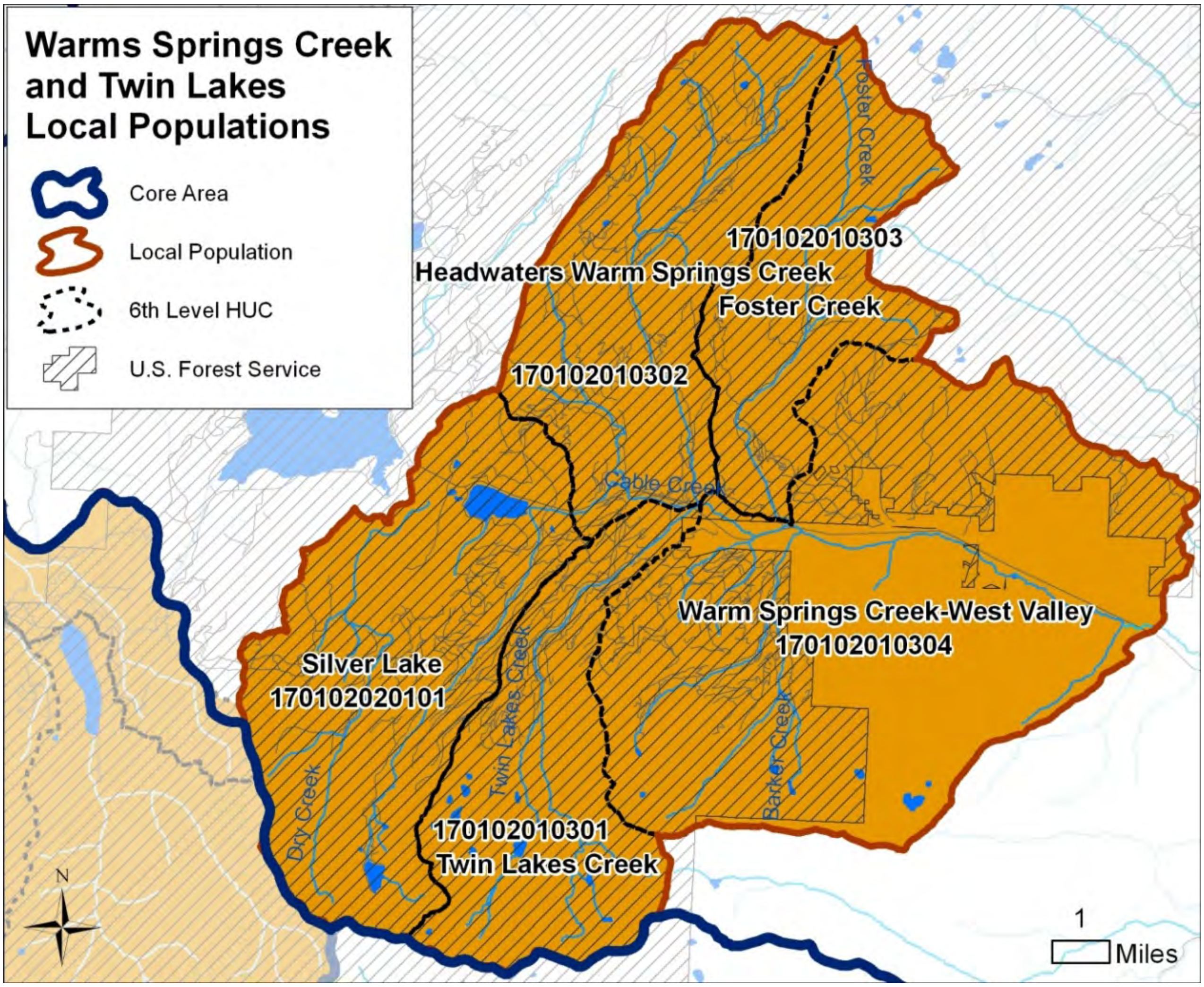
Of the three local populations and two other important populations in the core area, Warm Springs Creek and Twin Lakes Creek currently support the majority of bull trout spawning. Barker Creek (tributary to Warm Springs Creek) also supports high densities of bull trout within the Warm Springs Local Population. One or two large fish (which may have been migratory) have been observed in Barker Creek, but most spawning is likely by resident fish. This concentration of bull trout reproduction in one drainage (Warm Springs Creek) makes the overall population in the UCFCA highly susceptible to extirpation, and makes recovery throughout the Core Area problematic. Large systems like Flint Creek and the Little Blackfoot River were likely much more important spawning and rearing streams historically.

As far as we know, bull trout are at best incidental in the Upper Clark Fork River, extremely rare in the Little Blackfoot, and potentially gone in Racetrack Creek. The population is reasonably healthy in upper Harvey Creek, but isolated from any potentially refounding populations. Low numbers of bull trout exist in limited portions of the Boulder Creek watershed. Bull trout numbers are relatively stable in Warm Springs. The bull trout in the Warm Springs local population occupy the greatest length of stream of any local population in this Core Area. Approximately 75-80 kilometers of stream in the watershed are occupied representing about 80% of the perennial stream miles. This compares to 20 kilometers occupied in Harvey Creek and, at most, 25 km of occupied stream by the Boulder Creek local population. Adult sizes for bull trout in Warm Springs and Boulder Creeks attain sizes of up to 20 inches. In Twin Lakes fish up to 28 inches in length have been observed spawning. Resident adults in Harvey tend to top out at 14 inches in length, with most in the 10-12 inch range.

Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Local Populations: Warm Springs and Twin Lakes

Figure 1-3. Warm Spring Creek and Twin Lakes Creek Local Populations



Relative Importance of Population to Core Area (H,M,L): H

Table 1-1. Warm Springs & Twin Lake Creek Local Population Summary

Number Adults	Short-Term Pop Trend (5 years)	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250*	Stable to Slightly declining	Resident and Fragmented	At least 6 different spawning reaches in 5 streams	EB – High Threat BRN – Medium threat Lake Trout – Low threat
Importance of Geographic Distribution		**Vulnerability to Climate Change**		**Unique Population Attributes**
High – central to persistence and re-establishment of bull trout in upper Clark Fork		Low: These streams are some of the coldest we have; undoubtedly there are spring influences that are/should/will buffering changes in seasonal climate effects. The watershed abuts the continental divide and is relatively high elevation.		Upstream most, population in the Clark Fork drainage. No real occurrence of bull trout downstream probably until confluence of Harvey Creek. Adfluvial populations in upper and lower Twin Lakes and Silver Lake

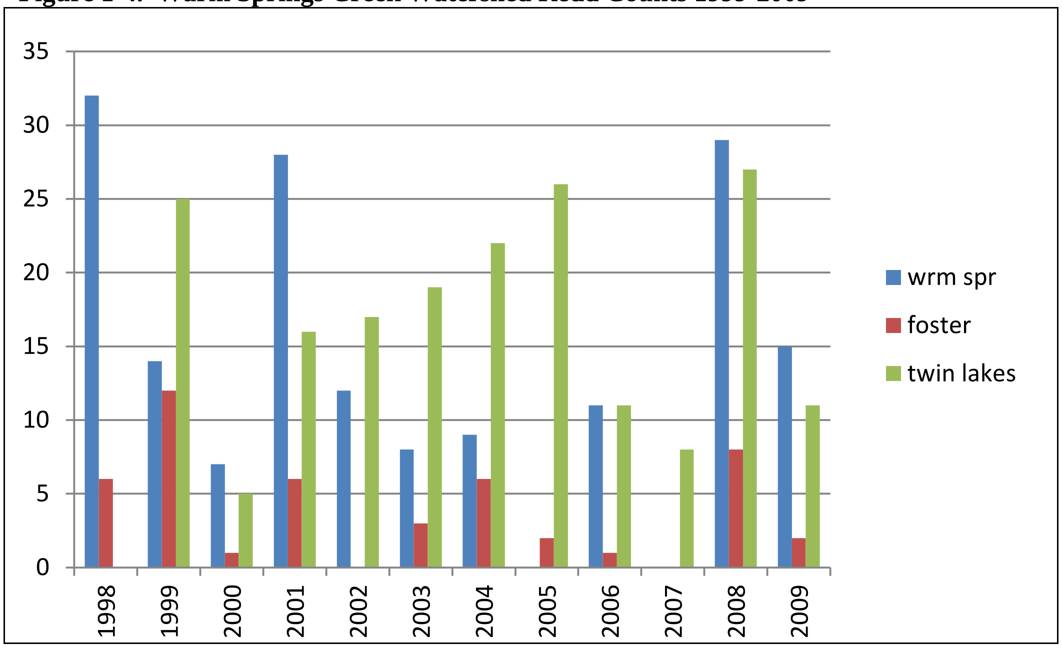
*: Unless otherwise noted, the number of adults is for the core area. Value is taken from USFWS 2005 Conservation Status Assessment. We have no reliable estimates of population size for each local population.

Driving Factors Determining Bull Trout Population:

Both local populations in the Warm Springs Creek watershed (Warm Springs Local Population and Twin Lakes Local Population) seem to be persisting fairly well, but they are fragmented into stream specific isolates that are genetically distinct. These population isolates are depressed due to the presence of widespread non-native fish, habitat fragmentation due to the Butte Silver Bow industrial water supply system, and habitat degradation from historic logging effects in support of mining and smelting operations. Isolation has led to very low effective population sizes and potentially genetic issues. In addition to the populations in Warm Springs and Twin Lakes Creeks, Barker Creek and Storm Lake Creek/Silver Lake also contain genetically distinct populations that contribute to the overall population structure in the Warm Springs Creek watershed.

Fragmentation of habitat, isolation of local populations from other populations and the presence of both hybridizing and competing species are the main limiting factors to bull trout populations.

Figure 1-4. Warm Springs Creek Watershed Redd Counts 1999-2009



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Silver Lake - 170102020101							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High. Isolated population due to Butte-Silver Bow water system. Work beginning to address issue.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FAR	FAR	Pending discussion	1	Pending discussion	Pending discussion	Pending discussion
Pools	FUR	FAR	2014	3	$30,000	M	M
Sediment	FUR	FAR	2014	2	$250,000	M	H

Barriers: There are 4 barriers noted in the baseline. Three of these barriers on the stream were replaced in the summer/fall of 2011 and now provide adequate passage. The final barrier is the dam to Storm Lake. Passage over the dam may or may not provide additional benefit for the population. Thus it is questionable as to whether the baseline should be changed to FA.

Pools/Sediment: FUR call for pools and for sediment is being largely driven by roads in the RCA. Fifty-two percent of the streams have a road within 300 feet of the channel. This equates to 6.7 miles of road. 2.5 miles of these are currently under contract for surfacing and drainage construction. An additional 0.4 miles will be paved where the road is immediately adjacent to the stream. This work was completed in 2010. Sediment source surveys will be conducted after completion to identify ongoing issues with sediment and to validate the baseline condition call. We are currently working with Butte Silver Bow to eliminate approximately 1 mile of road of which 0.3 miles of road is in RCA immediately below Storm Lake along with some stream channel reconstruction. Approximately 1 to 2 miles of stream could benefit from large wood placement in the channel increasing large pool frequency. This would be accomplished through stream enhancement projects.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Warm Springs Creek Headwaters - 17010210302							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High. Greatest length of connected habitat within local population							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR(2)	FAR	-	3	$0	-	-
Barriers	FUR	FAR	5 barrier culverts on the small streams could be replaced by 2014. Remaining culverts require coordination with MDOT. Unknown how long to implement.	1	Could replace 5 culverts on NFS lands for $250,000. Highway 1 barrier cost $250,000+.	M	H
Pools	FAR	FA	5-10 years (2014-2019) from natural recruitment of pine beetle mortality	2	$0	L	M
Sediment	FUR	FAR	Within 5 years	2	$50,000	M	M

Barrier: A box culvert on Montana Highway 1 (Forest Highway I believe) is a barrier and is on a 3rd order stream. We surveyed 6 culverts as part of the fish passage inventory. Five of the six culverts are complete barriers to upstream fish movement; the other poses no fish passage issues.

Temperature: The baseline call for temperature is based on thermograph data and not on the model.

Sediment is being driven by road density and location. 50% of the perennial stream miles have a road within the RCA, equating to 11.8 miles of road within 300 feet of the stream. The valley bottom is relatively wide and flat. Issues with sediment are related to isolated reaches. A sediment source survey will be completed within 2 years. Currently estimate that approx. 2-miles of road improvement through surfacing and drainage would pretty much mitigate sediment issues. Estimates of length and cost will be refined when survey is completed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Twin Lakes Creek - 17010210301							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High for both local populations. 6HUC supports portion of Warm Springs local population, plus Twin Lakes local population. Portion within the Warm Springs local population is isolated and may play only minor role at present. Selective fish passage over BSB diversion would certainly change contribution of this 6HUC to the local population. Twin Lakes local population is adfluvial in two lakes, in relatively unaltered habitat.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FUR(1)	FAR	Approx. 2 years for the first 5 slated for removal. Unknown timeframe for Highway 1 and old Highway barriers. Beginning discussions with BSB to design new diversion structure to selectively pass bull and westslope cutthroat trout.	1	$300,000+	H	M
Pools	FAR	FAR	2012-2019	M	Unknown	L	L
Sediment	FUR(2)	FAR	2012-2014	M	$100,000	L	L

Barriers: There are approximately 8 barriers present on perennial streams. Five of these are culverts that are currently slated for removal with a proposed road to trail conversion project. One of the remaining 3 is the Butte Silver-Bow water diversion that diverts Twin Lakes Creek water to Silver Lake. The other 2 are on Highway 1 and on the Old Highway and are only separated by 50 to 100 yards. The barriers are all on 2nd order Twin Lakes Creek, but are significant to the isolated resident population, so the call is FUR instead of FAR. FWP proposes selective fish passage at the Twin Lakes diversion. It would benefit the local population to remove the barriers on Highway 1 and the old highway. The old highway box culvert is currently under design and will be replaced by Anaconda-Deerlodge County – most likely in 2013.

Sediment is being driven by road location and road density. Need to answer question whether road lengths in baseline include RY roads. 34% of the lengths of all perennial streams have a road in the RCA. This equates to 5.8 miles of road. Sediment introduction from the road occurs primarily from relatively long lengths of road paralleling and immediately adjacent to the stream. Approximately 3 miles of road would probably have to be treated to be fully effective. A portion of these miles we do not have jurisdiction, or a legal easement on the road.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Foster Creek - 17010210303							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Relatively minor (Low) due to high numbers of EBT.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FUR(1)	FAR	2014	1	$200,000	M	H
Pools	FAR	FAR	-	3	$0	L	M
Sediment	FUR(2)	FAR	2014	2	$30,000	L	H

Barriers: There are 2 barriers present. They are both dams associated with the Anaconda Job Corp. Foster creek is a 2nd order stream, but we over-rode the baseline criteria for barriers, because the population in Foster Creek has a resident component and the barriers are a significant impact to the population because of their life history. Both dams are to pool water as a source for fire-fighting at the Job Corp Center. The Job Corp has recently decided they are not necessary, due to other opportunities. One dam is an earthen dam the other is a concrete structure. Initial work to replace these dams is part of a stewardship contract where funding was used for a survey of the stream. The survey will provide sufficient information to design a project to remove the structures and reconstruct the stream channel. $$ will then have to be secured for project implementation. NEPA and Consultation with the FWS are already complete. The stewardship portion of the survey and design was completed in fall of 2010 and implementation will be complete when funds become available, hopefully by 1012.

Sediment is being driven by road location. Fifty-six percent of the perennial stream length has a road within the RCA. This equates to 8.6 miles of road, along Foster Creek. Essentially, only a short portion of this road length is probably introducing sediment into Foster Creek. Road improvements as part of the timber sale there were implemented in 2010. This should mitigate sediment introduction from the road over a majority of the length of road that is delivering sediment. A sediment source survey will be completed by 2012 to document sediment delivery issues on the rest of the road system for subsequent design and improvement.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Valley - 170102010304							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 54%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FUR	FA	-	-	$0	L	L
Pools	FUR	FAR	2015	1	$20,000	M	M
Sediment	FUR	FAR	2014	2	Unknown	L	M

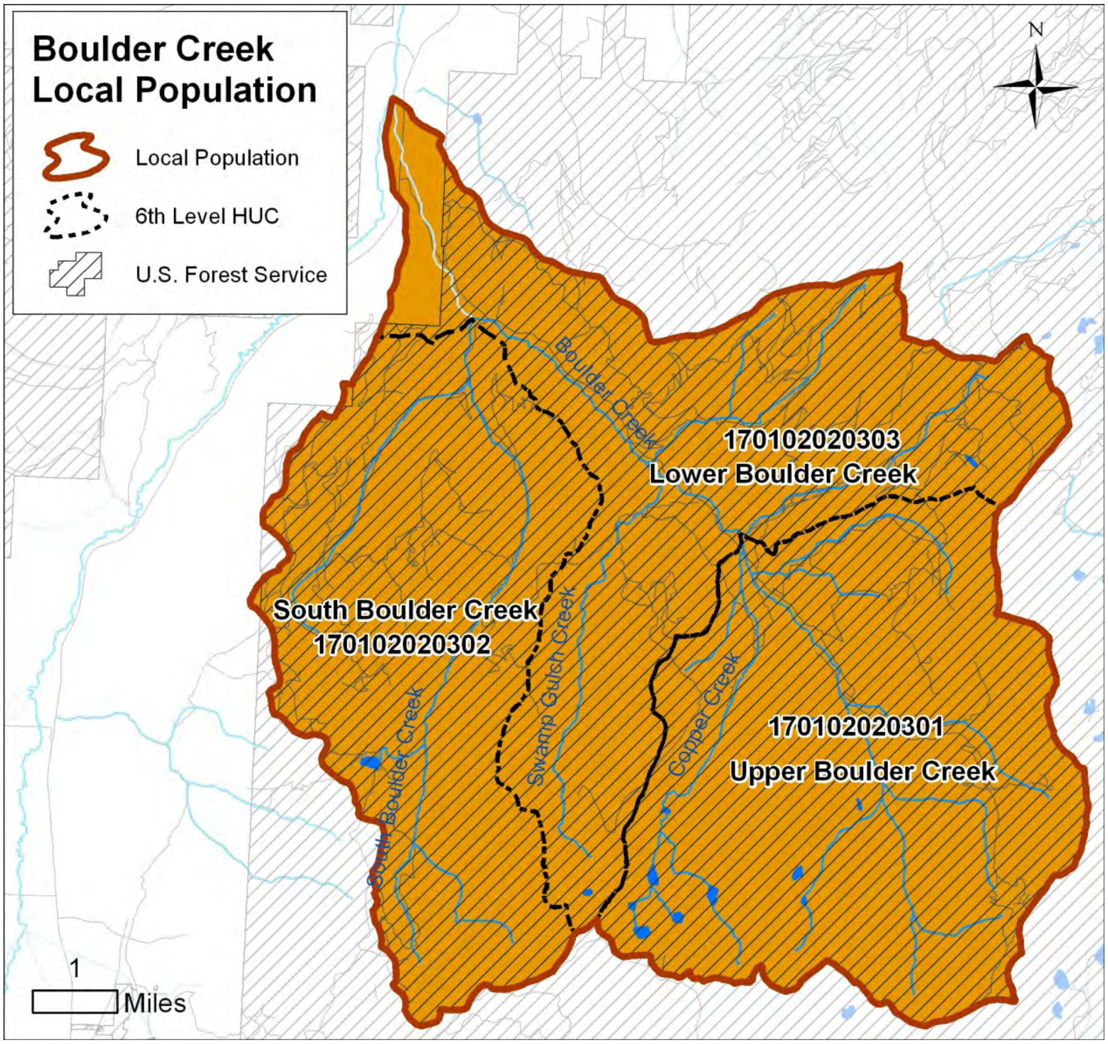
Barriers: Currently the baseline call is FUR. This is based primarily on Meyers Dam blocking upstream fish movement in Barker Creek. Meyers dam is where Butte Silver Bow takes water and pipes it to Butte. This structure is off Forest. At this time this barrier may not be a bad thing for bull trout in that it is preventing large-scale invasion by non-native brown trout(low numbers of brown trout are found upstream of Meyers Dam but do not appear to be expanding in numbers or distribution). We have no barriers on fish bearing streams within the administrative boundaries of the BDNF. Because the baselines are applied only to FS lands, we believe this should allow a revision of the Baseline call to FA. Need to take this up with the Level 1 Team. Interagency discussions are occurring with Butte Silver Bow to address BSBs water system impacts to bull trout in the Warm Springs Creek watershed.

Pools: The pool call is being driven by road proximity to perennial streams. In essence the road proximity to Barker Creek is probably not what is limiting pool abundance and structure. However, pools may be limited from a lack of large wood, due to historic harvest to support smelting and mining operations. There will be a stream survey completed to document this by 2013. If the need to improve pool frequency and quality is documented, the Forest will complete large wood introduction over 4 miles of stream by 2015. Would expect changes to pool abundance and quality to occur by 2017.

Sediment is being driven by road location. Thirty-one percent of the length of all perennial streams has a road in the RCA. This equates to 4.6 miles of road. A sediment source survey will be completed along Barker and Nelson Basin Creeks by 2012. A proposal for mitigation and improvement will be formulated following data collection. Implementation should occur by 2014.

Local Population: Boulder Creek

Figure 1-5. Boulder Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 1-2. Boulder Creek Local Population Summary

Number Adults	Short-Term Pop Trend (5 years)	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250*	Stable to Slightly declining	Primarily resident. Migratory sized bull trout have been sampled in Lower Flint Creek and FWP suspects these are from Boulder Creek.	At least 3 different spawning reaches in Boulder Creek	EBT – Medium Threat BRN – Medium threat

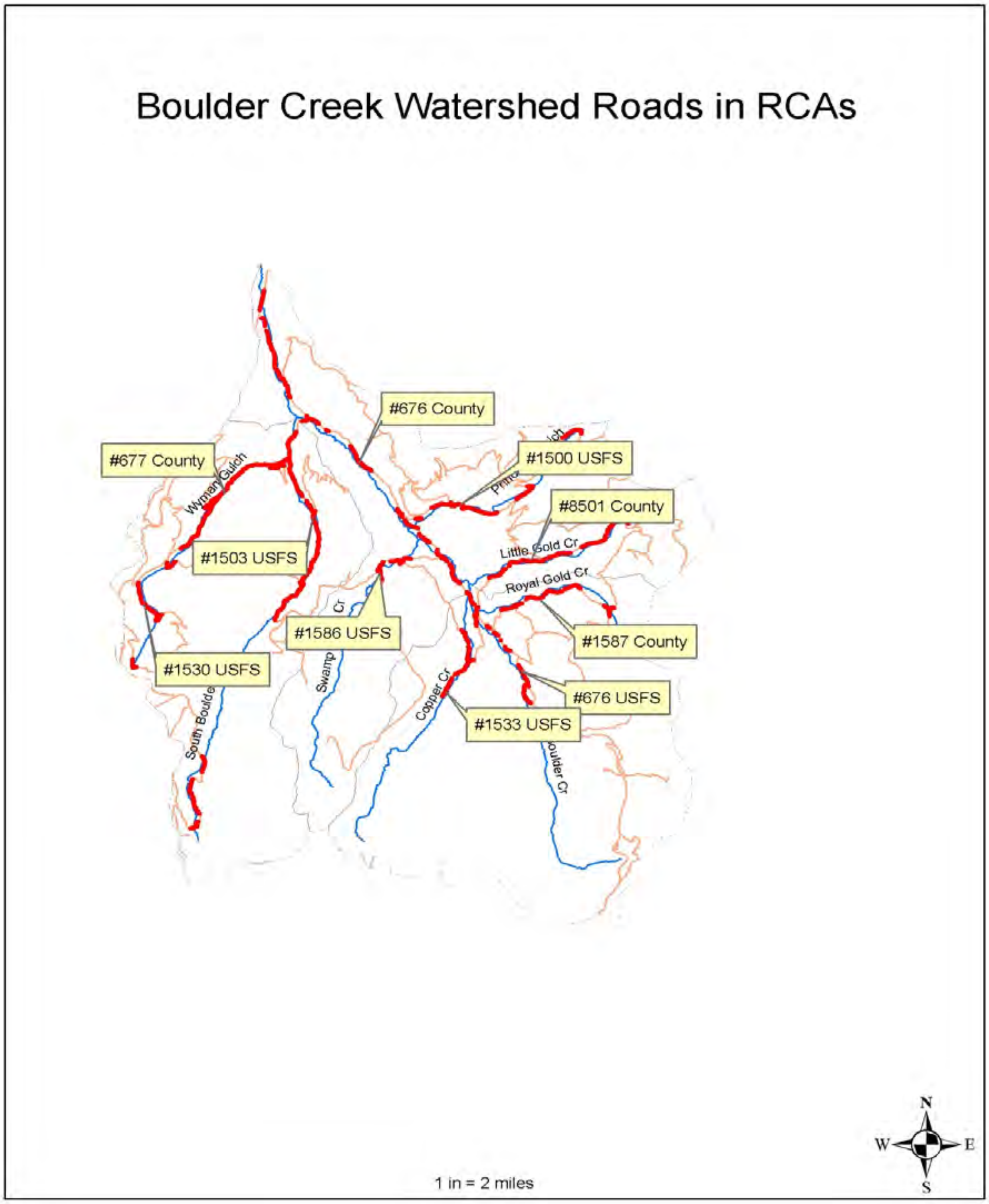
Importance of Geographic Distribution	Vulnerability to Climate Change	Unique Population Attributes
High: This watershed supports the only known local population of bull trout in the Flint Creek drainage.	Low: The Boulder Creek watershed is relatively high in elevation (9,522 on Racetrack Peak – 4,750 at the mouth). It flows in a NW direction, with most drainages flowing north. We have up to a decade of water temperature data in four of the major streams within the watershed. Temperatures have never exceeded 20^{o} C at any site. The uppermost portion of the watershed, where the strongest segment of the bull trout population is found has never exceeded 12^{o} C in six years of data collection. This 5th field watershed should continue to provide a cold water refuge under a warming climate	No. This is an isolated population consisting of resident-sized fish (up to 20") existing primarily in the Boulder Creek 5th field watershed.

*: Unless otherwise noted, the number of adults is for the core area. Value is taken from USFWS 2005 Conservation Status Assessment. We have no reliable estimates of population size for each local population.

Bull trout inhabit all three HUC 6s in the Boulder Creek 5th field watershed but high densities are found in only one. Limited juvenile monitoring has found high densities (up to 30/100m) of juvenile and sub-adults in 6HUC -01, with decreasing densities downstream (-03) and in South Boulder and Wyman creeks (-02).

Boulder Creek has been variable in production of bull trout over the past 10 years redd surveys have been conducted, ranging from a high of 18 redds in 2003 to a low of 2 in 2000. Redd surveys have been done only between Princeton and Granite Creek, about four stream miles upstream. There could be spawning elsewhere but access across private land makes surveying additional reaches difficult downstream of Princeton and low densities of fish in South Boulder and Wyman have not warranted the time and expense to survey these streams.

Figure 1-6. Map of Boulder Creek Watershed Roads in RCAs



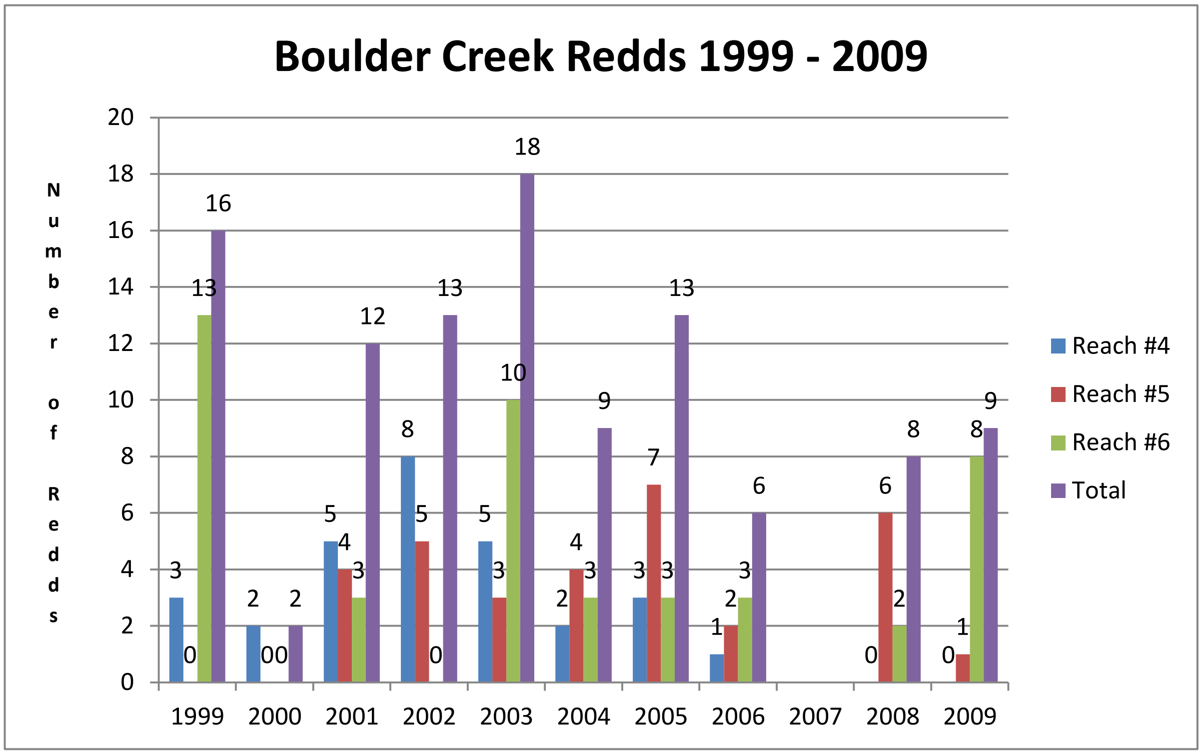
Driving Factors Determining Bull Trout Population:

Boulder Creek is very important to maintaining geographic distribution of bull trout across the Upper Clark Fork Core Area. It is one of only three local populations in this core area on lands administered by the BDNF. The number of redds, in the three index reaches is stable to slightly declining. Since 1999, the mean annual number of redds is 10.6. The past seven years of surveys have yielded 9 (2004), 13 (2005), 6 (2006), 8 (2008) and 9 (2009). No surveys were done in 2007. In

2008, eight redds were detected and nine were found in 2009. No trend in population size is apparent, although numbers and distribution in the watershed appears stable.

Isolation from other populations, limited quantity of available habitat and the presence of competing species (brown trout) and hybridizing species (EBT) are influencing this population.

Figure 1-7. Boulder Creek Redds



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Boulder Creek - 170102020301							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High. Supports the only known spawning for the local population and a large amount of rearing habitat.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA*	-	-	$0	-	-
Barriers	FAR	FA	-	3	$20,000	L	L
Pools	FAR	FAR	-	2	Unknown	L	L
Sediment	FUR	FAR	2019	1	Unknown	L	M

*: Call changed from baseline, using local data.

Temperature: Six years (1997 – 2002) of hobo temp data, collected near the lower end of the 6HUC, indicate water temperatures are FA. At no time did temperatures exceed 12^{o}C.

Barriers: Royal Gold Creek, a 2^{nd} order tributary to Boulder Creek does contain a culvert barrier on road #676. Royal Gold Creek is a high gradient, small stream that likely does not support bull trout. Sampling by Forest Service and FWP has documented WCT and EBT (near the mouth) in this stream. Replacing this barrier culvert may not be a very high priority given the characteristics of the stream upstream of the culvert.

Pools/Sediment: The percentage of stream within close proximity to a road affects both input indicators for the functional status of pools and sediment. Thirty two percent (32%) of perennial streams (4.9 miles) have a road within 300 feet. The Forest, in conjunction with Granite County, needs to assess the condition of these roads, identify sediment sources, and develop a plan to eliminate, or at least minimize sediment delivery to watershed streams from the road system.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): South Boulder/Wyman - 170102020302							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate. Some spawning and rearing likely occurs. Contains nearly 13 miles of suitable habitat. EBT and BRN present.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR*	-	-	$0	-	-
Barriers	FAR	FA	2012	1	$300,000	H	H
Pools	FAR	FAR	-	3	Unknown	L	M
Sediment	FUR	FAR	2019	2	Unknown	M	M

*: call changed from baseline, using local data.

Temperature: We have 8-10 years (1995-2005) of hobo temp data from both streams in this watershed. Water temperatures exceeded 15°C on four days, at one location during the period of record. MFWP placed hobo temps in both these streams in 2007. Their records indicate water temperatures exceeded 15°C on 13 days (max of 16.1°) in South Boulder Creek and eight days (max 15.9°) in Wyman. I've changed the indicator call to FAR based on these data.

Barriers: The BDNF let a contract to replace these structures in FY 2010 with work occurring over the next two years. The Clark Fork Coalition secured funding to replace two additional culverts in Wyman Gulch on private land. These replacements should occur within the next two years. Replacing all barriers will move this indicator to FA by 2012.

Pools/Sediment: The percentage of stream within close proximity to a road affects both input indicators for the functional status of pools and sediment. Sixty one percent (61%) of perennial streams (8.4 miles) have a road within 300 feet. The Forest, in conjunction with Granite County, needs to assess the condition of these roads, identify sediment sources, and develop a plan to eliminate, or at least minimize sediment delivery to watershed streams from the road system.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Boulder Cr - 170102020303							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 94%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate. This watershed provides additional habitat for bull trout in the 5th field HUC. It likely provides rearing and adult habitat and may be used for spawning and rearing. It links the Upper Boulder and South Boulder watersheds. It does support populations of both EBT and BRN.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR*	FAR	2034	3	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	2	Unknown	-	-
Sediment	FUR	FA	2019	1	Unknown	L	M

*: call changed from baseline, using local data.

Temperature: The USFS has 10 years (1995-2005) of hobo temp data from Boulder Creek near the Forest Boundary in this watershed. Water temperatures exceeded 15°C an average of 11 days each year during the period of record, with a maximum recorded temperature of 17.1°C in 1998. MFWP measured water temperatures near the mouth of Boulder Creek in 2007. Their records indicate water temperatures exceeded 15°C on 20 days (max of 17.2°). I've changed the indicator call to FAR based on these data.

Barriers: No fish passage barriers exist in this watershed.

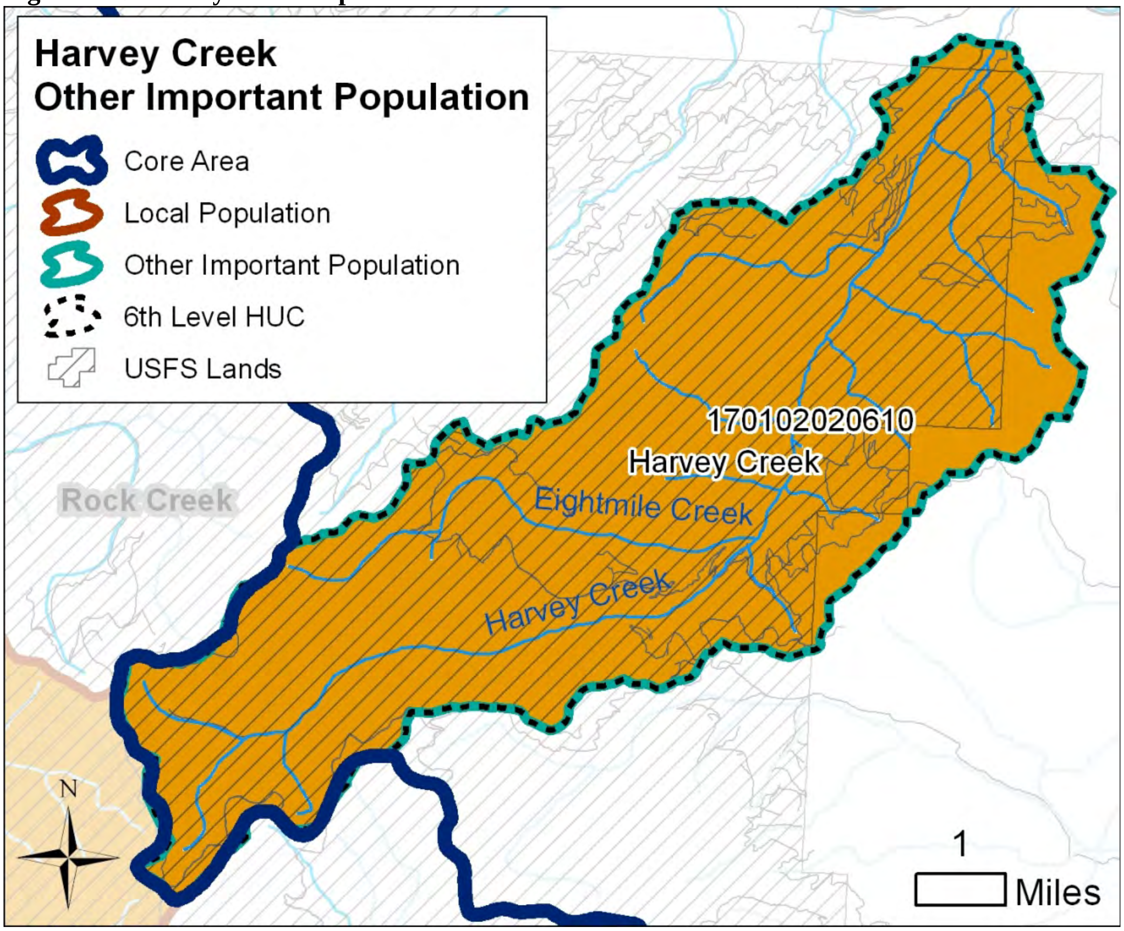
Pools/Sediment: As is the case in the two upstream 6HUCs, the primary factor leading to the FAR call for pools, and the FUR call for sediment, is the amount of stream within close proximity of a road. Forty three percent (43%) of the perennial stream length (8.2 miles) has a road within 300'.

The preponderance of roads within close proximity of the Lower Boulder Creek watershed streams are roads claimed by Granite County. These include road #676 along Boulder Creek and #8501 up Little Gold Creek. Roads administered by the BDNF with substantial lengths near streams include road #1500 in Princeton Gulch and Boulder Creek road #676 upstream Princeton.

The BDNF will need to develop a cooperative arrangement with Granite County to reduce impacts from county roads on streams in the Boulder Creek watershed. The USFS will also need to develop a plan to inventory roads under its jurisdiction and develop and implement a plan to reduce impacts from near-stream roads to negligible levels either through road decommissioning or erosion control methods.

Other Important Population: Harvey Creek (NOT designated by FWS as a local population)

Figure 1-8. Harvey Creek Population



Relative Importance of Population to Core Area (H,M,L): H

Table 1-3. Harvey Creek Population Summary

Number Adults	Short-Term Pop Trend (5 years)	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250*	Stable to Slightly declining	Resident only. No connection with any other local populations. Barrier on Granite County Road upstream of I-90 purposely kept in place by FWP when it was replaced.	0	None known. There is a barrier at I-90 that eliminates upstream access of all species. There are brown and rainbow trout populations in the main river immediately below this barrier.

Importance of Geographic Distribution	Vulnerability to Climate Change	Unique Population Attributes
High: This watershed supports one of the only populations of bull trout between the Rock Creek and Flint Creek drainages.	Moderate: Harvey Creek watershed is low elevation It flows in a NE direction, with most drainages flowing north. We have five years of water temperature data in the mid-point of the watershed. Temperatures have never exceeded 20^{o} C, although summer temperatures as high as 17^{o} C have been recorded and temperatures above 15^{o} C regularly. Despite somewhat warm water temperatures, this 6th level watershed should continue to provide cold water to the Clark Fork River under a warming climate	Yes. Harvey Creek supports an isolated population of bull trout and westslope cutthroat trout in the absence of any non-native species. Even though any fish that descend below the culvert barrier, at the bottom end of the watershed, are lost to the population, Harvey Creek may function as a source population. Selective fish passage could be investigated as an alternative to barrier removal to ensure persistence of the resident population and allow expression of the migratory life history.

*: Unless otherwise noted, the number of adults is for the core area. Value is taken from USFWS 2005 Conservation Status Assessment. We have no reliable estimates of population size for each local population.

Driving Factors Determining Bull Trout Population:

Although it is not designated as a local population, the population in Harvey Creek is very important to maintaining geographic distribution of bull trout across the Upper Clark Fork Core Area. The population may not be secure due to isolation. Harvey Creek supports an isolated population of resident life-history bull trout in about 13 miles of habitat. Due to the barrier near the mouth, non-natives are absent. Risks to the population are primarily related to stochastic events.
Isolation from other populations and limited quantity of available habitat is influencing this population.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

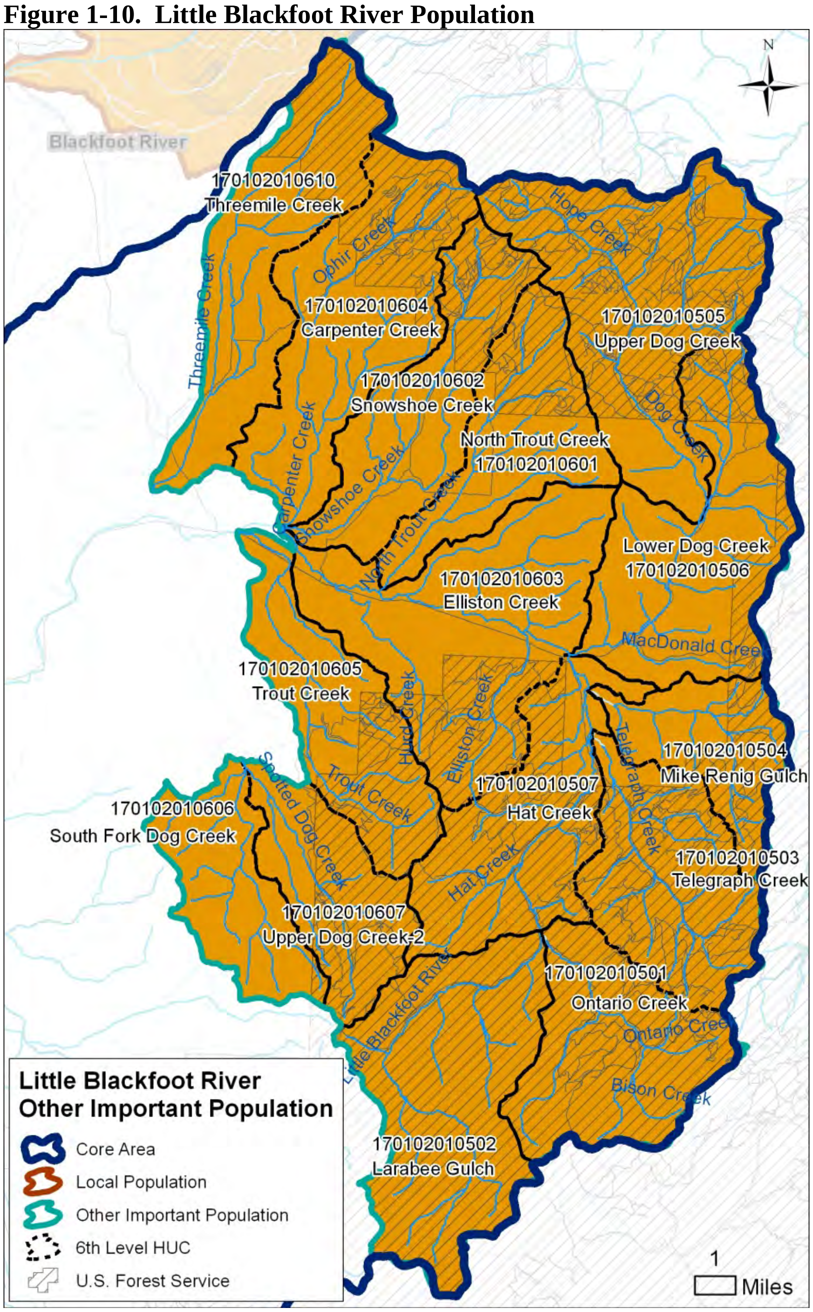
HUC6 (name and #): Harvey Creek - 170102020610							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 89%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High. Although this 6HUC does not support a designated local population, the location in the core area could contribute to recovery due to the watersheds location. The population is currently isolated from other local populations and the Clark Fork River by a barrier near the mouth.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	-	-	$0	-	-
Barriers	FA	FA	-	3	$20,000	-	-
Pools	FAR	FAR	-	2	Unknown	-	-
Sediment	FUR	FAR	2019	1	Unknown	L	M

Generally the condition of the population is not habitat related on National Forest. The baseline rates this 6HUC as FUR for sediment, FA for barriers, FUR for temperature and FAR for pools. The FUR rating for sediment is driven by the percent of low gradient stream within a grazing allotment. 10% (1.6 miles) of the length of Harvey Creek is low gradient. 0.6 miles of this is within allotments. Most of this length of stream has been fenced to exclude cattle. Given this, the grazing sub-indicator should be changed to FAR. With this change, the cascading effect would be to change the sediment indicator to FAR. The FUR rating for the temperature indicator may not accurately reflect actual water temperature. Hobo-temp data indicates that this indicator may actually be FAR. While there may be some room for improvement in habitat conditions in Harvey Creek for bull trout, current habitat conditions are not generally limiting bull trout in this 6HUC. Access is the main limiting factor.

Upper Clark Fork Section 1 (MFCR2): Helena National Forest

Other Important Population: Little Blackfoot River (NOT designated by FWS as a local population)

Figure 1-10. Little Blackfoot River Population



Relative Importance of Local Population to Core Area (H,M,L): L

Extensive sampling from 2008-2010 suggests bull trout are nearly extinct in the Little Blackfoot Drainage. Further, the 2010 final rule on bull trout critical habitat removed the Little Blackfoot as Bull Trout Critical Habitat- thus the assessment of L.

Table 1-4. Little Blackfoot River Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
Less than 50	Likely declining based on 2008-2010 survey	Resident, barriers on many tributaries (culverts and/or diversions). However, some potential for an occasional fluvial fish remains, but potential is likely very low.	1 in the upper Little Blackfoot upstream from Ontario Creek confluence. Habitat is suitable in other reaches of the Little Blackfoot and Ontario Creek	Brook trout, high threat throughout most of the drainage. Brown trout – threat is high but currently limited to the main stem of Little Blackfoot below Ontario Creek all the way to Garrison. Brown trout are also a threat on the following tributaries: Dog Creek, Lower Ophir Creek, Carpenter Creek, and Snowshoe Creek
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High significance – This is a large drainage with several potential spawning and rearing tributaries. The Little Blackfoot represents a relatively large chunk of habitat along the northern portion of the Core Population		Substantial vulnerability due to water temperatures which are currently less than optimum in all habitats within the local population except Ontario Creek. Very high vulnerability to climate change in the lower reaches of the Little Blackfoot River on non-federal lands (both the main stem and tributaries on private lands) due to water withdrawals and existing elevated water temperatures.		None, other than loss of the population would leave a substantial portion of habitat unoccupied in the core population area.

Driving Factors Determining Bull Trout Population:

The Little Blackfoot River is the weakest bull trout local population in the Upper Clark Fork Section 1 Bull Trout Core Area. The drainage is important from the geographic distribution aspect of ensuring bull trout remain well distributed across the landscape. Between 2005 and 2010 the Little Blackfoot River was considered critical habitat for bull trout, but the Little Blackfoot is no longer included as critical habitat in the final 2010 Rule

Bull trout in the Little Blackfoot River population are believed to be nearly extinct based on extensive sampling efforts by MFWP personnel during 2007 and 2008 and sampling by Forest Service fishery personnel in 2010. Currently bull trout are known to exist in only three of the sixteen, 6th level HUs influenced by Helena Forest lands in this Local Population. The decline of bull trout in the drainage is most likely due to hybridization and competition with brook trout in the headwater reaches of the Little Blackfoot River (hybrids have been documented), sport harvest due to miss-identification of bull trout as brook trout, competition and possibly predation by brown trout in the mid and lower reaches of the Little Blackfoot River, and less than optimum water temperatures for bull trout throughout the river; but especially below the Forest boundary. In the reaches of the Little Blackfoot (nonfederal lands) below the confluence of Dog Creek, brown trout are the dominant species in the river and are likely a factor that limits potential for bull trout due to potential for competition and predation. Additionally, downstream of the Forest there are multiple water diversions on the main stem river between Elliston and Garrison. The low flows resulting from water diversion result in increased water temperature during the summer months that are far from optimum for bull trout. The low flows in the river below the Forest inhibit fish movements, but do not present complete barriers to fish movements in most years. Habitat alterations from past highway and railroad location have affected stream morphology and reduced the quality of fish habitat as have agricultural practices on some reaches. In addition to the main stem of the Little Blackfoot River, many of the tributaries below the Forest suffer from water diversion and elevated water temperatures as well. Regarding portions of tributaries below the Forest, there currently is a lack of connectivity from the river to the upper reaches of most tributaries during times when any remaining bull trout would be migrating to spawning areas. Within the forest there are no barriers on the main stem river and few barriers remaining on tributaries.

Sediment levels, although somewhat elevated, are probably not the primary factor limiting bull trout.

Any effort to recover bull trout in the Little Blackfoot River drainage would require extensive efforts at nonnative fish control as nonnative fish are believed to be the primary factor on the Forest limiting bull trout. Water temperatures, although not optimum for bull trout, are adequate. There are additional opportunities to reduce sediment delivery to streams via improved road maintenance efforts as well as obliteration of some roads. There are a few barriers to fish movement remaining on tributaries and cutthroat trout and brook trout are more likely to benefit from removal of barriers than bull trout. Below the Forest nonnative fish as well as low flows and elevated water temperatures associated with water diversion are the most limiting.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Little Blackfoot – Larabee Gulch - 170102010502							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve existing habitat, but rehab short section of road above Kading Campground once travel planning completed. Maintenance of headwater resident population of bull trout can likely only be maintained by control of non-native species.							
% Forest Service Ownership in HUC: 99.9%							
Relative Contribution of Habitat in Limiting Local Population: Low, although water temperature may play a minor role.							
Functional Significance to Local Pop: This HUC likely provides the bulk of the remaining bull trout in the Little Blackfoot; probably over 90% and key to maintaining viability within the local population							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FAR	FAR	5 years	2	$20,000	L	L

Temperature: GIS Rating – FAR. Data and professional judgment suggest FAR is an appropriate rating. Human activities have had low influence in this HUC.

Barriers: GIS rating - FA. There are currently no manmade barriers present on the main stem of the Little Blackfoot River in the HUC. The barrier on a side tributary to the Little Blackfoot at Kading Cabin is being replaced in 2011 which will leave only one barrier left on one other unnamed side tributary and that particular tributary is occupied by cutthroat and brook trout. Bull trout are unlikely to have ever used this remaining tributary with a barrier due to its very small size.

Pools: GIS rating – FAR. Field evaluations and professional judgment suggest FA is more appropriate. Conditions are very good in this HUC upstream of the confluence with Larabee Gulch with limited disturbance from man in most of the HUC.

Sediment: GIS rating - FAR. Field collected fine sediment data suggests elevated levels of sediment are present. McNeil Core samples averaged 38%, but there is no current management related reason for the elevated levels. Additional samples should be collected, but in the meantime a call of FUR for sediment is more appropriate. An old jeep road extended a substantial distance up the drainage, but it functions as a trail and sediment delivery is mostly associated with portions of the road remaining open to wheeled vehicles. Below Kading Campground there is more sediment delivery to the Little Blackfoot occurring from the primary FS access road.

Bull trout recovery efforts in this HUC would need to focus on nonnative fish control first and foremost rather than reducing sediment. There is little to be done to reduce water temperatures. Pool habitat is not believed to be limiting bull trout. Nonnative brook trout are present in this HUC at low to moderate levels depending on location. Brown trout are also present at low density in the lowermost portion of the HUC. Nonnative fish and less than optimum temperatures are the factors affecting bull trout the most in this HUC. Sediment levels likely play a role in reduced embryo survival as well, but negative effects from sediment are secondary to the presence of nonnative fish. Water temperatures are less than optimum for bull trout, but are affected little if any by human related activities in this HUC. There is substantial opportunity to reduce sediment levels associated with obliterating about 1 mile of road upstream of Kading Campground and thereby eliminating one ford of a perennial stream and one ford crossing of an ephemeral drainage as well as eliminating sediment delivery associated with use of dispersed campsites along this piece of road. Additional sediment reductions could be accrued from continued maintenance of sediment delivery points along FS Road #227 and continued closure of the old road in the Larabee Gulch drainage.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Little Blackfoot –Hat Creek - 170102010507

Strategy (Active Restoration, Passive Restoration, Conserve): Conserve existing habitat, ensure road sediment contributions are minimized through annual maintenance. Maintenance of headwater resident population of bull trout can likely only be maintained by control of non-native species.

% Forest Service Ownership in HUC: over 68.4%

Relative Contribution of Habitat in Limiting Local Population: Low except possibly water temperature

Functional Significance to Local Pop: This HUC may still provide very important habitat for the remaining bull trout in the Little Blackfoot.

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FUR	FUR	-	-	$0	-	-
Barriers	FUR	FUR	-	-	$0	-	-
Pools	FUR	FUR	-	-	$0	-	-
Sediment	FUR	FUR	5 years	2	$20,000	L	-

Temperature: GIS rating - FUR. Field data suggests that conditions are similar to the headwaters which have a call of FAR.

Barriers: GIS rating - FUR. Some barriers on side tributaries (Hat Creek) have some habitat suitable for bull trout, suggesting the rating is appropriate.

Pools: GIS rating - FUR. Rating is appropriate as there are portions of the stream where the road has encroached on the stream channel and pools have been reduced, but the degree of reduction has not been quantified. Hat Creek has been substantially impacted by road location for about ¼ mile in the lower reach where bull trout use is most likely.

Sediment: GIS rating - FUR. Fine sediment levels from McNeil core samples averaged 38% from this portion of the Little Blackfoot River and 42% in Hat Creek which supports the GIS rating of FUR.

Nonnative brook trout are present in this HUC at moderate levels depending on location. Brown trout are also present at moderate density in the HUC. Nonnative fish and less than optimum temperatures are the factors affecting bull trout the most in this HUC. Water temperatures are affected little if any by human related activities in this HUC. There is some opportunity to reduce sediment levels associated with improved road maintenance at selected locations. Bull trout recovery efforts in this HUC would need to focus on nonnative fish control first and foremost rather than sediment control. There is little to be done to reduce water temperatures. Unintentional harvest of bull trout is known to occur, but other than educational signs that have been used little can be done. Pool habitat conditions could be improved but like sediment are not considered to be the factor limiting bull trout.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Ontario /Monarch - 170102010501							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 98.4%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low significance; bull trout believed to have been replaced almost entirely by brook trout. Bull trout extremely rare and have not been found in limited sampling for 15 years including extensive sampling efforts in 2010.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	-	-	$0	-	-
Barriers	FAR	FA	5 years	2	$50,000	Low (bull trout not likely to use the small tributary to Ontario where barrier is present.	L
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FUR	FAR	10 years	-	40,000	Low- the bull trout population is more limited by non-native fishes	L

Temperature: GIS rating - FUR. Field data suggest FAR overall with 57°F average maximum summer temperatures in Ontario Creek (FA to FAR) and FAR temperatures in Monarch Creek.

Barriers: GIS rating - FAR. Field information suggests FAR is accurate with a barrier on a tributary to Ontario Creek that would unlikely be used by bull trout. Two partial barriers to fish movement on Monarch Creek are unlikely to pose a barrier to upstream movement by bull trout in late summer or fall.

Pools: GIS rating - FAR. Field evaluation supports the FAR call with some reaches having been affected by past mining and road construction. Numerous reaches have good quality pools.

Sediment: GIS rating - FUR. McNeil core information from Ontario and Monarch Creeks suggests the GIS rating of FUR is appropriate. Fine sediment levels in stream substrates averaged 37% in Ontario Creek and 38% in Monarch Creek. Based on sampling across the Forest average levels of fine sediments are in the vicinity of the 28 to 32% and are considered to be of very high concern when levels are over 40%.

Non-native brook trout are present in this HUC depending on location. Brook trout are dominant in Monarch Creek with only an occasional cutthroat trout being present. No bull trout have been found in Monarch Creek. Cutthroat trout are dominant in Ontario Creek although some brook trout are present as well. Bull trout have been found at very low density in Ontario Creek. Non-native fish is the factor affecting bull trout the most in this HUC. Water temperatures are affected little if any by human related activities in the Ontario Creek portion of this HUC. Bull trout recovery efforts in this HUC would need to focus on nonnative fish control first and foremost.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Little Blackfoot - Elliston - 170102010603							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration- continue with sediment control on existing roads Maintenance of headwater resident population of bull trout can likely only be maintained by control of non-native species.							
% Forest Service Ownership in HUC: 23.8%							
Relative Contribution of Habitat in Limiting Local Population: High (water temperature, diversions, reduced access to tributaries)							
Functional Significance to Local Pop: Currently Low unless there are a few migratory bull trout that use this portion of the river as a migratory corridor.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FUR	FUR	5 years	3	$50,000	L	L

Temperature: GIS rating – FUR. Spot checks of water temperatures during summer when water withdrawals are high indicate that the GIS rating is appropriate with water temperatures in the mid 60's at times

Barriers: GIS rating - FA. Although no complete barriers are on the main stem, there are complete barriers on non-federal portions of streams within the HUC such as Elliston Creek and Hurd Creek. Assuming Elliston Creek was suitable bull trout habitat at one time the rating should be FUR.

Pools: GIS rating - FAR. Cursory qualitative field reviews suggest the GIS rating is reasonable.

Sediment: GIS rating - FUR. McNeil core samples with fine sediment levels in the 32-35% range suggest a rating of FAR is more appropriate given that mostly unmanaged streams have average sediment levels in the 28-30% range. Managed streams have averages in the 30-32% range on the average.

Non-native brown trout are the dominant species in this HUC. Nonnative fish, elevated water temperatures, and low stream flows are the factors affecting bull trout the most in this HUC. Water temperatures are affected substantially due to irrigation withdrawals. Other habitat components have been negatively affected due to constriction by the highway and railroad. Bull trout recovery efforts if undertaken in this HUC would need extreme efforts to remove nonnative fish rather than sediment control or improve habitat features. Efforts need to continue to prevent further increases in sedimentation by continued emphasis on reducing sediment delivery from roads. Given the dominance of brown trout and land ownership it probably is not feasible to manage for bull trout in this HUC.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Mike Renig Gulch - 170102010504							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 42%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: This HUC is currently not contributing bull trout to the Local Population. No bull trout have been found in this drainage.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	-	-	$0	-	-
Barriers	FAR	FAR	-	-	$0	-	-
Pools	FUR	FUR	-	-	$0	-	-
Sediment	FUR	FAR	10 years	3	Unknown	-	-

Temperature: GIS rating – FAR. No data to overrule GIS Rating.

Barriers: GIS rating - FA. The GIS rating does not portray current conditions. There are culvert barriers on two unnamed tributaries to Mike Renig, but they are very small streams and support both cutthroat and brook trout. They likely do not provide habitat for bull trout due to their small size. Additionally, there is a diversion below the Forest boundary that is a partial barrier due to its influence on water flow. Rating should be FAR.

Pools: GIS rating - FUR. Cursory qualitative field reviews suggest the GIS rating is reasonable on the reach of Mike Renig Gulch that has been placer mined, but in other locations the walk through survey suggests a rating of FAR is more appropriate.

Sediment: GIS rating - FUR. McNeil core samples with fine sediment levels averaging over 50% suggest the FUR rating is appropriate.

Discussion with a local landowner indicated that bull trout were found in the drainage many years ago and recalls that brook trout were introduced. There is low potential for bull trout management in this drainage due to the extensive distribution of brook trout. Any management effort for bull trout restoration would need to remove brook trout and reintroduce bull trout.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Telegraph Creek - 170102010503							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 85%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: This HUC is currently not contributing bull trout to the Local Population. No bull trout have been found in this drainage.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	-	-	$0	-	-
Barriers	FAR	FAR	-	3	$0	-	L
Pools	FUR	FUR	-	3	$0	-	L
Sediment	FUR	FAR	10 years	3	Unknown	L	L

Temperature: GIS rating – FUR. Spot checks of summer water temperatures confirm the GIS rating, but there is low influence of human impacts on the temperature regime.

Barriers: GIS rating- FAR. Many of the barriers in this drainage have been addressed. One barrier at the very head end of the Telegraph Creek drainage remains as well as one on an unnamed tributary. Neither stream where barriers are located is likely to have ever been used by bull trout based on stream size and location at the extreme headwaters.

Pools: GIS rating - FUR. Cursory qualitative field reviews suggest the GIS rating is reasonable due to past mining effects on some reaches. Other reaches have better pools but data is not sufficient to override the GIS call.

Sediment: GIS rating - FUR. McNeil core samples with fine sediment levels in the 32-35% range suggest a rating of FAR is more appropriate.

Confidence in your assessment (H,M,L): L

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Dog Creek - 170102010506							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration -Most of Dog Creek in this HUC is under nonfederal ownership							
% Forest Service Ownership in HUC: 19%							
Relative Contribution of Habitat in Limiting Local Population: Low except possibly water temperature							
Functional Significance to Local Pop: This HUC is unlikely to provide more than incidental contribution of bull trout to the Local Population. Dog Creek is dominated by brown trout.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FUR	FUR	-	-	$0	-	-
Sediment	FUR	FUR	-	-	$0	-	-

Temperature: GIS rating - FUR. Field data suggests the FUR rating is appropriate.

Barriers: GIS rating - FA. Field information suggests FA rating is accurate in relation to streams likely to be used by bull trout. There are three barriers on very small streams supporting cutthroat trout that have very low potential to support use by bull trout.

Pools: GIS rating - FAR. Field information suggests that this rating is accurate. Although there have been reaches of streams negatively affected by past mining and channelization for roads, activity by beaver on many reaches has resulted in substantial pool formation in the reaches negatively affected in the past.

Sediment: GIS Rating of FUR. McNeil core information has not been collected from the portion of Dog Creek or Uncle George Creek within this HUC. Field evaluations and visual reviews suggest that the GIS rating is accurate.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Dog Creek - 170102010505							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 54%							
Relative Contribution of Habitat in Limiting Local Population: Low except possibly water temperature							
Functional Significance to Local Pop: Low-- This HUC is unlikely to provide more than incidental contribution of bull trout to the Local Population. Dog Creek is dominated by brown trout.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of pop response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	-	-	$0	-	-
Barriers	FA	FA	-	1	$60,000	L	H
Pools	FUR	FUR	-	-	$0	-	-
Sediment	FUR	FAR	10 years	3	10,000	L	L

Note- Much of Dog Creek where bull trout occupancy is most likely is located on private in-holdings within the Forest boundary. Sampling to date has not confirmed bull trout as present in this HUC. Brown trout are the dominant species currently in the main stem of Dog Creek.

Temperature: GIS rating - FUR. Field data suggests the FUR rating is appropriate.

Barriers: GIS rating - FA. Field information suggests FA rating is accurate in relation to streams likely to be used by bull trout. Also, an additional barrier on Sawmill Creek is planned for replacement in 2011. There is one additional barrier on Dog Creek in the very headwater reaches supporting cutthroat trout that has extremely low potential to support use by bull trout.

Pools: GIS rating - FUR. Field information suggests that this rating is not accurate. Although there have been reaches of streams negatively affected by past mining and channelization for roads, activity by beaver on various reaches has resulted in substantial pool formation. Although livestock grazing has resulted in numerous instances of bank damage on stream reaches of Rosgen E channel type, there still is substantial pool habitat available.

Sediment: GIS rating - FUR. McNeil core information from Dog Creek and several tributaries suggests the FUR is accurate with average levels fine sediments varying from 34 to 43%.

Confidence in your assessment (H,M,L): H

6th level HUCs within the Little Blackfoot Local Population shown below are no longer believed to support bull trout on NFS lands based on field sampling and no work to benefit bull trout is proposed on NFS lands

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): North Trout - 170102010601							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 32%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	-	-	$0	-	-
Barriers	FAR	FAR	-	-	$0	-	-
Pools	FUR	FUR	-	-	$0	-	-
Sediment	FUR	FAR	5 years	3	$75,000	L	M

Temperature: GIS rating - FUR. No data to override GIS rating.

Barriers: GIS rating - FAR. This rating does not reflect current conditions; it should be FUR. There is a culvert barrier on North Trout Creek and an irrigation barrier at the Forest boundary. Clark Canyon Creek also has a culvert barrier on FS lands and irrigation barrier on non-federal lands. North Trout Creek is completely dry for most of the summer below the Forest boundary until near the confluence with the Little Blackfoot. There is little opportunity for bull trout to move into the HUC from the Little Blackfoot River.

Pools: GIS rating - FUR. Field reviews indicate the FUR rating is appropriate for Clark Canyon Creek. There is not enough quantitative data on North Trout Creek to override the GIS rating.

Sediment: GIS rating - FUR. Quantitative sediment sampling has not been completed on streams within this HUC. Visual evaluations suggest the GIS rating of FUR is reasonable. Substantial sediment delivery to North Trout and Clark Canyon occurs as a function of livestock grazing and erosion from existing roads is occurring.

No work for bull trout is proposed in this drainage except to reduce sediment delivery to reaches of the Little Blackfoot River

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Snowshoe Creek - 170102010602							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 31%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FUR	FUR	-	-	$0	-	-
Sediment	FUR	FUR	-	-	$0	-	-

Temperature: GIS rating - FUR. This rating is more appropriately a FAR as the stream is of spring origin and summer water temperatures were found in the 55-60° F range.

Barriers: GIS rating of FA is not accurate. With the complete barrier (dam/lake just below the Forest boundary) the rating for this drainage should be FUR.

Pools: GIS rating - FUR. This rating is appropriate with habitat having been substantially affected by past mining and current livestock grazing on various reaches.

Sediment: GIS rating - FUR. This rating is appropriate as sediment sampling from McNeil core samples averaged over 60% which is very high.

Brown and cutthroat trout are present on the Forest. There is a complete barrier to upstream fish movements located on private lands below the Forest. There is no potential for bull trout in this HUC on Forest. Below the Forest brown trout are the dominant species, but agricultural activities including water diversion substantially limit the potential for bull trout.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Carpenter Creek - 170102010604							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 34%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FUR	FUR	-	-	$0	-	-

Temperature: GIS rating – FUR. No data to override GIS call.

Barriers: GIS rating - FA. No data to override the call for Carpenter Creek, but Ophir Creek has substantial water diversions below the Forest and dry reaches on the Forest due to past mining that function as barriers. Rating should at a minimum be FAR.

Pools: GIS rating – FAR. No data to override existing call for Carpenter Creek but Ophir Creek has suffered extreme negative effects from past mining with substantial reaches lined with rocks in a ditch-like manner.

Sediment: GIS rating – FUR. This rating is appropriate with McNeil core samples averaging over 48% fines in Carpenter Creek.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Trout Creek - 170102010605							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 27%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low - no bull trout contributed from this HUC							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FUR	FUR	-	-	$0	-	-
Sediment	FUR	FUR	-	-	$0	-	-

Temperature: GIS rating - FUR. No information to alter GIS rating.

Barriers: GIS rating – FA. No barriers are known to exist on the Forest

Pools: GIS rating - FUR. Pools have been affected by loss of beaver and downcutting of the stream in some reaches. Livestock grazing has affected other reaches. The FUR rating is appropriate.

Sediment: GIS rating – FUR. McNeil core samples averaged 36% fines and are borderline between FAR and FUR.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): South Fork Spotted Dog - 170102010606							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 19%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FUR	FUR	-	-	$0	-	-

Temperature: GIS rating – FAR. No data to support a change.

Barriers: GIS rating - FA. No barriers documented on Forest.

Pools: GIS rating - FAR. Habitat on some reaches is impacted heavily by livestock grazing but those reaches have now been fenced. The FAR rating is appropriate.

Sediment: GIS rating - FUR. No quantitative evaluations but field reviews suggest sediment levels are in the 35 to 40% level and do merit the FUR rating.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Spotted Dog Creek - 170102010607							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 54%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timelines s of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FUR	FUR	-	-	$0	-	-
Pools	FUR	FUR	-	-	$0	-	-
Sediment	FUR	FUR	-	-	$0	-	-

Temperature: GIS rating - FAR. No data to support changing the GIS rating.

Barriers: GIS rating – FUR. There is one culvert that functions as a completed barrier in this drainage and one that functions as a partial barrier to fish movements. The complete barrier is on the North Fork Spotted Dog Creek, a drainage unlikely to have been used by bull trout

Pools: GIS rating - FUR. No information to support changing the GIS rating. Some reaches have been negatively affected by livestock grazing.

Sediment: GIS rating - FUR. The rating is appropriate with McNeil core samples averaging 40% fine sediment by depth.

There is an irrigation diversion on nonfederal lands at the Forest boundary which entrains large numbers of cutthroat trout that are left stranded when irrigation flows are shut down.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Threemile Creek - 170102010610							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 33%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FUR	FUR	-	-	$0	-	-

Temperature: GIS rating - FUR. Summer spot measurement suggests a FAR rating is more appropriate on Forest as temperatures were 56°F.

Barriers: GIS rating - FA. This rating is appropriate as there are no man-made barriers on Forest. However, there is a natural waterfall barrier located near the headwaters. Barriers are present below the Forest in the form of irrigation diversions.

Pools: GIS rating - FAR. No data to override the call, but based on lack of human disturbance in the drainage it is likely that a FA call is more appropriate.

Sediment: GIS rating - FUR. McNeil core samples not collected but qualitative field evaluations in the unmanaged drainage suggest fine sediment levels are no worse than 30 to 35% which suggests the rating should be no worse than FAR.

This drainage is mostly unmanaged on the Forest and has good habitat. Brook and cutthroat trout are present. There is little opportunity to manage this drainage as a connected stream to the Little Blackfoot due to agricultural activities on private lands.

Confidence in your assessment (H,M,L): M

Upper Clark Fork Core Area Summary:

Table 1-5 summarizes relevant information from each of the 6th level HUC local population. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire Upper Clark Fork Core Area within the borders of the Beaverhead-Deerlodge, Helena, and Lolo National Forests. It does not include necessary restoration activities on other federally managed lands which are critical for overall restoration of the bull trout population in the Core Area.

Table 1-5. Summary of important Local Population attributes and conservation recommendations for the Upper Clark Fork Core Area.

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
Warm Springs/ Twin Lake	Silver Lake	High	Moderate	Active	-	-	-
	Warm Springs Cr Headwaters	High	Moderate	Active	-	-	-
	Twin Lakes Cr*	High	Moderate	Active	Barriers	Unknown	$300,000
	Foster Cr	Low	Moderate	Active	-	-	-
	West Valley Cr	Moderate	Moderate	Active	-	-	-
Boulder Creek	Upper Boulder Cr	High	Moderate	Active	-	-	-
	South Boulder/Wyman	Moderate	Moderate	Active	Barriers	2012	$300,000
	Lower Boulder Cr	Moderate	Moderate	Active	-	-	-
Harvey Creek**	Harvey Cr**	High	Low	Conserve	-	-	-
Little Blackfoot River**	Larabee**	Moderate	Low	Conserve	-	-	-
	Hat**	Moderate	Low	Conserve	-	-	-
	Ontario/Monarch**	Low	Low	Active	-	-	-
	Elliston**	Low	High	Active	-	-	-
	Mike Renig**	Low	Low	Passive	-	-	-
	Telegraph**	Low	Low	Active	-	-	-
	Lower Dog**	Low	Low	Passive	-	-	-
	Upper Dog**	Low	Low	Active	-	-	-
	North Trout**	Low	Low	Active	-	-	-
	Snowshoe**	Low	Low	Passive	-	-	-
	Carpenter**	Low	Low	Passive	-	-	-
	Trout**	Low	Low	Passive	-	-	-
	South Fork Spotted Dog**	Low	Low	Passive	-	-	-
	Upper Spotted Dog**	Low	Low	Passive	-	-	-
	Threemile**	Low	Low	Passive	-	-	-

*This 6th level HUC supports a portion of the Warm Springs local population and also includes the Twin Lakes local population.
** These watersheds do not contain a designated local population of bull trout per the most recent list from the FWS. They are included here due to their location in the core area and their potential to contribute to recovery of the core area population.

Following is a list of specific restoration project recommendations that would directly benefit bull trout recovery. This list only includes those projects of high value to bull trout and is not all inclusive.

Silver Lake: Reduce road-related sediment delivery. Provide selective fish passage from Silver Lake back into Storm Lake Creek.

Twin Lakes Creek: Remove fish passage barriers. Provide selective fish passage over Twin Lakes diversion. Work with Butte Silver Bow County, MFWP and USFWS to manage flows for aquatic resource benefits.

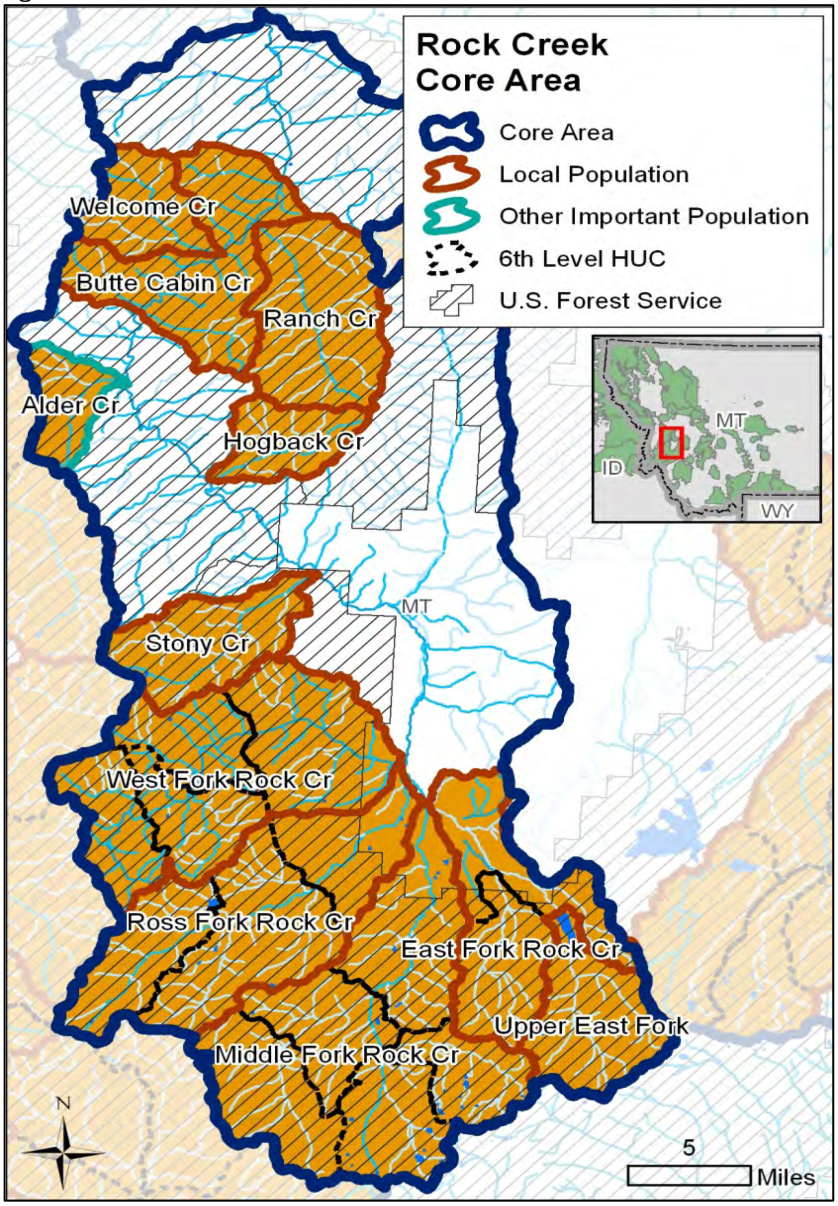
Warm Springs Creek headwaters: Remove fish passage barrier culverts and eliminate road-related sediment delivery.

Foster Creek: Remove fish passage barrier dams at Job Corps Center and address sediment delivery from road #195.

South Boulder/Wyman: Remove fish passage barrier culverts and address sediment delivery from road.

Chapter 2: Rock Creek

Figure 2-1. Rock Creek Core Area



Core Area Discussion:

The Rock Creek Core Area includes all of Rock Creek, from the headwaters to its confluence with the Clark Fork River. As with most core areas, bull trout densities were historically much higher than they are today. Distributions may not have been significantly different, as populations are still relatively widespread where suitably sized streams exist. It is unclear whether the proportion of fluvial to resident forms is currently different than it was in the past. Limited fisheries data makes it difficult to determine which populations have a resident component. The majority of bull trout shocked throughout the drainage are smaller than 300 mm (Liermann et al 2009), indicating that they could be either resident or fluvial juveniles.

Forest Service Biologists estimate that the Rock Creek Core Area may have supported as many as 400 to 800 fluvial bull trout redds prior to the 1850’s. As with most bull trout populations, overall numbers were likely highly variable from year to year, based on natural climatic and disturbance patterns.

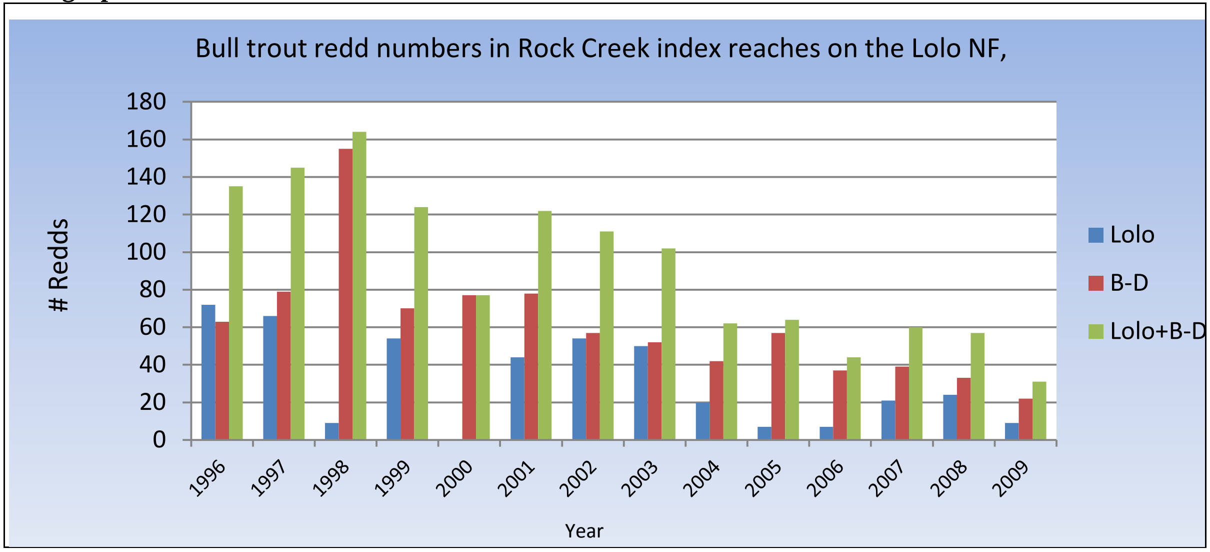
Bull trout populations in Rock Creek were likely first exposed to human-caused impacts in the early 1900’s in the form of small scale ranching, localized mining, and some fishing. The first significant impacts to the population, however, culminated in the late 1930’s to early 1950’s, when several major changes came to the watershed. In 1936, the East Fork Dam was constructed, effectively isolating the entire upper half of the East Fork Rock Creek. Ranching became more widespread, affecting significant portions of the middle and upper reaches. Improved access from roads lead to increased fishing without restrictions on bull trout. In response to higher demand, Fish, Wildlife and Parks began aggressively stocking rainbow trout, which resulted in long-lasting changes to the aquatic community.

The next significant era impacting Rock Creek bull trout was during the 1970’s and early 1980’s, when extensive road building and timber harvest resulted in higher sediment levels, less stream cover, and higher water temperatures in many drainages. A decade of successive drought years in the late 1990’s caused even warmer water temperatures that facilitated the upstream expansion of brown trout into the upper watershed, further impacting bull trout populations. Whirling disease may have also facilitated the upstream expansion of brown trout during this period by reducing rainbow trout numbers and effectively creating unoccupied habitat for brown trout to move into. The degree to which warm water temperatures, non-native species, or synergistic effects of both have impacted bull trout is unclear. It is however, clear that bull trout populations have shown a decline that corresponds with both the expansion of brown trout and the decrease in flows/increase in temperatures associated with the drought.

Many of the past direct impacts have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. For instance, virtually no new roads are constructed any longer, and timber harvest is at very low levels. The drought seems to have subsided, and regulation changes do not allow people to keep, or intentionally fish for, bull trout.

Despite this, bull trout numbers in Rock Creek continue to decline, and population levels are alarmingly low. Figure 2-2 shows bull trout redd numbers in index reaches throughout the basin from 1996 through 2009 (FWP and USFS unpublished data). The data show that bull trout populations on both the Lolo and Beaverhead-Deerlodge National Forests are declining. Over the entire basin, the population decline is even steeper. Annual redd numbers are somewhat higher, and slightly less variable in the upper (B-D NF) portions than in the lower (Lolo NF) portions of the watershed, suggesting that the best opportunity for recovery of the species may be in the upper watershed.

Figure 2- 2. Bull trout redd numbers in Rock Creek on the LNF, B-DNF, and combined, 1996 – 2009. This graph also shows linear trends of the three data sets.



As seen in Figure 2-2, the population trend for bull trout in Rock Creek is precipitously down. During the 14 years of record, combined numbers have declined by about two-thirds. When put in the context of historical numbers, these data are especially concerning. The average number of redds over the past six years has been about 50, while those a century ago were probably ten to twenty times this number (i.e. current numbers are 5-10 percent of historic). While the trend lines should not be taken to indicate that the population will go extinct in a few years, they should be used to suggest that the population is in imminent need of recovery actions that will halt further decline of the population.

Currently, the main factors limiting recovery of bull trout in Rock Creek are probably the extensive non-native fish communities throughout the system (mainly brown trout, but also brook trout in some tributaries), combined with warmer than historic water temperatures. Warm water temperatures are a result of irrigation water withdrawals, climate change, several drought years, and grazing impacts in the middle and upper reaches on both private and Forest Service lands that have caused the stream to become overly wide and shallow and the riparian zone to lose much of its stream shading capacity (Figure 2-3). A lack of large woody debris and overhead shade along the mainstem, caused by decades of grazing, a parallel road, and floaters cutting trees out of the creek, has resulted in fewer large pools and a wider, shallower stream which indirectly has led to warmer temperatures as well. Other chronic impacts, such as the East Fork Dam and associated water manipulations, inadvertent fishing mortality, and poaching probably also contribute significantly to the current population trend.

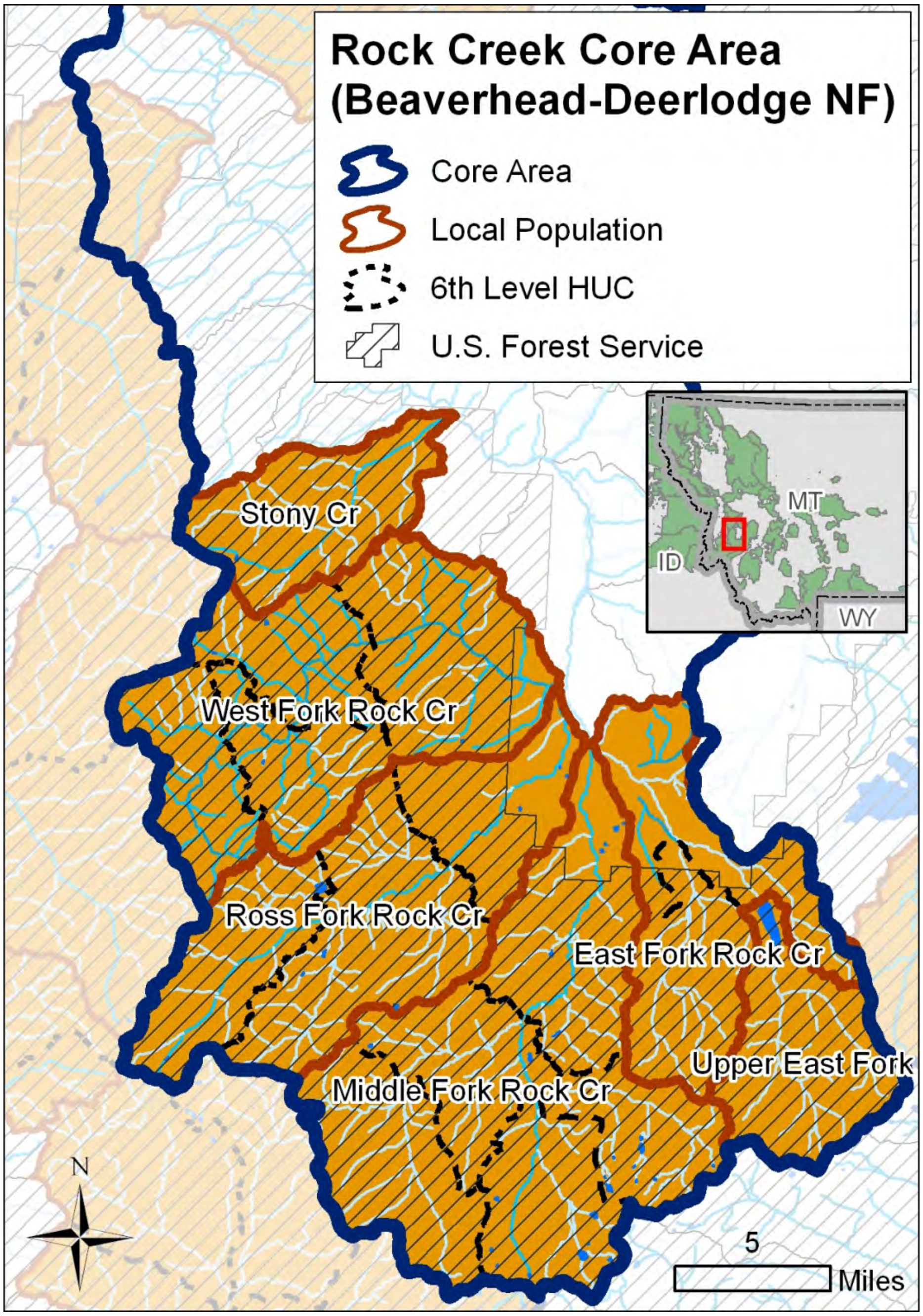
Figure 2-3. This aerial photo shows how portions of the middle reaches of Rock Creek are currently impacted by grazing. Note the over-widened channel, lack of riparian overstory, and numerous braided sections. Some of the braiding is also likely a result of this being a low gradient depositional zone.

While none of the previously mentioned impacts is easy to address, it will be necessary to change them in order to expect to maintain a long-term population of bull trout in the Rock Creek Core Area. It is likely that the impacts from any one of these sources cannot be eliminated entirely, but rapid and successive improvement in each will contribute synergistically to a stronger population, and this will allow us time to work further towards reducing additional impacts.

For example, it is unlikely that we would be able to completely eliminate non-native fish from the watershed. However, the Lolo and Beaverhead-Deerlodge National Forests should coordinate with FWP and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the drainage. There is some uncertainty as to how much benefit suppression of non-native species would provide, given warm water temperatures. This should be evaluated before any actions are taken. In addition, discussion with anglers would also be important given the high level of fishing pressure that Rock Creek receives. MTFWP recently initiated changes in regulations to liberalize brown trout limits – the effectiveness of this on the overall trout population will be monitored in future years. With more unoccupied habitat and less competition from non-native species, bull trout populations may increase. This would be a direct benefit to both native fish populations and the entire aquatic community in Rock Creek. Similarly, cooperative agreements establishing conservation easements or riparian management zones on private grazing lands could significantly improve stream channel dimensions and riparian shading. Planting cottonwoods along road fills adjacent to the stream, and restricting floating to the lower canyon reaches where log jams are less likely could also improve woody debris conditions in the mainstem. Specific restoration activities and types of activities aimed at addressing habitat impacts on federal lands are discussed in detail below.

Rock Creek Core Area – Beaverhead-Deerlodge National Forest

Figure 2-4. Map of Rock Creek Core Area – Beaverhead-Deerlodge National Forest

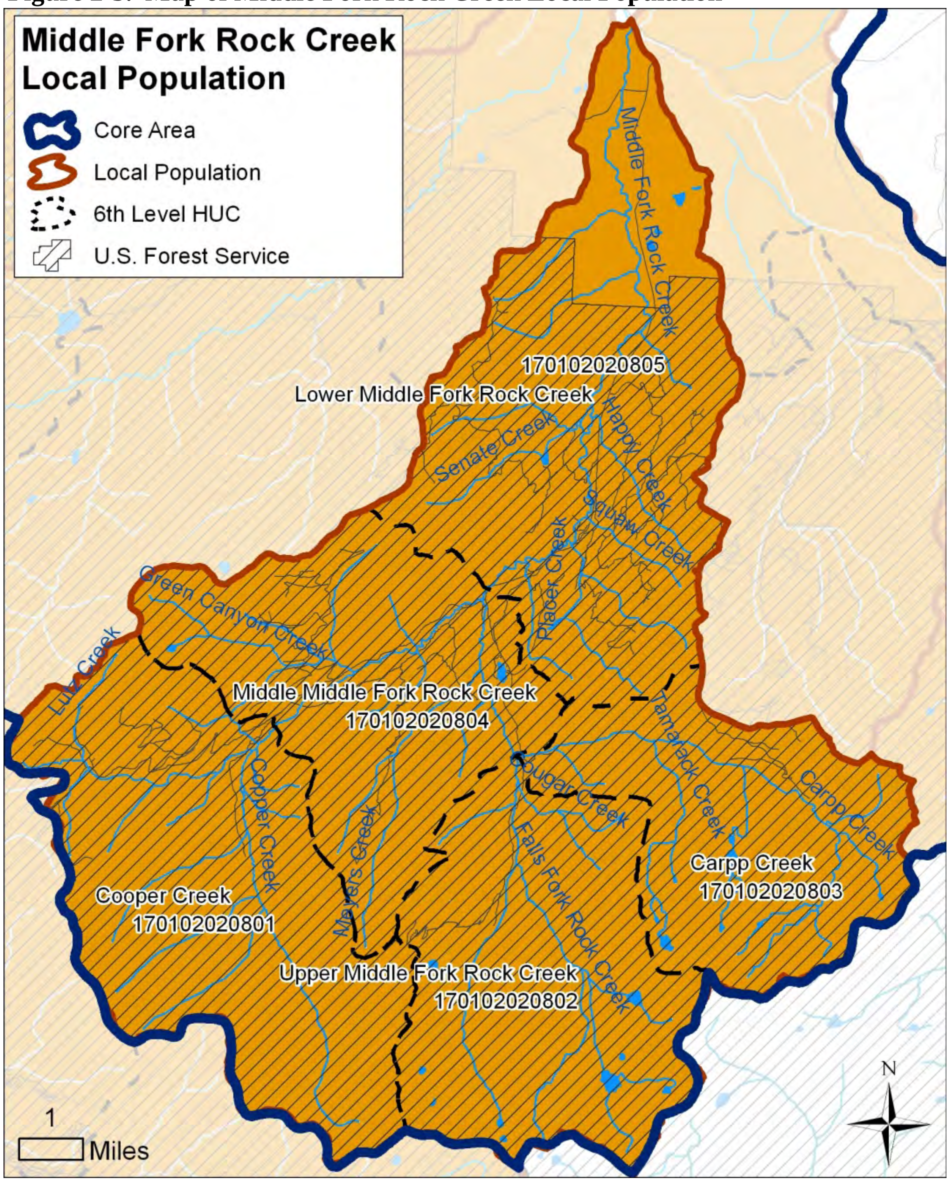


There are five local populations within the core area on the Beaverhead-Deerlodge National Forest – Middle Fork Rock Creek, East Fork Rock Creek, West Fork Rock Creek, Ross Fork Rock Creek, and Stony Creek.

Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Local Population: Middle Fork Rock Creek

Figure 2-5. Map of Middle Fork Rock Creek Local Population



Relative Importance of Population to Core Area (H,M,L): High

Table 2-1. Middle Fork Rock Creek Local Population Summary

Number Adults	Short-Term Pop Trend (5 years)	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
250-1000	Decline	Migratory and resident	Spawning is documented in 3 streams, over a total of 15+ miles of habitat. Additional spawning activity has been noted in the lowermost reaches of 2 additional tributary streams.	Moderate, but increasing threat from both brown and eastern brook trout

Importance of Geographic Distribution	Vulnerability to Climate Change	Unique Population Attributes
High: Traditionally, this watershed has supported the highest number of spawning sites in the Rock Creek Core area. Substantial spawning in 3 streams – Carpp Creek, Copper Creek and the Middle Fork. Minor amount of spawning also documented in Meyers and Tamarack creeks.	Medium: Both warm and cold water tributaries; Copper Creek, the warm water influence, flows through a wide somewhat open valley bottom making it susceptible to warming. Lower reaches of the Middle Fork flow through an open valley. It too is susceptible to warming from climate change. Carpp Creek and the upper Middle Fork both drain high elevation areas and serve as cold water buffers for the watershed.	No, although this local population does provide spawning and rearing habitat for a substantial number of fluvial bull trout in the Rock Creek core area.

*: Unless otherwise noted, the number of adults is for the core area. Value is taken from USFWS 2005 Conservation Status Assessment. We have no reliable estimates of population size for each local population.

Driving Factors Determining Bull Trout Population:

The Middle Fork has supported the highest number of redds in the Rock Creek core area, spread in multiple streams covering at least 25 kilometers. The importance of this local population is critical for the persistence of bull trout in Rock Creek. Redd numbers, in the index reaches of the three main spawning tributaries, appear to be declining. Since 1999, the mean number of redds is 44. The past four years have yielded 32 (2006), 24 (2007), 20 (2008) and 26 (2009).
Colonization of the watershed by brown trout may be the biggest factor influencing the continued persistence of this local population. There are limited opportunities for habitat improvement through sediment reduction from roads.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Middle Fork - 170102020802

Strategy (Active Restoration, Passive Restoration, Conserve): Conserve

% Forest Service Ownership in HUC: 100%

Relative Contribution of Habitat in Limiting Local Population: Low

Functional Significance to Local Pop: High. Provides critical spawning and rearing for fluvial fish from the Rock Creek core area.

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Restoration Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FAR	-	1 (High)	$0	L	L
Barriers	FA	FA	-	3 (Low)	$0	L	L
Pools	FA	FA	-	3 (Low)	$0	L	L
Sediment	FAR	FAR	-	3 (Low)	$0	L	L

The primary impacts occurring in this watershed that may improve the functional status of both pool habitat and sediment would be to address road-related sediment (1.2 miles of stream has a road within 300' of it) and to reduce livestock impacts. Currently, cattle grazing in this watershed is intensively managed and there is some uncertainty as to how much habitat would be improved even if cattle were removed. There is concern from some biologists that current grazing adds to sediment and reduces habitat quality on BDNF grazing allotments in this watershed. MTFWP, USFS, and USFWS fisheries personnel should coordinate to evaluate impacts and propose changes to grazing allotment management plans if it is determined that they would benefit bull trout populations.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Cooper Cr - 170102020801							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High. Provides moderate spawning and rearing for fluvial fish.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FAR	FAR	2030	1	$40,000	L	L
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Some improvement to baseline conditions could be made by replacing fish passage barrier culverts on Lutz Creek and by fixing road-related sediment issues on road #80.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Carpp Creek - 170102020803							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 99+%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High. Provides critical spawning and rearing for fluvial fish from the core area.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

This is one of only a few 6HUCs at FA in all categories.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle Middle Fork - 170102020804							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 99%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High. Provides critical spawning and rearing for fluvial fish from the core area.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA	FA	2030	-	$40,000	L	M
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FUR	FAR	2015	-	$150,000	M	H

Temperature: The water temperature call was changed from FUR to FAR based on HOBO temperature data collected between 1996 and 2003. Copper Creek typically exceeds 15°C for a short period each summer, with maximum temperatures reaching 17°C occasionally. Seven-day moving average maximum temperatures marginally exceed 15°C each year for a short period. There are few management activities affecting water temperatures in the watershed. Current temperature regime is likely a reflection of natural conditions.

Barriers: One fish passage barrier exists in this watershed, on Green Canyon Creek. This is a first order tributary to Copper Creek. Replacing this culvert is a low priority for bull trout but would provide some additional small stream habitat.

Sediment and Pools: The primary issue with both the pool and sediment indicators in this watershed is related to the proximity of the roads to watershed streams. 6HUC -0804 has 5.6 miles of road within 300 feet of a stream. In order to change the FUR status for **road density and location**, we will need to eliminate adverse road effects on about half the road length within RCAs. This will require several steps.

1. Sediment source surveys on all road segments within 300' of perennial streams.
2. Develop and implement sediment reduction plans for those road segments.
3. Identify and decommission Forest roads not needed for future management.

Road #80, from the junction with #5106 to Frog Pond Basin, is a county road. The portion of road #5106, between road #80 and Moose Lake, is also a county road. Total length of these county roads within 300' of perennial streams is about 2.9 miles in -0804. Improvements to reduce erosion and sediment delivery to streams will require coordination with Granite County.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Middle Fork - 170102020805							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 99%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate. Functions as a critical migratory corridor for fluvial fish from the core area accessing upstream spawning and rearing habitat.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	2030	3	$0	L	L
Barriers	FAR	FA	2020	2	$70,000	L	M
Pools	FUR	FAR	2015	2	$10,000	L	H
Sediment	FUR	FAR	2015	1	$10,000	L	H

Barriers: The Forest has identified three fish passage barriers in this 6HUC. All are on 2nd order tributaries. Replacing one will require coordination with the county (Placer Creek), while the other two are on FS roads (Senate and Happy creeks).

Temperature: Two years (2005-06) of temperature monitoring, located near the Forest boundary, indicate that maximum water temperatures do exceed 15^{o}C for periods of time each year. In 2005, temperatures exceeded 15^{o}C for 31 days, with a maximum temperature of 17.1^{o}C and a mean temperature of 15.2^{o}C during this period. In 2006, temperatures exceeded 15^{o}C for 56 days, with a maximum temperature of 20.2^{o}C and a mean temperature of 16.8^{o}C during this period. Additional data collection should be undertaken to establish an expected range of summer water temperatures. Addressing upstream human impacts may, over time, result in a decrease of water temperatures if they are responsible for the existing temperature regime.

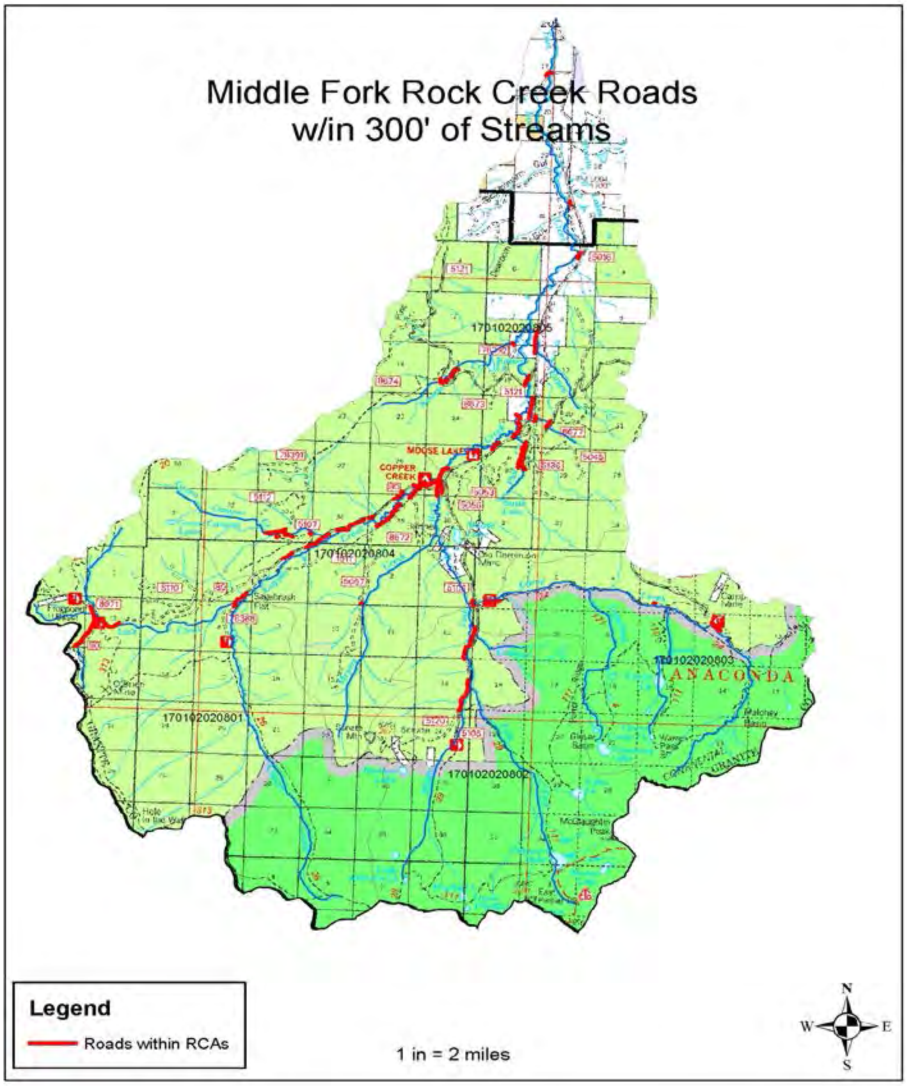
Sediment and Pools: The primary issue with both the pool and sediment indicators in this watershed is related to the proximity of the roads to watershed streams. Thirty percent (30%) of perennial streams in 6HUC -0805 have a road within 300 feet of the channel. In order to change the FUR status for **road density and location**, we will need to eliminate adverse road effects on at least half the road length within RCAs. This will require several steps.

1. Sediment source surveys on all road segments within 300’ of perennial streams.
2. Develop and implement sediment reduction plans for those road segments.
3. Identify and decommission roads not needed for future management.

Road #5106, from the Forest boundary to the junction with road #80 is a county road. One point six (1.6) miles of this road lies within 300 feet of a perennial stream. Improvements to reduce erosion and sediment delivery to streams, from this road, will require coordination with Granite County. Another 4.1 miles of Forest roads are within 300 feet of a perennial stream.

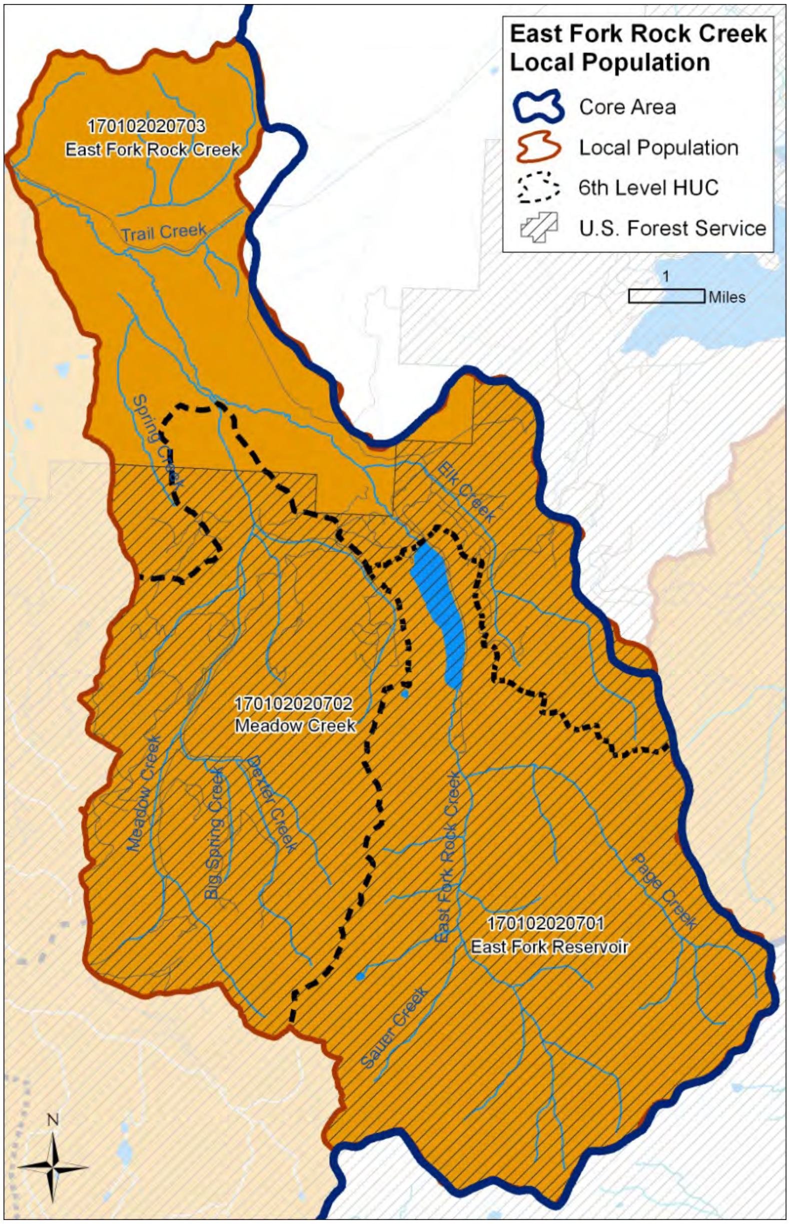
The other indicator affecting the functional status of the **sediment** indicator is **streambank stability.** The input factor driving the streambank stability indicator to an FUR rating is the condition of the riparian conservation areas. Road proximity to streams is driving the RCA to an FUR rating. Identifying and implementing the road strategy described above should result in an improvement in the functional status of the sediment indicator to FAR within five years.

Figure 2-6. Middle Fork Rock Creek Road w/in 300' Feet of Streams



Local Population: East Fork Rock Creek

Figure 2-7. East Fork Rock Creek Local Population



Relative Importance of Population to Core Area (H,M,L): Moderate

Table 2-2. East Fork Rock Creek Local Population Summary

Number Adults	Short-Term Pop Trend	Life History, Connectivity	# Known Spawn Areas	Nonnative Species, threat
250-1,000*	Unknown	Resident	1	High threat from both Eastern brook and brown trout

Importance of Geographic Distribution	Vulnerability to Climate Change	Unique Population Attributes
Moderate. The East Fork and Meadow Creek support mostly non-native eastern brook trout and brown trout. The importance of this local population could increase if water management issues associated with the East Fork reservoir are resolved. Bull trout flushed from the East Fork reservoir have the potential to add to the downstream population.	HIGH: The East Fork, downstream of the reservoir, and its' tributary, Meadow Creek, are warm, with the East Fork exceeding 15^{o}C for 40+ days in each of the five years data were collected. Meadow Creek also exceeded 15^{o}C during the season water temperature data was collected. Both 6th level watersheds flow through lower elevation, relatively broad valleys, allowing fairly high levels of solar input. In addition, the lower East Fork 6HUC (-0703) flows primarily through an open, unforested valley. Flows in the East Fork Rock Creek, in this 6HUC are severely impacted by irrigation withdrawal, increasing the potential for measurable effects solar inputs.	This local population consists of primarily resident fish, in low numbers, in the presence of both eastern brook trout and brown trout.

*: Unless otherwise noted, the number of adults is for the core area. Value is taken from USFWS 2005 Conservation Status Assessment. We have no reliable estimates of population size for each local population.

Driving Factors Determining Bull Trout Population:

The presence of high numbers of both competing species (brown trout) and hybridizing species (eastern brook trout), in degraded habitat, and severely altered flow regime, limit the potential of this local population to contribute to the recovery of the core area population.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Meadow Creek – 170102020702

Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration

% Forest Service Ownership in HUC: 97%

Relative Contribution of Habitat in Limiting Local Population: Moderate

Functional Significance to Local Pop: High. Contains 73% of habitat on USFS for the local population. Non-natives present in high numbers. Some spawning occurs despite degraded habitat.

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timelines s of opps (H,M,L)
Temperature	FUR	FAR	10 years	2	$50,000	L	L
Barriers	FAR	FA	15 years	2	$50,000	L	L
Pools	FAR	FAR	-	3	$0	L	L
Sediment	FUR	FAR	15 years	2	$50,000	L	L

The model uses the condition of the RCA and peak and base flows as surrogates for the functionality of both the temperature regime and streambank stability. The primary driver making these indicators FUR is the amount of stream with a road in close proximity. The current situation does not take into account actions that have already occurred to remedy the current condition. Road #8678, along Dexter Creek has been converted to a non-motorized trail, eliminating almost 2 miles of RCA road. The Pintler RD will develop their Motor Vehicle Use map (MVUM) in 2012. The District

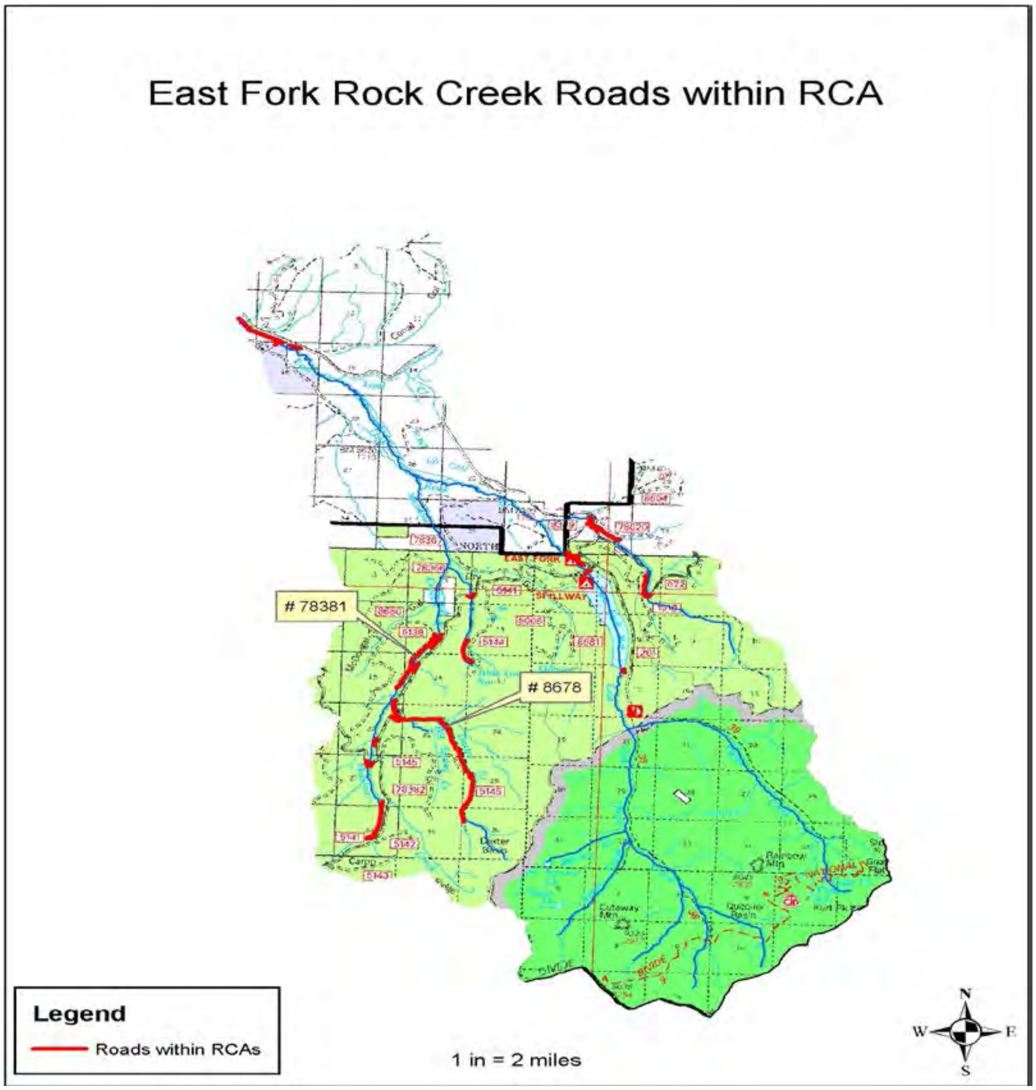
has identified the highest risk road (to aquatics) in this 6HUC for decommissioning (road #78381). These two routes comprise over 65% of road length within RCAs. Fixing problems on these routes will move the baseline to FAR for both sediment and temperature.
The 2002 culvert inventory identified four barrier culverts in this watershed. None of these block upstream fish movement to substantial lengths of suitable habitat. Priority to replace these pipes is: #1 Dexter Creek, #2 McDougal Creek, #3 meadow Creek, #4 Blue Grotto Creek.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): East Fork Rock Creek – 170102020703							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 37%							
Relative Contribution of Habitat in Limiting Local Population: Low to Moderate							
Functional Significance to Local Pop: Low. Contains 27% of habitat on USFS for the local population. Supports high numbers of EBT and BRN. High density of T. tubifex worms.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	Unknown	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FUR	FAR	15 years	3	Unknown	L	L
Sediment	FUR	FAR	15 years	3	Unknown	L	L

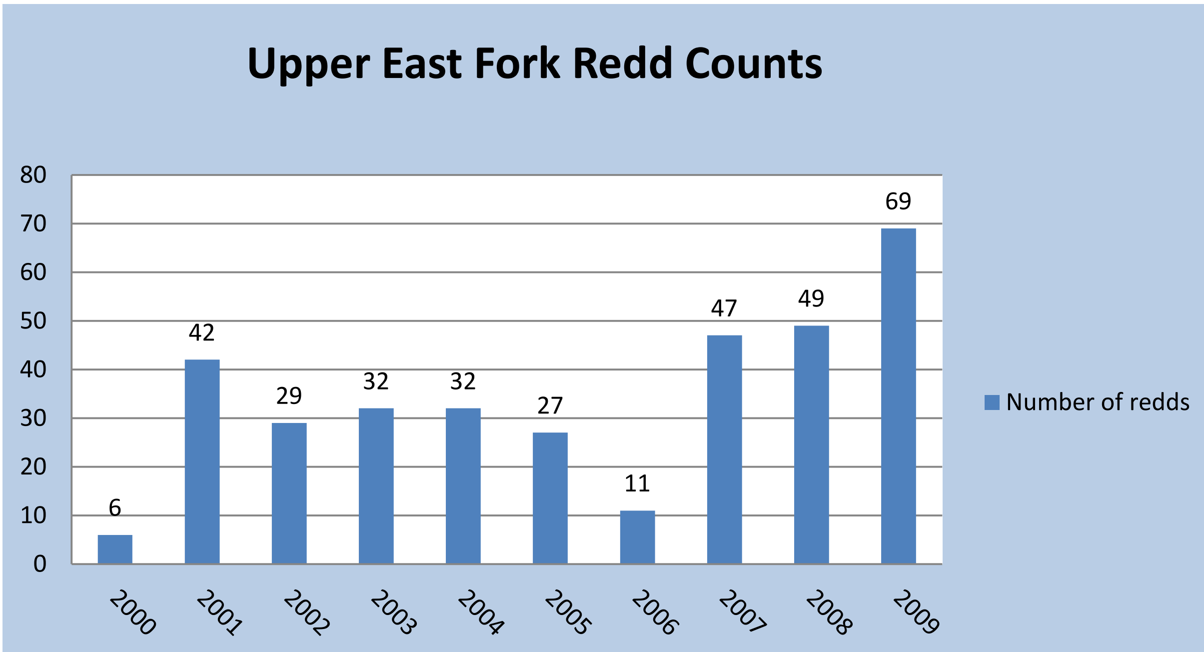
Only about a third (37%) of this 6HUC lies within the external boundary of the National Forest, and probably ¼ of this is privately owned. These conditions make our ability to effect change in baseline conditions relatively low. Over 1/3 of the length of perennial stream, with a road in the RCA, occurs on private land. Attempting to change the baseline calls in this 6HUC are a low priority.
However, there are actions that the USFS is working on that should provide substantial benefits to bull trout in this 6th level watershed. These actions are tied to East Fork dam and diversion. Currently, the USFS is evaluating a “Ditch Bill” application submitted by Montana DNRC. The DNRC owns the dam and diversion and markets the water to irrigators in the Flint Creek drainage. Ongoing discussions have identified the need to prevent loss of bull trout into the diversion and provide sufficient instream flows (including timing and volume) to the East Fork Rock Creek downstream of the diversion to sustain functionality of the stream channel.

Figure 2-8. East Fork Rock Creek Roads within Riparian Conservation Areas (RCA)



Upper East Fork Rock Creek (East Fork Reservoir)

Figure 2-9. Upper East Fork Rock Creek Redd Counts



Redd counts only include those within the bounds of the reservoir full pool elevation and up to the mouth of Page Creek (R4). It does not incldue reach 5, from Page Creek to Sauer Creek because of insufficient number of years of data.

Relative Importance of Population to Core Area (H,M,L): High

Table 2-3. Upper East Fork Rock Creek Population Summary

<table>
<tr><th>Number Adults</th><th>Short-Term Pop Trend</th><th>Life History, Connectivity</th><th># Known Spawn Areas</th><th>Nonnative Species, threat</th></tr>
<tr><td>100+</td><td>Stable</td><td>Adfluvial in the reservoir. Isolated from local population downstream.</td><td>2</td><td>Eastern brook trout – Low threat</td></tr>
<tr><th colspan="2">Importance of Geographic Distribution</th><th colspan="2">Vulnerability to Climate Change</th><th>Unique Population Attributes</th></tr>
<tr><td colspan="2">High. The East Fork reservoir supports a sizeable population of bull trout. The dam precludes invasion by non-native brown trout. Bull trout flushed from the reservoir have the potential to add to the downstream population.</td><td colspan="2">The East Fork, and its' tributary, Page Creek, are cold (based solely on spot temps collected during sampling efforts). The drainages are high elevation, on generally north aspects, in deeply incised canyons, abutting the continental divide.</td><td>The East Fork, above the reservoir, supports primarily bull trout. Some eastern brook trout inhabit the reservoir and occasionally move into the stream above the head of the reservoir, but do not appear to be established. Rainbow trout were historically planted in the reservoir and still exist in low numbers but have not established themselves upstream. Westslope cutthroat trout have been planted in the reservoir since 2004 and appear to be establishing themselves in the East Fork, upstream of the reservoir.</td></tr>
</table>

Driving Factors Determining Bull Trout Population:

Isolation from the rest of the core area, loss of surface flow upstream of the reservoir and uncertain water levels in the reservoir. The loss of surface flow prevents upstream movement of bull trout to suitable spawning areas and contributes to mortality of eggs in redds as the stream loses surface flow. Loss of surface flow also prevents fish from returning to the reservoir following spawning, contributing to mortality of adult fish. Low water levels in the reservoir during winter months may cause stress to fish through a variety of mechanisms including low oxygen levels, competition for food and space.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): East Fork Reservoir – 170102020701							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve and Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low to Moderate							
Functional Significance to Local Pop: High. Single 6th level supporting population.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FA*	3 years	1	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FAR	-	3	$0	L	L
Sediment	FAR	FAR	-	3	Unknown	L	L

*: Water temperatures in the East Fork are cold, based on spot samples and two years of data collected by PIBO. Documented maximum daily temperatures were 8.8° and 9.1° C in 2009 and 2004, respectively.

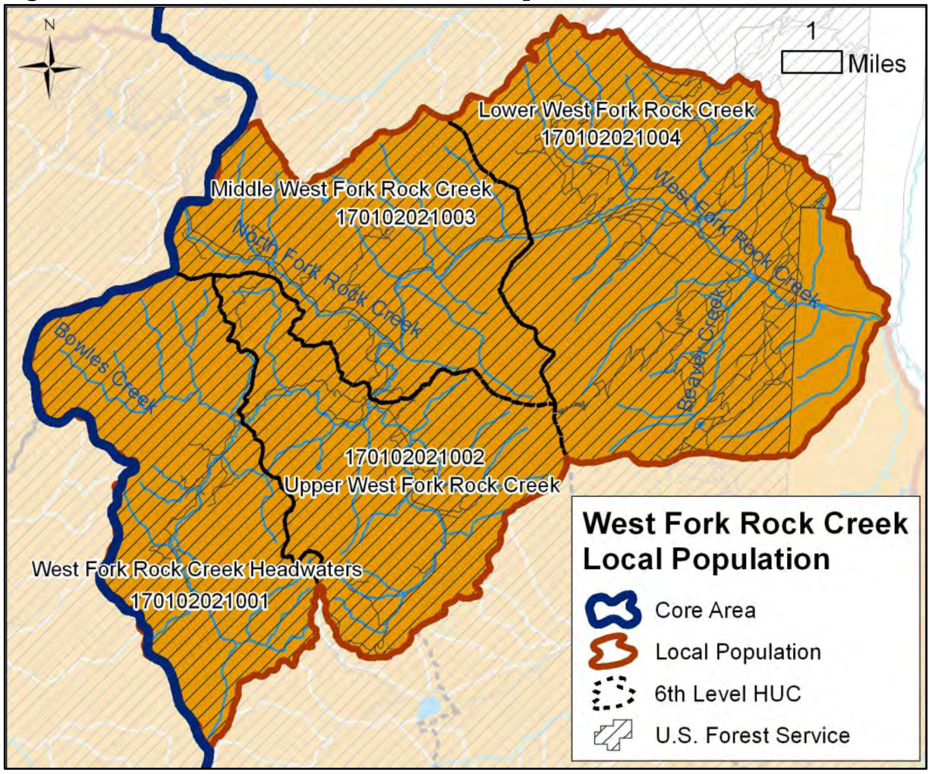
The model uses the condition of the RCA and peak and base flows as surrogates for the functionality of the temperature regime. While the portion of the East Fork upstream of the reservoir is within a grazing allotment, it has not been grazed for the past five years. The allotment is currently vacant and there are no plans to graze this pasture if/when the allotment is used in the future. Without grazing occurring, the functional status of the RCA should be changed to FA.

The model used to generate values for the functional status of the various indicators does not accurately reflect conditions in this watershed. The Upper East Fork is 92% designated Wilderness.

The issues affecting the health of this watershed are two-fold; water management in the reservoir and the de-watered reach of stream upstream of the reservoir. If sufficient water levels can be maintained in the reservoir throughout the year and a fix to the de-watering issue immediately above the reservoir can be implemented, this local population will be secure.

Local Population: West Fork Rock Creek

Figure 2-10. West Fork Rock Creek Local Population



Relative Importance of Population to Core Area (H,M,L): Moderate

Table 2-4. West Fork Rock Creek Local Population Summary

Number Adults	Short-Term Pop Trend	Life History, Connectivity	# Known Spawn Areas	Nonnative Species, threat
250-1000	Stable	Resident with small component of migratory individuals. All 6HUCs connected and the 5HUC is connected to Rock Creek.	One spawning reach for migratory fish known in 6HUC 1004.	Brown trout pose an increasing risk as they continue to colonize the watershed.

Importance of Geographic Distribution	Vulnerability to Climate Change	Unique Population Attributes
High. As brown trout continue to colonize the headwater tributaries of Rock Creek, the West Fork continues to be dominated by native fish species. While the population of bull trout tends to be dominated by a resident life history, it does appear there may be some migratory fish spawning in the lower end of the watershed. Mud Lake, at the headwaters of the North Fork, may still support a small adfluvial population of bull trout, although no sampling has occurred since 1972 when FWP gill-netted the lake.	The West Fork appears generally warm, except for the North Fork, which is a cool water influence. The watershed is relatively low elevation (≈8,000" on the Sapphire divide to 5,200' at the confluence with the Middle Fork), broad with low local relief making it vulnerable to increased solar inputs, possibly allowing non-natives to further colonize the watershed.	The West Fork supports only native fish species over the majority of the stream length. Brown trout have only extended their presence by about four miles in the past 15 years.

*: Unless otherwise noted, the number of adults is for the core area. Value is taken from USFWS 2005 Conservation Status Assessment. We have no reliable estimates of population size for each local population.

Driving Factors Determining Bull Trout Population:

The West Fork has supported some spawning by migratory bull trout in the Rock Creek core area, although it appears the majority of fish in this local population exhibit a resident life history. Migratory spawning that does occur appears to be concentrated in the lower reaches of the core area. This watershed provides 46 miles of habitat for bull trout, and 40 miles without non-native competing species. The importance of this local population is high for the persistence of bull trout in Rock Creek. This local population appears relatively secure in the short term. It may be vulnerable to climate change and colonization by brown trout. Colonization by non-native brown trout and sediment delivery from watershed roads are factors affecting bull trout populations.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Fork Rock Creek Headwaters – 170102021001

Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration

% Forest Service Ownership in HUC: 100%

Relative Contribution of Habitat in Limiting Local Population: Low to Moderate

Functional Significance to Local Pop: High. The watershed supports a native fish assemblage and likely contributes individuals to the core area population.

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FUR	FAR	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FA	20 years	3	$0	L	L
Sediment	FUR	FAR	5 years	1	Unknown	L	L

Temperature: Four years of HOBO temperature data (2002, 3, 5, 6) have been collected from near the mouth of Bowles Creek. Three of four years showed the seven day moving average daily maximum water temperatures exceeded 15°C on 20 days, with a maximum temperature of 17.1°C in both 2002 and 2006. Water temperatures only exceeded 15°C on three days in 2003, with a maximum temperature of 16.4°C. While HOBO temperature data does show that water temperatures do exceed 15°C annually, the temperature regime is more reflective of what's occurring naturally, not a result of human impacts.

Barriers: No barriers on streams capable of supporting bull trout exist.

Pools: The model is likely incorrect when used to characterize pool frequency and quality. Livestock grazing was curtailed in 2005 on the Sand Basin allotment. As streambanks continue to stabilize, pool habitat will incrementally improve, although the frequency and quality of pools is likely more a reflection of what the system can produce naturally.

Sediment: Road proximity to watershed streams is the primary driver to the FUR rating for sediment. Road #5071 is the only road in this 6HUC. It parallels the West Fork for about 4 miles, with 3.6 miles of stream within 300' of it. This road is closed to vehicular traffic between September 1 and June 15 annually. The seasonal closure, the gentle topography and robust riparian vegetation limit potential erosion and sediment delivery to the West Fork. A sediment source survey is required to determine where the road is delivering sediment to the stream. This will identify what road work is needed (surfacing, drainage, obliteration). The Pintler RD will produce the Motor Vehicle Use Map (MVUM) in 2013? This will provide the best opportunity to identify roads that are affecting this indicator and propose treatment that will eliminate sediment issues.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper West Fork Rock Creek – 170102021002							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low to Moderate							
Functional Significance to Local Pop: High. Purely native fish assemblage.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	-	3	$0	L	L
Barriers	FAR	FA	-	3	$0	L	L
Pools	FUR	FAR	10 years	3	$0	L	L
Sediment	FUR	FAR	10 years	2	Unknown	L	L

Temperature: Two years of HOBO temperature data recorded one day each year where maximum water temperatures exceeded 15°C; 15.1° in 2003 and 15.1° in 2001. Continued data collection will confirm this call.

Barriers: One barrier was identified on Sand Basin Creek. This was replaced in 2003. Call is FA.

Pools and Sediment: As described for 6HUC -01, livestock grazing is not occurring in this 6th level watershed, changing the streambank stability call to FAR. This leaves stream/road proximity as the indicator that is contributing to the FUR rating for both sediment and pools. Sediment source surveys will be conducted to identify where 6HUC roads are delivering sediment to watershed streams. This will identify what road work is needed (surfacing, drainage, obliteration). The Pintler RD will produce the Motor Vehicle Use Map (MVUM) in 2013? This will provide the best opportunity to identify roads that are affecting this indicator and propose treatment that will eliminate sediment issues.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle West Fork Rock Creek – 170102021003							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low to Moderate							
Functional Significance to Local Pop: High. High densities of bull trout in North Fork and Mud Lake may still support adfluvial fish.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FAR	-	3	$0	L	L
Sediment	FUR	FAR	10 years	2	Unknown	L	L

Temperature: Water temperatures were collected in 2006. Three days exceeded 15^{o}C, with a maximum recorded temperature of 15.23^{o}C. Additional monitoring will be needed to confirm this change.

Barriers: Existing fish passage barriers have been fixed. FA is appropriate.

Pools and Sediment: As described for the above two 6HUCs, livestock grazing is not occurring in this 6th level watershed, changing the streambank stability call to FAR. This leaves stream/road proximity as the indicator that is contributing to the FUR rating for both sediment and pools. The primary road contributing to the FUR call is the Skalkaho Hwy, MT-38. Downstream of the junction with FS 5070, the Skalkaho is paved, although ditches do drain directly into the West Fork. Upstream of FS 5070, it is a graveled road. Surveys of this road may identify additional sediment reduction measures that could be implemented in coordination with Montana DOT. Sediment source surveys will be conducted on roads under USFS jurisdiction to identify where 6HUC roads are delivering sediment to watershed streams. This will identify what road work is needed (surfacing, drainage, obliteration). The Pintler RD will produce the Motor Vehicle Use Map (MVUM) in 2013? This will provide the best opportunity to identify roads that are affecting this indicator and propose treatment that will eliminate sediment issues.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower West Fork Rock Creek – 170102021004							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 88%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High. Does support spawning in the West Fork near the upstream end of the watershed.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	-	3	$0	L	L

Barriers	FA	FA	-	3	$0	L	L
Pools	FUR	FAR	15 years	3	$0	L	L
Sediment	FUR	FAR	15 years	2	Unknown	L	L

Temperature: The West Fork, in its lower reaches commonly exceeds 15°C, and at times 20°C, based on limited HOBO temperature data. The stream was rated as non-functioning due to high width/depth ratio, high entrenchment ratio and eroding streambanks.

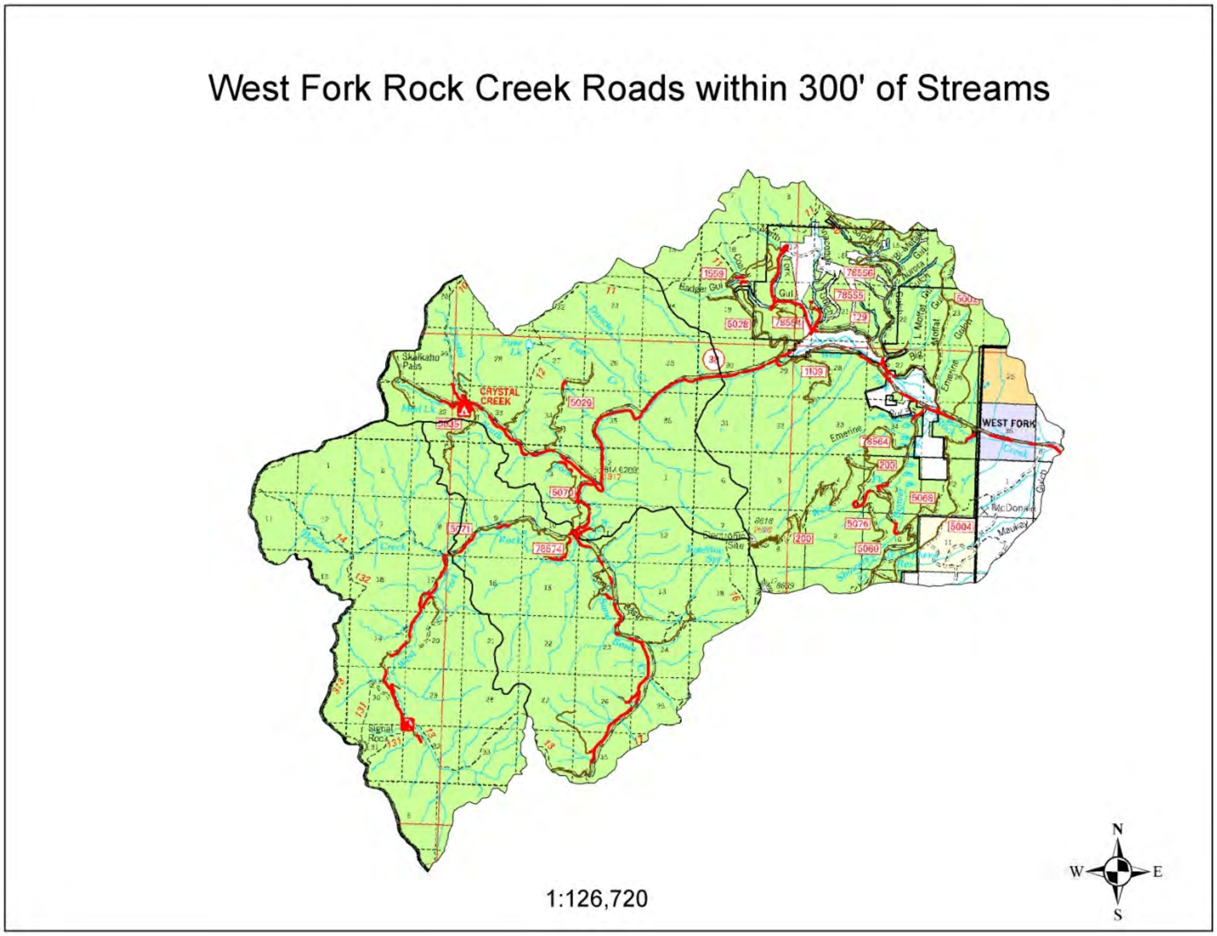
Barriers: No barriers on streams capable of supporting bull trout exist.

Pools and Sediment: There are a number of problems within this 6HUC. Over a quarter of low gradient streams lie within a grazing allotment, the road density is high, and almost half the length of perennial stream is within 300' of a road.

The FS has limited opportunity to address road-related issues in this 6HUC. The majority of roads in close proximity to streams are either private, or administered by Montana DOT (MT-38). Sediment source surveys are needed to identify opportunities on USFS administered lands and cooperation with MDOT on MT-38.

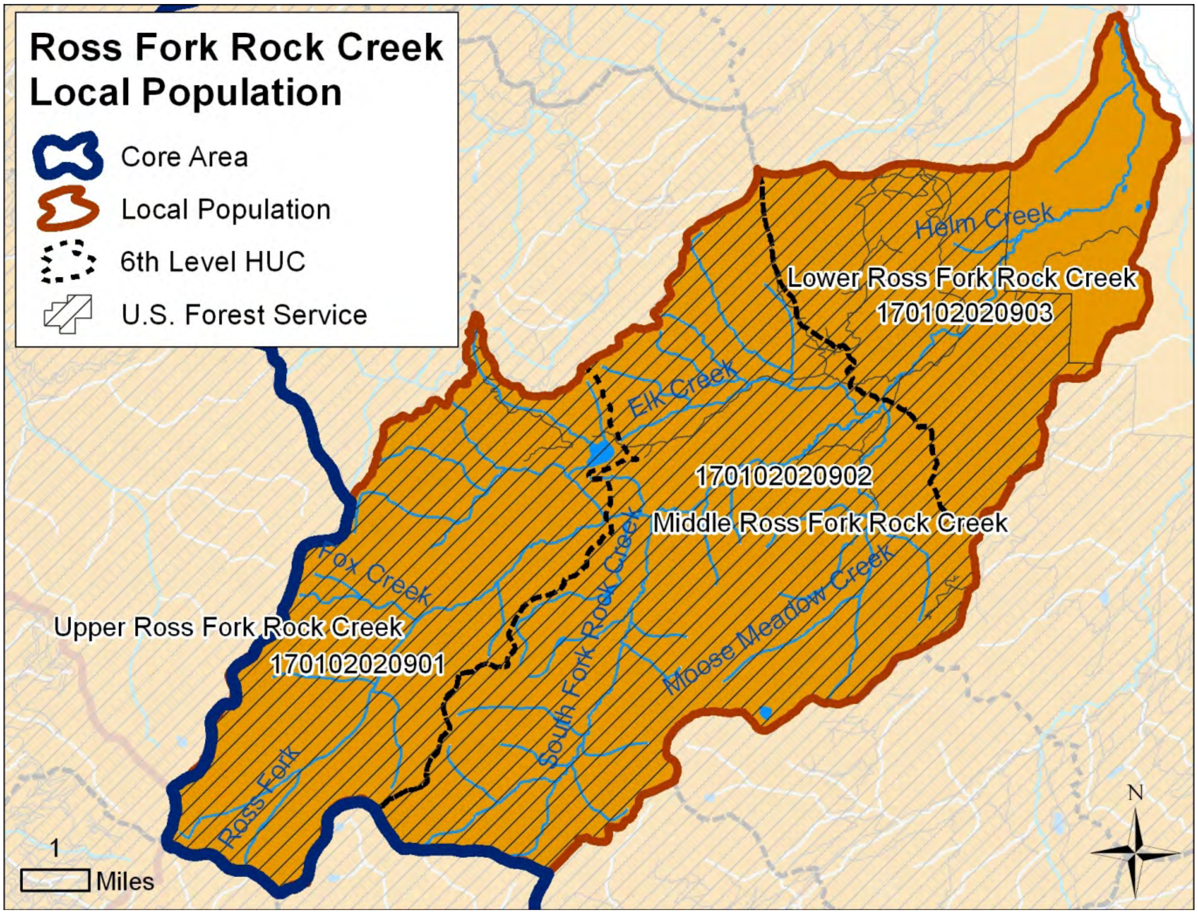
Most low gradient stream reaches in grazing allotments lie in either the Beaver Creek or Ross Fork allotments. Within the Ross Fork allotment, the majority of low gradient stream consists of the West Fork Rock Creek in the vicinity of the West Fork administrative site. This area is fenced to exclude livestock, although trespass cattle from the adjacent State Trust section (sec 36) do access this area during low flow periods. A more effective fence crossing the stream should eliminate this use. The other low gradient "stream" in this allotment is the irrigation ditch flowing out of Stephens Reservoir. The Beaver Creek allotment contains numerous reaches of Beaver Creek and Emerine Gulch. An assessment of the streams in this allotment is needed to determine areas where impacts are occurring in order to develop a plan to reduce or eliminate those impacts.

Figure 2-11. West Fork Rock Creek Roads within 300' of Streams



Local Population: Ross Fork Rock Creek

Figure 2-12. Ross Fork Rock Creek Local Population



Driving Factors Determining Bull Trout Population:

The Ross Fork is variable in the number of redds in the Rock Creek core area. It does support a largely native fish assemblage in the upper two 6th level watersheds, although non-native brown trout appear to be colonizing more of the watershed each year. We have incomplete information regarding the distribution of bull trout use of this watershed. Known spawning occurs between Falls and Fox creeks. This local population could become increasingly important for the persistence of bull trout in Rock Creek if flow-related issues in the lowest sub-watershed are addressed. Redd numbers in the one index reach appear to be declining. Since 1999, the mean annual number of redds is 6. The past five years have yielded 5 (2006), 4 (2007), 3 (2008), 1 (2009) and 10 (2010).

Irrigation water withdrawals in the bottom watershed (private lands) limit habitat suitability and provide competitive advantage to colonizing brown trout.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Ross Fork – 170102020901							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High. Supports the only known spawning for the local population and a large amount of rearing habitat.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR*	FA	2013	-	$0	-	-
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR*	FA	2013	-	$0	-	-
Sediment	FA	FA	-	-	Unknown	-	-

Barriers: This watershed is virtually roadless. Only a single, upland road enters the watershed.

Temperature: It is doubtful that the temperature indicator is FAR. A single year of HOBO temperature data, collected near the lower end of the watershed indicates the water is cold, never reaching 14°C. Additional data collection would verify the appropriateness of this call.

Pools: This indicator is FAR due to the length of stream not under a shade cover type (as defined by the GIS exercise). With almost no roads in the 6HUC, the streams contain all the LWD the system is capable of producing. A survey of the streams could tally LWD in Forested reaches and pool numbers and quality in representative reaches across the watershed.

Sediment: With almost no development in the watershed, this indicator is functioning appropriately.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle Ross Fork – 170102020902							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 99%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High. Likely functions as migratory corridor to known spawning and rearing habitat in the upper reaches of the Ross Fork. Known to support resident bull trout and contains some suitable spawning and rearing habitat for fluvial fish from Rock Creek. EBT and BRN present.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: Data should be gathered on all streams in the watershed to determine the temperature regimes on each. This may help identify any opportunities to improve riparian area management, the driver for the FAR rating for water temperature. Some improvement to the temperature regime could possibly be made by improving grazing practices along Moose Meadows and Elk creeks (identified by MFWP).

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Ross Fork – 170102020903							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 67%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate. Degraded habitat parameters allowing invasion by non-native species – BRN and EBT. The Ross Fork is severely dewatered in this subwatershed. Un-screened irrigation diversions may be contributing to loss of bull trout. High water temperatures may be limiting return of spawning DV.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	2050	3	$0	L	L
Barriers	FA	FA	-	-	$0	-	-
Pools	FUR	FAR	2015	2	$1,000	L	L
Sediment	FUR	FA	2015	1	$10,000	L	L

Temperature: Measured water temperatures, on NFS lands rarely exceed 20°C. The FS has three summers of HOBO temperature data and MFWP has one. These four seasons of data indicate that summer maximum water temperatures typically exceed 15°C for about 40 days, but on only one occasion have exceeded 20°C, indicating this indicator may not be truly FUR at the Forest boundary. Irrigation diversions on private land do impact water temperatures below the Forest boundary, with water temperatures routinely exceeding 20°C throughout the summer. Little opportunity exists to alter the temperature regime on NFS lands, although identifying road improvements and livestock management on the Ross Fork Allotment may yield some benefit.

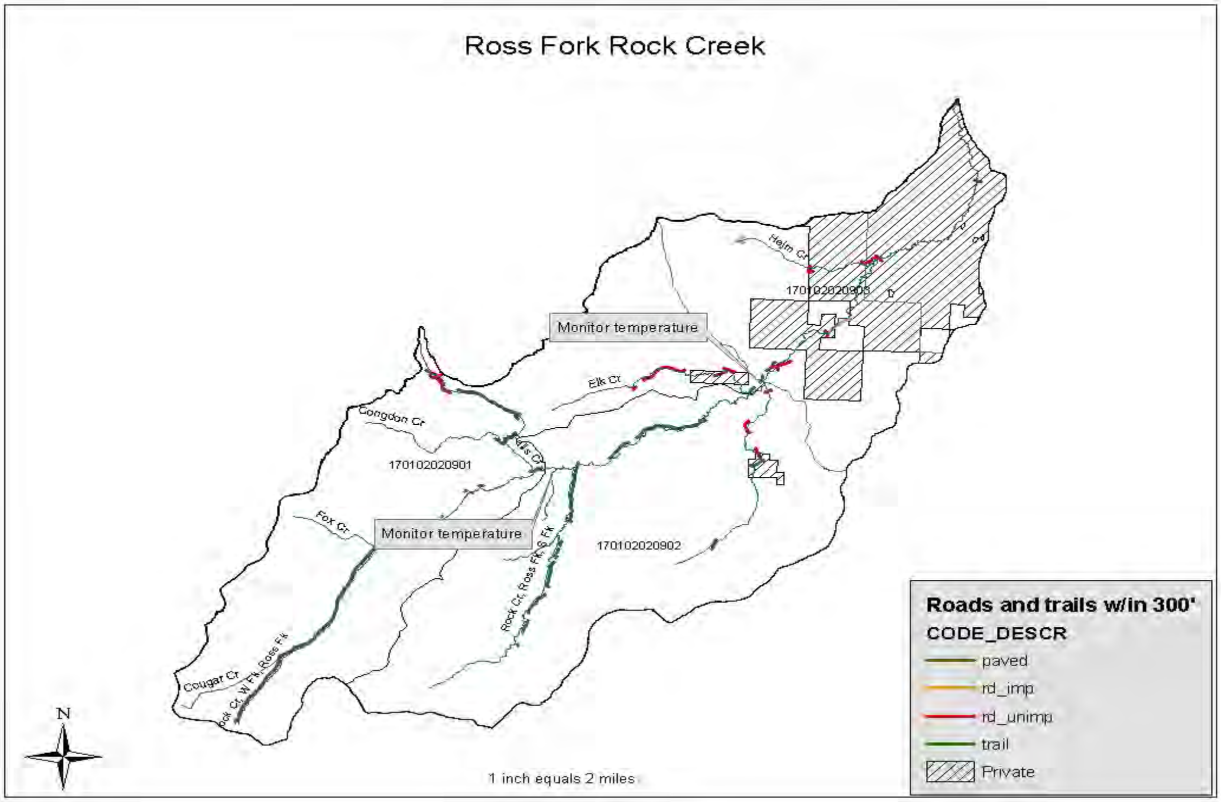
Barriers: None exist in this watershed on NFS lands on streams supporting bull trout.

Pools: Relatively little opportunity exists to improve the functional status of the pool indicators in this watershed. Likely the best option to maintain and improve LWD recruitment into watershed streams is through signing along Forest roads, informing the public that firewood cutting is prohibited within 150’ of all streams.

Sediment: Opportunities to improve the condition of the sediment indicator in this watershed are limited. Twenty-two percent (1.4 miles) of perennial streams have a road within 300’. This equates to 1.7 miles of road within 300’ of perennial streams within the external Forest boundary. Sediment source surveys will be conducted to identify ongoing issues with sediment and to validate the baseline condition call.

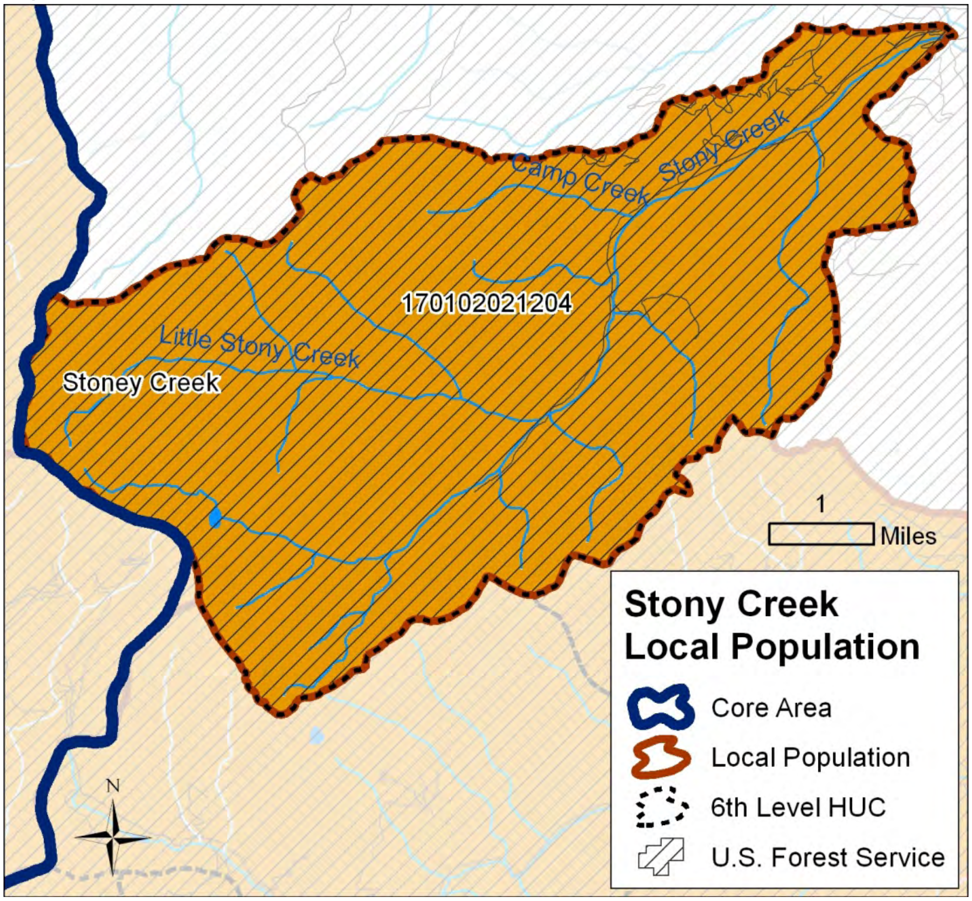
On USFS administered lands, the Ross Fork grazing allotment is generally managed to standards. Results of riparian surveys, conducted by MFWP in conjunction with electrofishing reaches during 2007, indicate riparian conditions are fair (Angelico Creek) to excellent (Helm Creek) on streams in this watershed. Increased efforts should be taken to improve riparian habitat conditions in degraded areas.

Figure 2-13. Ross Fork Rock Creek Roads within 300'



Local Population: Stony Creek

Figure 2-14. Map of Stony Creek Local Population



Relative Importance of Population to Core Area (H,M,L): High

Table 2-6. Stony Creek Local Population Summary

Number Adults	Short-Term Pop Trend (5 years)	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
250-1000*	Declining	Migratory, Connected	2 in Stony Creek and 1 in Little Stony Creek	Brown trout, rainbow trout and brook trout. Medium

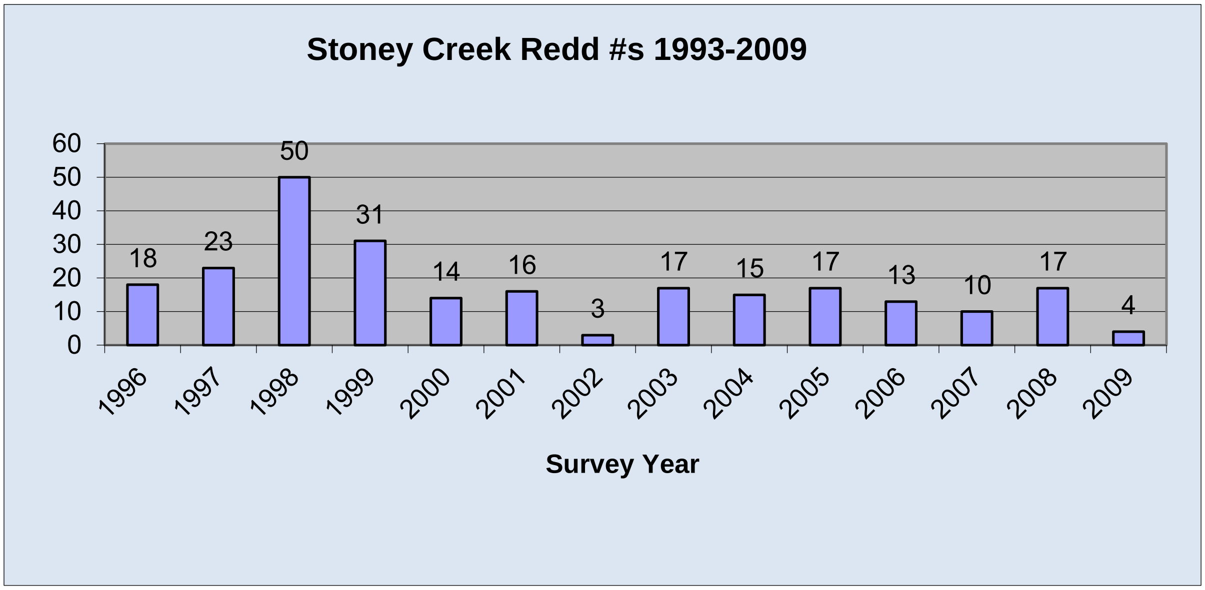
Importance of Geographic Distribution	Vulnerability to Climate Change	Unique Population Attributes
High: Key spawning and rearing watershed for bull trout in the mid and upper reaches of Rock Creek	Medium; It is a cold-water influence for Rock Creek. Physical orientation is east flowing and it is deeply dissected and is largely shaded and so doesn't have a lot of solar gain to it.	None

*: Unless otherwise noted, the number of adults is for the core area. Value is taken from USFWS 2005 Conservation Status Assessment. We have no reliable estimates of population size for each local population.

Driving Factors Determining Bull Trout Population:

Declines in redd occurrence from the late 1990s to present have been substantial in Little Stony Creek, which has historically had about 25% of the redds in this HUC. From 1999 to 2001, the average number of redds in Little Stony averaged 6. From 2006 to present only 1 redd has been observed - in 2006. Redd numbers in Stony Creek have been relatively stable over the last 5 years. Given the declines in Little Stony, however **the population is at risk**. Road occurrence in RCAs is driving an FUR call there for the baseline. Based on our understanding of road conditions and the immediate proximity of roads next to streams and associated sediment delivery, the problems with roads are limited in scope. The presence of non-native brown trout in Stony Creek and Rock Creek are also limiting bull trout populations.

Figure 2-15. Stoney Creek Redd Counts



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Stony Creek – 170102021204							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 97%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High. Key spawning and rearing habitat for bull trout inhabiting the middle segments of Rock Creek.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FA	-	-	$0	L	L
Barriers	FA	FA	-	2	$0	-	-
Pools	FUR	FAR	2014	3	$1,000	L	L
Sediment	FUR	FAR	2014	2	$30,000	L	L

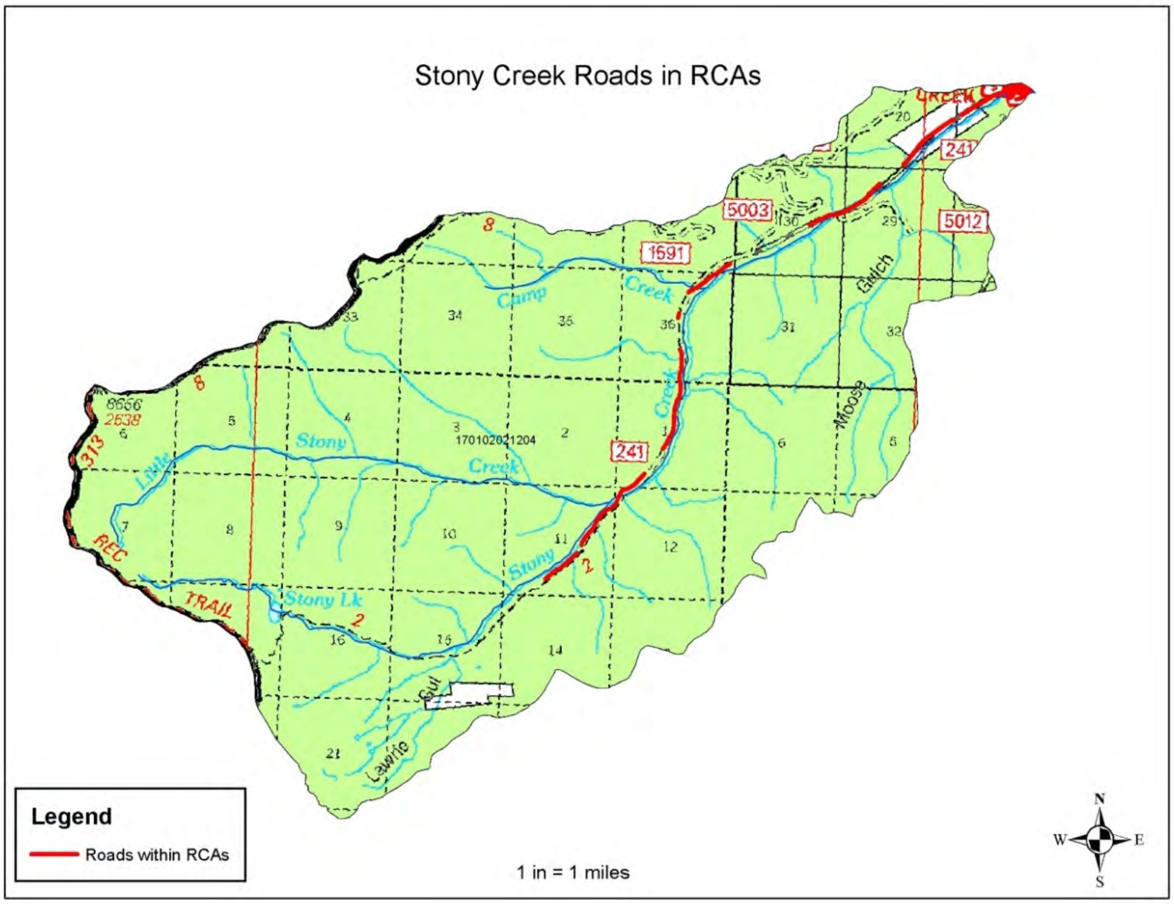
Temperature: Six years of Hobo temperature data collected in lower end of watershed indicates FA status.

Barriers: None in the watershed.

Pools: The FUR call for pools is being primarily driven by the proximity of roads to streams. Thirty-three percent of the total perennial stream length has a road within the RCA. That equates to 5.7 miles of road. Our impression is that Pools are probably not currently at an FUR level. We will use existing data and any necessary additional survey information to document the status of pool abundance and quality, by 2014.

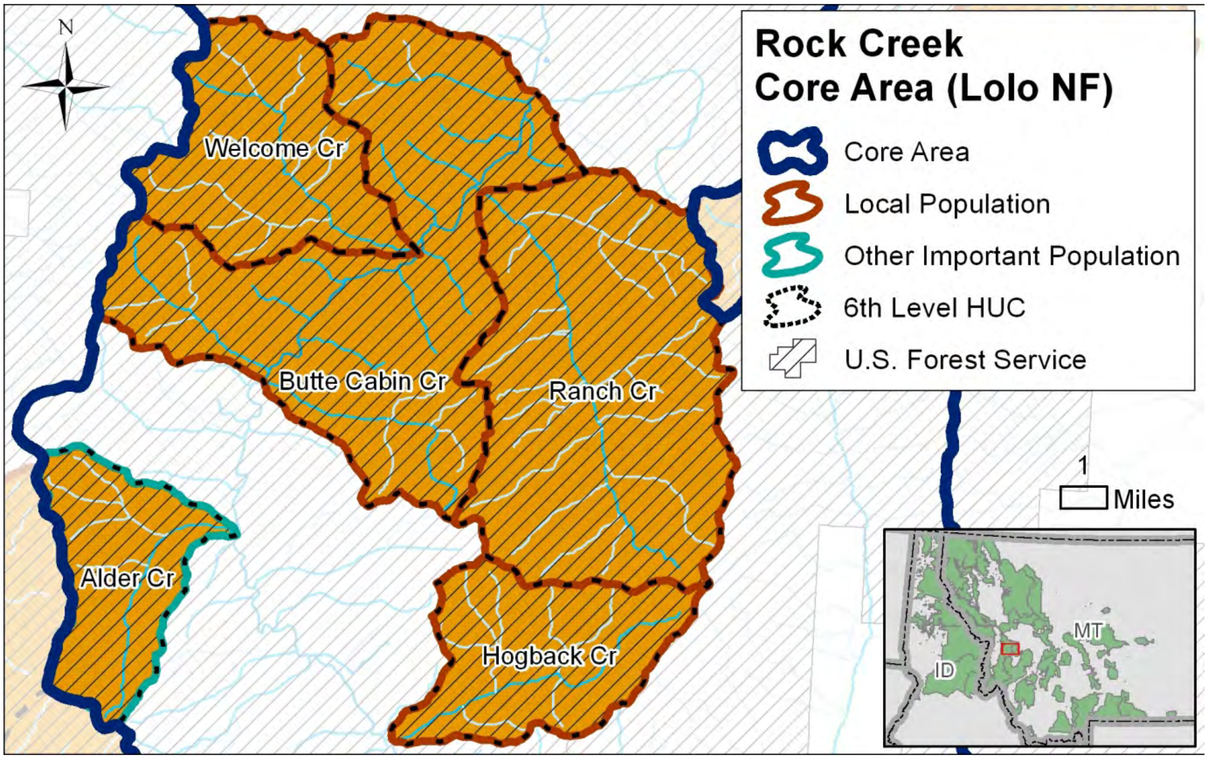
Sediment: The FUR call for sediment is being primarily driven by the proximity of roads to streams. Thirty-three percent of the total perennial stream length has a road within 300 feet of the stream. That equates to 5.7 miles of road. Sediment issues are considered limited in occurrence. The floodplain is fairly broad and flat and the actual sediment contribution is not as extensive as might be implied by the road proximity to stream data. A sediment source survey will be completed by 2012 and a subsequent design and implementation plan will follow – completed by 2014. There is concern by state biologists that the grazing allotment in the lower reaches is causing substantial bank erosion and sediment addition to the stream. This should be specifically addressed as part of the sediment survey as it may be a high priority for improving habitat conditions in the HUC.

Figure 2-16. Stony Creek Roads in RCAs



Rock Creek Core Area – Lolo National Forest

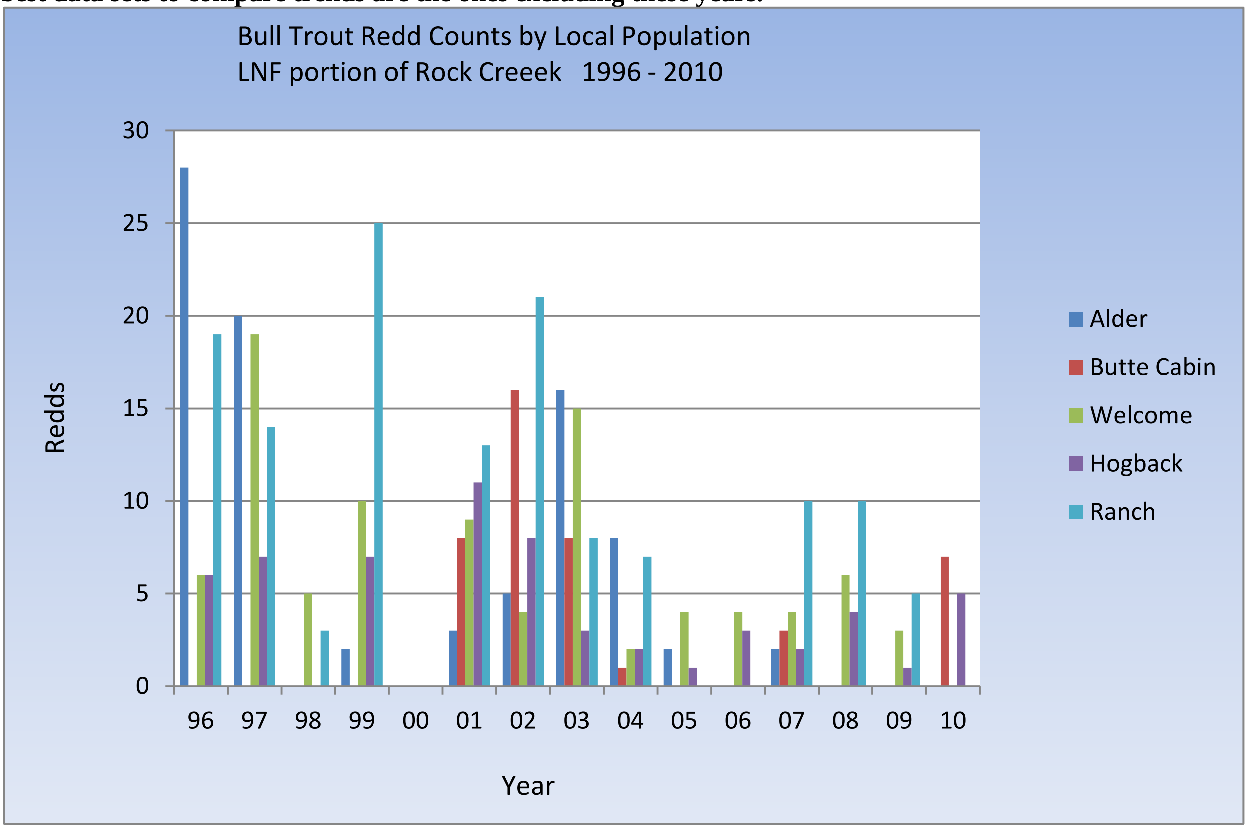
Figure 2-17. Rock Creek Core Area – Lolo National Forest



There are four local populations within the core area on the Lolo National Forest – Hogback, Butte Cabin, Welcome and Ranch Creek. A discussion of Alder Creek is also included, even though it is not considered a local population by the FWS. Alder Creek is considered bull trout critical habitat and important for the recovery of bull trout in the Rock Creek core area. While fluvial bull trout do spawn in other tributaries, these five streams support the majority of fluvial spawning, and redd numbers within them likely represent over 75 percent of the total fluvial spawning that occurs on the Lolo NF portion of Rock Creek.

Bull trout redd counts are conducted annually by USFS and MFWP biologists in index reaches where significant fluvial spawning is known to occur. Figure 2-18 shows redd count data from the five index reaches over the 1996 – 2010 time period. As can be seen, redd numbers in any given reach are highly variable from year to year. This is partly a result of the extremely low numbers within index reaches. Most index reaches usually support less than ten bull trout redds, and often support only a few.

Figure 2-18. Bull trout redd counts within the four local population index reaches on the Lolo National Forest portion of Rock Creek, 1996 – 2010 (Alder Creek is also included). Note that not all streams were counted in all years. With the exception of Butte Cabin Creek in 1996, all other reaches with no redds showing are because surveys were not conducted, not because there were no redds. In the years of 1998, 2000, 2006, and 2008-2010, only two to three of the five local populations were surveyed. Therefore the best data sets to compare trends are the ones excluding these years.



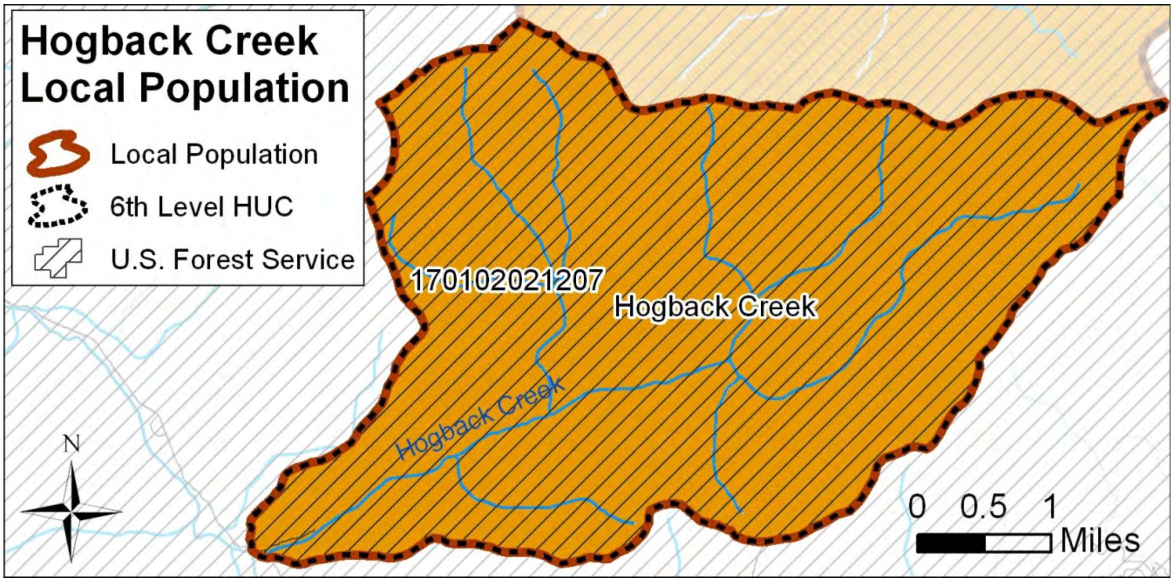
Of primary concern is the fact that some of these index reaches have years where only one or two redds are present. This is a key warning sign that the populations in these reaches are at high risk of extinction and may currently be in the process of "blinking out". As these index reaches are the cornerstones that support the overall population in the Core Area, loss of any one represents a significant setback to overall sustainability and recovery of the population.

Of the five local populations on the Lolo NF portion of the core area, Ranch Creek and Welcome Creek are currently the strongest. They consistently support the most redds, and numbers are generally slightly less variable than those in Hogback, Butte Cabin, and Alder Creek. A similar pattern, in terms of importance, probably existed historically between these five streams. Ranch Creek has probably always been the most significant bull trout spawning tributary among the five due to its size and relatively low gradient, unconfined valley bottom.

Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Local Population: Hogback Creek

Figure 2-19. Hogback Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 2-7. Hogback Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50 Migratory 50-250 Res (estimate – we aren't sure what, if any portion, is truly resident	Stable, extremely low. However 15 year trend is declining.	Fluvial, Connected	1	Minimal – some threat in mainstem of Rock Creek, but Hogback is primarily native.

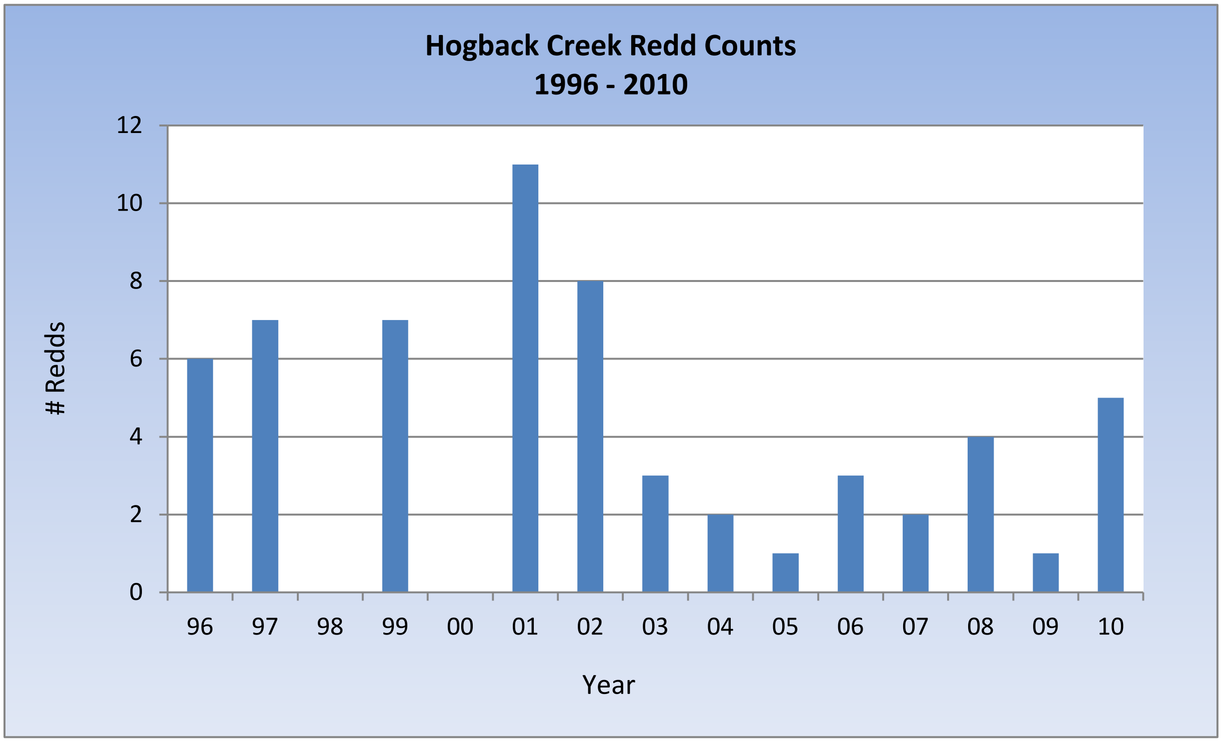
Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Moderate – Hogback Creek is relatively small, confined, and has large substrate, which limits spawning habitat and recruitment capacity. There are numerous other small spawning tributaries in the area.	Moderate. This is a small watershed and headwaters are relatively low elevation. However, there does appear to be good capacity to maintain low water temperatures due to subterranean flow in the upper reaches.	None known.

Driving Factors Determining Bull Trout Population:

Habitat conditions are near what occurred naturally in the HUC, however, the steep, rocky nature of the watershed results in a stream system with large, angular substrates, few large pools, and limited spawning habitat available. There are intermittent reaches in the stream approximately 2 miles upstream of the mouth. These likely limit spawning access and habitat availability. The current main limiting factor is the overall population decline in the Rock Creek Core Area. Prior to 2005, there was a culvert barrier at the mouth that partially limited upstream migration. This culvert was removed in 2005. The following table shows bull trout redd counts in Hogback Creek between 1996 and 2010. The numbers of fluvial spawners in Hogback Creek are very low. The extremely small population is cause for concern.

Confidence in your assessment (H,M,L): M

Figure 2-20. Hogback Creek Redd Counts



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Hogback Creek – 170102021207							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FA	FA	-	3	$0	-	-

There are no needs in this HUC. The culvert was recently replaced and no other issues exist.

Temperature: The temperature indicator, while it does show FAR, is functioning as it would have historically. FWP data from 2008 shows that temperatures in Hogback Creek didn't exceed 10 C (Liermann et al 2009), indicating that the call should be FA. The call is a function of talus slopes and naturally sparse riparian vegetation due to shallow and rocky soils. There is no need for actions to address this indicator.

Barriers: There are no barriers and there are no future actions needed to address this indicator.

Pools: Pool conditions are likely at or near historic levels, although they are naturally limited due to the large, angular substrates that comprise the valley floor. There is no need for actions to address this indicator.

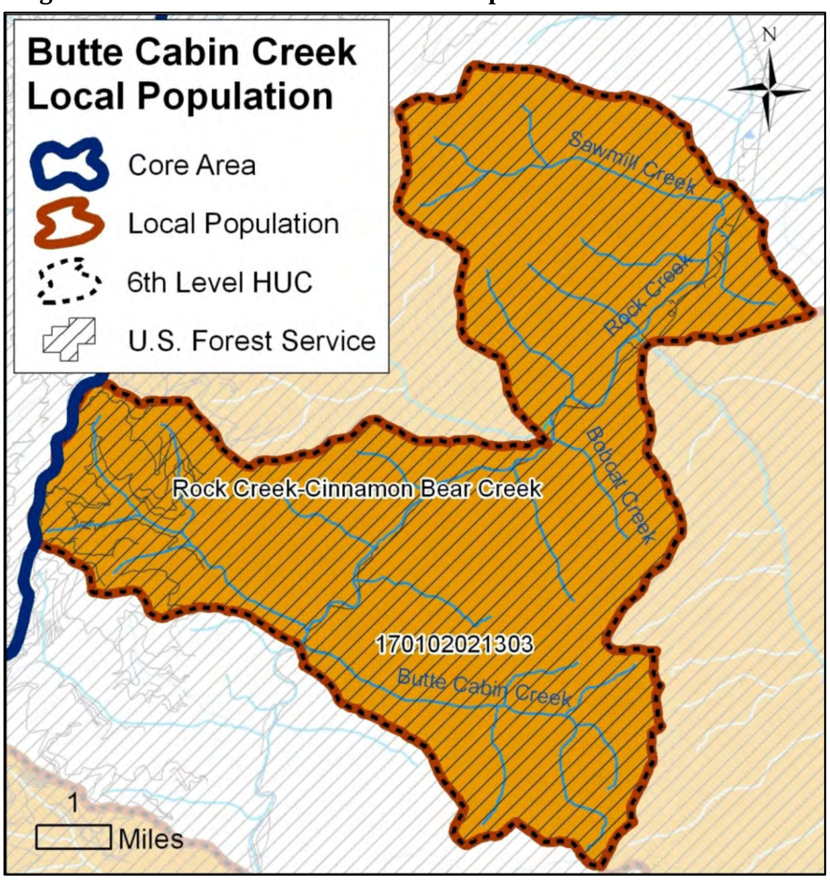
Sediment: Sediment levels are probably near natural in the system. There is no need for actions to address this indicator.

Most important activities to improve bull trout population:

1. Coordinate with Fish, Wildlife and Parks and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Local Population.
2. Develop and implement projects (primarily grazing and water diversion management) to reduce water temperature in the upper mainstem and tributaries.

Local Population: Butte Cabin Creek

Figure 2-21. Butte Cabin Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 2-8. Butte Cabin Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50 Migratory 50-250 Res (estimate – we aren't sure what, if any portion, is truly resident	Decline	Fluvial, Connected	1	Minimal – some threat in mainstem of Rock Creek. Butte Cabin Creek appeared to contain only native species until sometime in the 1990's. Now it contains relatively high densities of rainbow and brown trout in the lower reaches.
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Moderate – Butte Cabin Creek is relatively small, confined, and has large substrate, which limits spawning habitat and recruitment capacity. There are numerous other small spawning tributaries in the area.		Moderate. This is a small watershed, and headwaters are relatively low elevation. However, there does appear to be good capacity to maintain low temperatures due to subterranean flow through much of length.		None known.

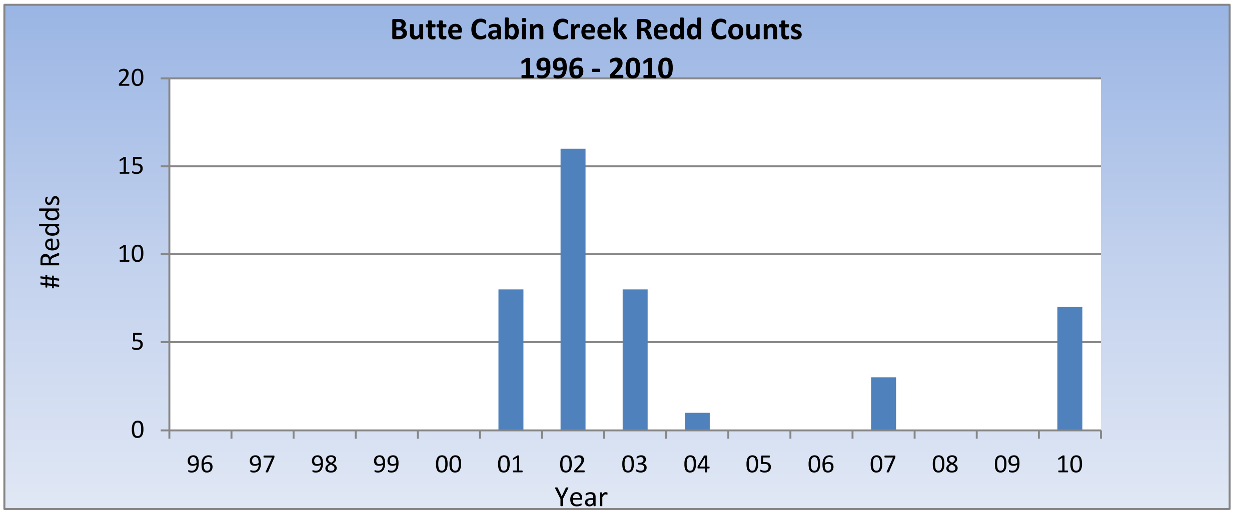
Driving Factors Determining Bull Trout Population:

Habitat is generally very good. Access may be limited in the upper reaches of Butte Cabin Creek by talus slides that completely bury the stream for substantial lengths. Prior to 2008, there was a culvert barrier approximately 1.5 miles up from the mouth that prohibited upstream migration. This culvert was removed in 2008, reconnecting upstream habitat, and removing the main limiting factor to the fluvial component of the population. Prior to 2008, there were no known fluvial spawners in the population above the culvert, although large redds in the lower mile of the stream indicated that some fluvial spawning was occurring in the lower reaches. In the 2010 redd survey, at least one redd upstream of the culvert removal location appeared to be constructed by fluvial fish (based on its size).

The overall population decline in the Core Area as a whole is probably the main limiting factor at present. The following figure shows bull trout redd counts in Butte Cabin Creek between 1996 and 2010. (In 1996 a survey was conducted, but no redds were observed – all other years with zeros are because no survey was conducted that year). Overall, numbers of fluvial spawners in Butte Cabin Creek are low. The extremely small population is cause for concern, however, the recent barrier removal project and observation of fluvial spawning indicate that the population may have the capacity to rebound in future years.

Confidence in your assessment (H,M,L): M

Figure 2-22. Butte Cabin Creek Redd Counts



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Rock Creek – Cinnamon Bear Creek – 170102021303							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FUR	FA	1 year	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FA	FA	-	3	$0	-	-

This HUC contains the mainstem Rock Creek, Cinnamon Bear Creek, and Butte Cabin Creek. The mainstem serves as a migration corridor, but also supports rearing of juvenile and adult bull trout. The overall population in the Core Area affects the strength of many local populations (i.e., there are limited numbers of adult fish returning to spawning grounds). Some evidence suggests that recent increases in non-native species (especially brown trout) in the mainstem may be affecting bull trout populations since the increases in these species corresponds with the decline in bull trout. Whether this is a causative or resulting factor is unknown. Higher summer temperatures in the mainstem, or synergistic effects of increased temperatures and increased brown trout may also be affecting bull trout populations. Cinnamon Bear doesn't support bull trout to our knowledge. Butte Cabin Creek currently supports low densities of bull trout (Liermann, et al 2009), however densities of bull trout were much higher as little as a decade ago (Lolo National Forest unpublished data). We are unsure what proportion of these fish are resident versus fluvial, but some fluvial spawning does appear to occur. Spawning habitat in Butte Cabin Creek is naturally limited due to large substrate size, and redd numbers are generally low. Habitat in Butte Cabin is nearly pristine. There is an access road that parallels the stream for about 1.5 miles, but impacts are light. The barrier at the end of this road has been removed, so the call should be adjusted to FA. There are minimal impacts from a recently used gravel pit and storage area, but these should be eliminated in a few years when use of the site is complete. Overall there are few opportunities or limitations in the bull trout part of the HUC.

Temperature: Temperature patterns are probably similar to natural potential for this stream. Talus slopes along significant portions of the stream probably influence temperatures to some degree. Recent use of the gravel pit and road removed a few trees, but the overall impact on shade was negligible. There is no need for actions to address this indicator.

Barriers: There are no known barriers. The culvert that existed prior to 2008 has been removed, and spawning surveys in 2010 identified one fluvial redd, indicating that fish are passing the site. The baseline call should be updated to FA, and there are no future needs.

Pools: The baseline indicator for pools is FAR. This is likely due to the presence of talus slopes, which is natural. Pool conditions are likely at or near historic levels. There is no need for actions to address this indicator.

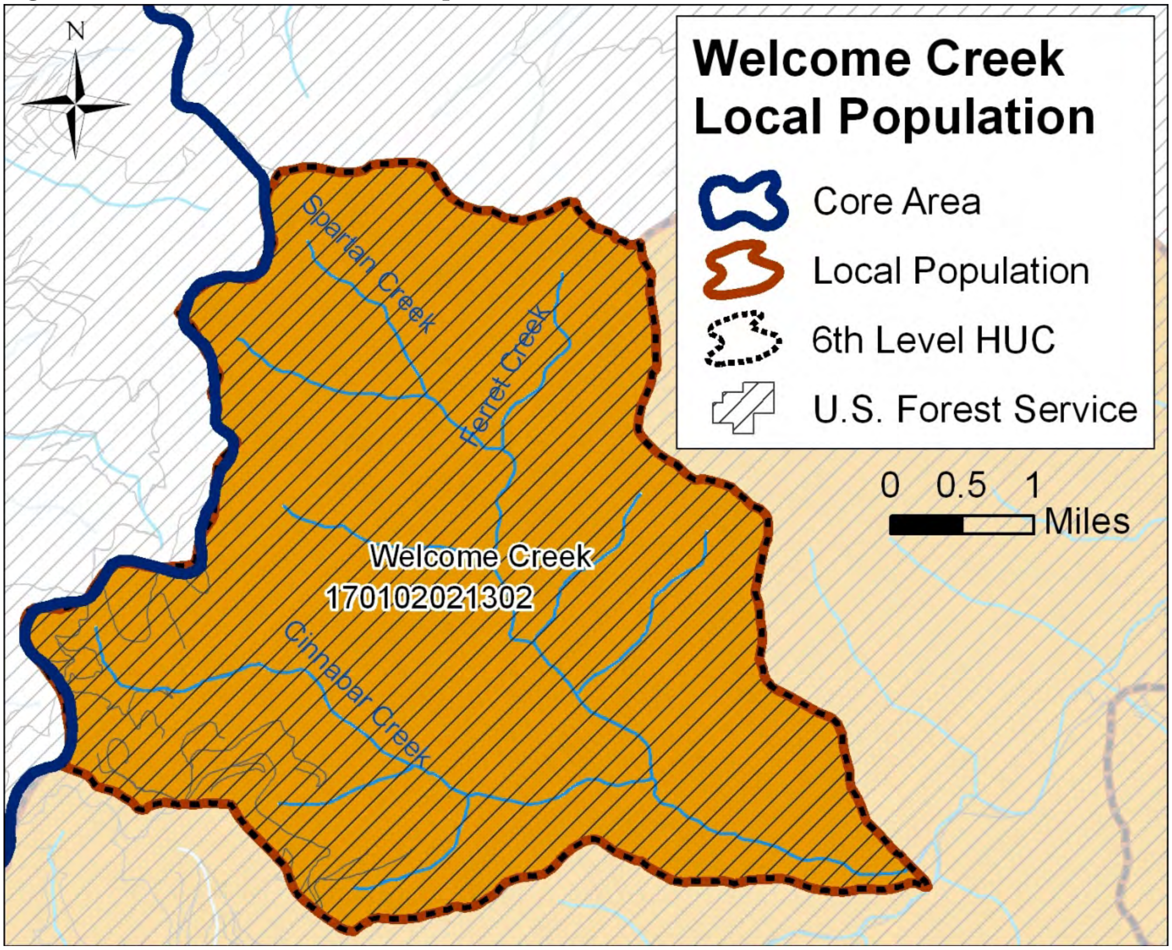
Sediment: Sediment levels are probably near natural in the system, although we have no data to validate this assumption. The road in the lower 1.5 miles is closed to traffic. This road is supposed to be obliterated once all of the stored gravel is utilized. There will be no further activities needed to reduce sediment in the watershed.

Most important activities to improve bull trout population:

1. Coordinate with Fish, Wildlife and Parks and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Local Population.
2. Obliterate the 1.5 mile road that parallels Butte Cabin Creek once the gravel storage pile has been used.
3. Develop and implement projects (primarily grazing and water diversion management) to reduce water temperature in the upper mainstem and tributaries.

Local Population: Welcome Creek

Figure 2-23. Welcome Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 2-9. Welcome Creek Local Population Summary

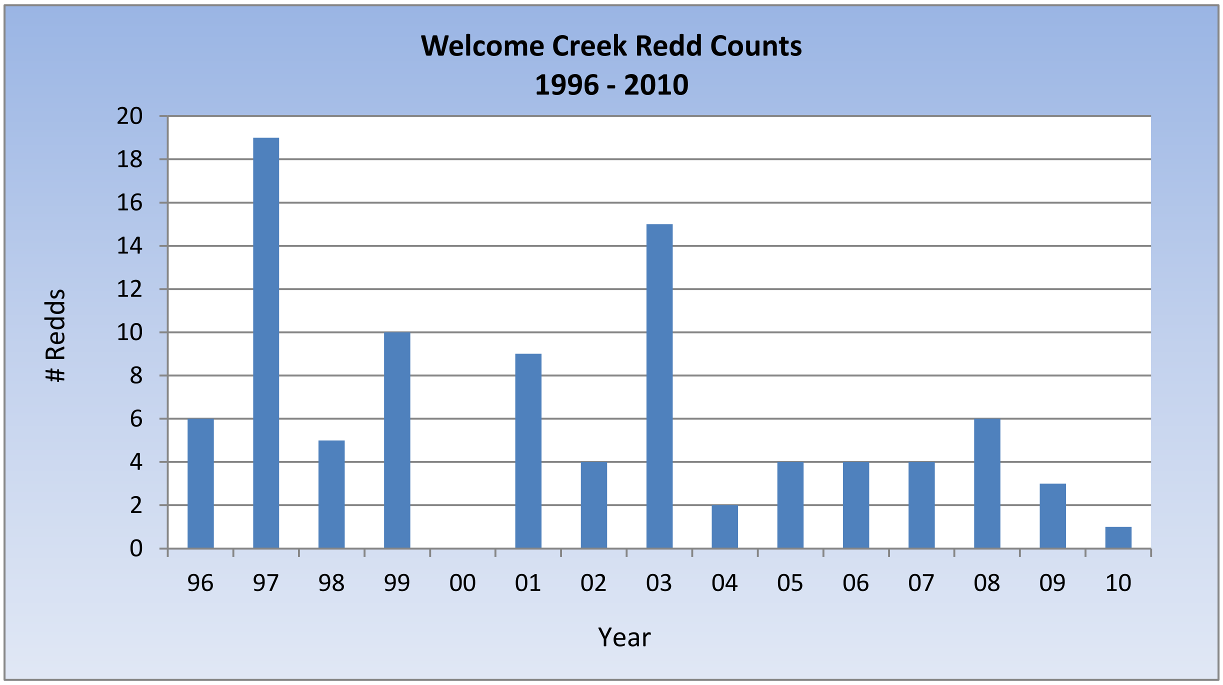
# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50 Migratory 50-250 Res (estimate – we aren't sure what, if any portion, is truly resident	Decline	Migratory, Connected	1	Minimal – some threat in mainstem of Rock Creek, but Welcome is mostly natives.
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low – Welcome Creek is in the lower reaches of core area, where several other spawning streams also exist. Most are relatively small and contain limited spawning habitat due to confined valleys and large substrate.		Moderate. This is a small watershed with relatively low elevation headwaters – will probably be affected by climate change		None known.

Driving Factors Determining Bull Trout Population:

Habitat is generally good, but natural valley constraints, high channel energy, and large substrates, limit the overall capacity as a spawning tributary. The following table shows bull trout redd counts in Welcome Creek between 1996 and 2010. Numbers of spawners have been very low over the last several years, which is cause for concern. The overall population decline in the Core Area as a whole is assumed to be the current limiting factor.

Confidence in your assessment (H,M,L): H

Figure 2-24. Welcome Creek Redd Counts



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Welcome Creek - 170102021302							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

This HUC is largely pristine. There is a trail in the watershed that parallels the stream and crosses it several times, but impacts are isolated and relatively low. Recent habitat conditions have been influenced by a large fire that occurred in 2007. A short-term increase in sediment and spawning gravels, and a long-term increase in large woody debris were the most significant changes that resulted from the fire. These effects should benefit the system by increasing spawning habitat over the long-term. There is no need for work in this HUC.

Temperature: The temperature indicator could be checked – it is currently FAR due to recent fires, but these probably did not increase temperatures in Welcome Creek due to the rocky and steep nature of the canyon. FWP temperature data collected in 2008 shows maximum summer temperatures rarely exceed 11 C (Liermann 2009). In any case, vegetation will quickly recover naturally and the indicator will change to FA within 10 years. There is no need for actions to address this indicator.

Barriers: There are no barriers and there are no future actions needed to address this indicator.

Pools: Pool conditions are likely at or near historic levels. There is no need for actions to address this indicator.

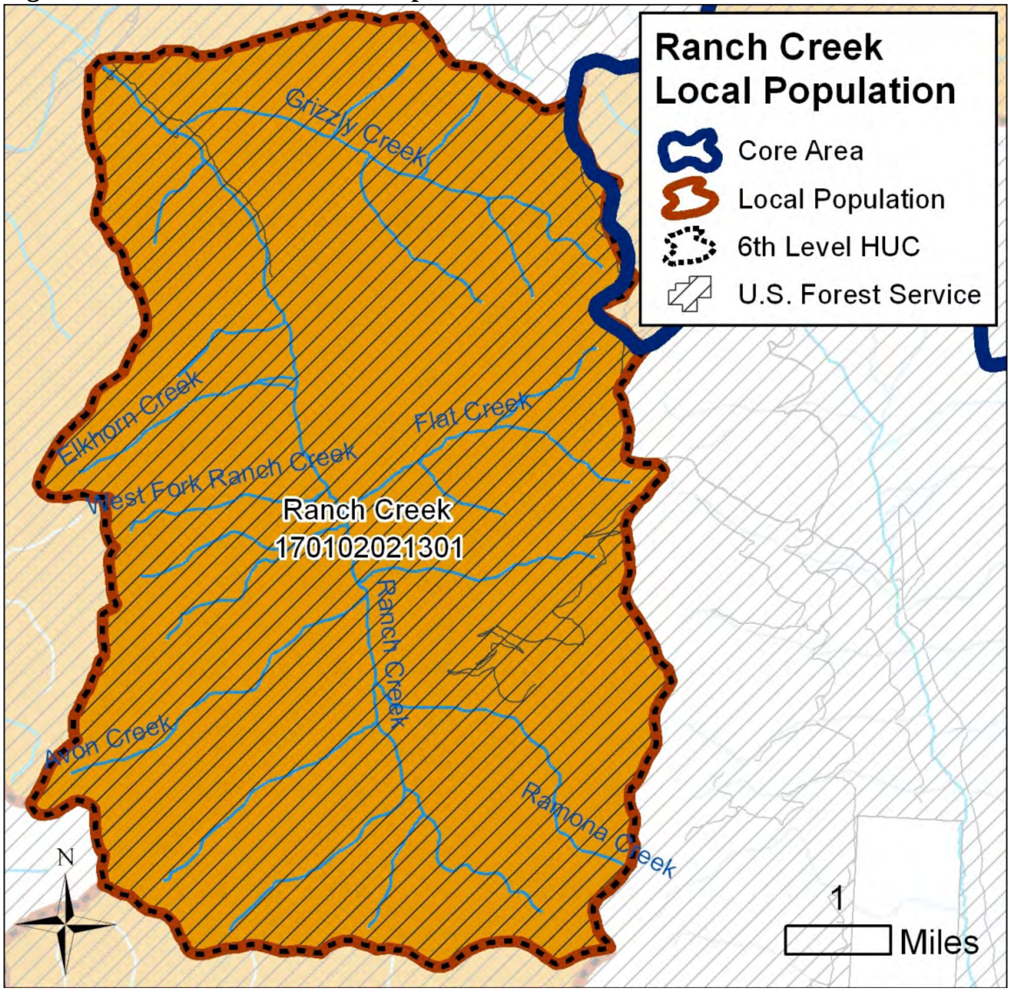
Sediment: Sediment levels are probably near natural in the system, although we have no data to validate this assumption. The recent fire likely resulted in higher short-term sediment levels in the stream, but also probably increased the amount of spawning gravels. There is no need for actions to address this indicator.

Most important activities to improve bull trout population:

1. Coordinate with Fish, Wildlife and Parks and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Local Population.
2. Develop and implement projects (primarily grazing and water diversion management) to reduce water temperature in the upper mainstem and tributaries.

Local Population: Ranch Creek

Figure 2-25. Ranch Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 2-10. Ranch Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50 Migratory 250-500 Res (estimate – we aren't sure what, if any portion, is truly resident	Stable last 5 years, however Decline over the past 15 years.	Migratory, Connected	1	Minimal – some threat in mainstem of Rock Creek, but Ranch Creek is mostly natives in the upper reaches. There are some rainbows, browns, and brooks in lower reaches.

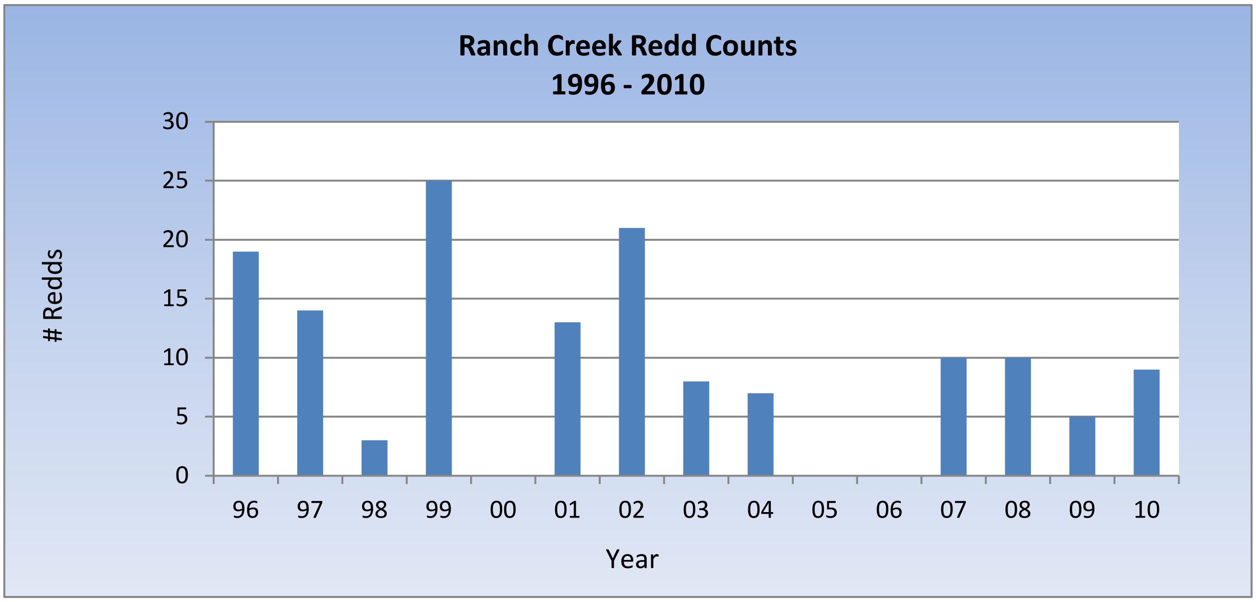
Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Moderate – Ranch Creek is the largest spawning tributary in lower Rock Creek, below the canyon. While there are other spawning tributaries, most have limited capacity for recruitment due to their small size and large substrate.	Moderate. This is a larger watershed, but the headwaters are still relatively low elevation – will probably be affected by climate change	None known.

Driving Factors Determining Bull Trout Population:

Habitat is generally good, but there are some impacts in the lower two miles on private lands. Ponds and water diversions are the main issues, along with habitat degradation caused by over-grazing in some areas. Bull trout are entrained in at least one ditch. The magnitude of this effect may be substantial, but it is currently undocumented, as no official monitoring has been conducted. The loss of bull trout through the ditch/pond system, are likely the main limiting factors to the population at the current time. The following table shows bull trout redd counts from 1996 to 2010. Numbers of fluvial spawners are low, but still nearly double those of other local populations on the LNF portion of the Rock Creek Core Area. Ranch Creek is the stronghold in the lower portion of Rock Creek, making the importance of restoration activities very high.

Confidence in your assessment (H,M,L): H

Figure 2-26. Ranch Creek Redd Counts



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Ranch Creek - 170102021301							
Strategy (Active Restoration, Passive Restoration, Conserve): Active							
% Forest Service Ownership in HUC: 99%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	5 years	2	$25,000	M	H
Barriers	FA	FA	-	3	$0	-	-
Pools	FA	FA	-	3	$0	-	-
Sediment	FA	FA	-	3	$0	-	-

Most of this HUC is in good condition, with the exception of the effects of water diversion and grazing impacts in the lower end. A private pond associated with this diversion contains non-natives. This issue should be addressed. The diversions on the lower end take water from the stream and entrain bull trout. Past efforts to maintain a fish screen on the upstream diversion have been unsuccessful. Addressing the diversion and fish loss issue is critical on this stream, although it doesn't show up in any of the indicators above. Ranch Creek is the largest recruitment source for bull trout on the Lolo National Forest portion of the Rock Creek Core Area, and loss of juvenile fish through the ditch is likely the main limiting factor in this local population. In addition, approximately one mile of riparian zone on private land has had most of the trees removed in the past, and this affects temperatures in the lower reaches. There is also a Forest Service road that parallels the lower ½ mile of the stream. This road has had problems with capturing out of bank flows from Ranch Creek. When this occurs, sediment is added to the stream.

Temperature: Temperatures in the lower reaches of Ranch Creek are affected by the riparian zone on private land, irrigation diversions, and the road and campground. Discussions with landowners should be instigated to develop an effective ditch system that screens bull trout. Discussions to restore riparian vegetation and increase woody debris in the stream through the affected riparian zone should also be pursued. This could be a very productive cooperative partnership. The road and campground should be assessed to determine if there are areas that could be relocated to reduce impacts. These activities will all improve the condition of the temperature indicator.

Barriers: There are no barriers and there are no future actions needed to address this indicator.

Pools: Pool conditions are likely at or near historic levels throughout most of the watershed; however, there is a good opportunity to improve pool conditions on the 1 mile section of private land that has been harvested by adding large woody debris from adjacent Forest Service land. This activity has a high potential to be a good partnership project with groups like Trout Unlimited or Montana Trout.

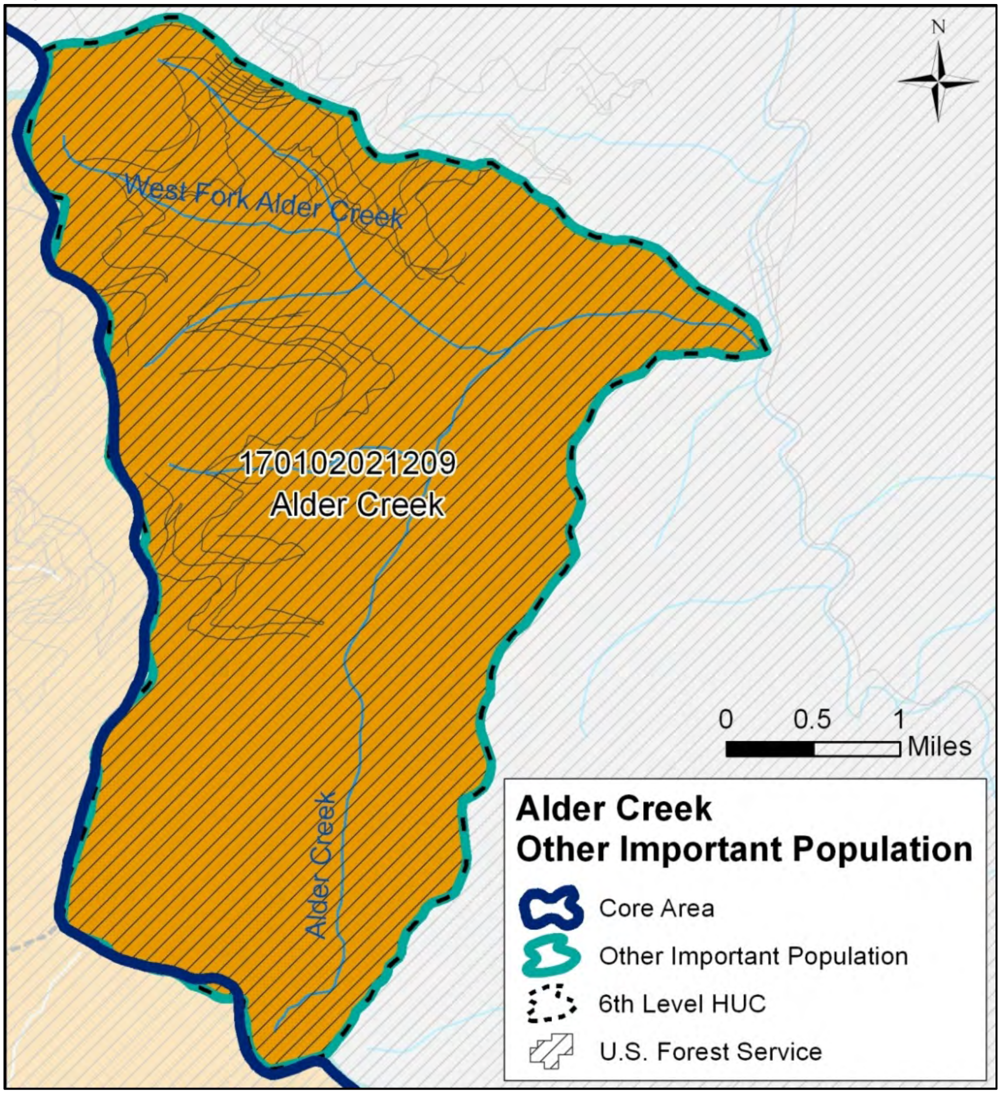
Sediment: Sediment levels are probably near natural in the system, but the road does pose a risk to the lower reaches during high flow periods. Future analyses in the area should address the potential of relocating this road to reduce sediment impacts.

Most important activities to improve bull trout population:

1. Coordinate with Fish, Wildlife and Parks and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Local Population.
2. Improve ditch system to reduce withdrawal and screen intake to eliminate entrainment of bull trout.
3. Develop and implement projects (primarily grazing and water diversion management) to reduce water temperature in the upper mainstem and tributaries.

Other Important Population: Alder Creek

Figure 2-27. Map of Alder Creek Population



Relative Importance of Population to Core Area (H,M,L): M

Table 2-11. Alder Creek Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50 Migratory 50-250 Res (estimate – we aren't sure what, if any portion, is truly resident	Decline (assumed based on past data, although no data has been collected since 2007)	Fluvial, Connected	2	Minimal – some threat in mainstem of Rock Creek, but Alder Creek is primarily native.

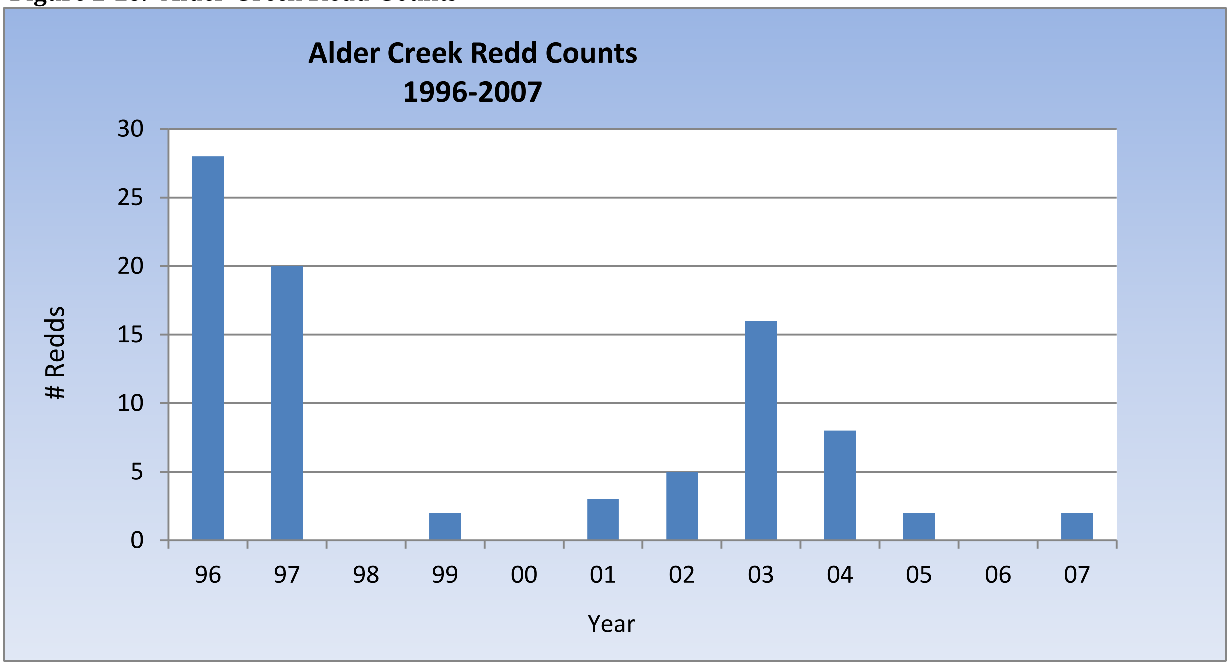
Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Moderate – Alder Creek is relatively small, confined, and has large substrate, which limits spawning habitat and recruitment capacity. There are numerous other small spawning tributaries in the area.	Moderate. This is a small watershed, and headwaters are relatively low elevation. However, there does appear to be good capacity to maintain low water temperatures due to subterranean flow in the upper reaches.	None known.

Driving Factors Determining Bull Trout Population:

Habitat is generally very good. There is one diversion near the mouth on private land that has the potential to take bull trout. The overall population decline in the Core Area as a whole is assumed to be the main limiting factor. The following figure shows bull trout redd counts in Alder Creek between 1996 and 2007. We have not conducted surveys since then due to limited budgets and time. The population trend is heavily influenced by two high years in 1996 and 1997. It is unclear why redd numbers were so high during these years, but the overall trend, as with most local populations in the Rock Creek Core Area, is decreasing. Numbers of spawners in Alder Creek are likely very low, oscillating around zero. The extremely small population is cause for concern.

Confidence in your assessment (H,M,L): M

Figure 2-28. Alder Creek Redd Counts



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Alder Creek - 170102021209							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High – only HUC in local pop							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	3	$0	L	L
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FAR	FA	25 years	3	$50,000	L	L

There are minor road issues in the extreme headwaters of Alder Creek, but most roads are on very stable soils, so the urgency and expected resulting change in habitat conditions is also low. This population is mostly driven by the strength of the overall population in the Rock Creek Core Area. The main issue with this local population is a diversion near the mouth that may take some fish (this effect is not captured well in the 4 indicators above), but the effect of water diversion is probably minimal since it's so small.

Temperature: Temperature patterns are currently influenced by recent fires in the watershed, but are probably similar to natural over the long-term. The fires burned over a large portion of the watershed and may influence temperatures for a short time period (1 – 10 years until riparian shrubs recover). This is not a concern due to the resiliency of the watershed and overall high quality of the aquatic system. The baseline condition for this indicator will change to FA over 10 years as stream canopy fills in. Talus slopes along portions of the stream may also influence temperatures to some degree. A minor amount of road crossings in the extreme headwaters could theoretically impact temperature, however the overall impact of these crossings on temperature, and the expected benefit if eliminated, are extremely low.

Barriers: There are no known barriers. The diversion is through a small hose and does not present any upstream or downstream barrier to fish movement. There is a slight potential for small fish to be entrained into the pond, but this is very minimal since the structure is a hose, not an open ditch.

Pools: The baseline indicator for pools is FAR. This is likely due to the presence of talus slopes, which is natural. Recent fires will contribute large amounts of woody debris to the system over the next several years, resulting in more high quality pools, but it is likely that the baseline call for pools will remain FAR due to the extent of talus slopes along the stream. There is no need for actions to address this indicator.

Sediment: Sediment levels are probably near natural in the system, although we have no data to validate this assumption. The roads in the extreme headwaters are on stable soils and have been in place for a long time. There is very little traffic on them, and few crossings. There may be some opportunity to reduce sediment through obliteration of some roads or through BMP maintenance, but the priority for this work is low.

Most important activities to improve bull trout population:

1. Coordinate with Fish, Wildlife and Parks and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Local Population.
2. Develop and implement projects (primarily grazing and water diversion management) to reduce water temperature in the upper mainstem and tributaries.
3. Determine whether the irrigation diversion near the mouth of Alder Creek entrains any bull trout – if so, develop a project to install an effective screening device.

Rock Creek Core Area Summary:

Table 2-12 summarizes relevant information from each of the 6th level HUC local population. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire Rock Creek Core Area within the borders of the Lolo National Forest and Beaverhead-Deerlodge National Forest.

Table 2-12. Summary of important local population attributes and conservation recommendations for the Rock Creek Core Area.

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
Middle Fork Rock Cr	Upper Middle Fork	High	Low	Conserve	-	-	-
	Upper Copper Cr	High	Low	Conserve	-	-	-
	Carpp Cr	High	Low	Conserve	-	-	-
	Middle Middle Fork Rock Cr	High	Moderate	Active	-	-	-
	Lower Middle Fork Rock Creek	Moderate	Moderate	Active	-	-	-
East Fork Rock Cr	Meadow Cr	High	Moderate	Active	-	-	-
	East Fork Rock Cr	Low	Low/Moderate	Active	-	-	-
	East Fork Reservoir	High	Low/Moderate	Conserve/ Active	-	-	-
West Fork Rock Cr	West Fork Rock Cr Headwaters	High	Low/Moderate	Passive	-	-	-
	Upper West Fork Rock Cr	High	Low/Moderate	Passive	-	-	-
	Middle West Fork Rock Cr	High	Low/Moderate	Passive	-	-	-
	Lower West Fork Rock Cr	High	Moderate	Active	-	-	-
Ross Fork Ross Cr	Upper Ross Fork	High	Moderate	Conserve	-	-	-
	Middle Ross Fork	High	Moderate	Conserve	-	-	-
	Lower Ross Fork	Moderate	Moderate	Passive	-	-	-
Stoney Cr	Stoney Cr	High	Low	Active	-	-	-
Hogback Cr	Hogback Cr	High	Low	Conserve	-	-	-
Butte Cabin Cr	Rock Cr – Cinnamon Bear Cr	High	Low	Conserve	-	-	-
Welcome Cr	Welcome Cr	High	Low	Conserve	-	-	-
Ranch Cr	Ranch Cr	High	Low	Active	-	-	-
Alder Cr*	Alder Cr	High	Low	Passive	-	-	-

* These watersheds do not contain a designated local population of bull trout. They are included here due to their location in the core area and their potential to contribute to recovery of the core area population.

Following is a list of specific restoration project recommendations that would directly benefit bull trout recovery. This list only includes those projects of high value to bull trout and is not all inclusive.

Alder: Coordinate with Fish, Wildlife and Parks and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Local Population and develop and implement projects (primarily grazing and water diversion management) to reduce water temperature in the upper mainstem of Rock Creek and tributaries.

Butte Cabin: Coordinate with Fish, Wildlife and Parks and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Local Population and develop and implement projects (primarily grazing and water diversion management) to reduce water temperature in the upper mainstem and tributaries.

Welcome: Coordinate with Fish, Wildlife and Parks and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Local Population and develop and implement projects (primarily grazing and water diversion management) to reduce water temperature in the upper mainstem of Rock Creek and tributaries.

Hogback: Coordinate with Fish, Wildlife and Parks and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Local Population and develop and implement projects (primarily grazing and water diversion management) to reduce water temperature in the upper mainstem of Rock Creek and tributaries.

Ranch: Several issues impact this local population: 1) Coordinate with Fish, Wildlife and Parks and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Local Population and develop and implement projects (primarily grazing and water diversion management) to reduce water temperature in the upper mainstem of Rock Creek and tributaries; 2) Install fish screen on irrigation diversion to eliminate bull trout entrainment; 3) Work with landowners to increase irrigation ditch efficiency and retain saved water in Ranch Creek; 4) Develop cooperative project with landowners to helicopter large woody debris into the stream and plant riparian zone throughout the reach affected by past timber harvest; 5) Assess the potential for relocating the road and campground outside of the active floodplain on Forest Service land.

Upper East Fork: Two issues impact this local population. 1) Reservoir management needs to be addressed through discussions with Montana DNRC on the re-issuance of a special use permit for the dam. 2) The reach of the East Fork immediately upstream of the reservoir loses surface flow during low-flow periods. The reason for this loss of flow (anthropogenic or natural, or a natural phenomenon exacerbated by past human activity) needs to be further explored and whether/how the condition should be addressed.

Meadow Creek: Road #78381 is the greatest sediment contributor to Meadow Creek and has been identified for decommissioning in the initial stage of the MVUM process. Other roads, particularly at road/stream crossings need to be assessed for sediment delivery. Fish passage barriers have been identified and prioritized for replacement as funding becomes available.

Lower East Fork: Issues with the management of the dam and associated irrigation diversion structure need to be resolved with Montana DNRC. Adequate flows in the East Fork are vital to the persistence of this local population.

Middle Fork Local Population: Addressing road-related sediment sources is the primary action the USFS can take to limit impacts to this population from NFS lands. Brown trout are expanding their range in this watershed, spawning in some of the same locations as bull trout.

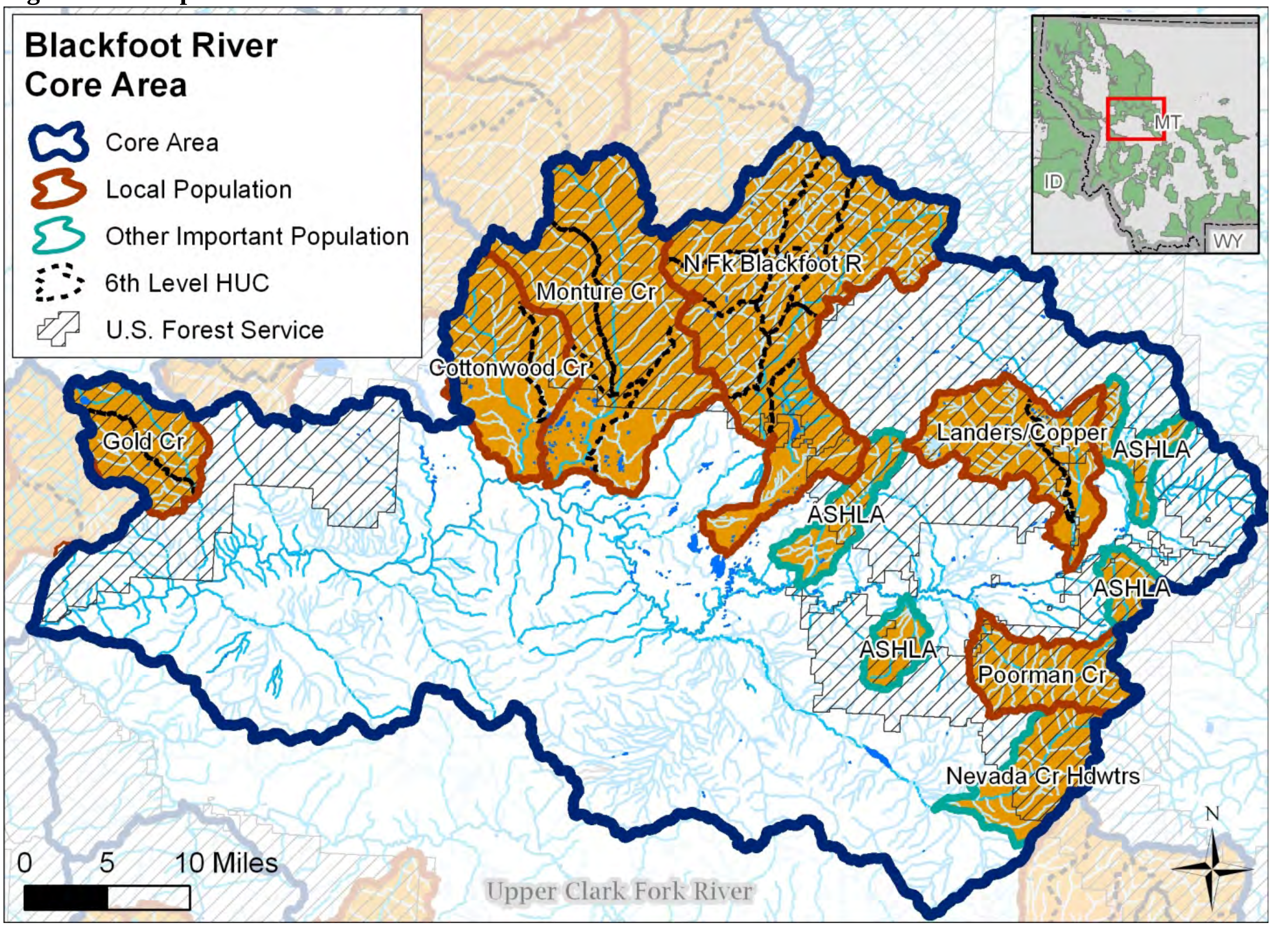
Ross Fork Local Population: The biggest issue for this local population is irrigation water withdrawals in the lower subwatershed on private lands and NFS lands (ditch bill applications). Water temperatures are also elevated due to reduced flows. These attributes may be limiting use of the upper portions of the watershed by migratory bull trout. They may also be encouraging colonization of the watershed by non-native brown trout.

West Fork Local Population: Road-related sediment issues, both on NFS roads and MT-38 may be impacting this local population. Suspension of cattle grazing on the Sand Basin allotment has eliminated the greatest stressor in the upper portion of the watershed. There are issues (year-long diversion, when water right is for irrigation season) with a Colorado ditch bill application in the lowermost subwatershed (Bauer Ranch) that needs to be addressed.

Stoney Creek: Need to look at possible road-related sediment problems on FSR 241. One ditch bill (prior rights assertion denied?) in lower Stony. The issue may be more fish loss to diversion than reduced flow.

Chapter 3: Blackfoot River

Figure 3-1. Map of Blackfoot River Core Area



Core Area Discussion:

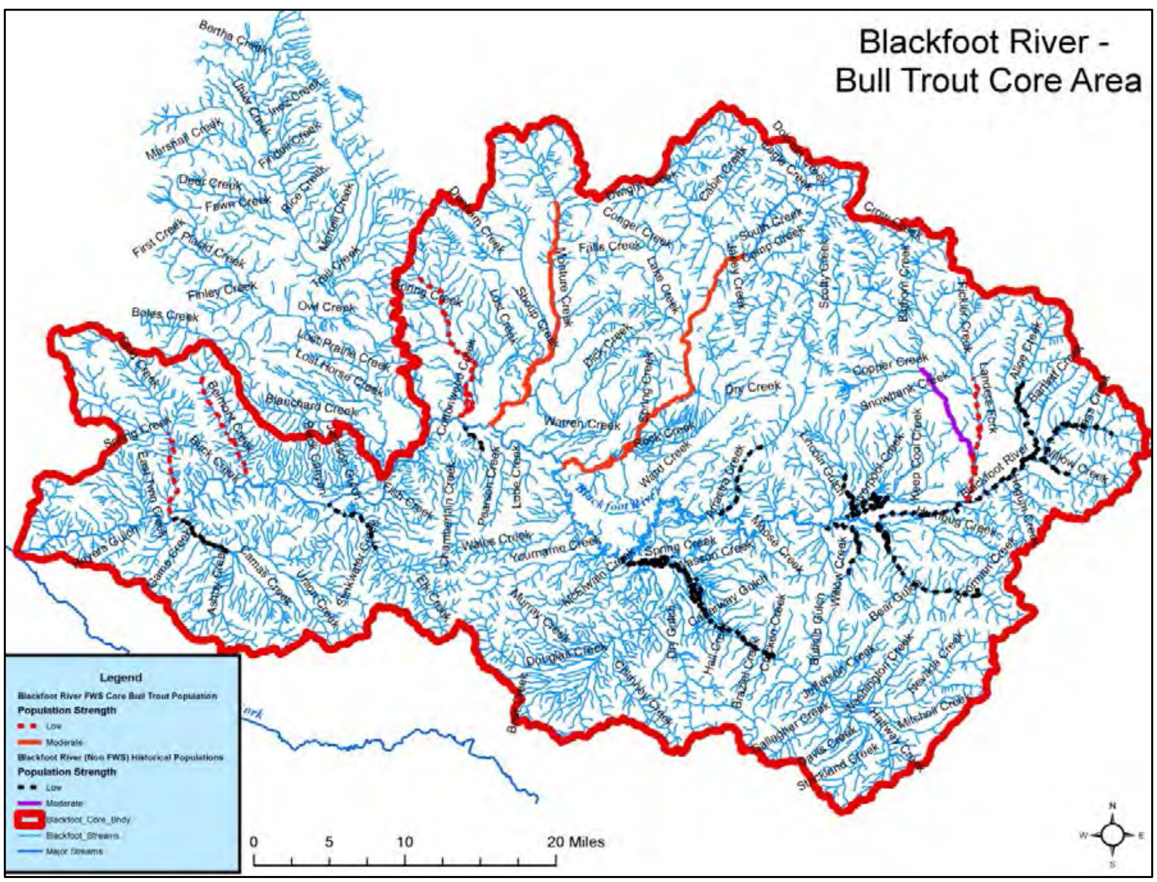
The Blackfoot River originates from the continental divide with the confluence of Beartrap and Anaconda Creeks. It then flows westward for approximately 132 miles where it joins the Clark Fork River, at Bonner Montana. The drainage area of the watershed is approximately 2,290 mi^2 and has an average annual discharge of approximately 1,553 cfs (USGS website, 2011). Significant tributaries include: Landers, Poorman, Beaver, Arrastra, Nevada, North Fork Blackfoot, Monture, Chamberlain, Cottonwood, Belmont, Gold, and Union Creeks.

Land ownership in the Blackfoot Subbasin is 54% federal (USFS, USFWS, BLM), 10% state (DNRC, MFWP, University of Montana), 31% private and 5% corporate timber company. Most of the middle and high elevation forested lands within the subbasin are administered by the USFS. Private lands are concentrated in the low elevation portions of the subbasin. Land ownership patterns in the Blackfoot Subbasin have changed in recent years due to large-scale transfers of Plum Creek Timber Company (PCTC) lands. In 2003, the Blackfoot Challenge and The Nature Conservancy initiated the Blackfoot Community Project, which involved the purchase and re-sale of 89,215 acres of PCTC lands based on a community-driven disposition plan. The lands encompassed all PCTC lands from the Blackfoot River head waters near Rogers Pass to the Clearwater drainage. Approximately 75% of the lands have been or will be transferred into federal or state ownership and 25% into private ownership. In 2008, The Nature Conservancy and The Trust for Public Land entered into another agreement with PCTC, the Montana Legacy Project, to purchase 312,500 acres of timberland in western Montana. As part of the Legacy Project, a total of 71,754 acres in the Clearwater and Potomac valleys of the Blackfoot Subbasin will be purchased and resold to public agencies and/or private buyers. The majority these lands are intended to be re-sold to the USFS and DNRC.

"Average annual minimum temperatures in the subbasin range from 24 °F (Ovando) to 27 °F (Seeley Lake) and average annual maximum temperatures range from 54 °F (Ovando) to 56 °F (Potomac). Average total annual precipitation ranges from 15 inches (Potomac) to 21 inches (Seeley Lake) and average total annual snowfall ranges from 54 inches (Potomac) to 120 inches (Seeley Lake). June is the wettest month and snowfall is greatest in January. Higher levels of precipitation and snowfall occur at higher elevations in the subbasin.[3]" (Blackfoot Challenge and Trout Unlimited 2009)

Glaciation strongly influenced the current subbasin landscape as evidenced by numerous moraines and associated hummocky topography, glacial pothole lakes and broad expanses of flat glacial outwash (Whipple et al. 1987, Cox et al. 1998). The Blackfoot Subbasin was subjected to two major periods of glaciation, the Bull Lake glaciation (~70,000 years ago) and the Pinedale glaciation (~15,000 years ago). During these periods, large continuous ice sheets extended from the mountains southward into the Blackfoot and Clearwater River valleys (Witkind and Weber1982). During the latter part of the Pleistocene Era, the Blackfoot Valley was further shaped by the repeated filling and catastrophic draining of Glacial Lake Missoula, a massive lake formed by a series of ice dams that impounded the Clark Fork River downstream of Missoula. In the Blackfoot Valley, Glacial Lake Missoula extended upstream as far as Clearwater Junction (Alt and Hyndman 1986).

Figure 3-2. Map of Blackfoot River Bull Trout Core Area



When the glaciers receded, large deposits of glacial till, glacial outwash, and glacial lake bed sediments were left behind. These deposits cover much of the Blackfoot Valley floor, shaping the topography of the valley and the geomorphology of the Blackfoot River and the lower reaches of most tributaries. Glacial features evident on the landscape today include moraines, outwash plains, kame terraces and glacial potholes. The landscape between Clearwater Junction and Lincoln, for example, is characterized by alternating areas of glacial moraines and their associated outwash plains. In this area, ice pouring down from the mountains to the north spread out to form large ponds of nearly stagnant ice several miles across known as piedmont glaciers. Muddy melt water draining from these piedmont glaciers spread sand and gravel across the ice free parts of the valley floor to create large outwash plains. The town of Ovando sits on one of these smooth outwash plains (Alt and Hyndman 1986). Due to the highly permeable nature of coarse outwash sediments, streams generally lose water through infiltration and often go dry where they cross outwash plains. Such is the case with the Blackfoot River between the Landers Fork and the town of Lincoln. Since glaciation, the geomorphology of the lower elevation portions of the subbasin has been modified by alluvium originating from reworked glacial deposits. Alluvial deposits cover most drainage bottoms and reach depths of several hundred feet in portions of the Blackfoot Subbasin (MDEQ 2008a, 2008b, Tetra-tech 2004).

As a result of these glacial deposits many streams or stream reaches are intermittent by nature. Streams are usually perennial in confined valley types but have intermittent reaches when the valley widen or enters a larger valley. This can be seen with Cottonwood, Dunham, Monture, Arrastra, and Landers stream systems. These types of environments often provide ideal spawning habitat near the lower end of the streams intermittent reach. As the water “resurfaces” or “upwells” it is often clean and cold which are key criteria for spawning sites. Two key sites that meet this description on a large scale are the Blackfoot mainstem, upstream of Lincoln, and lower Beaver Creek which is a compilation of seeps and springs.

Historically, bull trout populations were well distributed throughout the Core Area and were likely in much higher densities than they are today. We hypothesize that up to 1000 bull trout redds may have been historically present in the Blackfoot River Core Area. As with most bull trout populations, overall numbers were likely highly variable from year to year, based on natural climatic and disturbance patterns. These redd numbers were generated from estimating the potential in each of the 16 major spawning tributaries to the Blackfoot River (Union, Gold, Belmont, Cottonwood, Monture, Chamberlain, North Fork Blackfoot, Nevada, Arrastra, Beaver, Willow, Poorman, Upper Willow, Landers, Alice, and the upper Blackfoot). They may be conservative since not all streams or tributaries were assigned a redd count number. Smaller streams like Johnston and Elk Creek may have contributed to the overall population historically but were not assumed to support redds for this exercise. The Montana Bull Trout Scientific Group (1995) cites unpublished information from MDFWP that indicates bull trout use of small streams like Elk and Dick Creek, however spawning is not documented to occur in them at the present time.

Bull trout populations in the Blackfoot River were likely first exposed to mining -caused impacts in the late 1800’s in the form of small scale mining. This mining was focused mainly south of the Blackfoot River in the Lincoln area (eastern Nevada Creek tributaries to Anaconda Cr.) and in the northern Garnet mountain range (Ashby to Chamberlain Creek). The mining method was often an instream “placer” type operation that directly disrupted fish habitat and stream functions. Once disturbed in this fashion, streams rarely have the ability to naturally recover to their pre-disturbance level.

In the early 1900’s small scale ranching and homesteading moved into the Ovando and Helmville area. Significant impacts to the population where likely related to water rights and water diversions and overgrazing or clearing stream riparian areas. Use of surface waters required diversions, which were not usually screened, leading to the entrainment of various age classes of aquatic species. In addition to unscreened diversions, the withdrawal of water from the stream diminished the ability to provide adequate habitat for aquatic species. Clearing of riparian shrubs and damage to streambanks by over-grazing also caused impacts to stream's geomorphology (streams can become wider and warmer). Eroding banks introduced high amount of sediment into streams which exacerbated stream morphology problems and reduced fish spawning success.

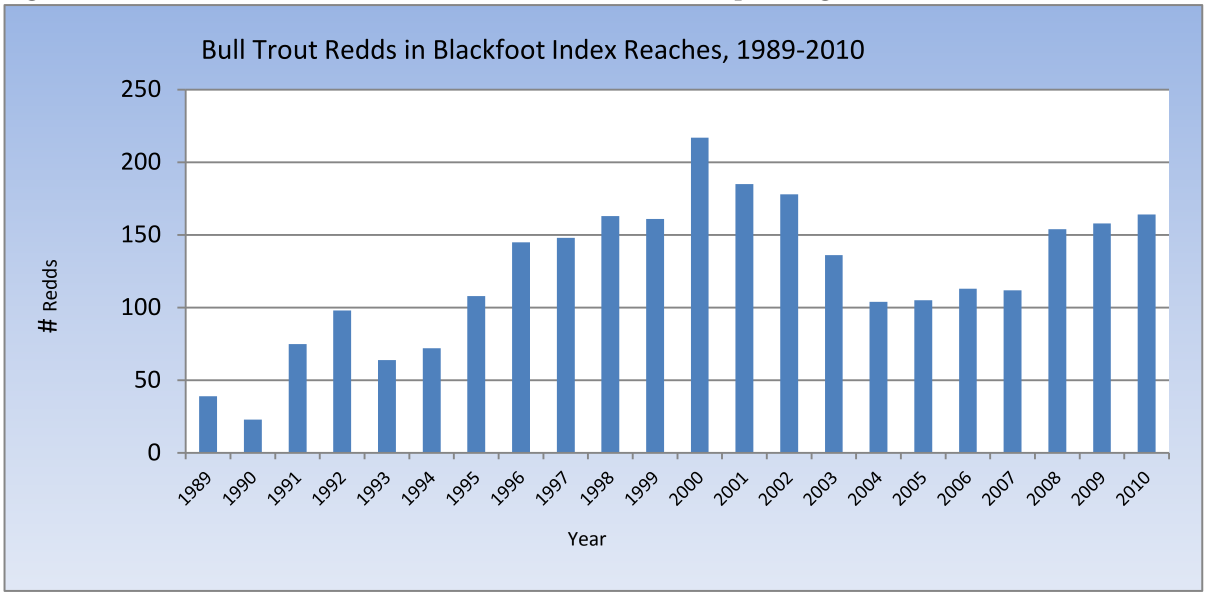
Another earlier cumulative impact was the construction of Milltown Dam in 1906. This structure severed and isolated fish population in the Blackfoot River from other Core Populations such as the Middle Clark Fork, Upper Clark Fork, and Rock Creek.

During the era from 1930's to 1980's, significant timber harvest and road building was taking place. These activities lead to additional increases in fish barriers (undersized culverts), increased sediment delivery, increased stream temperatures, and other water quality impacts. Water Quality studies done by Streebin et. al in 1973, documented the streams with the lowest water quality were Richmond Creek, Deer Creek, and West Fork Clearwater River which were all intensively harvested and roaded prior to the study period. Early in the logging era, log drives down the Blackfoot mainstem and its major tributaries were common. These log drives effectively removed important log jams that created adult bull trout habitat in the mainstem Blackfoot but also removed pools and spawning habitats in the larger tributaries. In addition, droughts (1930's and 2000's) undoubtedly have played a role with the rest of the negative effects and reduced access to spawning areas and increased stress and mortality. Figure 8-2 likely shows a response to drought conditions from 2000 to 2007.

Many of these past impacts have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. For instance, fish barriers have been identified as a significant impact and multiple agencies and partners are removing culverts, upgrading culverts for fish passage, removing mainstem dams (Milltown) and removing or mitigating more local barriers such as irrigation diversion structures. In addition, regulation changes no longer allow for harvest of or intentional fishing for bull trout. Other recent positive attributes within this core populations is the implementation of the Montana Legacy Lands Projects. This project successfully transferred thousands of acres of Plum Creek Timber Company land ownership to that of the Forest Service and Montana Fish Wildlife and Parks, via The Nature Conservancy. This land transfer now allows for large scale restoration efforts in the form of decommissioning roads negatively impacting aquatic resources, relocating roads out of valley bottoms, removal and upgrade of undersized culverts, and allowing stream side management areas to recovery without industrial timber harvest or the threat of subdivision.

As seen in Figure 3-3, the population trend for bull trout between 1989 and 2010 in three primary spawning tributaries (Monture Creek, North Fork Blackfoot and Copper Creek) in the Blackfoot Core Area is upward. However, a critical issue with this graph is its short time scale. The average number of redds over the past 23 years has been about 126. Historically, bull trout numbers were likely at much higher levels. While the recent trend shows some recovery of bull trout, it is skewed by a slight improvement of three-low level populations. Thus, we believe that the population is still well below its potential.

Figure 3-3. Bull Trout Redd counts in Index Reaches of Three Spawning Tributaries

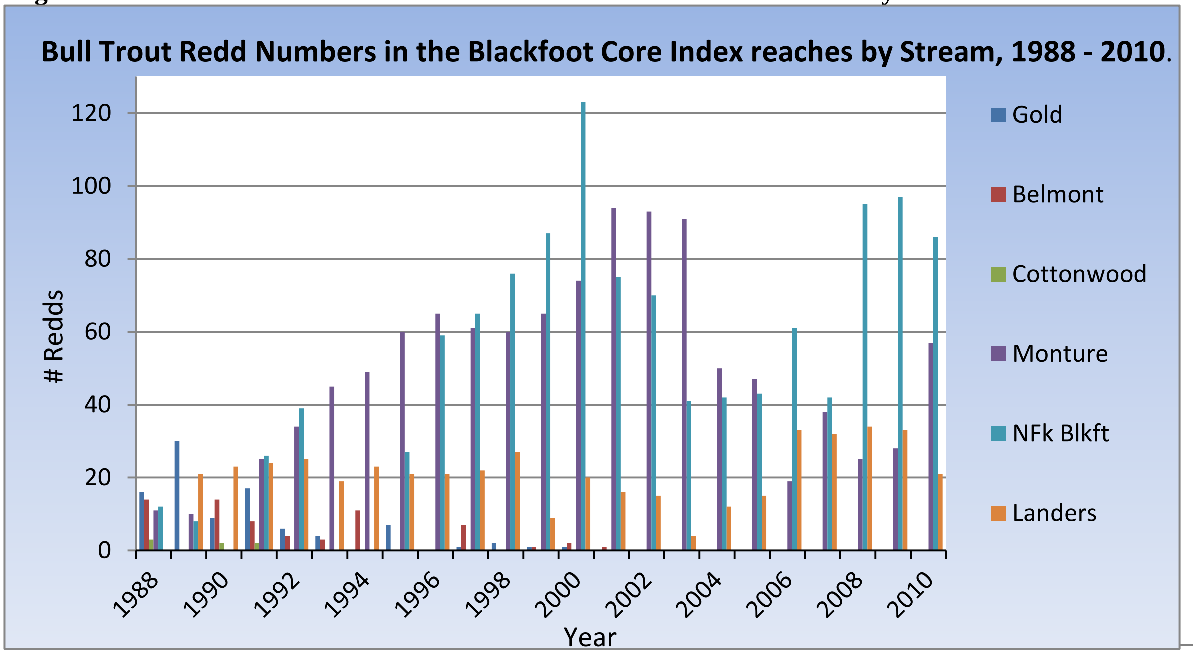


Currently, the main factor limiting recovery of bull trout in the Blackfoot is probably the lack of high quality tributaries throughout the Blackfoot watershed. However, it is unlikely that this impact is entirely responsible for the overall decline. Numerous other significant impacts, such inadvertent fishing mortality, non-native fish competition and hybridization, and water temperature probably also contribute significantly to the current population trend. Future concerns will likely be associated with the protection of instream flows in an era of increasing human consumption of surface and groundwater.

While none of the previously mentioned impacts are easy to address, it will be necessary to change them in order to expect maintenance of long-term population of bull trout in the Blackfoot Core Area. It is likely that the impacts from any one of these sources cannot be eliminated entirely, but rapid and successive improvement in each will contribute synergistically to a stronger population, and this will allow us time to work further towards reducing additional impacts.

Figure 3-4 shows redd count data from the six index streams over the 1998 – 2010 time period. As can be seen, redd numbers in any given stream are highly variable from year to year. This graph shows that the North Fork, Monture Creek, and Landers bull trout have been consistent and generally account for the majority of spawning within the core area.

Figure 3-4. Bull Trout Redd Numbers in the Blackfoot Core index reaches by stream



Of primary concern is the fact that there are only six index reaches or tributaries within the Blackfoot Core area that have bull trout populations high enough to warrant counting. Further concern is related to three of the six index reaches are declining. Gold Creek and Belmont Creeks are both in steep declines and appear to be in imminent threat of extirpation. The three stronger populations are clustered into the northern and eastern portion of the Blackfoot River watershed. The locations of these remaining-stronger populations are in unroaded or minimally managed watersheds and have less anthropogenic impacts. However they are in landscapes that are inherently stochastic and sensitive to drought conditions and dry years. Thus, in order to conserve long-term bull trout populations within the Blackfoot River, restoration and conservation efforts need to secure populations that are distributed across the Core Area. As bull trout have long migratory movements, cross numerous ownerships, and are susceptible to various kinds of impacts; it will require continued coordination and participation of all the landowners within the Core Area for the conservation of bull trout.

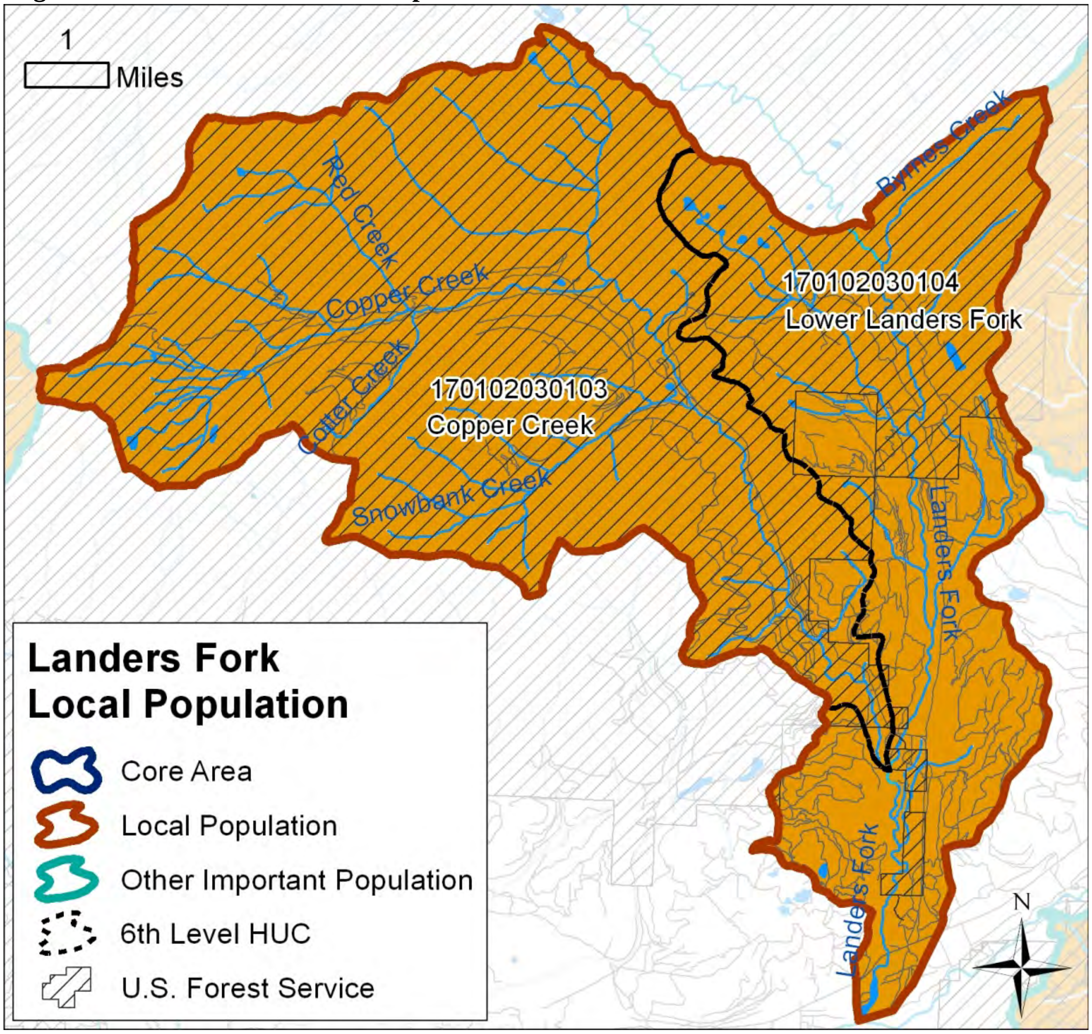
Blackfoot River Core Area – Helena National Forest

There are two local populations within the core area on the Helena National Forest – Landers Fork and Poorman Creek.

Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Local Population: Landers Fork

Figure 3-5. Landers Fork Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 3-1. Landers Fork Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
150-300	Increasing	Fluvial, Connected	Three -- two in Copper Creek and one in Snowbank Creek. No spawning reaches identified to date in Landers Fork- Some spawning likely just below Silver King Falls based on anecdotal information.	Brown trout—Low threat with a few found in lower Landers Fork by MFWP and Hillman and Chapman (1996) None currently found in Copper Creek based on sampling by FWP and Forest Service fishery personnel.

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High significance – This is a moderate sized drainage and the primary spawning tributary to Upper Blackfoot River above Nevada Creek	Low vulnerability due to high elevation headwaters and groundwater upwelling of cold water.	None known other than the high magnitude of recruitment provided to the Blackfoot Core Population

Driving Factors Determining Bull Trout Population:

Poor stream morphology conditions on Lower Landers Fork due to past flood events and human related channel disturbance on nonfederal lands likely affects use by bull trout. Much of the land bordering lower Landers Fork is in private ownership. Additionally, low flows during winter on portions of Landers Fork below the confluence of Copper Creek are known to have caused some post spawn mortality due to bull trout being trapped in isolated pools which freeze in the winter. Access to upper Landers Fork by bull trout is prevented by Silver King Falls. Habitat is in good condition in the Copper Creek drainage with the exception of the need to remove one partial barrier (Snowbank Creek, one complete barrier (Cotter Creek), and some additional road sediment control on open roads. Additional benefits can be obtained by obliterating some roads identified as part of the currently ongoing travel planning process. The lack of full access to two tributaries to Copper Creek (Snowbank Creek and Cotter Creek) by spawning bull trout may limit the population to a minor degree. Bull trout egg survival and rearing associated with sediment levels in stream substrates likely play a minor role in limiting bull trout survival.

Individual HUC6 (w/in Local Population) attributes and strategies, based on above factors

HUC6 (name and #): Copper Creek - 170102030103

Strategy (Active Restoration, Passive Restoration, Conserve): Some Active – mostly Conserve

% Forest Service Ownership in HUC: 97%

Relative Contribution of Habitat in Limiting Local Population: Moderate

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FAR	-	-	$0	L	L
Barriers	FUR	FA	3 years	1	$120,000 (pull Snowbank culvert and close road and replace Cotter Culvert with bridge)	Moderate- Snowbank culvert is partial barrier, with removal of Snowbank diversion extensive spawning is now occurring throughout Snowbank Creek	M

Pools	FAR	FA	10 years	3	$0 (happening naturally due to recruitment of woody debris)	M	-
Sediment	FUR	Improve but probably will remain FAR	10 years	1	$10,000 per year for emphasis on graveling and maintenance of FS Road #330. $60,000 needed for relocation of one segment of road #330. Additional unknown funding needed to obliterate yet to be determined roads in the drainage (travel planning)	L	M

Temperature: GIS rating – FAR. Extensive field sampling indicates the rating should be FA rather than FAR. Temperatures are near optimum for bull trout in Copper Creek. Average temperature for July or August was found to be less than 51 F (Pierce et al. 2002) while in other years it has been found to average as low as 46 and 48 F (Pierce et al 1997 page 35 and Pierce and Schmetterling 1999 page 40, respectively).

Barriers: GIS rating - FUR. Barrier rating should be FAR rather than FUR as currently assigned. All barriers have been removed in the drainage with the exception of a partial barrier on Snowbank Creek and a culvert barrier on Cotter Creek which only has an estimated 400 feet of useable habitat upstream of the culvert. The culvert on Snowbank Creek already passes numerous fluvial bull trout based on redd counts upstream of the culvert in 2008 and 2010. As of 2010 Red Creek up to the barrier falls and Cotter Creek up to the barrier culvert have not been evaluated for use by spawning bull trout. This should be accomplished in 2011.

Pools: GIS rating - FAR. Pools following the fire in 2003 have increased dramatically due to recruitment of fire killed trees. The rating for this parameter should now be FA as number of pools per mile is in excess of 60 based on walk through survey during redd counts conducted every year since the fire in 2003.

Sediment: GIS rating - FUR. Sediment should be rated as FAR rather than FUR. The sediment levels in spawning gravels are not substantially elevated in Copper Creek based on McNeil core samples collected between 1986 and 2003 where average sediment levels varied between 24% and 34%. Average sediment levels are only slightly elevated over what is found in relatively unmanaged streams of similar geology (28-30% on the average).

Most important activities to improve bull trout populations:

Top priorities for this HUC include removing the remaining culvert (partial barrier) on Snowbank Creek or replacing it with a structure that provides unimpeded passage. Additionally, continue with road improvements and maintenance on FS Road 330 to decrease sediment delivery from roads. There is one important sediment contributing location on FS Road #330 that needs to be relocated. Also obliterate other sediment contributing roads in the drainage after travel planning has been completed and roads available to be closed are identified. Note: Following the 2003 Snow Talon Fire a culvert providing for 100 year flow events was installed on Cotter Creek with the intent of installing a bolt in baffle system for upstream spawning fish passage once the system stabilized. The bolt in baffle system has not yet been installed. The decision at the time was that it was not worth installing a bridge as there is an estimated 400 to 500 feet of habitat upstream until a natural barrier is encountered. Additional discussion with MFWP should be undertaken to determine if the above rationale is still acceptable or whether complete passage (such as provided with a bridge) should be provided at the site. Some additional survey work should be accomplished to determine if there is any use by spawning bull trout of Red Creek (up to the barrier falls) or Cotter Creek (up to the barrier culvert).

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors-

HUC6 (name and #): Lower Landers Fork – 170102030104							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive on Forest – Active management below the Forest on private lands							
% Forest Service Ownership in HUC: 36%							
Relative Contribution of Habitat in Limiting Local Population: No limitation from portion on Forest as bull trout are believed to be limited to the mainstem of Landers Fork which is all on private land. Habitat is limiting bull trout on non-federal lands.							
Functional Significance to Local Pop: Currently low significance due to the strength of the population in Copper Creek and limited amount of use believed to occur in Landers Fork based on relative abundance of bull trout found to be using Landers Fork.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FUR- see comments below	20 years	2	Unknown and work would be located on private lands	H	L
Sediment	FA	FA	-	-	$0	-	-

Temperature: GIS rating – FA. This rating seems appropriate given findings from MDFWP that average monthly temperatures for July and August are less than 52 F. Hillman and Chapman (1996) also had similar findings in 1996.

Barriers: GIS rating – FA. There are no man caused barriers on Landers Fork. Natural barriers exist at Silver King Falls and in some years summer flows can be limiting due to the flow going subsurface downstream of the confluence of Copper Creek

Pools: GIS rating – FA. This is not accurate on Landers Fork (private land and the only portion of the HUC supporting bull trout). Pool structure in Landers Fork below Silver King Falls has been reduced by flood events and stream channelization as assessed by MDFWP (Pierce et al. 2002 page 55) and some cursory walk through surveys by Forest Service fishery personnel. The rating should be FUR.

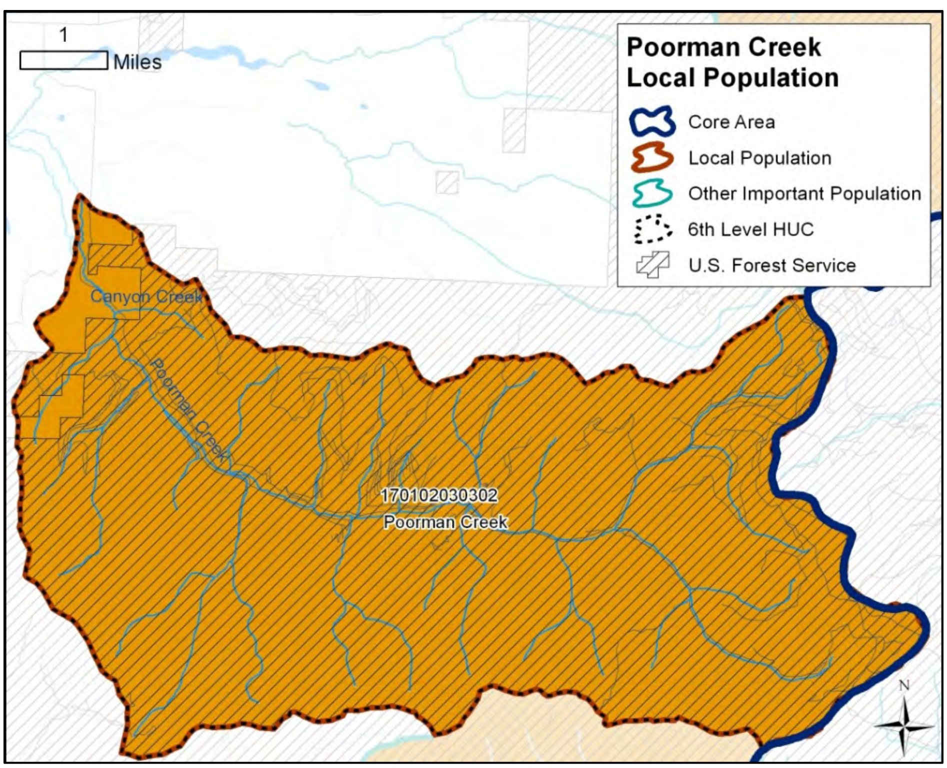
Sediment: GIS rating – FA. Limited McNeil core data from below Silver King Falls had fine sediment levels averaging in the upper 20s which supports the FA call given that unmanaged streams on the Helena Forest have sediment levels averaging between 28 to 30%.

Most important activities to improve bull trout populations:

For Landers Fork the primary opportunity for habitat improvement to benefit bull trout is associated with improved stream channel morphology on nonfederal lands as has been suggested by MDFWP Pierce et al 2002 page 55). Another longer term improvement would be to improve the bridge crossing where FS Road 330 (county jurisdiction) crosses Landers Fork with the intent to reduce risk for large contributions of sediment should the bridge washout or the stream reroute itself around the bridge. This bridge span is too narrow for the floodplain width and encroaches on the stream channel to the degree that substantial bedload deposition is occurring upstream. The bedload deposition appears to be leading toward channel migration which could eventually lead to new channel formation and large contributions of sediment downstream at some point in the future. One additional consideration would be to expand bull trout distribution by introducing them above Silver King Falls. There should be reasonable chance for success in establishing a resident population.

Local Population: Poorman Creek

Figure 3-6. Poorman Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M with potential to be H

Table 3-2. Poorman Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
Unknown	Believed to be increasing	Resident and Fluvial -- Connected within the last 10 years	None currently confirmed but spawning is known to occur based on age classes present. Magnitude of spawning not confirmed	Brown trout and brook trout—Moderate in the lower reaches, brook trout –moderate to high in upper reaches. Brook bull trout hybrids noted during sampling effort by MDFWP. Additional evaluations need to be conducted to better assess threat.
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High significance – This is a moderate sized drainage and the primary Blackfoot tributary south of highway 200 and upstream of Highway 141 still supporting moderate numbers of bull trout.		Moderate vulnerability, although some tributaries to Poorman Creek have cold summer water temperatures. Water temperatures to be collected in 2011.		None identified to date

Driving Factors Determining Bull Trout Population:

Nonnative fish (brown and brook trout are present with their influence likely higher in the lower reaches of Poorman Creek as compared to upper reaches. Habitat has been fragmented by culvert barriers and past placer mining. Many of the barriers have been eliminated, but some still remain on both public and private lands and need to be addressed. Sediment delivery from roads is a factor related to the substantially elevated sediment levels in stream spawning and rearing substrates. Severe channel alterations and lack of pools (mostly from past mining activities) for some reaches are limiting; especially on private lands. Some metals contamination occurs from past mining on some reaches, but the degree it inhibits fish production is unknown. As a result, bull trout are likely limited by many habitat and habitat connectivity issues as well as adverse interactions with non-native trout. There are good opportunities for partnerships with other agencies and private individuals to benefit bull trout on both federal land and nonfederal lands.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Poorman Creek - 170102030302							
Strategy (Active Restoration, Passive Restoration, Conserve): Active							
% Forest Service Ownership in HUC: 92%							
Relative Contribution of Habitat in Limiting Local Population: 20% on Forest (higher on private lands)							
Functional Significance to Local Pop: Moderate, is not part of the Landers/Copper Local Population but is bull trout critical habitat and likely contributes fish to the core population.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FUR	FA	10 years	1	$250,000	M	M
Pools	FUR	FAR	20 years	2	Unknown	L	L
Sediment	FUR	FAR	10 years	1	$250,000 over 10 years (Road relocation South Fork Poorman Creek-$50,000 partnership share. Other road cooperative work with L&C county, $20,000 per year for 10 years	L-M	H

Temperature: GIS rating – FAR. No data to discount GIS call. Temperatures data was collected in 2011.

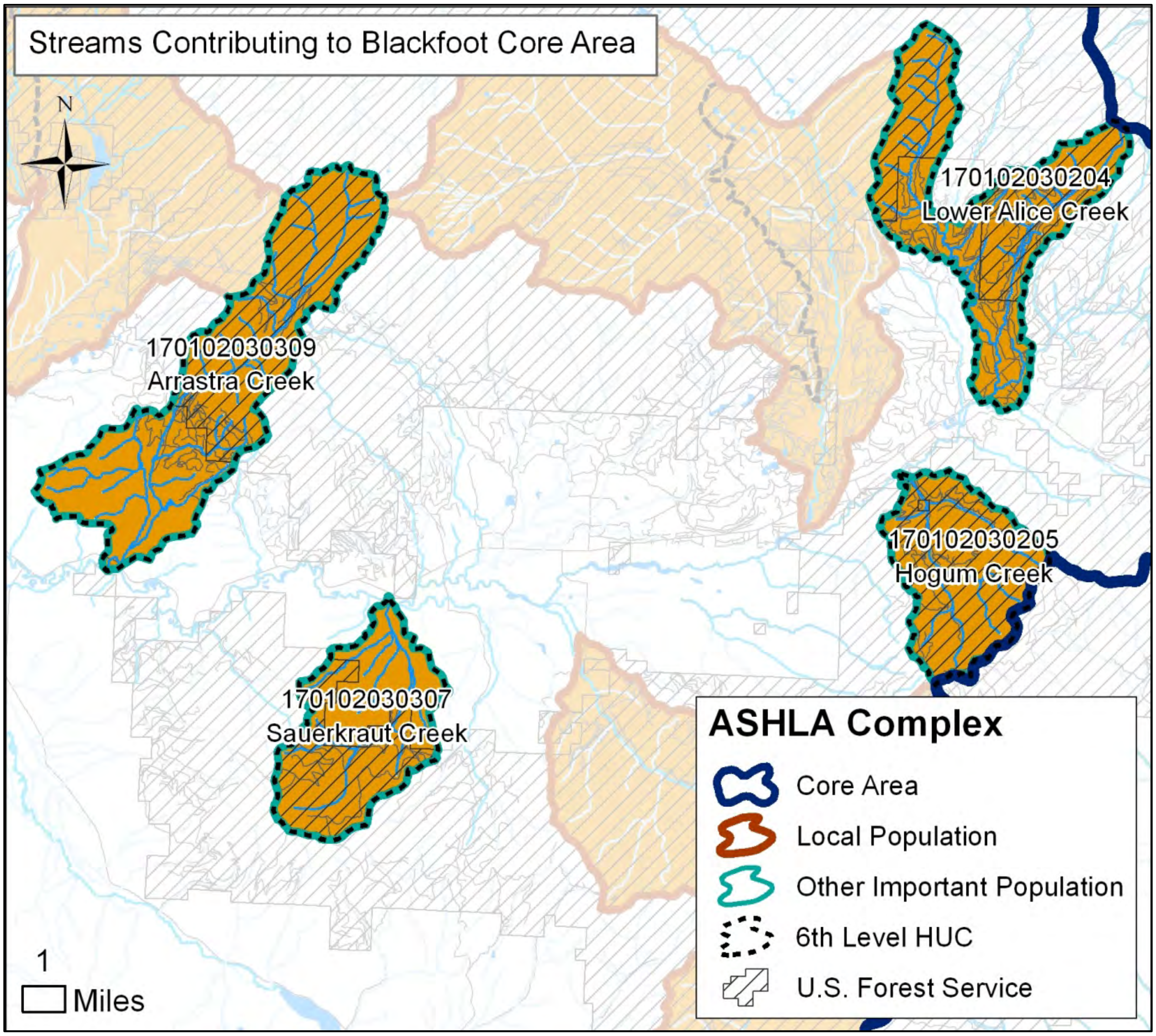
Barriers: GIS rating – FUR. This is an accurate assessment as there are still several barriers and partial barriers to fish movements on both federal and nonfederal lands.

Pools: GIS rating – FUR. This is accurate with numerous reaches of the stream, both federal and nonfederal lands, having been placer mined with low levels of quality pools. Partial walk through surveys by Forest Service fishery personnel in the mid-1990s found substantial reaches negatively affected by channelization and mining.

Sediment: GIS rating - FUR. GIS assessment is believed to be an overestimate based on fine sediment (less than 6.4 mm diameter) found in McNeil core samples from spawning gravels. Fine sediment level averages have varied between 24 and 39% between 1985 and 2006 with an overall average from all years of 33.1%. A call of FAR is probably more appropriate based on all information currently available.

Other Important Population: Group of Streams that Contribute to Blackfoot Core Population

Figure 3-7. Group of Streams that Contribute to Blackfoot Core Population



Relative Importance of Population to Core Area (H,M,L): L

This is a grouping of streams that are not designated local populations, but do contribute to the Blackfoot Core Population. Consequently they are considered together as a peripheral population or other important population category. Streams within the category include Sauerkraut, Hogum Creek, Arrastra Creek, and Alice Creek.

Table 3-3. Group of Stream that Contribute to Blackfoot Core Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
Unknown	Unknown	Fluvial—and connected in some streams and partially connected in others	None currently confirmed on a yearly basis. However, sporadic redd searches have identified incidental	Brown trout and brook trout vary in density and distribution by stream and pose variable levels of risk to bull trout- see 6th level HUC assessments

			redds on Alice Creek. Rearing by fluvial fish is believed to occur in some streams with spawning by resident bull trout likely to occur in others	

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Moderate significance when the 4 6th level HUCs are taken as a whole– The streams are individual 6th level HUCs and are distributed throughout the headwaters of the Blackfoot drainage (Two streams north of highway 200 and two south of Highway 200) which helps reduce risk of any single event for affecting contribution of bull trout from this grouping of streams	Moderate vulnerability overall with some streams having low vulnerability while others have moderate vulnerability based on current water temperatures and overall elevation.	None currently known

Driving Factors Determining Bull Trout Population:

Information as to how bull trout utilize these streams indicates limited bull trout use. It is known that all four streams support some rearing bull trout likely from fluvial fish from the Blackfoot River. Of these four streams, only Arrastra Creek indicates reproduction as suggested by the presence of age-0 fish. Habitat alterations are present in all streams and non-native fish species are likely factors that adversely affect bull trout as well. Barriers or partial barriers to fish movements on nonfederal lands may be important on some of the streams with some of those barriers having been recently addressed.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Arrastra Creek - 170102030309							
Strategy (Active Restoration, Passive Restoration, Conserve): Active							
% Forest Service Ownership in HUC: 58%							
Relative Contribution of Habitat in Limiting Local Population: 20%							
Functional Significance to Local Pop: Low Is not part of the Landers/Copper Local Population but is considered a bull trout Emphasis Watershed.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FAR	FA	10 years	3	$150,000	L	M
Pools	FAR	FAR	10 years	2	$25,000	L	M
Sediment	FAR	FAR	-	-	$0	-	-

Temperature: GIS rating – FAR. Temperature data from Pierce et al 2002 found average August temperatures of 52.3 F in the lower part of the drainage which falls in the FA range.

Barrier: GIS rating – FAR. This is an accurate assessment on Forest as the only manmade barrier present that affects bull trout distribution is the culvert barrier on the North Fork of Arrastra Creek. The North Fork appears to be used only by westslope cutthroat trout, but bull trout have been observed at the confluence of the North Fork with the main stem of Arrastra Creek. There is another culvert which is a complete barrier to bull trout on Arrastra Creek where FS Road 4106 crosses, but there is a natural barrier within 150 feet upstream of the culvert barrier. Discussions with Lolo Forest fishery personnel indicate that there is an additional culvert barrier on non-federal lands below the Forest that would be beneficial to remove.

Pools: GIS rating of FAR is accurate overall, but pools on FS lands are abundant (FA as measured by RI/R4 Forest Service survey methods in the early 1990s) while below the Forest pools are very limited (FUR) on over one mile of stream. There are good opportunities for partnership efforts on nonfederal lands.

Sediment: GIS rating – FAR. This rating is borderline FA. Average fine sediment levels from McNeil core samples varied on a yearly basis from 22.4% to 33.3 % values for years from 1988 to 2005. Average levels for mostly unmanaged streams on the Helena Forest had average sediment levels in the 28-30% range.

The Arrastra drainage is in good condition within the Forest. There is a natural barrier just upstream of a culvert barrier on Arrastra Creek where FS Road #4106 crosses the stream. This presents the potential to attempt to establish a resident bull trout population in the currently fishless section upstream from a natural barrier above the road crossing of FS Road #4106. Additionally, there is a culvert barrier on the North Fork of Arrastra Creek. It is unknown if bull trout will benefit from removal of this barrier. The primary benefit to bull trout in this HUC could be derived from nonnative fish control in the lower reaches below the Forest, correcting any flow issues that may be present due to irrigation, removing a potential culvert barrier on nonfederal lands, improving pool conditions on non-federal lands, and adjusting grazing practices on both BLM and nonfederal lands.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Sauerkraut Creek - 170102030307

Strategy (Active Restoration, Passive Restoration, Conserve): Active

% Forest Service Ownership in HUC: 58%

Relative Contribution of Habitat in Limiting Local Population: 0% on Forest, 50% on non-federal lands

Functional Significance to Local Pop: Low, is not part of the Landers/Copper Local Population but does contribute to the Blackfoot Core Population

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Restoration Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	20 years	2	$200,000	M	L
Sediment	FUR	FAR	10 years	2	$10,000 Road sediment control at any culvert delivery points in the drainage.	L	L

Temperature: GIS rating - FAR. Data from MDFWP found average July August temperatures were in the vicinity of 56 F which supports the FAR call.

Barrier: GIS rating – FA. This is an accurate assessment as the remaining barriers to fish movement on nonfederal lands were removed in 2010 in a partnership agreement with the Blackfoot Chapter of TU and there are no manmade barriers on FS lands.

Pools: GIS rating of FAR is accurate, although pools have been affected in some locations on federal lands where placer mining has altered pool structure substantially. Much of the habitat still supports high quality pools on federal lands where it has not been altered by past placer mining. On non-federal lands substantial reclamation efforts have occurred on placer mined reaches to develop pool habitat.

Sediment: GIS rating - FUR. The FUR GIS assessment is not accurate. McNeil substrate core samples by Forest Service personnel found very low levels of fine sediment (less than 20% fines by depth less than 6.4 mm) This unusual finding is most likely due to the large substrate present throughout the formerly placer mined reaches. However, upstream reaches may have somewhat more sediment. Overall a FAR rating is believed to be more appropriate. Additional sampling is planned for 2011.

With barriers having been removed and with the abundant levels of brook trout in the lower reaches below the Forest, bull trout may benefit from brook trout removal in the lower reaches. However, Sauerkraut Creek is relatively small, and, because of this, may not provide significant spawning habitat. There are brook trout on Forest although at relatively low abundance in comparison to cutthroat trout. Brook trout removal would provide the most benefit for any bull trout on FS lands as well. Some channel restoration from mining and improvement of an existing ford on FS lands would provide some lesser amount of benefit for bull trout.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Hogum Creek - 170102030205							
Strategy (Active Restoration, Passive Restoration, Conserve): Active							
% Forest Service Ownership in HUC: 90%							
Relative Contribution of Habitat in Limiting Local Population: 5%							
Functional Significance to Local Pop-- Low, Is not part of the Landers/Copper Local Population but is considered a bull trout Emphasis Watershed and likely provides some limited contribution of bull trout to the Blackfoot core population							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FAR	FA	10 years	2	$30,000	L	L
Pools	FAR	FA	-	-	$0	-	-
Sediment	FUR	FAR	10 years	3	$5,000	L	L

Temperature: GIS rating – FAR. No data to discount GIS call.

Barrier: GIS rating – FAR. The existing culvert on Hogum Creek within the Forest is not a barrier to fish movements based on site specific field evaluations and documented in the Regional database.

There is one barrier present in the drainage at the culvert crossing on Black Diamond Creek. Because it is unlikely that bull trout use Black Diamond Creek (it is a very small stream and no bull trout have been found in it to date), the FAR rating is appropriate.

Pools: GIS rating - FAR. This rating underestimated the number of pools. Field evaluations by Forest Service fishery personnel have found the number of pools at 126 to 149 per mile. With this level of pool habitat the baseline rating for pools should be FA.

Sediment: GIS rating – FUR. The FUR GIS assessment is an overestimate of sedimentation. A baseline call of FAR is more appropriate. Substrate core samples from McNeil Core samples found somewhat elevated levels of fine sediment (average of 33%) in stream gravels. The average on the HNF for mostly unmanaged streams is 28 to 30%). The Helena Forest considers one standard deviation over the average to be of concern but not excessive. The 33% level falls within one standard deviation.

In general Hogum Creek has good habitat and has been found to support very low numbers of bull trout in the lower reaches (mostly below the Forest) with the limited sampling conducted. Bull trout would benefit from some nonnative fish control (removal of brook trout) in the lower reaches where bull trout are most likely to be found. Some sediment control at culvert crossings would be of some benefit, but as mentioned above sediment levels are not excessive. Some additional efforts to determine if there is any use of the drainage for spawning by fluvial bull trout are needed.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Alice Creek - 170102030204							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive for habitat							
% Forest Service Ownership in HUC: 60%							
Relative Contribution of Habitat in Limiting Local Population: 20%							
Functional Significance to Local Pop: Low, Is not part of the Landers/Copper Local Population but is considered a bull trout Emphasis Watershed							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA	FA	See below	3	$100,000	L	L
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: GIS rating – FAR. Sampling on Forest by MDFWP shows water temperatures averaging in the mid to upper 50s in summer on the Forest during July and August. Sampling by the state found maximum summer temperature of 57 F in July and August. Below the forest temperatures are more elevated with summer temperatures ranging from low 50s to 65 Degrees F in some locations. The GIS rating of FAR is appropriate.

Barrier: GIS rating – FA. There are no barriers on the mainstem of Alice Creek. The small tributaries known to support westslope cutthroat trout do not have manmade barriers, but do go dry at times in the lower reaches, which presents a barrier to fish movements. A culvert barrier on Hardscrabble Creek was removed in 2009. Barrier culverts are believed to be present on Bartlett Creek or former

Plum Creek lands which the Forest Service now owns. Bull trout have not been found to use Bartlett Creek, but a rating of FAR is more appropriate than FA at the present time.

Pools: GIS rating – FAR. Field evaluations indicate that loss of beaver in some reaches has affected pools. State habitat evaluations suggested that habitat was in relatively good condition. Not enough information to suggest changing rating to FA.

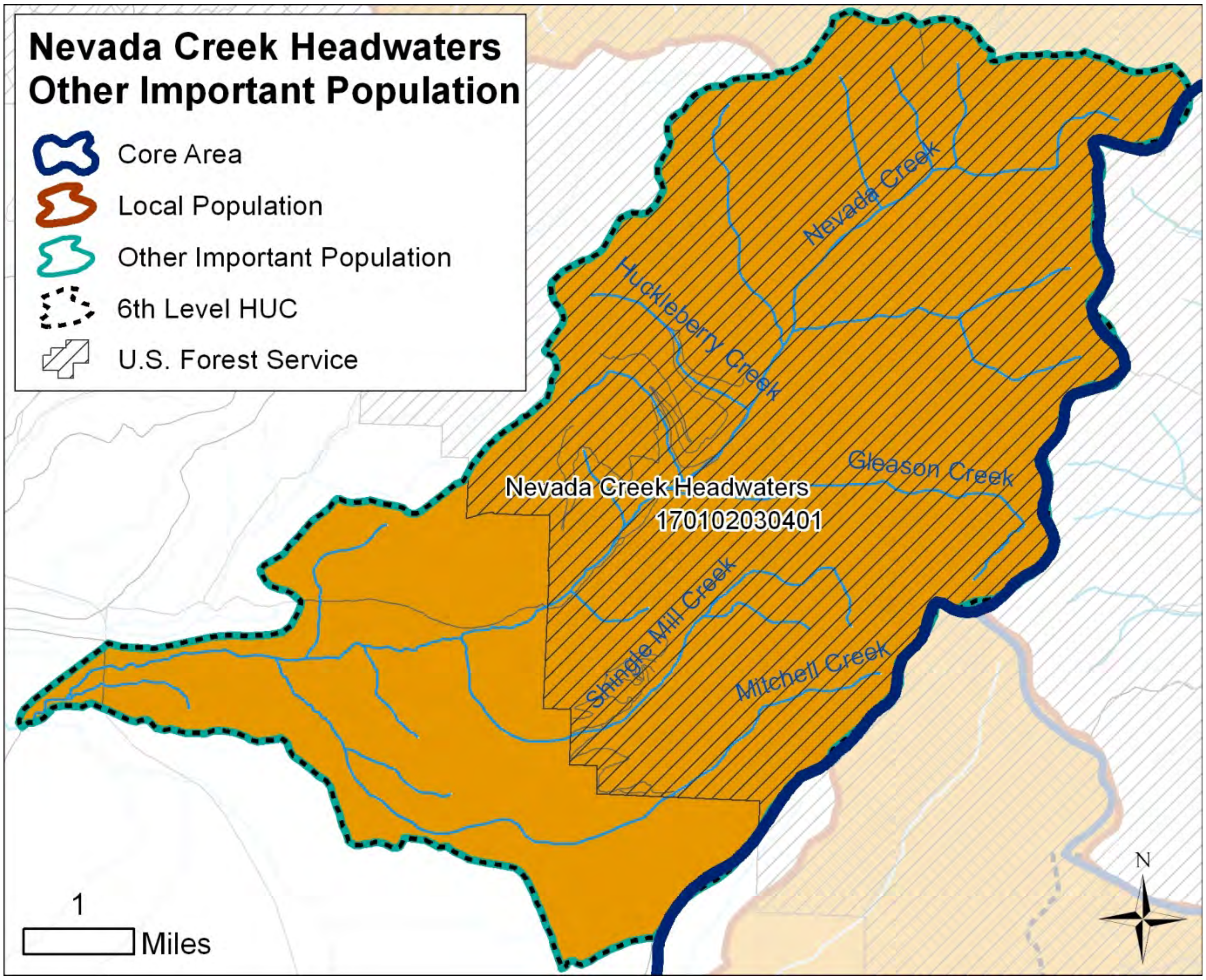
Sediment: GIS rating – FA. The FA GIS assessment is not accurate. Substrate core samples from McNeil Core samples found levels of fine sediment averaging 33% in stream gravels in 1988 while samples in 2005 fine sediment levels averaged 26%. With levels of fine sediment from core samples in mostly unmanaged drainages found to average between 28-30% the levels in this stream appear to be slightly elevated and a baseline call of FAR is more appropriate

Alice Creek was documented as supporting bull trout on nonfederal reaches at various times over the last 20 years. Bull trout have not been found on federal lands. In 1937 there are anecdotal statements that Dolly Varden were abundant, but location where fish were observed was not specified. Only one instance in recent years has documented bull trout spawning in Alice Creek and that was on nonfederal lands below the forest in 1993. One of the most beneficial steps may be to coordinate with Fish, Wildlife and Parks personnel and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the stream. In addition, riparian areas on private land have been cleared, and re-vegetating these areas would also likely improve conditions for bull trout. Habitat manipulations on Forest are not likely to benefit bull trout in a meaningful way at this point in time with the exception of upgrading crossings on Bartlett Creek.

Confidence in your assessment (H,M,L): M

Other Important Population: Nevada Creek Headwaters

Figure 3-8. Nevada Creek Headwaters Local Population



Relative Importance of Population to Core Area (H,M,L): L

Note: this is not a local population, but was classified as a Bull Trout Emphasis Watershed and considered as an "other important population." Bull trout in this population do not contribute to the Blackfoot Core Population due to the presence of Nevada Reservoir and generally poor habitat below Nevada Reservoir.

Table 3-4. Nevada Creek Headwaters Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
Unknown	Likely decreasing due to upstream expansion of brook trout and known hybridization effects in Nevada Creek	Possible adfluvial with Nevada Reservoir below the forest (barriers on upper Nevada Creek were removed within the last 10 years) Resident bull trout likely present within the Forest	None currently confirmed but spawning is known to occur based on age classes found during snorkeling and electrofishing efforts in 2000 and 2010. Suitable habitat is present.	Brook trout— Very High – hybridization of bull trout with brook trout confirmed from samples collected and analyzed in 2010.

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High significance – Overall Nevada Creek is a large drainage and historically likely provided substantial contribution of bull trout to the Blackfoot River prior to the presence of Nevada Creek Reservoir.	Moderate vulnerability, but temperature data from 2010 suggests that vulnerability on Nevada Creek within the Forest is low. See below for specifics	None

Driving Factors Determining Bull Trout Population:

Recent surveys by Montana Fish, Wildlife and Parks have not detected pure bull trout in Nevada Creek above the reservoir. However, a hybrid bull trout was detected in 2010, indicating that some bull trout may be present. It is also possible that they may be functionally extirpated from this reach. If present, however, bull trout on National Forest lands would likely be most affected by nonnative brook trout and limited pools due to past mining effects to the stream channel. Sediment levels are somewhat elevated within the Forest as well. Water temperature within the Forest is still favorable for bull trout with summer average maximum temperature less than 57 F. Summer average temperatures found by Pierce et al (2002) during July and August upstream of Shingle Mill Creek averaged 54 F.

Below the Forest habitat has suffered substantial negative effects from various agricultural activities which has resulted in substantially elevated water temperatures, elevated sediments and poor quality pools on various reaches below the Forest upstream from Nevada Reservoir. If bull trout exist below the forest they are likely limited by all of these impacts and by non-native species.

Note: Only the Nevada headwaters HUC is addressed as other HUCs are not believed to provide much opportunity for bull trout.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Nevada Creek Headwaters - 170102030401							
Strategy (Active Restoration, Passive Restoration, Conserve): Active							
% Forest Service Ownership in HUC: 71%							
Relative Contribution of Habitat in Limiting Local Population: 20%							
Functional Significance to Local Pop – Low, Is not part of any Local Population but is considered as an "other important bull trout population"							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR –see comments	-	-	$0	-	-
Barriers	FA	FA	5 years	3	$50,000	L	H
Pools	FAR	FA	20 years	3	$100,000	L	L
Sediment	FUR	FAR - see comments	10 years	2	Unknown	L	M

Temperature: GIS rating – FUR. Field sampling on Forest shows average maximum temperatures in the mid to upper 50s in summer for Nevada Creek on the Forest. Temperatures of 46 degrees F have been found in Gleason Creek while Huckleberry Creek was found to have summer temperatures of 49 degrees F. Temperatures in Nevada Creek upstream of Gleason Creek in July and August by MDFWP were found to average less than 54 F. This suggests a rating of FAR is more appropriate than FUR.

Barriers: GIS rating - FA. A rating of FAR is more appropriate. There remains a partial barrier to fish movements that could affect bull trout (Gleason Creek culvert). Bull Trout have been found in Gleason Creek immediately below the culvert crossing, but not above the culvert. Providing complete fish passage at Gleason Creek could benefit bull trout slightly, but may also provide access for the brook trout population to the detriment of westslope cutthroat trout upstream of the culvert crossing.

Pools: GIS rating – FAR. Past mining has resulted in substantial reductions in the number and quality of pools in the reaches below Huckleberry Creek. A number of log structures to improve pool habitat were installed in the 1990s. Numbers of pools per mile have not been quantified and the GIS rating is assumed reasonable.

Sediment: GIS rating - FUR. A FAR rating may be more appropriate especially in consideration of the streams actually used the most by bull trout. Substrate core samples from McNeil Core samples from Nevada Creek in four different years averaged 28, 26, 41, and 32% for an average of about 32%. Huckleberry and Gleason Creeks had fine sediments by depth of 36 and 37% respectively. With the average level of fine sediments from unmanaged drainages found to average between 28 to 30% and fine sediments from managed drainages averaging 30 to 32% for the Helena Forest the levels in the Nevada Creek itself are not projected as FUR. The levels in Huckleberry and Gleason Creek are bordering on what is considered FUR.

It may benefit bull trout (if present) in the Nevada Creek headwaters if USFS and MTFWP cooperated to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the reach. It is already too late to prevent hybridism as hybrid bull trout have been documented (through genetic analysis) as present in 2010. Habitat manipulations such as pool improvements on Forest may not benefit bull trout substantially at this point in time and could actually benefit brook trout more than bull trout. The barrier removal on Gleason Creek could benefit bull trout, but may benefit brook trout as well. Lastly ensuring livestock grazing within the allotment meets bank disturbance direction as well as ensuring no grazing occurs above the drift fence would provide some level of benefit to bull trout due to lower sediment contribution, as would erosion control on roads within the Huckleberry Creek drainage.

Confidence in your assessment (H,M,L): M

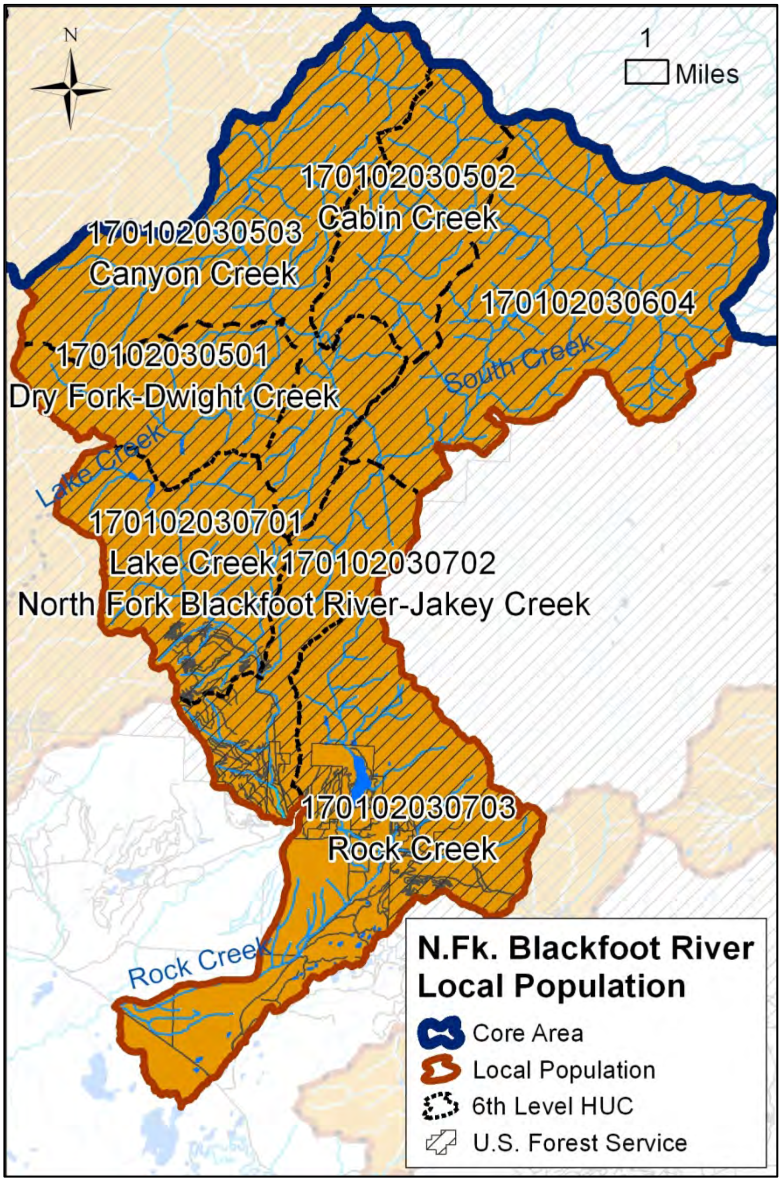
Blackfoot River Core Area - Lolo National Forest

There are five Fish and Wildlife Service determined local populations within the core area on the Lolo National Forest. The Lolo National Forest ownership only has meaningful contributions to four of these populations: North Fork Blackfoot, Monture, Cottonwood, and Gold Creek. Belmont Creek is predominately owned and managed by Plum Creek Timber Company and is not included in this conservation strategy.

Following is a detailed description of each Lolo National Forest local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Local Population: North Fork Blackfoot River

Figure 3-9. North Fork Blackfoot River Local Population



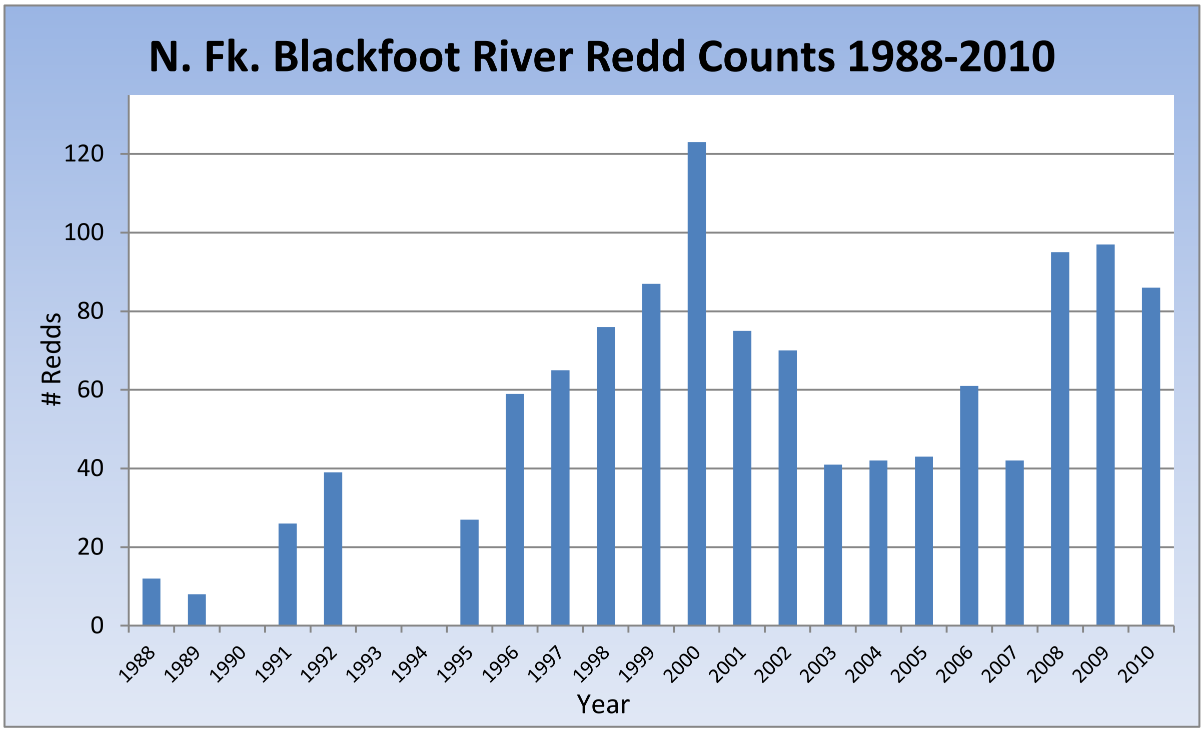
Relative Importance of Population to Core Area (H,M,L): H

Table 3-5. North Fork Blackfoot River Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250 Migratory 250-500 Res	Upward	Fluvial, Connected	1	Moderate. Rainbows and brown trout present in the lower North Fork. Angling pressure is increasing on the North Fork and by-catch of bull trout is unknown.

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High – The Monture/Dunham and North Fork Blackfoot systems support most of the middle Blackfoot River bull trout recruitment.	High. The North Fork is a large, high elev. watershed in a high precipitation zone. It's primarily undeveloped in the middle and upper reaches and therefore has high resiliency to physical change. However, it is highly susceptible to drought due to its glacial influences and intermittent segments.	Strongest fluvial population in the Blackfoot River system.

Figure 3-10. North Fork Blackfoot River Redd Counts



Driving Factors Determining Bull Trout Population:

Habitat in the lower reaches is affected by diversions and water withdrawal, but this is being addressed through the efforts of BBCTU, MDFWP, and landowners. Habitat in the middle and upper reaches is pristine. Incidental mortality (and probably some poaching) may affect this population. Fishing pressure is high, and some targeting of bull trout is suspected. Changes in MDFWP fishing regulations which closed the system to fishing with bait should help to improve this situation.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Canyon Creek – 170102030501							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	1 year	3	$0	-	-
Sediment	FA	FA	-	3	$0	-	-

This HUC is entirely pristine. The only disturbance is minor trail network with little to no impacts (and associated guide camps) and the Canyon Creek fire of 1988, which is largely healed by now from a watershed and fish population standpoint. Pool call should be validated and likely updated – this is the only activity to do.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Cabin Creek – 170102030502							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	1 year	3	$0	-	-
Sediment	FA	FA	-	3	$0	-	-

This HUC is entirely pristine. The only disturbance is minor trail network with little to no impacts (and associated guide camps) and the Canyon Creek fire of 1988, which is largely healed by now from a watershed and fish population standpoint. Pool call should be validated and likely updated – this is the only activity to do.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Dry Fork North Fork Blackfoot River – 170102030503							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	1 year	3	$0	-	-
Sediment	FAR	FA	1 year	3	$0	-	-

This HUC is entirely pristine. The only disturbance is minor trail network with little to no impacts (and associated guide camps) and the Canyon Creek fire of 1988, which is largely healed by now from a watershed and fish population standpoint. Pool and sediment calls should be validated and likely updated – this is the only activity to do.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): North Fork Blackfoot River – Headwaters – 170102030604							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	1 year	3	$0	-	-
Sediment	FA	FA	-	3	$0	-	-

This HUC is entirely pristine. The only disturbance is minor trail network with little to no impacts (and associated guide camps) and the Canyon Creek fire of 1988, which is largely healed by now from a watershed and fish population standpoint. Pool call should be validated and likely updated – this is the only activity to do. This portion of the watershed is isolated from the other portions of the North Fork Falls which is a significant fish barrier. It is likely that bull populations are limited to downstream reaches and never historically occupied habitats above the falls.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lake Creek – 170102030701							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	3	$0	L	L
Barriers	FA	FA	-	3	$0	-	-
Pools	FUR	FAR	10 years	3	$50,000	L	L
Sediment	FAR	FA	10 years	3	$100,000	L	L

There are limited opportunities to improve conditions in this watershed by removing roads. The roads in this landscape have landslide and slumping issue. The watershed is naturally recovering from past salvage logging. In addition the North Fork Road (#5550) has an undersized bridge that is impairing the transport of large wood out of Lake Creek into the North Fork Blackfoot.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): North Fork Blackfoot – Jakey – 170102030702							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 83%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	3	$0	M	L
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FA	10 years	3	$0	M	L
Sediment	FA	FA	-	-	$100,000	-	-

This HUC contains the North Fork mainstem and headwaters of two 1st order unnamed tributaries that enter from the west. These streams of themselves are not bull trout habitat but any associated road impacts to them likely will produce downstream effects. A road assessment needs to be completed to determine the impacts of the existing road system to these tributaries.

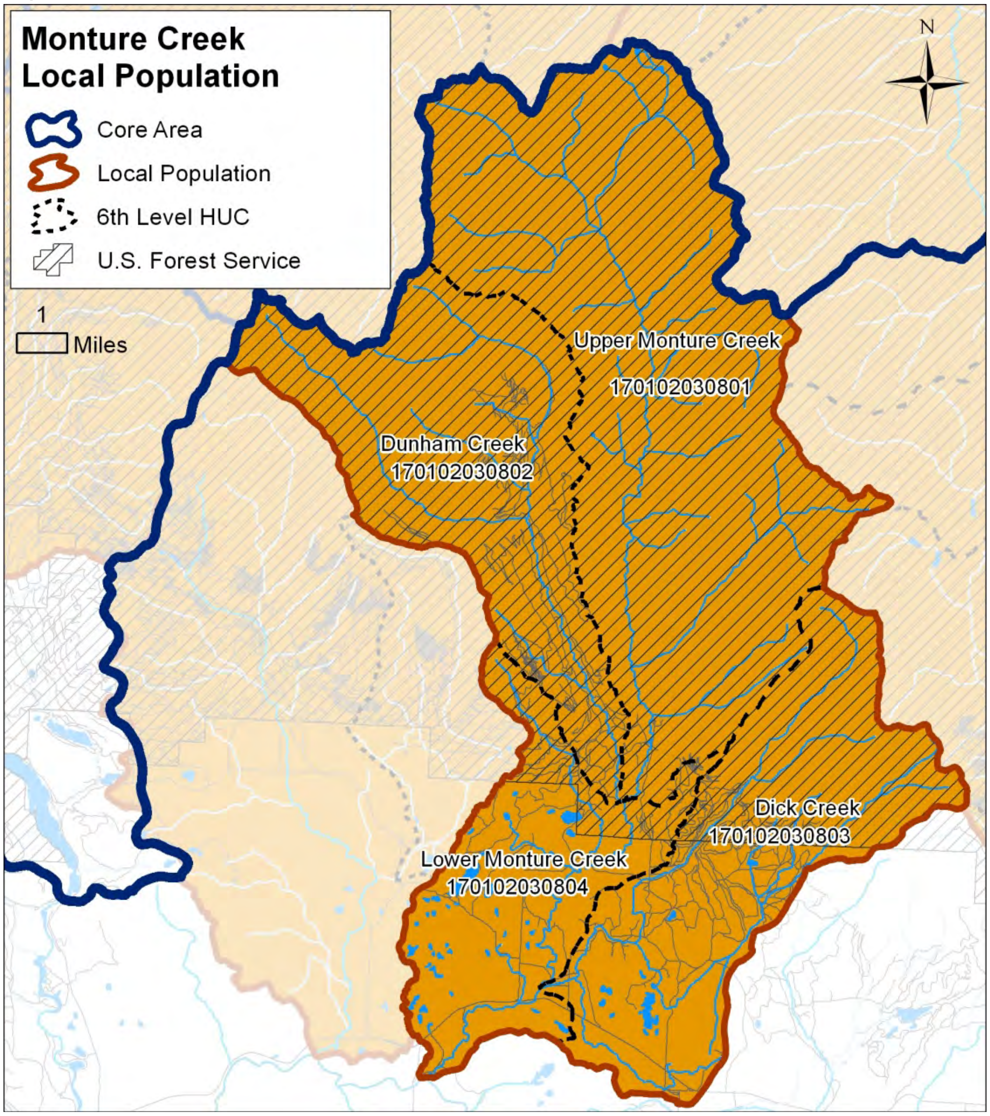
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Rock Creek – 170102030703							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 17%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	2	$100,000	M	M
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FA	10 years	2	$100,000	H	M
Sediment	FA	FA	-	-	$0	-	-

The Forest portions of this HUC are primarily roadless. Through recent land acquisition from The Nature Conservancy the Lolo NF received ownership of the land immediately west of Coopers Lake. This ownership has a system of legacy roads on within. The Lolo NF needs to complete a road assessment to determine the impact of these roads upon the Bear Creek tributary.

Local Population: Monture Creek

Figure 3-11. Monture Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 3-6. Monture Creek Local Population Summary

Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250 Migratory 250-500 Res	Stable	Fluvial, Connected	1	High – brook trout

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High – The Monture/Dunham and North Fork Blackfoot systems support most of the middle Blackfoot River bull trout recruitment.	High. Monture Creek is a large, high elevation watershed in a high precipitation zone. It's primarily undeveloped in the middle and upper reaches and therefore has high resiliency to change. However, it is highly susceptible to droughts and dry years due to its glacial influences and intermittent segments.	None.

Figure 3-12. Monture Creek Redd Counts

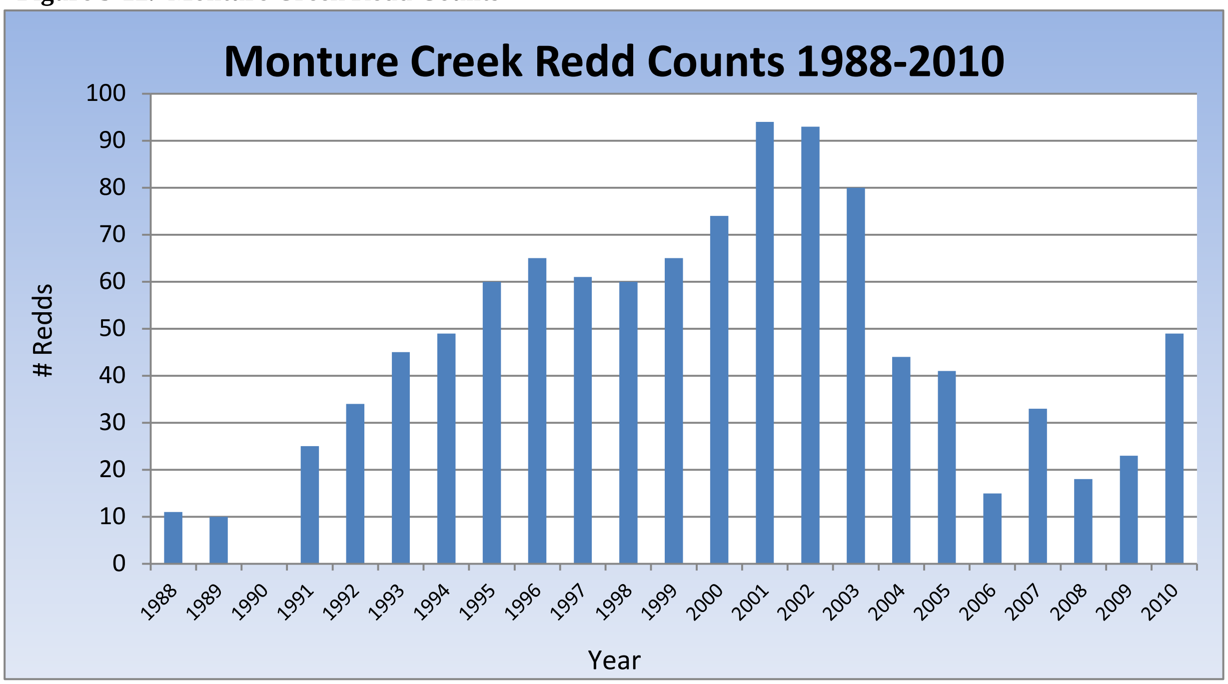
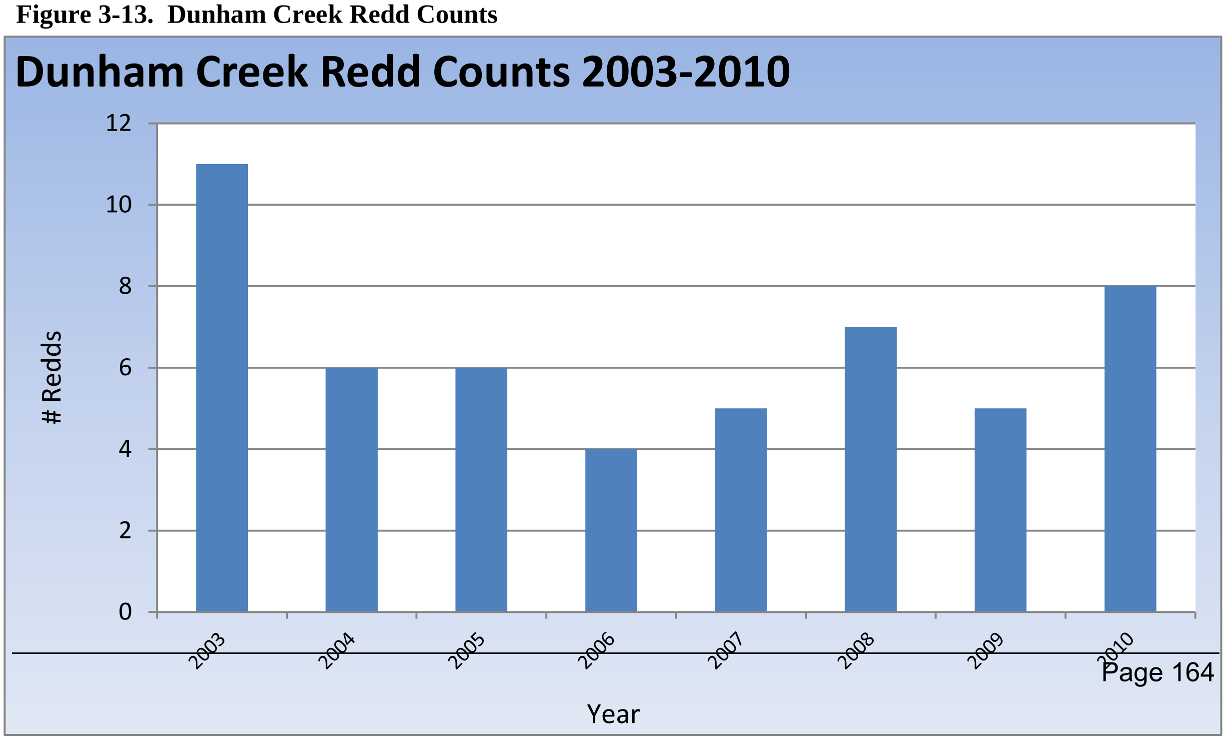


Figure 3-13. Dunham Creek Redd Counts



Driving Factors Determining Bull Trout Population:

Habitat in the lower reaches of Monture Creek is marginal, but has been improved in recent years through efforts by BBCTU, MDFWP, and landowners. Bull trout populations in Monture Creek are driven primarily by the strength of the fluvial population in the Blackfoot River. Dunham and McCabe Creeks are two significant tributaries to Monture Creek. Currently, Dunham is the only one sustaining a population of bull trout. Both stream have received restoration efforts that have benefitted either access or habitat conditions. McCabe Creek is need of an inventory of habitat conditions within its middle reaches. In addition a Lolo National Forest Road #5401 crosses McCabe Creek with an undersized culvert resulting in a partial barrier to upstream fish movement. Also there are two undersized bridges that affect stream morphology and large wood transport. These are located on Dunham Creek and Monture Creek road crossings (NFSR #477).

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Monture Creek – 170102030801							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FA	FA	-	2	$250,000	L	L
Sediment	FA	FA	-	3	$0	-	-

This HUC is largely pristine. Relocation or removal to two or three dispersed and one developed site recreation site is necessary to minimize impacts from hazard tree felling operations. There is some concern by FWP personnel that grazing may be affecting riparian areas in some spawning reaches as well – this should be followed up on. The bridge crossing of the Cottonwood Lakes road (#477) is an undersized wooden bridge. This bridge is affecting transport of large wood, channel function, and floodplain connectivity.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Dunham Creek – 170102030802							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 98%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FAR	FA	1 year	3	$0	-	-
Pools	FAR	FA	10 years	3	$200,000	M	H
Sediment	FUR	FAR	10 years	3	$400,000	M	H

Bull trout and the call should probably be adjusted. The bridge on Dunham Creek should be increased in size so that it doesn't continue to filter large wood as it moves through the system. There are some opportunities to decommission existing roads, and this will improve things slightly. The main issue is the main road up Dunham Creek. BMP's are mostly ineffective on this road at the current time, and sediment contribution is relatively high. This should be addressed and if possible road relocation should be looked into, especially at the intersection of the Cottonwood/Dunham road, which is an ongoing problem. There are opportunities to reduce impacts from dispersed camping by moving them out of the RHCA. There is a diversion that should also be looked at.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Dick Creek – 170102030803							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 49%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FUR	FA	5 years	3	$75,000	H	H
Pools	FAR	FA	10 years	3	$50,000	H	H
Sediment	FUR	FAR	10 years	3	$200,000	M	H

There is a significant barrier on McCabe Creek that needs to be removed. TU has already removed all barriers downstream of this. There are opportunities to improve the road network and reduce roads now that most of this HUC is in Blackfoot Community Forest management rather than Plum Creek, and there are extensive road systems. BBCTU, MDFWP, and landowners have also reduced impacts of grazing through better management plans. An aquatic habitat inventory needs to be conducted throughout the middle reaches of McCabe Creek to better determine limiting factors. Large wood and pool quality/quantities are suspected to be below reference conditions.

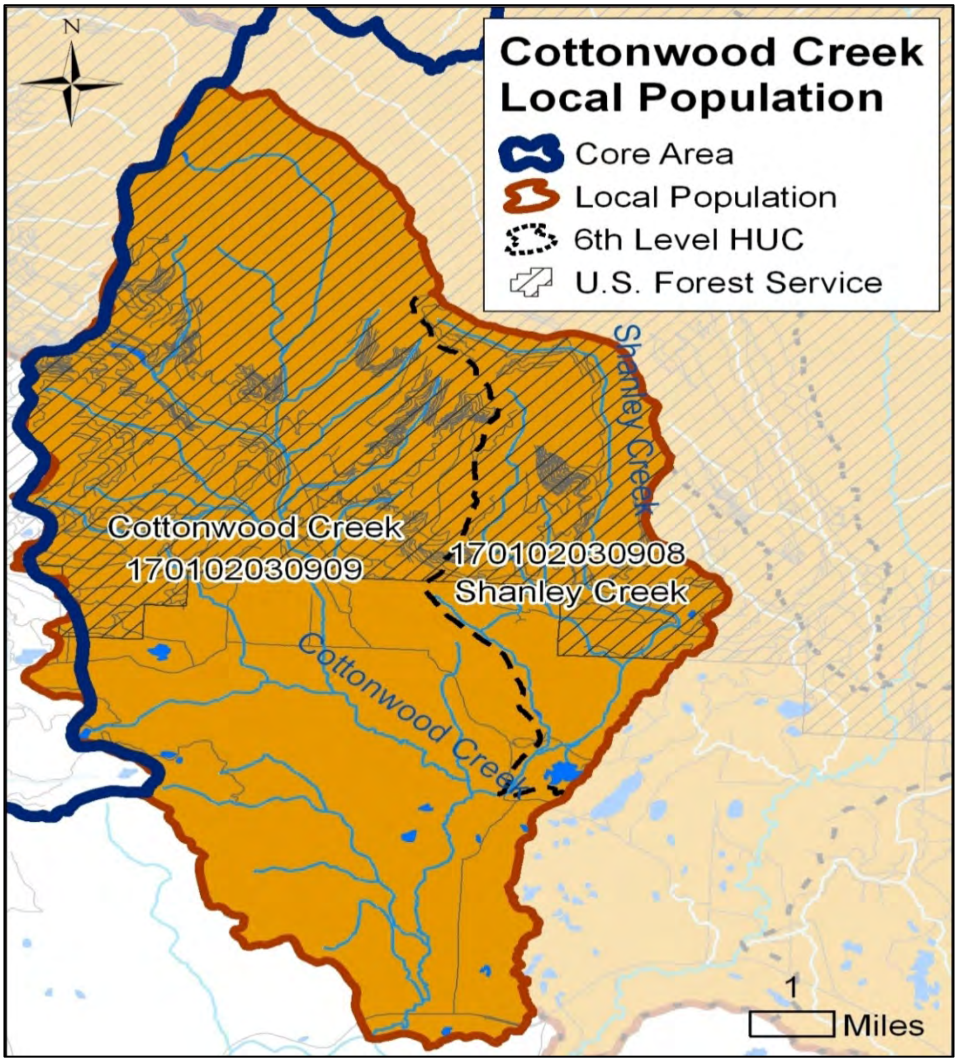
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Monture Creek – 170102030804							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 17%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$100,000	M	H
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	$50,000	M	H
Sediment	FUR	FAR	20 years	3	$100,000	M	H

There has been extensive work by BBCTU, MDFWP, and private landowners on private land in this HUC. Habitat conditions are improving, but there are still impacts. On FS land, there are numerous road and road crossing issues in Shoup Creek that need to be evaluated and mitigated to improve the sediment and temperature call. There are opportunities to reduce impacts from dispersed camping by moving them out of RHCA and restricting any dispersed camping in them.

Local Population: Cottonwood Creek

Figure 3-14. Cottonwood Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 3-7. Cottonwood Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
0 Migratory 100-300 Res	Unknown	Primarily resident; Connected	1	High. Brown and brook trout are prevalent in the mid-lower reaches. Upper reaches are natives. Non-natives in Blackfoot also.
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Moderate. This stream lies between		Low. The upper reaches are		None.

the Clearwater and Monture/Dunham/North Fork areas, so there is probably adequate habitat geographically dispersed.	extremely cold. Lower reaches probably have good groundwater in beaver complex areas.	

Driving Factors Determining Bull Trout Population:

Restoration work in Cottonwood Creek has been extensive over the last several years. Restoration activities include the removal of an irrigation diversion, screening of all ditches, instream flow enhancement, and grazing changes. Habitat in the middle reaches is improving from past overgrazing. A portion of the mainstem, on Forest ownership (Section 11), is altered from historical logging operations. Approximately 2500 feet of stream is poorly defined and has significant erosion issues. Road systems also pose a problem in the context of undersized crossings and partial barriers on smaller stream. Non-natives brown trout, rainbow trout and eastern brook trout dominate the mid to lower reaches and may limit the bull trout population in those reaches.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Cottonwood Creek – 170102030909							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 37%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$100,000	H	H
Barriers	FUR	FA	5 years	3	$50,000	M	M
Pools	FAR	FAR	10 years	3	$200,000	H	H
Sediment	FUR	FAR	10 years	3	$200k	M	H

Barriers affecting bull trout have been mostly addressed. However, there are some minor barriers that would improve the overall function of the watershed, if removed. Temperature has also been addressed to some degree through BBCTU, MDFWP, and landowner projects that reduce the amount of water diverted from the stream. There are still significant impacts on the University property in the middle reaches, where overgrazing causes temperature problems, a reduction in quality pools, and high sediment levels. This watershed has the potential to contribute significantly to bull trout in the Blackfoot River Core Area if temperature issues are addressed. Currently, bull trout recruitment is well below potential. There is extensive local support for improving conditions throughout this core area, so the opportunities are realistic. There are opportunities to reduce and improve roads on forest service lands, and there is a good opportunity to directly affect habitat through direct stream restoration on approximately two miles of Cottonwood Creek located in section 11 of the Lolo NF.

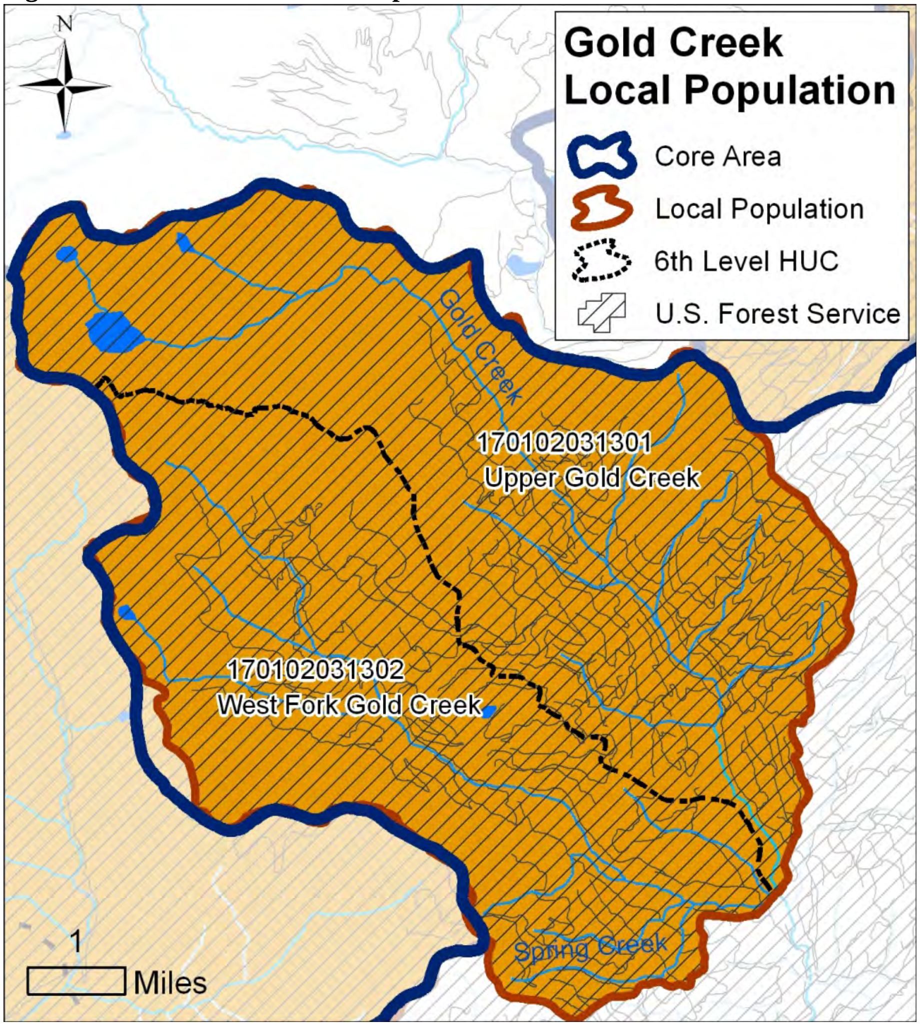
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Shanley Creek – 170102030908							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 61%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$200,000	M	M
Barriers	FAR	FA	5 years	3	$200,000	H	H
Pools	FAR	FA	5 years	3	$100,000	H	H
Sediment	FUR	FAR	10 years	3	$300,000	M	M

There are numerous opportunities to address fish passage and reduce road densities as well. This HUC was jammer logged in the 1970's, so there are a lot of opportunities to get rid of old road beds and remove culverts that are sediment risks. There is also an opportunity to restore about 1 mile of stream channel and improve pool conditions and bank stability. Opportunities also exist to relocate or combine roads to reduce overall road densities and impacts. There are also grazing impacts on the lower portions of private and state lands in the HUC – these have been reduced but it will take time to passively recover. Adding large woody debris to the lower 1/3 of the stream would also be beneficial and improve large pools (this used to be Plum Creek and was logged through the riparian in the 1970-80's). There are also a significant number of projects that need to be undertaken on private lands and the University property downstream of Forest Service ownership.

Local Population: Gold Creek

Figure 3-15. Gold Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 3-8. Gold Creek Local Population Summary

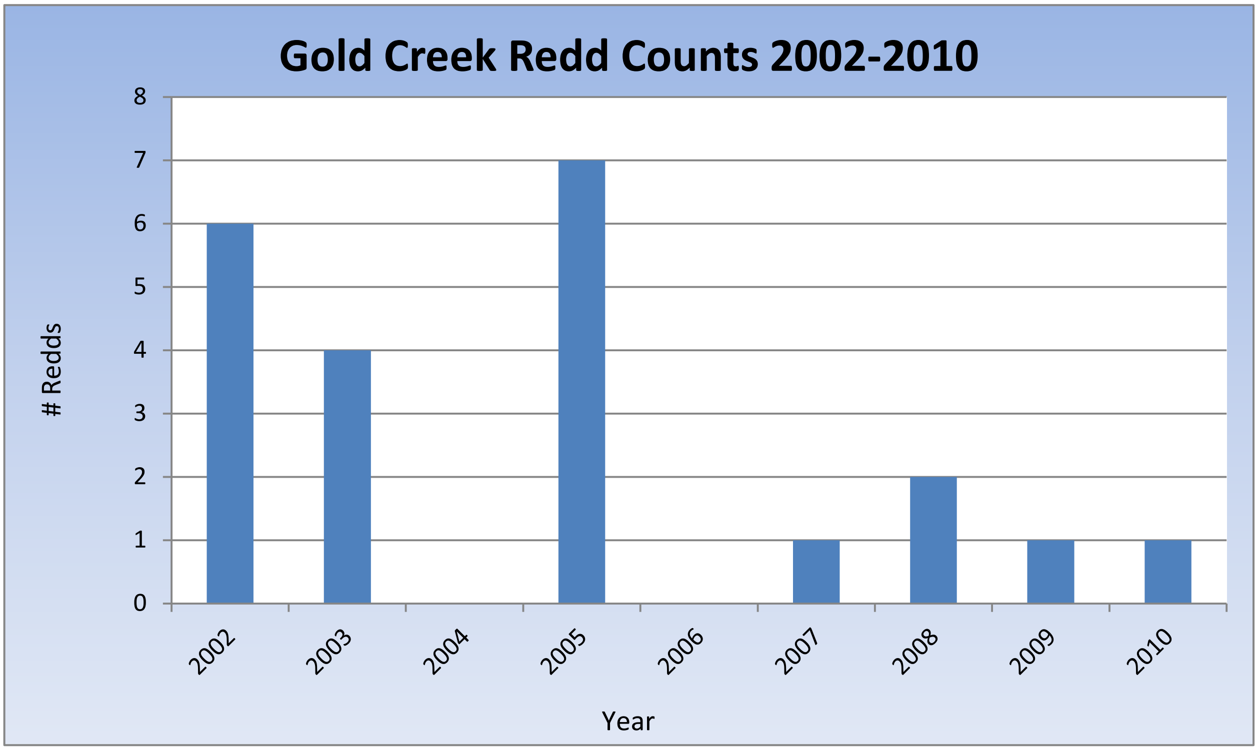
# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
0-50 Migratory 250-500 Res	Decline	Fluvial, Connected	Unknown	Moderate. Brook trout are present in the system.
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High – Gold Creek provides the only significant potential for large-scale recruitment of bull trout in the entire lower portion of the Blackfoot River system. This is the main reason Gold Creek is included in		Low. Gold Creek is a large, high elevation watershed in a high precipitation zone. Despite an extensive history of logging and road development, it maintains colder water temperatures, suggesting high resiliency and importance under warmer climate		None.

the Conservation Strategy.	regime.	

Driving Factors Determining Bull Trout Population:

Habitat conditions throughout the watershed are affected by extensive road networks and logging. Most of the watershed is owned by Plum Creek and has been heavily manipulated. There is still a small fluvial bull trout component in Gold Creek, however, this population is in trouble. In the long-term, this stream system is critical for bull trout recovery due to its location in the watershed. Land acquisition, conservation easements, etc. should be pursued to restore bull trout habitat. Non-native brook trout and brown trout are also threats to bull trout persistence.

Figure 3-16. Gold Creek Redd Counts



Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Gold Creek – 170102031301							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%, based on FS reserve boundary							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FA	20 years	3	$1,000,000	H	H
Barriers	FA	FA	-	3	$0	-	-

Pools	FUR	FA	20 years	3	$1,000,000	H	H
Sediment	FUR	FAR	20 years	3	$1,000,000	H	H

Gold Creek is critical to long-term recovery of bull trout in the Blackfoot River system. However, most of this HUC is owned by Plum Creek, is currently being marketed, and may be sold and subdivided in the relatively near future. Acquiring land in public ownership in the Upper Gold HUC would provide the opportunity to restore the watershed to productive bull trout status by removing roads and allowing vegetative recovery. This is a high cost, but high potential benefit watershed that should be looked at for a large-scale recovery effort. The lower HUC which contains the mainstem and the lower half of Gold Creek is entirely owned by Plum Creek Timber Company.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Fork Gold Creek – 170102031302							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%, based on FS reserve boundary							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FA	20 years	3	$1,000,000	H	H
Barriers	FAR	FA	10 years	3	$200,000	L	L
Pools	FUR	FA	20 years	3	$1,000,000	H	H
Sediment	FUR	FAR	20 years	3	$1,000,000	H	H

West Fork Gold Creek is critical to long-term recovery of bull trout in the Blackfoot River system. However, most of this HUC, (like Upper Gold Creek), is owned by Plum Creek and may be sold and subdivided in the relatively near future. Acquiring land in public ownership in the Upper Gold and West Fork Gold Creek HUCs would provide the opportunity to restore the watershed to productive bull trout status by removing roads and allowing vegetative recovery. This is a high cost, but high potential benefit watershed that should be looked at for a large-scale recovery effort.

Blackfoot River Core Area Summary:

Table 3-9 summarizes relevant information from each of the 6th level HUC local populations. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire Blackfoot River Core Area within the borders of the Lolo and Helena National Forests. It does not include necessary restoration activities in watersheds where the LNF or HNF have no ownership that may be critical for overall restoration of the bull trout population in the Core Area.

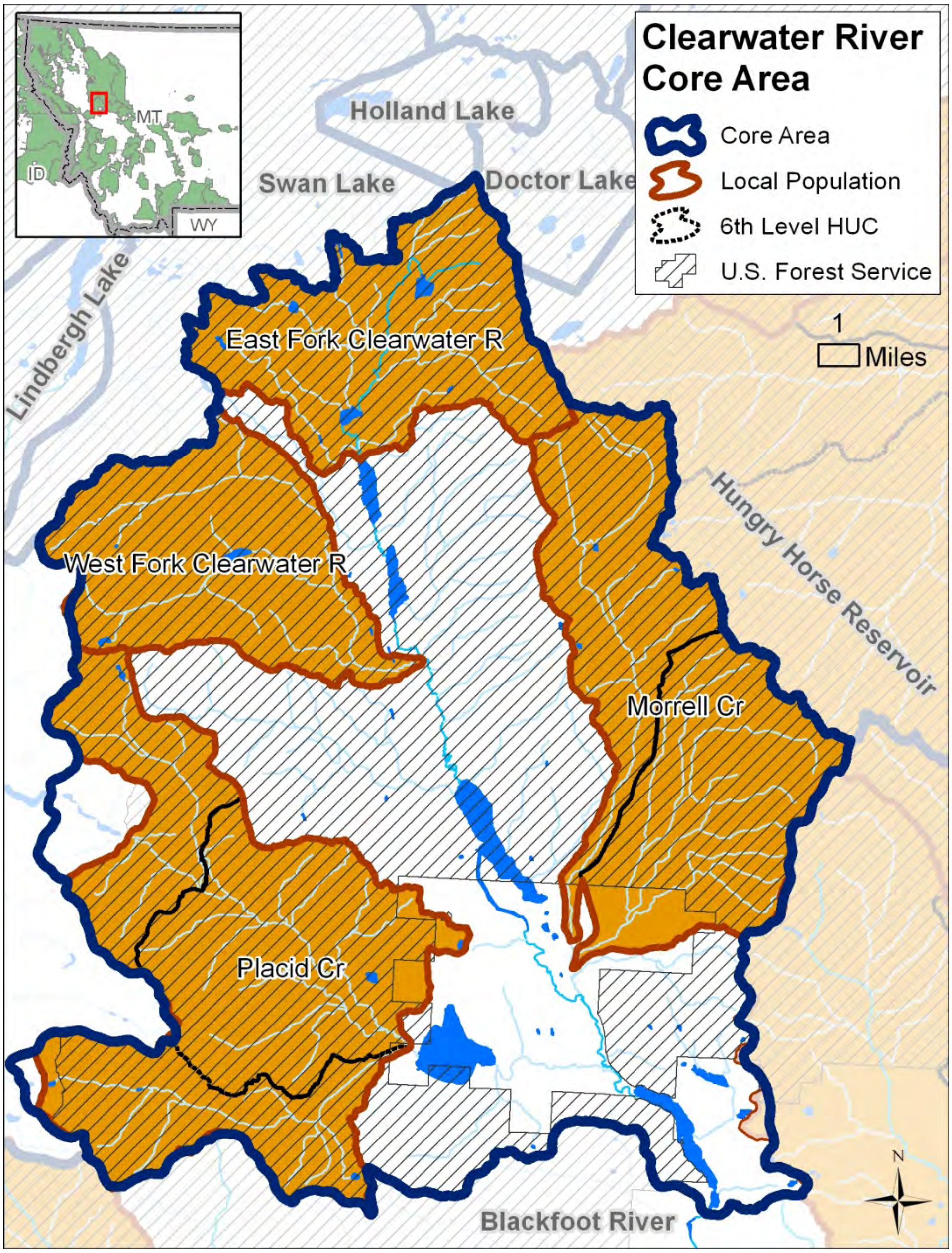
Table 3- 9. Summary of important Local Population attributes and conservation recommendations for the Blackfoot River Core Area.

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
Landers Fork	Copper Cr	High	Moderate	Active/ Conserve	-	-	-
	Lower Landers Fork	Low	Moderate	Passive	Pools	20 years	Unknown
Poorman Creek	Poorman Cr	Moderate	Moderate	Active	-	-	-
Group of Streams that Contribute to Core Area*	Arrastra Cr*	Low	Moderate	Active	-	-	-
	Sauerkraut Cr*	Low	Moderate	Active	-	-	-
	Hogum Cr*	Low	Low	Active	-	-	-
	Alice Cr	Low	Moderate	Passive	-	-	-
Nevada Cr Headwaters*	Nevada Cr Headwaters*	Low	Moderate	Active	-	-	-
North Fork Blackfoot River	Canyon Cr	High	Low	Conserve	-	-	-
	Cabin Cr	High	Low	Conserve	-	-	-
	Dry Fork North Fork Blackfoot River	High	Low	Conserve	-	-	-
	North Fork Blackfoot River – Headwaters	High	Low	Conserve	-	-	-
	Lake Cr	High	Low	Passive	-	-	-
	North Fork Blackfoot – Jakey	Moderate	Low	Passive	-	-	-
	Rock Cr	Moderate	Low	Passive	Pools	10 years	$100,000
Monture Creek	Upper Monture Cr	High	Low	Conserve	-	-	-
	Dunham Cr	High	Moderate	Active	-	-	-
	Dick Cr	Moderate	Moderate	Active	Barriers & Pools	5-10 years	$125,000
	Lower Monture Cr	High	High	Active	-	-	-
Cottonwood Creek	Cottonwood Cr	High	High	Active	Temperature & Pools	10 years	$300,000
	Shanley Cr	Moderate	High	Active	Barriers & Pools	5 years	$300,000
Gold Creek	Upper Gold Cr	High	High	Active	Temperature, Pools & Sediment	20 years	$3,000,000
	West Fork Gold Cr	High	High	Active	Temperature, Pools & Sediment	20 years	$3,000,000

* These watersheds do not contain a designated local population of bull trout. They are included here due to their location in the core area and their potential to contribute to recovery of the core area population.

Chapter 4: Clearwater River

Figure 4-1. Clearwater River and Surrounding Core Areas



Core Area Discussion:

The Clearwater River Core Area includes all of Clearwater River, from the headwaters to its confluence with the Blackfoot River. The Clearwater River drainage is bounded on the west by the Mission Mountains and on the east by the Swan Range. Both mountain ranges are mainly sedimentary carbonate rocks. The entire valley and surrounding mountains were heavily glaciated during the Pleistocene epoch. Topography of the area is dominated by a prominent linear trend roughly paralleling the center of the valley. Glacial till deposits are found from valley floor level to the highest elevations within the area bounded by the Swan and Mission ridges. Alden (1953) states that valley glacier ice, fed by tributary glaciers from the Swan and Mission Ranges, moved northwestward down the Swan Valley and southeastward down the Clearwater Valley. Apparently the present drainage divide separating the two river systems was the locale for accumulation of an ice mass nourished by tributary glaciers that spread laterally both northwestward and southeastward. Further, according to Alden (1953), the ice was at least 1,000 feet thick in the vicinity of present Salmon Lake and extended as far south as the Blackfoot Valley. Till deposits indicate that ice once covered Rice Ridge to its highest elevations. The surficial deposits underlying Rice Ridge to the south represent a medial moraine emplaced by ice and meltwater from both valley glaciers.

The present climate has moderated considerably in this age. Current average annual precipitation in the valley bottom is 30 inches and ranges up to 40 inches at the crest of the Missions and more than 70 inches on the ridges of the Swans. Temperatures in the valley range from a "normal" low (average of daily lows for the month) in January of 9 °F to a normal high in July of 82 °F.

According to Lustgraaf (1972), the valleys of the present Clearwater River and its tributaries consist predominantly of post-glacial stream deposits. Watershed shape is often long and narrow with the main valley floor made up of irregular deposits of glacial till. When this type of soil is bare of vegetation, it is readily eroded, especially in areas of steep slopes. This till can be "heavy" resulting in poor infiltration and subsurface drainage. After the glaciers receded, meltwater streams formed alluvial deposits of water-sorted and stratified particles over a wide range of sizes, although most are sand to gravel size. A good portion of the remainder of the soils is glacial till deposits which again range from clay to boulder-size material. Silt to cobble-size fragments are the most common.

The Clearwater River originates at Clearwater Lake, which is fed by underground springs and intermittent avalanche chutes. The lake has an area of approximately 100 acres and is at an elevation of 4,790 feet. From Clearwater Lake the river flows about 5.1 miles to Rainy Lake (elevation 4,100 feet; area 100 acres). The East Fork of the Clearwater intersects the river between Clearwater and Rainy lakes. (A lesser stream, Bertha Creek, empties into Rainy Lake from the northwest, but its flow is much less than that of the Clearwater River.)

From Rainy Lake, the Clearwater flows about 1.7 miles to Lake Alva (elevation 4,080 feet; area 300 acres), picking up water from Colt Creek from the west and an unnamed creek from the east. Richmond Creek flows directly into Lake Alva from the east.

From Alva to Lake Inez (elevation 4,058; area 300 acres) the Clearwater flows about 1.3 miles with Uhler Creek joining from the west. Then exiting Inez Lake the Clearwater runs 7.6 miles to Seeley Lake, and Camp, Findell, Murphy, Benedict, and Sawyer Creeks join from the east and The West Fork Clearwater joins from the west. A large wetland of approximately 11 acres is formed above Seeley Lake by a series of rock weirs that were installed in 2010 by MTFWP to take the place of a previous fish barrier (Emily A Dam). Deer Creek from the west, Rice and Seeley creeks from the east, flow directly into Seeley Lake.

The Clearwater River exits the west side of Seeley Lake and flows approximately 7 miles to Salmon Lake. Morrell and Owl creeks empty into the Clearwater on this stretch. The Clearwater River continues to flow south into Elbow Lake and then Blanchard Lake. Two dams form these lakes -- one upstream of Lost Horse Creek, and one upstream of Blanchard Creek. Approximately 4 miles after leaving Blanchard Lake the Clearwater River enters the Blackfoot River. Tributaries to the Clearwater River between Salmon Lake and the confluence of the Blackfoot River are Fish, Lost Prairie, Lost Horse, and Blanchard creeks.

The general nature of the surface and sub-surface hydrologic environment beneath the Clearwater River valley floor can be reasonably inferred from geologic mapping by the USGS (Witkind 1977). Bedrock in the area is primarily composed of argillites of Precambrian age. These rocks are hard and generally impervious to fluid flow except where fractured.

The bedrock basin underlying the study area contains a large volume of unconsolidated valley fill and forms an extensive groundwater reservoir. The valley fill, and consequently the groundwater reservoir, is deepest along the center of the valley.

Recharge for this groundwater reservoir is accomplished by a combination of groundwater inflow from the Clearwater River, subsurface inflow from tributary drainages, subsurface flow through unconsolidated rock material overlying the main valley slopes and the main lake. The water level of the main lake, kettle hole lakes, drift-dammed ponds, and perennial streams are surface expressions of the local water table which forms the upper boundary of the groundwater reservoir.

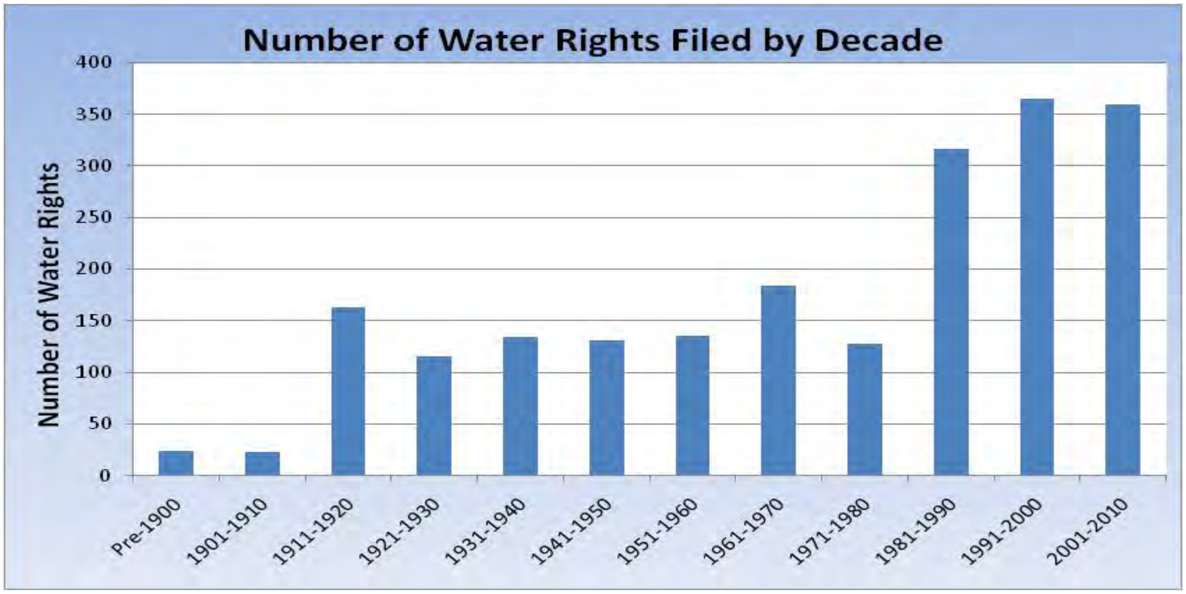
Geologic mapping further portrays the distribution of unconsolidated material units. Drilling indicates that valley fill materials may exceed 600 feet in thickness at several sites. This depth of fill suggests that surface and sub-surface hydrology are closely linked. The materials are dominantly inter-fingering accumulations of glacial till, outwash and alluvium from several glaciations. To a large extent, the fill materials were derived from local sources though ice transport from areas further north, indicated by the presence of erratics. When till soil is bare of vegetation it is readily eroded, especially in areas of steep slopes. Glacial tills, because of their fine-grain soil particles are generally very erosive and are easily transported in water. However, the topography in the main stem valleys is generally undulating with lower slopes which tend to keep sediment delivery risks low. Also, the main stream channels are described as "under-fit"; that is they evolved under conditions of much higher discharge. They are thus able to carry higher volumes of water without a high risk of eroding sediment from within the channels.

Clearwater bull trout populations may have historically consisted of all three life-forms: resident, fluvial, and adfluvial. Additionally, they were likely of high enough population density that they contributed to the overall Blackfoot River Core bull trout population. As with most core areas, bull trout densities were historically much higher than they are today. Distributions were likely different than what we see today as several major tributaries currently don’t support or only support nominal resident or adfluvial bull trout populations.

Forest Service biologists estimate that as many as 400 – 800 redds may have been present in the Clearwater River Core Area historically. As with most bull trout populations, overall numbers were likely highly variable from year to year, based on natural climatic and disturbance patterns. These redd estimates are based on the hypothesized potential of the eight major spawning tributaries to the Clearwater River (Blanchard, Placid, Morrell, Deer, Camp, West Fork Clearwater, East Fork Clearwater, and portions of the Clearwater mainstem). The estimates may be conservative since not all streams or tributaries were assigned a redd count number. Smaller streams like Boles and Inez Creeks may have contributed to the overall population historically but are not counted for this exercise.

Bull trout populations in the Clearwater were likely first exposed to settler -caused impacts in the early 1900’s in the form of small scale ranching and homesteading. The first significant impacts to the population where likely related to water rights and water diversions. Figure 4-2 demonstrates the acquisition of water rights (ground and surface) by decade for the Clearwater Core. Interestingly this graph illustrates the demand of water for a human use continues to grow. Use of surface water requires diversions, which are not usually screened, leading to the entrainment of various age classes of aquatic species. However, the Clearwater Core area only has a few ditch diversions that would be considered “significant”, and there are no unscreened diversions that are considered to affect bull trout. In addition to unscreened diversions is the simple withdrawal of water from the stream that diminishes the streams ability to provide adequate habitat for aquatic species. Extensive use of groundwater is more difficult to quantify aquatic impacts as they tend to have a delayed impact and potentially affect late summer flow. Approximately 51% of the allocated use has a source type listed as ground water and 49% is listed as surface water. (Data taken from MT DNRC website, 2010)

Figure 4-2. Number of Water Rights Filed by Decade

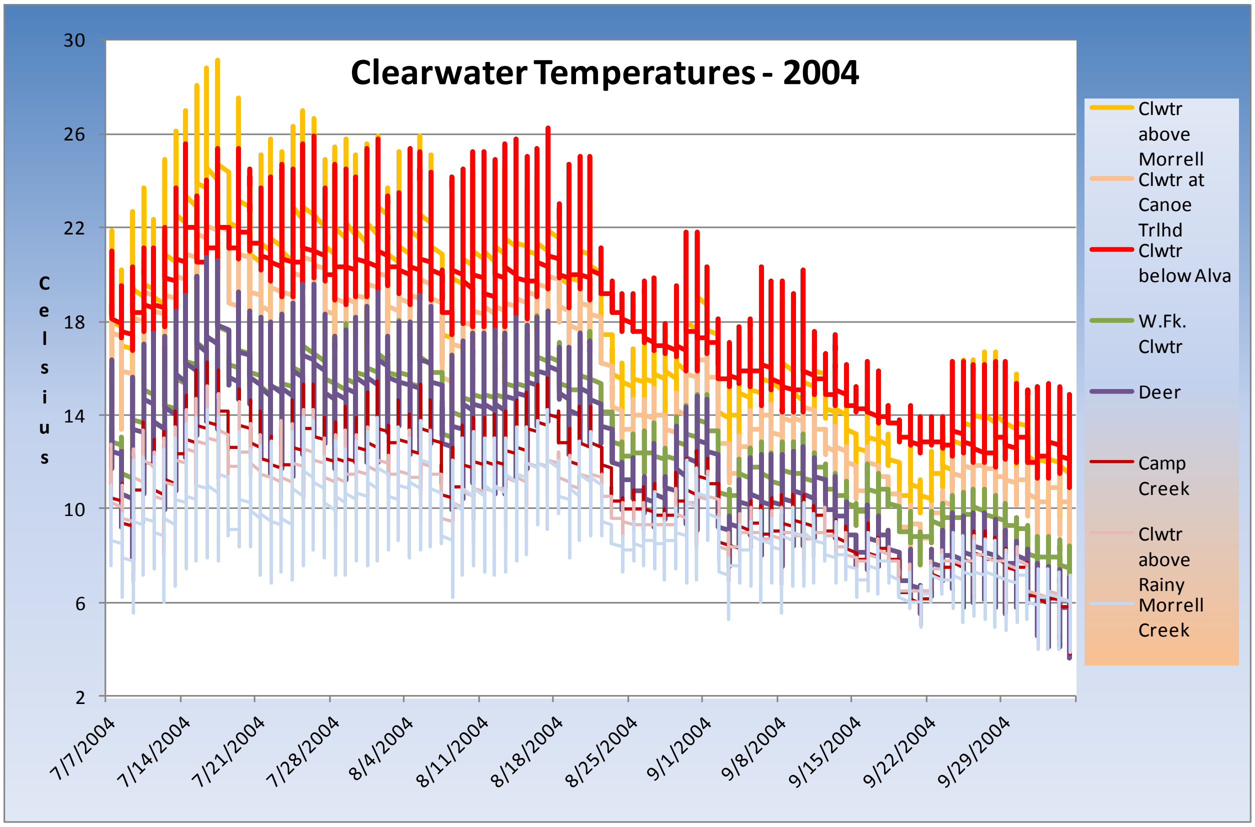


The next significant era impacting Clearwater River bull trout was during the 1930's thru the 1960's when extensive hatchery planting of non-native fish was employed. In addition, three critical fish barriers were installed by Montana Fish, Wildlife, and Parks (MDFWP). The Rainy Lake Barrier, Lake Inez Barrier, and the Emily A Barrier were installed to prevent the movement of undesirable species including perch, pikeminnow, suckers, etc. from occurring between lakes that were stocked with more desirable fish species after chemical rehabilitation of the lakes. An additional dam out the outlet of Placid Lake was constructed to raise the level of the lake and provide better boat access to the shoreline for the surrounding residents. This small dam effectively severed the Placid Creek watershed from the rest of the Clearwater River.

Also during this same era, 1930's to the 1980's, significant timber harvest and road building was taking place. These activities lead to additional increases in fish barriers (undersized culverts), increased sediment delivery, increased stream temperatures, and other water quality impacts. Water quality studies done by Streebin et. al in 1973 documented the streams with the lowest water quality were Richmond Creek, Deer Creek, and West Fork Clearwater River which were all intensively harvested and roaded prior to the study period.

In addition, droughts (1930's and 2000's) undoubtedly have played a role with the rest of the negative effects and reduced access to spawning area and increased stress and mortality. As the Clearwater has a unique series of lakes it also produces a unique set of water temperature issues. Because the lakes present themselves as large solar sinks, they warm quickly throughout the year and influence downstream water temperatures. Figure 4-3 illustrates water temperatures taken during the summer of 2004 in four tributaries of the Clearwater River and four segments of the Clearwater mainstem. This graph shows that Morrell and the Clearwater River (upstream of Rainy Lake) are the coldest. The warmest water is located in Clearwater River (below Alva lake), Clearwater River (above Morrell Creek), and Clearwater River (Canoe Trail). All three of these sites have temperatures that generate concern as they commonly exceed thresholds that increase salmonid stress or are intolerable for salmonid survival (we are unsure, however, if these reaches ever supported salmonids in July and August due to these temperatures). It is these same temperatures that provide and increase risk from introduced species such as Northern Pike. This puts high importance on the function, health, and temperatures of the tributaries to the Clearwater River and its lakes. Dewatering is also an issue between Seeley Lake and Morrell Creek, and this has important implications to bull trout populations that spawn in Morrell Creek in some years.

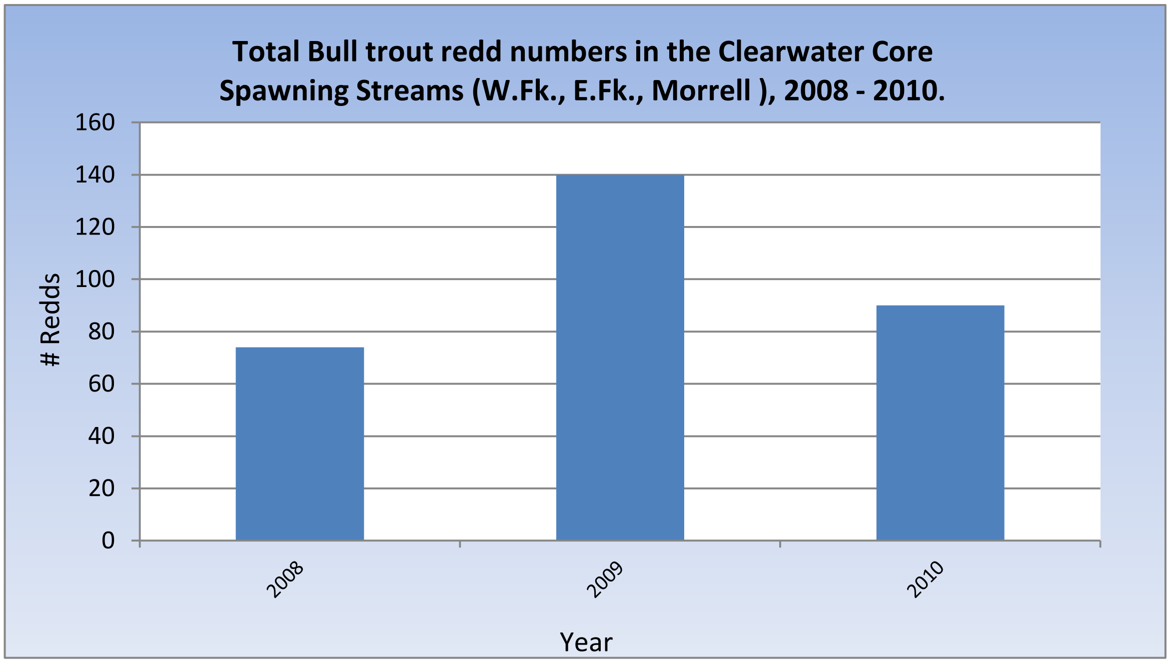
Figure 4-3. Eight Water Temperature Sites within the Clearwater Core - 2004



Many of these past impacts have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. For instance, fish barriers have been identified as a significant impact and multiple agencies and partners are removing culverts, upgrading culverts for fish passage, mitigating or removing mainstem dams. Fishing regulation changes that close spawning areas in the Core Areas to all fishing have likely significantly benefited bull trout populations. The drought seems to have subsided, and regulation changes do not allow people to keep, or intentionally fish for, bull trout. Other recent positive attributes within this core populations is the implementation of the Montana Legacy Lands Projects. This project successfully transferred thousands of acres of Plum Creek Timber Company land ownership to that of the Forest Service and Montana Fish Wildlife and Parks, via The Nature Conservancy. This land transfer will prove to be invaluable as large scale restoration efforts may now present themselves in the form of decommissioning roads negatively impacting aquatic resources, relocating roads out of valley bottoms, removal and upgrade of undersized culverts, and allowing stream side management areas to recovery without future timber harvest entries.

The most visual positive affect is largely attributed to joint efforts between MDFWP and the Lolo NF barrier removal or mitigation efforts over the last ten years. The Forest Service has removed and/ or upgraded several culverts in the upper Clearwater and MTFWP has provided passage improvements on both mainstem fish barriers (Rainy and Emily A dams). These efforts, in addition to some good water years, are believed to have resulted in improved conditions for bull trout access and spawning in the West and East Forks of the Clearwater River.

Figure 4-4. Bull trout redd numbers in Clearwater Core Area from 2008 – 2010.



Bull trout redd counts have only recently been monitored within the Clearwater River Core Area and trends are therefore difficult to speculate on. When put in the context of historical numbers, however, these data are concerning. The average number of redds in stream reaches surveyed over the past nine years has been about 48, while those a century ago were probably more than ten times this number. Recovery actions should first focus on securing existing populations (Boles, Deer, West Fork, East Fork, & Morrell) and then on expanding these populations into nearby tributaries.

Currently, a primary factor limiting recovery of bull trout in the Clearwater is probably the extensive non-native fish communities throughout the system (northern pike, brown, and brook trout) and the lack of high quality tributaries. However, it is unlikely that this impact is entirely responsible for the overall decline. Numerous other significant impacts, such as the historical channel and habitat impacts from past logging, and fishing mortality probably also contribute significantly to the current population trend. Future concerns will likely be associated with the protection of instream flows in an era of increasing human consumption of surface and groundwater.

While none of the previously mentioned impacts are easy to address, it will be necessary to address them in order to ensure maintenance of long-term population of bull trout in the Clearwater Core Area. It is likely that the impacts from any one of these sources cannot be eliminated entirely, but rapid and successive improvement in each will contribute synergistically to a stronger population, and this will allow us time to work further towards reducing additional impacts.

For example, it is unlikely that we would be able to completely eliminate non-native fish from the watershed. However, USFS and MTFWP biologists should coordinate and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery.

With open habitat and less competition, westlsope cutthroat and bull trout populations may increase. This would be a direct benefit to both native fish populations and the entire aquatic community in the Clearwater. Similar opportunities exist to address other impacts identified. The distribution of land ownership throughout Clearwater Core make “Partnerships” essential for the long-term conservation of bull trout.

Specific restoration activities and types of activities aimed at addressing habitat impacts on federal lands are discussed in detail below.

Clearwater River Core Area – Local Populations

There are four local populations within the core area on portions of the Lolo National Forest – East Fork Clearwater, West Fork Clearwater, Morrell and Placid Creek. Other streams within the core area that likely had historical significant bearing on the bull trout populations were: Blanchard, Marshall and Camp Creeks.

Figure 4-5. Clearwater Core Bull Trout Spawning Sites by Stream

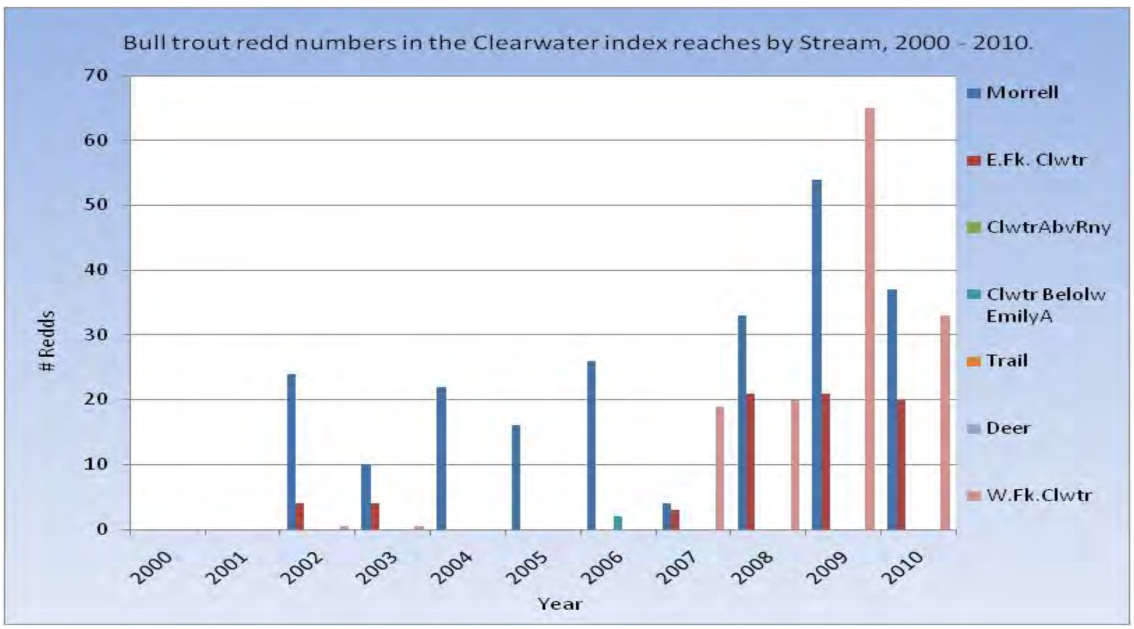


Figure 4-5 shows redd count data from the seven index streams over the 2000 – 2010 time period. As can be seen, redd numbers in any given stream are highly variable from year to year. This graph shows that Morrell Creek bull trout have been consistent and generally account for the majority of spawning within the core area. However, recent efforts to mitigate barriers have allowed better access to spawning sites in the West Fork and East Fork Clearwater. In addition, these streams likely supported fluvial spawning prior to 2008 but they weren’t routinely monitored, so numbers appear lower than they probably were.

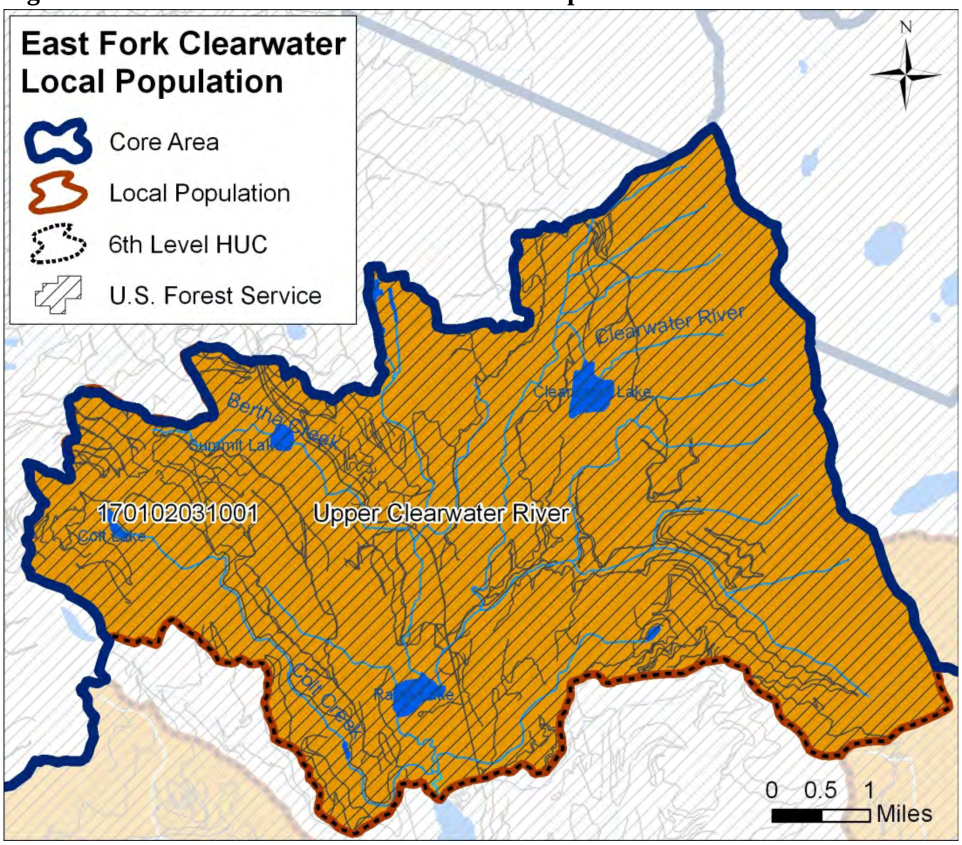
Of primary concern is the fact that some of these index streams may have years where no spawning occurs (note that a “zero” on the graph doesn’t necessarily mean that no spawning occurred that year – it can also indicate that no survey was completed, or redds were located in other reaches). In this case, low numbers and high variability is a key warning sign that the populations in these streams are at high risk of extinction. As these index reaches are the cornerstones that support the overall population in the Core Area, loss of any one represents a significant setback to overall sustainability and recovery of the population.

Of the ten historical populations within the core area only four are functioning at levels that warrant the efforts of conducting redd count, and these are Morrell, East Fork, West Fork Clearwater, and Marshall Creek.

Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Local Population: East Fork Clearwater River

Figure 4-6. East Fork Clearwater River Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 4-1. East Fork Clearwater River Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
0-50 Migratory 50-250 Res	Upward	Migratory, Partially Connected	1	Minor in East Fork (Brook trout are present as wells as yellow perch in Rainy Lake), but very high in Clearwater system due to pike, bass, etc. in Chain Lakes.

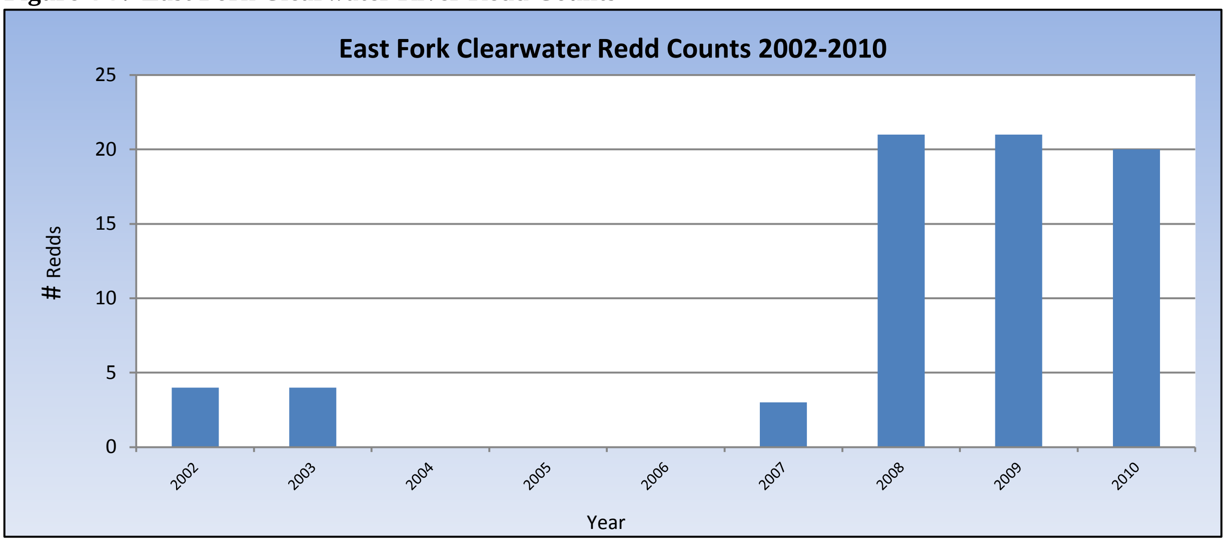
Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High – The East Fork is one of the main headwaters of the entire system – most logical place to support large numbers of spawners out of downstream lakes, which have large adfluvial populations.	Low. This is a large watershed with relatively high elevation headwaters and lots of precipitation and groundwater influence.	Adfluvial – Majority of the populations likely uses Rainy and Alva Lakes.

Driving Factors Determining Bull Trout Population:

Habitat is generally good. The main limiting factor was/is probably a low-head dam on the Clearwater River, but recent efforts to provide natural passage around the dam should reduce (although not entirely eliminate) this factor. Looking at the graph below of the redd count data it can be seen when improvements to Rainy Dam started in 2008. Recent detection of brook trout in Clearwater Lake may be a problem. Pike and brown trout are currently not known to be present above Rainy Lake Dam.

Confidence in your assessment (H,M,L): M

Figure 4-7. East Fork Clearwater River Redd Counts



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Clearwater River - 170102031001

Strategy (Active Restoration, Passive Restoration, Conserve): Active

% Forest Service Ownership in HUC: 100%

Relative Contribution of Habitat in Limiting Local Population: High

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FUR	FAR	5 years	3	$200,000	M	M
Barriers	FAR	FA	5 years	2	$100,000	H	H
Pools	FAR	FA	5 years	3	$100,000	M	H
Sediment	FUR	FAR	5 years	2	$100,000	M	H

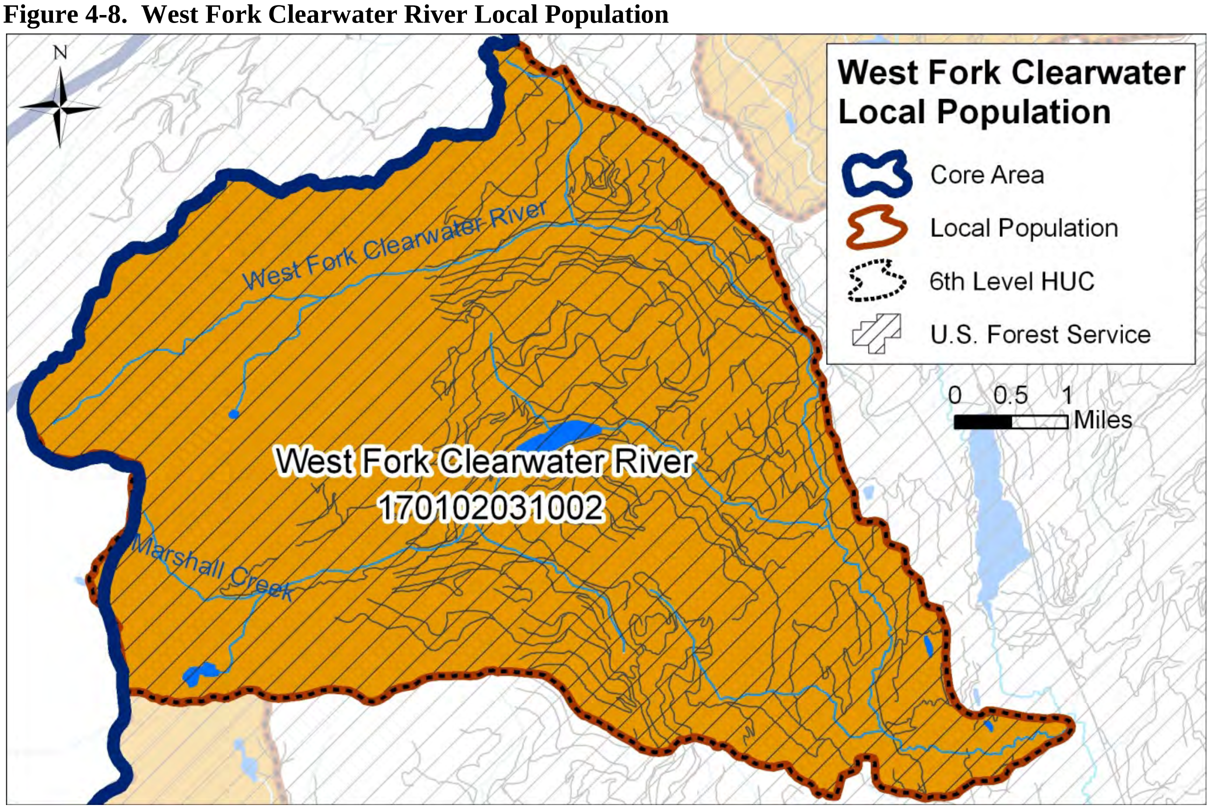
Temperature: Temperatures in the mainstem East Fork are good upstream of the lake, but it warms up in the lake – this indicator may be misleading.

Barriers: Rainy Dam is a barrier on the mainstem – we completed a cooperative project with Montana Department Fish Wildlife and parks this last year to raise the bed elevation below the dam so more bull trout can pass, but it is still apparently a partial barrier, particularly for sub-adult bull trout that cannot jump as well or navigate as high of velocities as larger adults. Eventually, the objective is to remove this barrier completely if the threat of further non-native fish invasion were rectified. Replace the culvert that is used to cross Colt Creek on NFSR #646. This culvert is currently a barrier to upstream aquatic organism passage. Limited fish data of Colt Creek does not suggest that it is an important bull trout stream at this time. However, it does have the necessary elements of cold and complex habitats and may be important as a rearing area.

Pools/Sediment: Decommissioning the portion of NFSR #646 that parallels Colt Creek will also limit fine sediment input and assure long-term RHCA integrity. Upgrade/relocate/or decommission the portion of NFSR #646 that parallels and crosses Bertha Creek. Encourage and enter into an agreement private landowners to rehabilitate the lower 1.5 miles of Bertha Creek. Historically, this portion of Bertha Creek has been forced to one side of the valley to make room for hay production. Bertha Creek is currently not a significant bull trout stream; however, it is a direct tributary to Rainy Lake and is important for water quality and westslope cutthroat trout.

Local Population: West Fork Clearwater River

Figure 4-8. West Fork Clearwater River Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 4-2. West Fork Clearwater River Local Population Summary

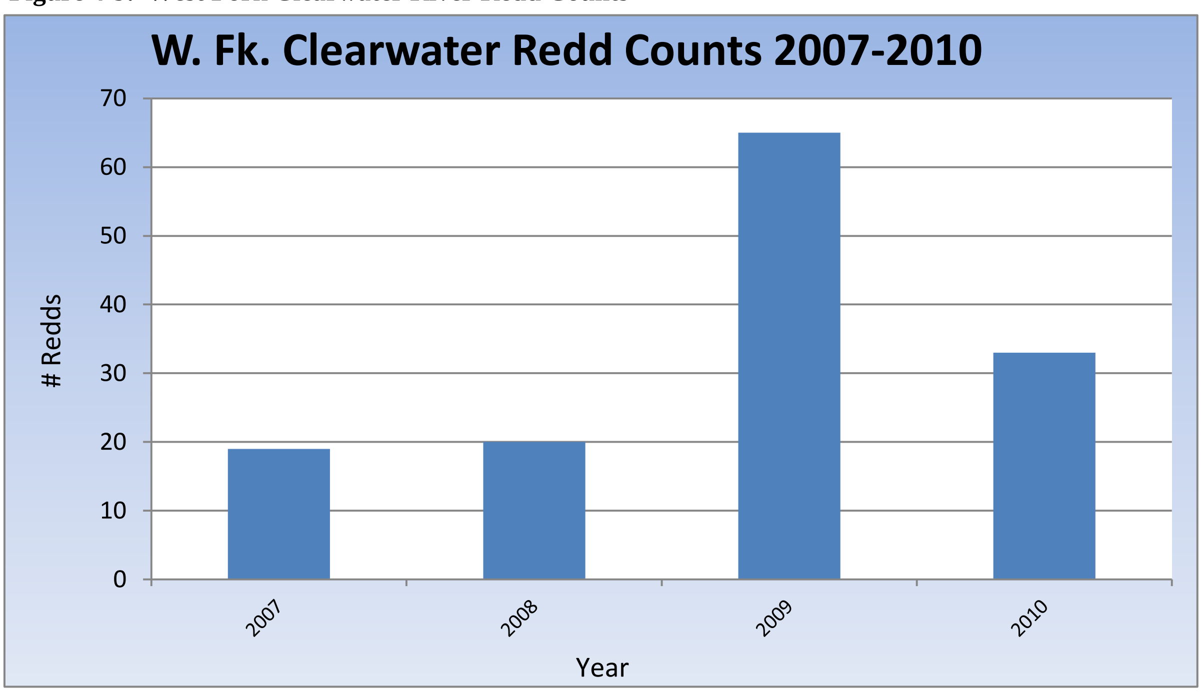
# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250 Migratory 50-250 Res	Increasing	Migratory, Connected	1, but spawning is spread over a larger area in drought years	Brook trout threat is High in West Fork. Other non-native threats (pike, bass, etc.) may be high in lakes downstream.
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High – The West Fork is one of the primary spawning tributaries of the entire system – most logical place to support large numbers of spawners out of Seeley Lake and Lake Inez, which have large adfluvial populations.		Moderate. This is a large watershed with relatively high elevation headwaters and lots of precipitation and groundwater influence, however the middle reach is influenced by glacial outwash which can create low base flow situations, and it's a relatively small basin, adding to low flow problems.		Adfluvial – Individuals migrating from Seeley and Inez Lakes, as well as Lake Alva and likely Salmon Lake.

Driving Factors Determining Bull Trout Population:

Habitat is generally good on Forest Service ownerships, but limited by natural barriers in the form of steep cascades. The lower portion of the stream has been historically impacted by timber harvest and roading and is currently used mainly as a migratory corridor. It is suspected that these reaches may lack the large woody debris that was there prior to extensive timber harvest. The lower reach is susceptible to drought years as the stream has very low base flows. The main limiting factor was a low-head dam (Emily A) on the Clearwater River, but recent efforts to pass fish manually and provide natural passage at the dam have largely eliminated this factor. Exotic species issues are primarily related to the mainstem Clearwater and Lakes. Expansion of brook trout, however, is a significant concern.

Confidence in your assessment (H,M,L): H

Figure 4-9. West Fork Clearwater River Redd Counts



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Fork Clearwater River - 170102031002							
Strategy (Active Restoration, Passive Restoration, Conserve): Active							
% Forest Service Ownership in HUC: Database says 99%, but this is high due to Forest Reserve Boundary							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	5 years	3	$100,000	H	H
Barriers	FAR	FA	1 year	3	$0	-	H
Pools	FAR	FA	3 years	2	$100,000	H	H
Sediment	FUR	FAR	3 years	2	$100,000	H	H

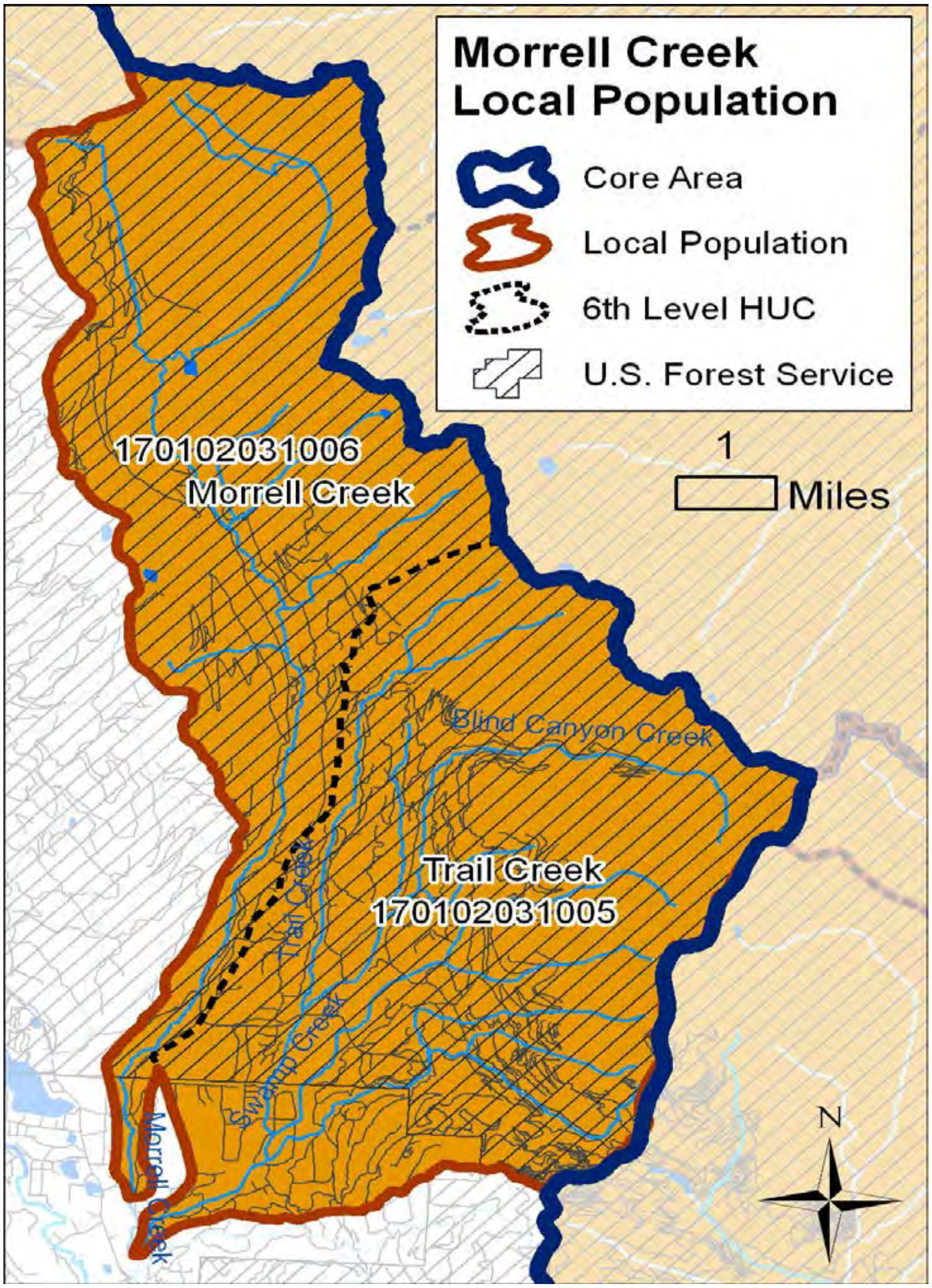
Temperature: Temperature taken in the lower end of the West Fork during the summer of 2004 shows that this is one of the warmer tributaries to the Clearwater River (aside from Placid Creek).

Barriers: Currently there are no human caused access issues. Marshall Creek has some chutes and cascades that prove to be difficult for passage as certain flows. The Emily A dam, while not directly within this HUC, has impacted populations in the HUC by creating a barrier between Seeley Lake and the West Fork Clearwater and Marshall Core area. Work has recently been completed by MTFWP to provide full passage around this dam.

Pools/Sediment: Habitat conditions likely vary with current and historic ownership. The upper reaches are owned by the Lolo National Forest and are managed as wilderness. The middle reach was historically owned by various industrial timber agencies and has recently been purchased by The Nature Conservancy and Montana Fish Wildlife and Parks. Because of this history, there may be a habitat issue related to large woody debris depletions. A lack of large woody debris would lead to fewer pool numbers, lower pool quality, and reduced spawning locations. An inventory through this reach, of these factors, would help determine the severity of impact and the immediacy of rehabilitation. High road densities and associated stream crossing increase the hydrologic connectivity of upland management impacts. However, MTFWP has plans to obliterate and remove many of these culverts and roads that are needed for their land management needs. This creates an opportunity for the Lolo National Forest to partner in this work.

Local Population: Morrell Creek

Figure 4-10. Morrell Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 4-3. Morrell Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250 Migratory 50-250 Res	Slightly upward	Migratory, Connected	2	Moderate in Morrell Creek itself (there are brook trout and some brown trout present), but may be high in Clearwater system due to pike, bass, etc. in Chain Lakes.

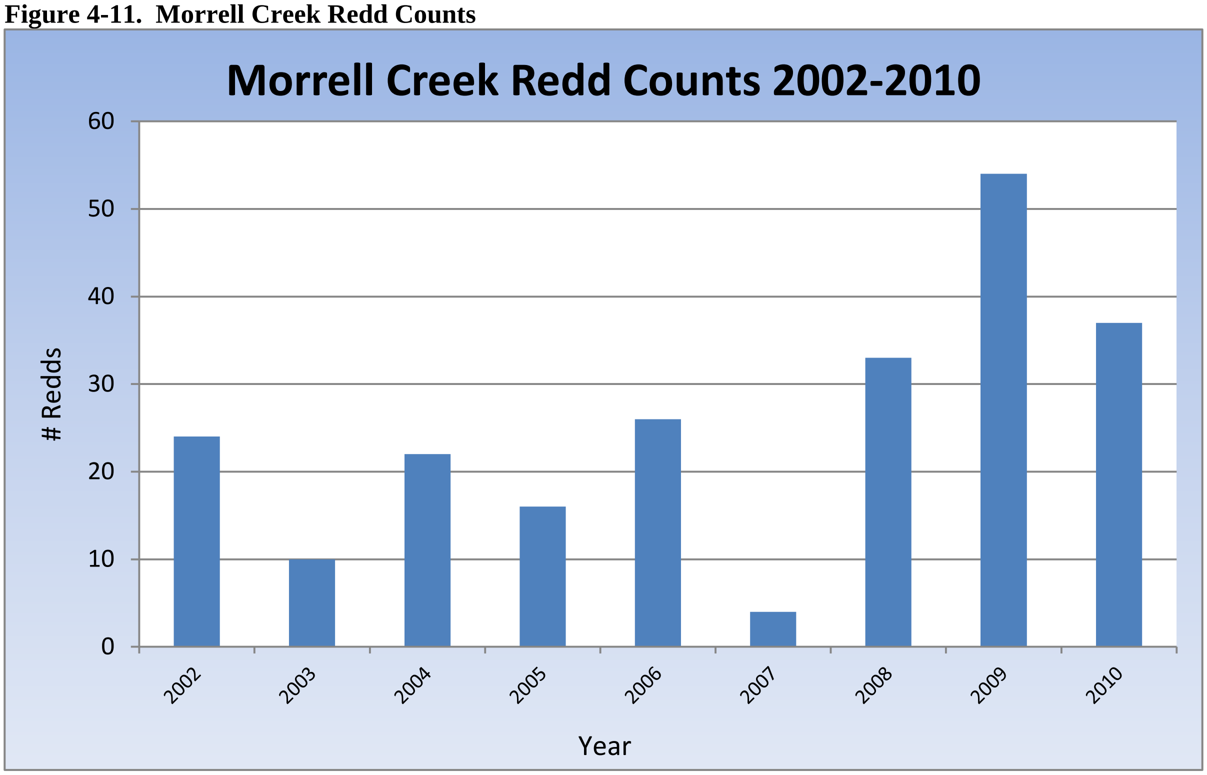
Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High – Morrell Creek is the strongest large tributary spawning population in the lower reaches of the Clearwater system. Some Seeley Lake fish move downstream to access this trib. Only other potential significant tributary in lower reaches of system is Placid, which has marginal habitat.	Moderate. This is a large watershed with relatively high elevation headwaters and lots of precipitation and groundwater influence. There is a large natural waterfall that precludes access and non-natives from the upper half of the watershed.	Adfluvial – Downstream movement out of Seeley Lake and into Morrell Creek by a significant number of spawners, which is unique.

Driving Factors Determining Bull Trout Population:

Habitat is generally good. The main limiting factor is warm temperatures in the Clearwater River and dewatering between Seeley Lake and Morrell Creek in low water years. This precludes spawning access to Morrell Creek and has significant impacts on the population. Irrigation diversion issues in the extreme lower end of Morrell Creek are also an issue, but water is not diverted in these after July 1, and both are screened. There are additional concerns/impacts related to riparian management by Double Arrow Subdivision owner and the Golf course. Brook trout and brown trout are present in this system.

Confidence in your assessment (H,M,L): H

Figure 4-11. Morrell Creek Redd Counts



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Morrell Creek - 170102031006							
Strategy (Active Restoration, Passive Restoration, Conserve): Active							
% Forest Service Ownership in HUC: 98%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	1 year	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	1 year	3	$0	-	-
Sediment	FUR	FAR	10 years	3	$100,000	M	M

Temperatures: Morrell Creek is the second coldest tributary (next to the East Fork) to the Clearwater River (measured at the Cottonwood Lakes road bridge crossing).

Barriers: Morrell Creek has no structural access issues. Low flows coupled with beaver dams likely poses access challenges during dry years or drought periods. Increase in water uses and/or water right will likely exacerbate this problem. Thus, securing minimum instream flows for this lower reach is necessary to protect long-term access needs.

Pools/Sediment: Morrell Creek aquatic habitat within the headwaters and middles section is in good condition. The main headwater tributary drains an area known as “Grizzly Basin” which is managed as a roadless area by the Lolo National Forest. This headwater area is inaccessible to fish due to Morrell Falls. An Unnamed headwater tributary was heavily roaded and logged in the 1970’s. However, in the early 2000’s these roads and culverts were obliterated. The middle section has two bridge crossings that are currently undersized and negatively affect the transport of woody debris. In between these bridges is also a segment of Morrell Creek that is naturally intermittent. This segment along with the lower end is probably more susceptible to dry years and drought conditions. Aquatic habitat in lower end deteriorates as impacts become prevalent from riparian management associated with the Double Arrow subdivision and Golf course. Potential projects, educational opportunities, and partnership would be useful to help address stream shading, water use, width to depth ratios, overall riparian management, and fish identification. The baseline calls for temperature, sediment, pools are largely affected by the presence of the road within 300 feet; however, the road is mostly on a terrace and not as imp active as indicated. These calls may need to be adjusted. There are some opportunities to improve BMP’s on some roads and reduce sediment sources. Roads 17480 and 17483 are located parallel to Morrell Creek and should be obliterated to reduce sedimentation and improve overall RHCA conditions.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Trail Creek - 170102031005							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 85%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$0	M	M
Barriers	FUR	FA	2 years	2	$100,000	M	M
Pools	FAR	FAR	10 years	3	$50,000	M	M
Sediment	FUR	FAR	10 years	3	$100,000	M	M

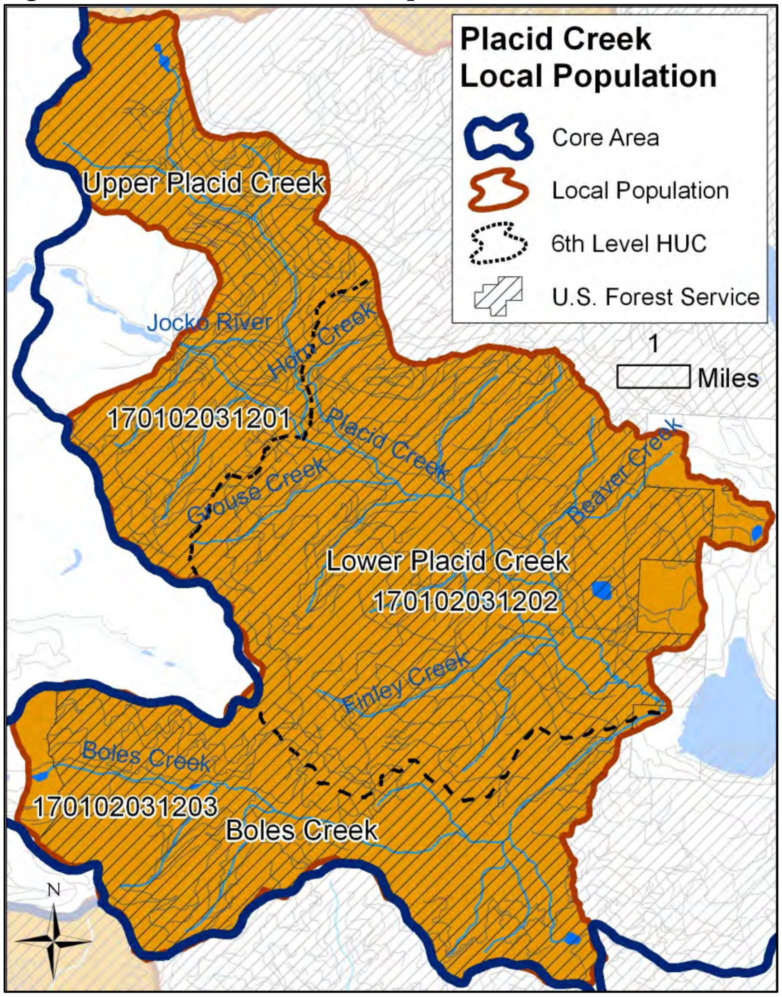
Temperature: Trail and Blind Canyon both originate at high elevation in steep canyons and have cooler temperatures. As these streams move through the heavily logged areas and the Double Arrow subdivision their temperature likely warm up.

Barriers: Trail and Blind Canyon Creek have several fish barriers in the form of undersized culvert barriers. Our inventory of culvert/barriers needs to update with the new lands and road that were recently acquired. There was a partial barrier at the Double Arrow diversion on Trail Creek that was remedied by MTFWP installing a fish ladder in 2003.

Pools/Sediment: Trail Creek is a major tributary to Morrell Creek. It has high densities of brook trout and is assumed to be the source population for brook trout in Morrell Creek. This stream and its major tributary, Blind Canyon, historically were likely important bull trout streams as well. As there was a checkerboard ownership between the Lolo National Forest and Industrial Forestry the aquatic habitat is not as good as Morrell Creek. However, as part of the Montana Legacy Lands Project these parcels are now in Forest Service ownership. Thus the watershed can now be managed as one watershed rather than section by section. Streamside Management Zone will not be reentered and allowed to recover. A transportation analysis needs to be completed by the Forest Service to determine which roads are needed to meet management objectives and which ones should be obliterated to meet aquatics needs. There is long-term concern related to future subdivision potential with section 31 with was sold by Plum Creek Timber Co to a private individual(s).

Local Population: Placid Creek

Figure 4-12. Placid Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 4-4. Placid Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
0-50 Mig; 0-50 Res	Decline	Migratory, Fragmented by the Placid Dam	1	High in Placid system due to brook trout. High in Clearwater system due to pike, bass, etc. in Chain Lakes.

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High – Placid Creek is similar to Morrell Creek in terms of location and size, however, there is no evidence of fluvial fish from Seeley or Salmon Lakes moving into Placid currently. Placid Creek is important to the Placid Lake adfluvial population, as it provides the only potential spawning habitat for this population.	High. This is a large watershed in a high precipitation zone with lots of groundwater influence. Placid Lake also provides thermal buffer capacity. However, Placid Creek is relatively warm and dominated by > 95% brook trout.	Adfluvial – from Placid Lake. However, the population appears to be nearly extirpated at the current time.

Driving Factors Determining Bull Trout Population:

Habitat is marginal due to extensive timber harvest throughout the watershed. However, Placid Lake dam is probably the main limiting factor in terms of the potential contribution of Placid Creek to the Clearwater River system. Non-native species in Placid Lake may also limit the population. Habitat upstream of Placid Lake is in marginal condition, and there is a limited amount of habitat available to support a large lake population. Steam temperatures within the mainstem of Placid, above and below Placid Lake, are likely an issue -- even more so post Jocko Lakes Fire and the subsequent timber salvage effort. Potential subdivision of Plum Creek Timber lands and the associated water use is a long-term threat. Recent MDFWP sampling shows Boles Creek was the last tributary to Placid Creek to support a nominal population. Basin-wide electrofishing surveys by MTFWP from 2010 to 2012 detected no bull trout in the drainage.

Confidence in your assessment (H,M,L): M

Bull trout redd data is not currently collected within the Placid Core due to extremely low numbers (if any) of bull trout remaining.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Boles Creek - 170102031203							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 95%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	2	$50,000	H	M
Barriers	FUR	FA	1 year	3	$0	L	M
Pools	FAR	FAR	10 years	1	$50,000	H	H
Sediment	FUR	FAR	10 years	1	$50,000	H	H

Temperature: Temperature, pools, and sediment are affected by roads along streams and crossings, recent salvage activity, and fires that occurred two years ago.

Barriers: There are no barriers left that are significant to bull trout (need to evaluate Culvert ID#1221 – this one shows red in one database and could be significant if it's a barrier).

Pools/Sediment- Fire suppression activities had major impacts to Boles Creek in the form of several dozer line crossings and large safety zones. Plum Creek Timber Co. has constructed a road system (#545) that tightly parallels Boles Creek and it is having a negative impact to aquatic habitats through increases in sedimentation and a reduction in LWD and stream shade. Many of these impacts will naturally recover, but there is a need to conduct travel planning to define the minimum road network necessary and implement road removal projects to achieve this. Boles Creek supports the majority of available bull trout habitat in the system upstream of Placid Lake, and is therefore important to restore.

Boles Creek would be an appropriate area to purchase lands or acquire conservation easements for the purpose of restoring bull trout habitat. However, recent expansion of brook trout into this system would make restoration efforts more difficult to realize benefits.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Placid Creek - 170102031202							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 94%, based on Federal Reserve line							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	2	$50,000	H	M
Barriers	FAR	FA	1 year	3	$0	M	M
Pools	FAR	FA	10 years	2	$50,000	M	M
Sediment	FUR	FAR	10 years	2	$50,000	M	M

Barriers: Mainstem Placid Creek has no barriers and culvert barriers on larger tributaries are currently being replaced. This population is isolated from mainstem Clearwater by a small dam at the outlet of Placid Lake. This dam also, however, precludes invasion by northern pike.

Temperature/Pools/Sediment: There are extensive road systems, but some have been decommissioned in the recent past. The main limitation to further decommissioning is the checker board ownership patterns. Another long-term concern is the potential for fur subdivision of Plum Creek Lands. There are, however, numerous opportunities to relocate and consolidate roads to reduce sediment impacts. The temperature and pool calls will naturally recover over time – they are largely in poor condition now due to excessive timber harvest that has affected the RHCA's. The southern tributaries drain the Reservation Divide, which is a high precipitation zone, and provides for cool water from Second, Grouse, and Buck Creeks.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Placid Creek - 170102031201							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 99%, based on Federal Reserve Line							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$300,000	H	M
Barriers	FAR	FA	10 years	3	$100,000	H	M
Pools	FAR	FA	10 years	3	$200,000	M	M
Sediment	FUR	FAR	10 years	3	$200,000	M	M

The confluence of all the tributaries in the mainstem was probably historically an important area for bull trout, but there are few bull trout remaining. Road densities are extremely high and there are numerous paralleling roads. There is also a major barrier on a large second order stream that is probably significant to bull trout, but does not rank out as FUR because it's not technically a third order stream. There are extremely high densities of brook trout in this HUC. The BIA ditch has an impact from water withdrawal as well. Relocating or removing roads and adding large woody debris to the system would likely result in a very positive response in this system. The potential for this and the Lower Placid Creek HUCs for improvement and significant contribution to the Placid Local Population are high. The biggest challenge is mixed ownership.

Clearwater River Core Area Summary:

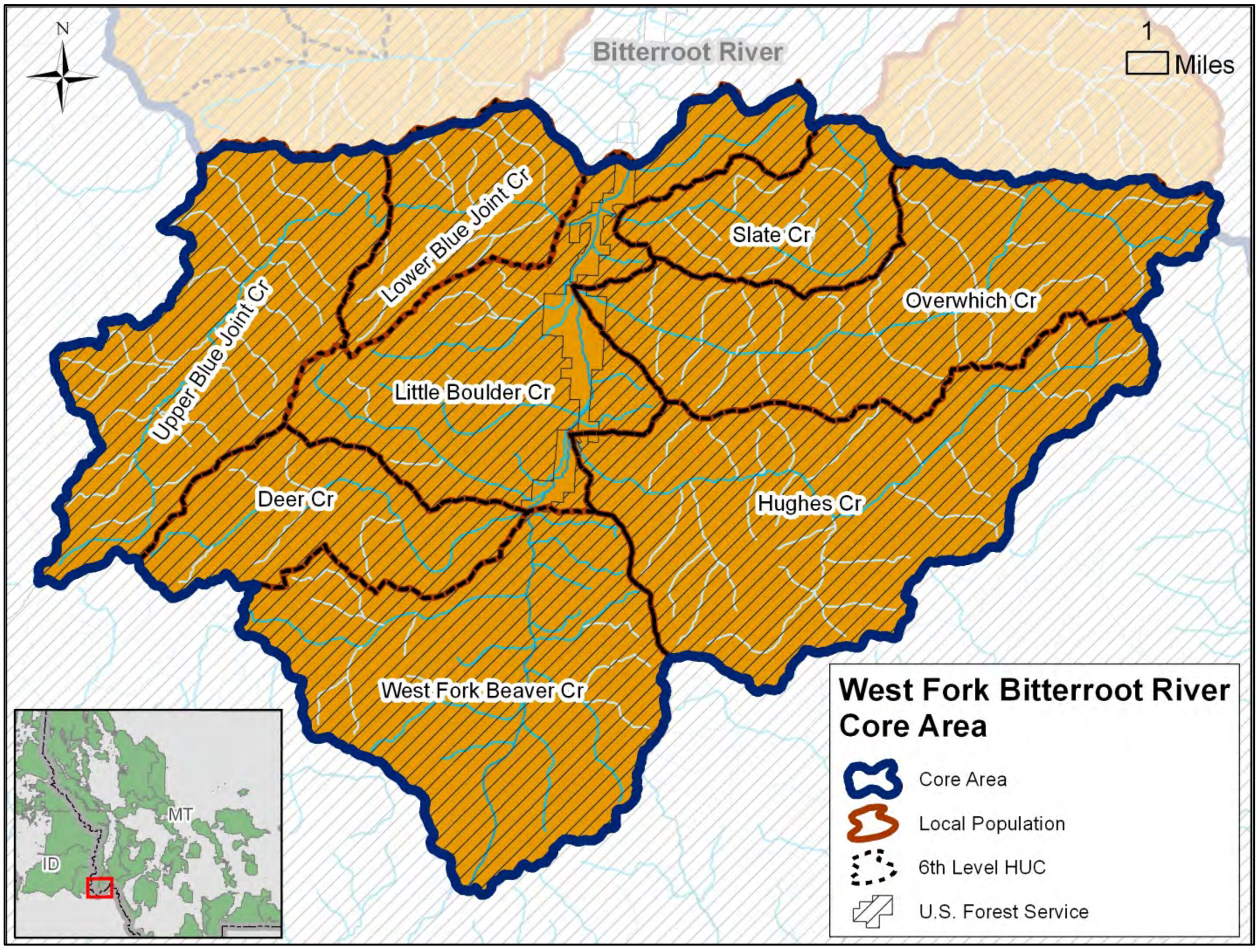
Table 4-5 summarizes relevant information from each of the 6th level HUC local populations. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire Clearwater River Core Area within the borders of the Lolo National Forest. It does not include necessary restoration activities in watersheds where the LNF has no ownership that may be critical for overall restoration of the bull trout population in the Core Area.

Table 4-5. Summary of important local population attributes and conservation recommendations for the Clearwater River Core Area.

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
East Fork Clearwater River	Upper Clearwater River	High	High	Active	Barriers	5 years	$100,000
West Fork Clearwater River	West Fork Clearwater River	High	High	Active	Temperature, Pools & Sediment	3-5 years	$300,000
Morrell Creek	Morrell Cr	High	High	Active	-	-	-
	Trail Cr	Moderate	Moderate	Active	-	-	-
Placid Creek	Boles Cr	High	Moderate	Active	Temperature, Pools & Sediment	10 years	$150,000
	Lower Placid Cr	High	Moderate	Passive	Temperature	10 years	$50,000
	Upper Placid Cr	Low	High	Passive	Temperature & Barriers	10 years	$400,000

Chapter 5: West Fork Bitterroot River

Figure 5-1. West Fork Bitterroot River and Surrounding Core Areas



Core Area Discussion:

The West Fork Bitterroot River Core Area (WFBCA) includes all of Painted Rocks Reservoir and the West Fork Bitterroot River and all tributaries upstream of the dam. Painted Rocks Dam, completed in 1940, isolates the West Fork Bitterroot River drainage from its former connectivity with the Bitterroot River, cutting off about one-third of the spawning and rearing habitat for the Bitterroot River Core Area. The WFBCA bull trout population evolved from fluvial Bitterroot River stocks that were trapped upstream of Painted Rocks Dam. There appears to be some resident fish in this core area, but the proportion of resident to fluvial/adfluvial forms is unknown.

Sporadic abundance monitoring has occurred in Slate, Overwhich, Hughes, and Chicken Creeks, all tributaries to Painted Rocks Reservoir or the West Fork upstream, but trends are inconclusive (MFWP, unpublished data). These streams all contain low numbers of bull trout, but typically the numbers are not adequate to calculate statistically valid estimates. Densities, however, are much reduced from historic levels. The distribution of populations throughout the core area is probably similar to historic patterns. Life form expression is probably different in that fewer of the large, fluvial fish are present.

The WFBCA is a relatively small core area. Some natural barriers exist in headwater streams and occasional temporary barriers resulting from beaver dams or other natural activities also occur. Painted Rocks Dam isolates the upper West Fork Bitterroot River from downstream waters. The effects of the passage barrier on either the upstream or downstream core area are not documented. Most tributary local populations (7 of 8) are fully connected to the West Fork Bitterroot River and/or downstream reservoir. Some minor culvert passage issues remain. In general habitat on USFS lands in the drainage has trended toward improvement, due largely to elimination of passage barriers. A culvert at the mouth of Slate Creek was replaced with a passable structure in 2003-2004, opening up approximately 6 miles of blocked habitat. In 2007, an irrigation diversion that was an upstream passage barrier was removed in lower Chicken Creek, opening up another 4 miles of blocked habitat. Additional, lower priority passage barriers have been surveyed and scheduled for eventual improvement. Subdivision developments have increased on private lands along the river corridor.

Historic bull trout redd counts are not available, but it is likely that numbers were highest immediately following construction of the dam and filling of the reservoir. There may have been a brief increase in numbers with the new habitat and food resources afforded by the reservoir, but then populations probably began a steady decline to today's level.

Only one minor local population (Deer Creek) is routinely monitored in this core area. Prior to listing in 1998, a total of 6 redds were counted in 1994 and 2 redds in 1997. Since 1998, redd counts have been conducted annually and there have been a low, but steady number of 2-5 redds observed in each of those counts (MFWP 2004a). Continuing, but sporadic mark-recapture monitoring occurs in streams in the core area (e.g., Slate, Overwhich, Hughes, and Chicken Creeks) (MFWP, unpublished data). Bull trout are found, however, numbers are typically too low to calculate valid population estimates. With this limited information, we are not able to draw conclusions about the abundance or trend of bull trout in the core area. Based on anecdotal reports, a mixture of migratory and resident bull trout are spread amongst multiple local populations, with numbers exceeding 100 adult fish and possibly as high as several hundred.

The size of the WFBCA is relatively small but habitats are relatively well connected. In addition, the population has the added benefit of having a reservoir rearing area, providing habitat that is relatively buffered from environmental extremes and supports ample food resources for bull.

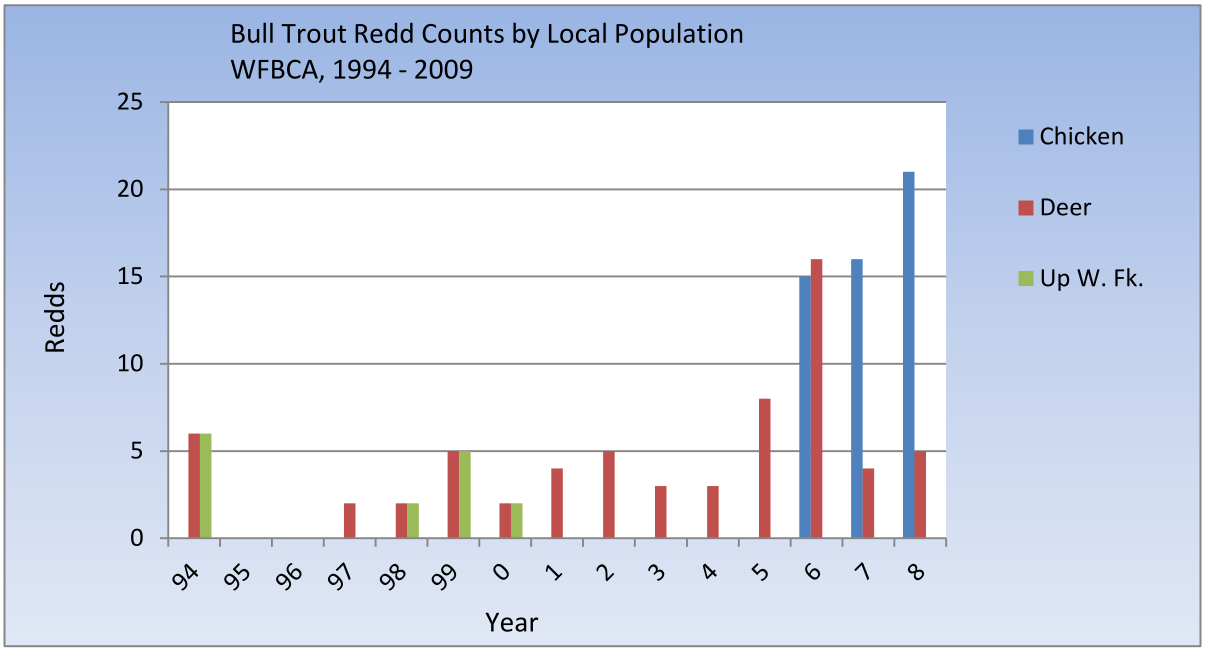
In the 2002 USFWS Draft Recovery Plan, specific local populations for the WFBCA were not designated. More recent information suggests that there are seven local populations – Upper West Fork Bitterroot River, Deer, Hughes, Overwhich, Blue Joint, Slate and Little Boulder. In addition to these seven proposed local populations, bull trout have been documented in Beaver and Woods Creeks and in the mainstem West Fork Bitterroot River. Sporadic occupancy has also been observed in Johnson, Sheep, and Chicken Creeks.

In general habitat on USFS lands in the drainage have trended toward improvement, due largely to elimination of passage barriers. Subdivision developments have increased on private lands along the river corridor, and these pose a long-term future threat. The Bitterroot Headwaters TMDL was approved by EPA in 2006. TMDL remediation was prescribed for sediment and thermal concerns in West Fork Bitterroot River and Hughes Creek and for thermal issues in Overwhich Creek. Deer Creek was dropped from the 303(d) list.

Brook trout are the primary nonnative species in the core area and they outnumber bull trout throughout the system, especially in the mainstem West Fork and lower portions of larger tributaries. They are the main threat to long-term bull trout persistence in the core area. Hybrids are commonly observed in nearly all occupied streams. Secondary threats are forest management practices and forest roads, followed by residential development and urbanization. Water management in the reservoir is an unknown threat, depending on future demands and uses.

There is currently only one index reach in the WFBCA – Deer Creek. However, there is redd survey data for two other stream reaches for some years. Collectively, these three reaches probably represent over half of the total fluvial spawning in the Core Area. Figure 5-2 shows bull trout redd numbers in the reaches from 1994 through 2009 (FWP and USFS unpublished data). Note that blank years are typically when no survey was conducted – they do not indicate zero redds found.

Figure 5-2. Bull trout redd numbers in the WFBCA from 1994 through 2009.



Currently, the WFBCA appears to support a relatively stable, although very small bull trout population. This population is likely less secure than many populations within the Conservation Strategy due to its small size, limited amount of habitat, and isolation above Painted Rocks Dam.

West Fork Bitterroot River Core Area - Above Painted Rocks Reservoir

There are seven local populations within the core area on the Bitterroot National Forest. They include:

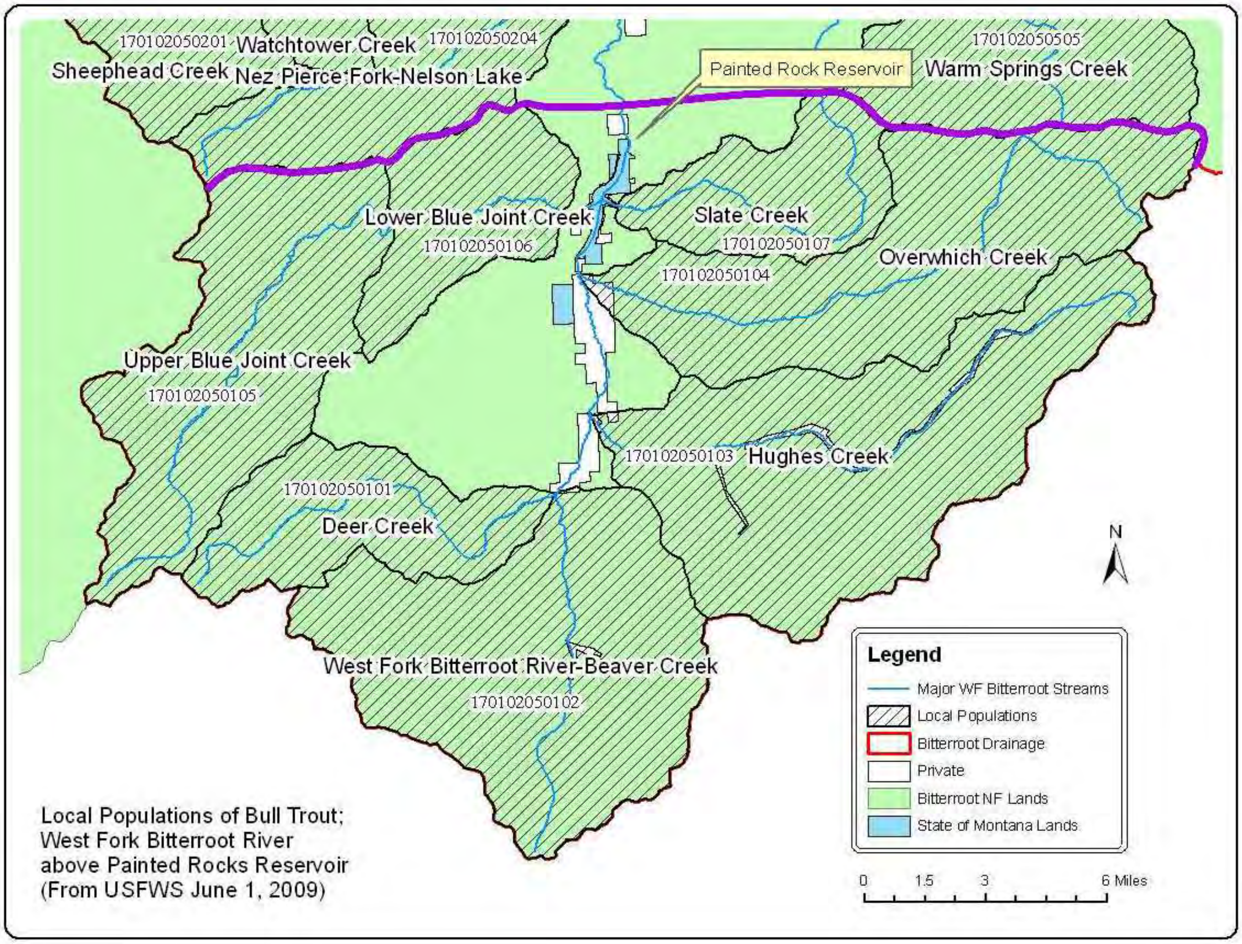
- Upper West Fork Bitterroot River
- Deer Creek
- Hughes Creek
- Overwhich Creek
- Blue Joint Creek
- Slate Creek
- Little Boulder Creek

While fluvial bull trout do spawn in other tributaries, these seven streams support the majority of the spawning, and redd numbers within them likely represent over 85 percent of the total fluvial spawning that occurs in the basin.

Of the seven local populations in the core area, Deer Creek, Chicken Creek, and the Upper West Fork Bitterroot River currently support the majority of fluvial bull trout spawning. It is unclear whether a similar pattern, in terms of importance, may have existed historically between these streams.

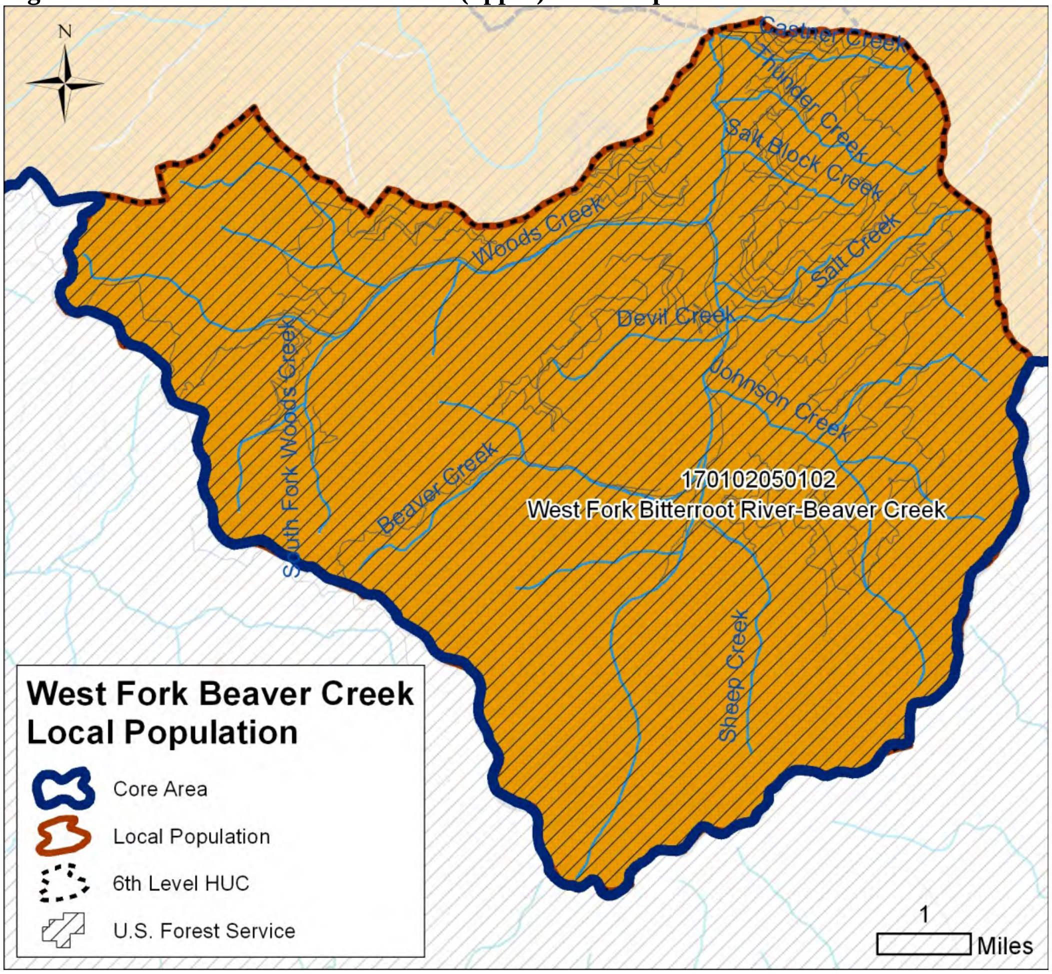
Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Figure 5-3. Map of Local Populations of Bull Trout



Local Population: West Fork Bitterroot River (upper)

Figure 5-4. West Fork Bitterroot River (upper) Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 5-1. West Fork Bitterroot River (upper) Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
250 -500 (residents) 0-50 (migratory)	Unknown/ Stable	Resident dominant, Migratory present but few in numbers, Connected.	1 (West Fork between Deer and Beaver Creeks)	Brook (common in lower reaches in HUC) Threat = High Hybrids present
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Moderate significance – Central proximity for the core area.		Moderate vulnerability due to overlap with brook trout in the West Fork and the lower reaches of the larger tributaries		Monitoring indicates that numbers and distribution of bull trout and brook trout have not changed much since the early 1990's

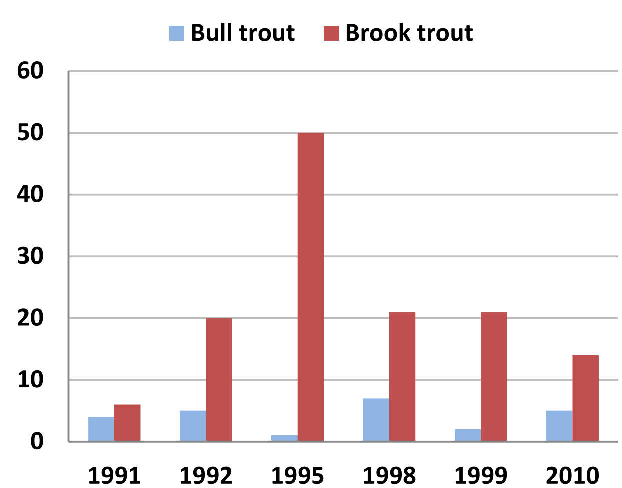
Driving Factors Determining Bull Trout Population:

The local population in HUC 0102 is widely distributed at generally low densities throughout the West Fork Bitterroot River and its larger tributaries of Woods, Beaver, Sheep, and Johnson Creeks. Spawning and rearing habitat is present in all of those waters. Overlap with brook trout limits the local population, particularly in the West Fork and the lower reaches of all of the larger tributaries. Hybrids are present in most areas of overlap. Roads limit the quality of habitat (culvert barriers, sediment, and temperature), but for the most part, overall habitat quality is still good in most reaches. The majority of the habitat in the HUC is connected year-round. With the exception of Johnson Creek (which has culvert barriers near its mouth), most of the culvert barriers in the HUC minimally impact the local population because they occur high in the watershed or on small tributaries that lack bull trout. Restoration projects should focus on: (1) coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area (#1 priority), followed by (2) eliminating all culvert barriers (Johnson Creek is the #1 priority) and (3) reducing roads in RHCAs and the number of road stream crossings. If brook trout and culvert barriers were to be eliminated, habitat quality would likely have minimal impacts on the local population.

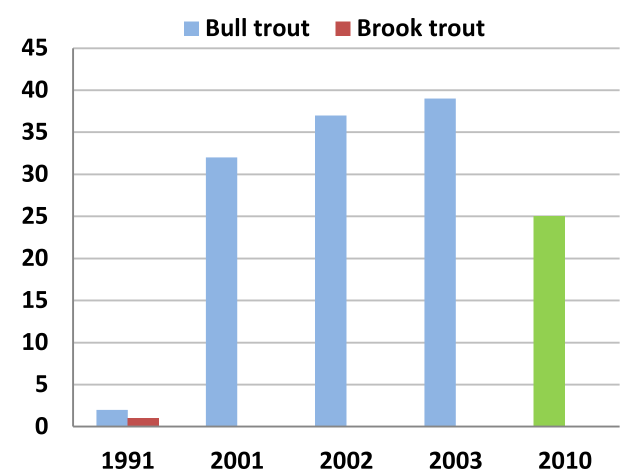
Confidence in your assessment (H,M,L): H (there are six long-term population monitoring reaches in the HUC – two in the West Fork and one each in the major tributaries of Woods, Beaver, Sheep, and Johnson creeks – so bull trout trend data is pretty good).

Figure 5-5. Number of trout captured in the West Fork Bitterroot River

Number of bull trout and brook trout captured in 1000 feet of the West Fork Bitterroot River at river mile 34.0 (near lower end of HUC 0102).



Number of bull trout and brook trout captured in 800 feet of the West Fork Bitterroot River at river mile 40.0. In 2010, only 400 feet was sampled and 25 bull trout were captured (green bar).



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Fork Bitterroot River-Beaver Creek – 170102050102							
Strategy (Active Restoration, Passive Restoration, Conserve): Active							
% Forest Service Ownership in HUC: 99.6% (136 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	80 years	3	$3,000,000 *	L	M
Barriers	FUR	FA	30 years	1	$500,000	H	M
Pools	FAR	FA	80 years	3	*	L	M
Sediment	FUR	FAR	80 years	2	*	L	M

* = the 3000k is for: (1) relocating arterial road segments out of RHCAs along Woods Creek, Beaver Creek, and the West Fork between Woods and Beaver Creeks; and (2) purchasing private inholdings along lower Johnson Creek and the Cooper Draw segment of the West Fork, or if that is financially infeasible, improving riparian grazing practices on the Cooper Draw inholding. These actions would concurrently benefit temperature, pools, and sediment.

Temperature: GIS rating = FAR, data and professional judgment rating = FAR. Montana DEQ has established a thermal TMDL for the West Fork Bitterroot River (all reaches). The TMDL is a phased allocation to address shade losses due to roads and mining (potentially irretrievable commitments). The water quality goal is a mean-maximum temperature < 12° C at river mile 40.0 (located in this HUC), and 45% effective shade. The temperature goal has been met during most summers, the exception being those that are unusually hot (e.g. 2003, 2007). The effective shade goal is being met. During “average” climatic summers, the upper West Fork and its larger tributaries typically have mean-maximum temperatures ranging between 12 and 15° C. Temperatures in the majority of the HUC do not appear to be significantly impaired. The lowest elevation in the HUC is 5093 feet, which helps maintain cold water. Road encroachment is a concern as 48% of the perennial stream length in the HUC is located within 300 feet of roads. Large segments of Woods Creek, Beaver Creek, and the West Fork between Deer and Beaver Creek are paralleled by arterial roads in their RHCAs. HUC 0102 has not experienced significant areas of moderate or high severity fire over the past decade; ECA is 5%. Restoration projects aimed at improving the temperature regime should focus on relocating arterial RHCA road segments (if feasible), and reducing the number of road stream crossings. Road relocation will likely be very difficult because the roads are well traveled and socially desirable. Another restoration opportunity would be to purchase the Cooper Draw private inholding along the West Fork, or work with the landowner to reduce riparian grazing impacts from livestock.

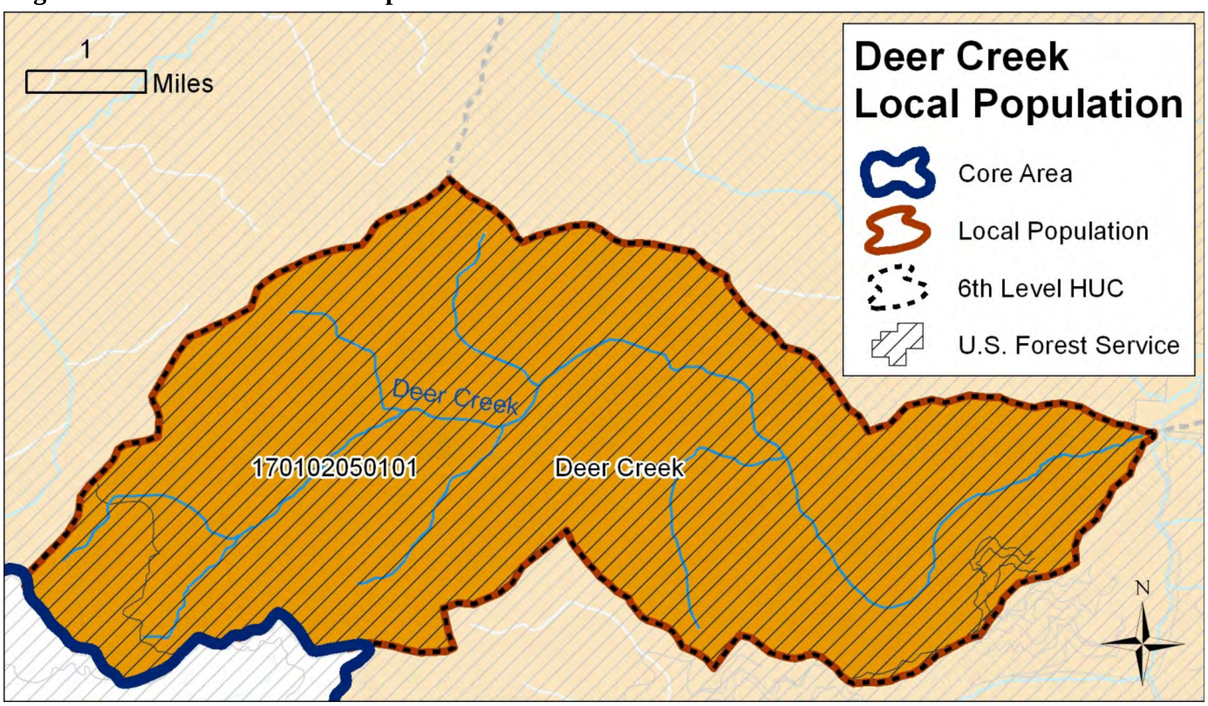
Barriers: GIS rating = FUR; data and professional judgment rating = FUR. Six culverts in HUC 0102 are believed to function as barriers to bull trout; another seven culverts are barriers to westslope cutthroat trout but probably not for bull trout at this time. With the exception of Johnson Creek (which has culvert barriers near its mouth), most of the culvert barriers are located on small tributaries that contain few bull trout and limited amounts of suitable habitat. The #1 priority is to eliminate the three culvert barriers near the mouth of Johnson Creek (one on the West Fork Road + two on private lands). The #2 priority is to eliminate the other three culvert barriers that affect bull trout in the HUC (one each on Soldier Creek, Sheep Creek, and Woods Creek tributary 3.8). Purchasing the private inholding along Johnson Creek would be a major step in accomplishing priority #1.

Pools: GIS rating = FAR, data and professional judgment rating = FA. Habitat surveys indicate that pools are common throughout the HUC and quality is good despite the prevalence of roads in RHCAs (48% of perennial stream length within 300 feet of roads). Most pools are formed by large wood, which is abundant in most areas. There are no reaches where direct intervention in the form of man-made woody debris additions is needed. A limited amount of illegal firewood cutting occurs near streams, particularly along Forest Road 091 between Woods and Johnson Creeks and near the Salt Creek dispersed campsite complex. On the reach and watershed scales, firewood cutting has an insignificant effect on pools. Restoration projects should focus on relocating arterial road segments out of RHCAs. This would concurrently benefit temperature, pools, and sediment.

Sediment: GIS rating = FUR, data and professional judgment rating = FAR. Montana DEQ has established a sediment TMDL for the West Fork Bitterroot River (all reaches). The TMDL is a 5% reduction in total load to the river. The water quality goals (to be measured in C4 reaches) are 6-20% fines < 2 mm, 17-49% fines < 6 mm, 3-47 mm D50, and clinger richness > 14. Most of these goals are being met. Roads are the primary source of man-caused sediment in HUC 0102. Restoration projects should focus on relocating arterial road segments out of RHCAs, reducing the number of road stream crossings, and improving riparian grazing practices on the Cooper Draw inholding.

Local Population: Deer Creek

Figure 5-6. Deer Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 5-2. Deer Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
250-500 (residents) 0-50 (migratory)	Unknown/ Stable	Resident dominant, Migratory present but few in number. Connected.	1 (lower two miles of Deer Creek)	Brook (common in lower half of Deer Creek) Threat = High Hybrids present

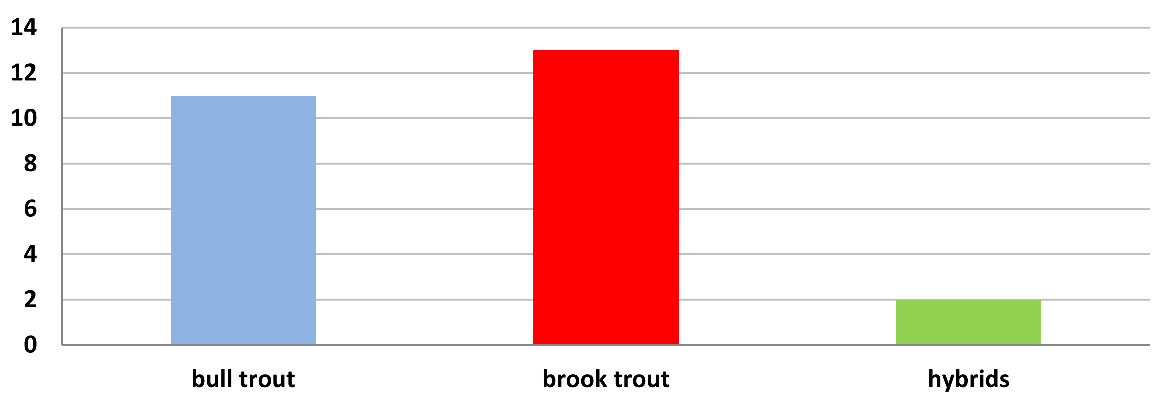
Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Moderate significance – connected to the West Fork and neighboring bull trout populations in its larger tributaries	Moderate vulnerability due to overlap with brook trout in the lower half of Deer Creek.	Deer Creek provides good spawning and rearing habitat for migratory bull trout, but few appear to be currently using it

Driving Factors Determining Bull Trout Population:

Deer Creek is essentially a roadless drainage with habitat in reference condition. Brook trout overlap with bull trout in the lower half of Deer Creek and the upper West Fork Bitterroot River, and are probably the limiting factor for the local population in the Deer Creek HUC. Hybrids are present where overlap occurs. Restoration projects should focus on coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area, which is the only type of restoration needed. Other than brook trout, the local population and its habitat are controlled by natural processes; man has minimal influence. There is one screened water diversion (Hawkes) near the mouth of Deer Creek, but it has a negligible effect on water quantity and quality. The number of migratory bull trout that spawn in Deer Creek is believed to be very low.

Confidence in your assessment (H,M,L): M (a few migratory bull trout have been found in the lower end of Deer Creek while electroshocking or conducting redd surveys, but we have no good feel for how many spawn in the Deer Creek drainage)

Figure 5-7. Number of Trout captured in Deer Creek



Number of bull trout, brook trout and hybrids captured in 1000 feet of Deer Creek in 2009 (river mile 0.3).

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Deer Creek – 170102050101							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 99.9% (13 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: GIS rating = FA, data and professional judgment rating = FA. The temperature regime of Deer Creek is controlled by natural processes; man's activities have negligible influence. During "average" climatic summers, mean-maximum temperatures near the mouth of Deer Creek typically range between 14-16° C. During hot summers (2001, 2003 and 2006), mean-maximum temperatures near the mouth of Deer Creek have ranged between 17-18° C. This indicates that Deer Creek is vulnerable to climatic warming. Since 2000, 1.5% of the Deer Creek HUC has been burned by moderate or high severity fire; ECA is 0.2%.

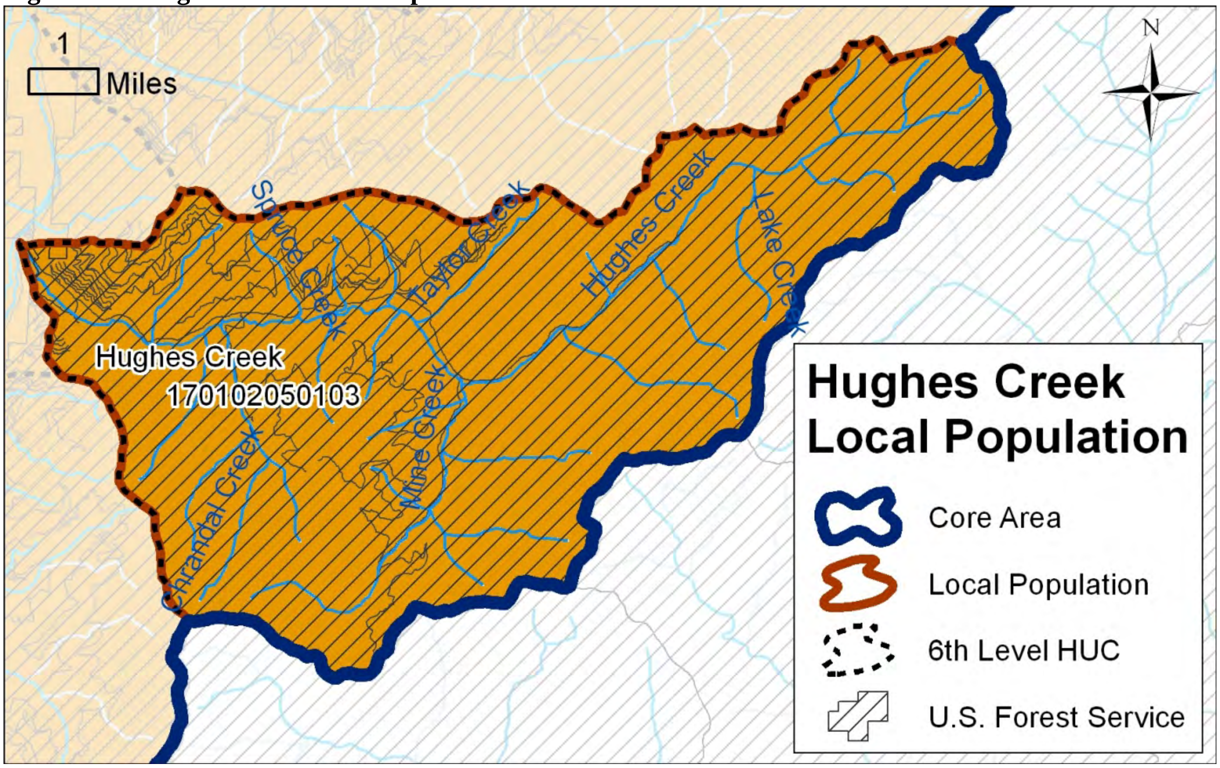
Barriers: GIS rating = FA, data and professional judgment rating = FA. No man-made barriers are present.

Pools: GIS rating = FA, data and professional judgment rating = FA. Pool habitat is controlled by natural processes and man's activities have negligible influence. Habitat surveys indicate that pools are common in Deer Creek and pool quality is good.

Sediment: GIS rating = FA, data and professional judgment rating = FA. The sediment regime is controlled by natural processes; roads and trails have negligible influence. Habitat surveys indicate that surface fines < 2 mm are naturally high (24-26%) due to the granitic geology of the drainage.

Local Population: Hughes Creek

Figure 5-8. Hughes Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 5-3. Hughes Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
250-500 (residents) 0-50 (migratory)	Unknown/ Stable	Resident dominant Migratory present but few in number. Connected.	None, but suitable habitat is present	Brook (common - nearly complete overlap with bull trout in the HUC) Threat = High Hybrids present
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Moderate significance – connected to the West Fork and neighboring bull trout populations in its larger tributaries		High vulnerability due to the combination of brook trout and naturally high solar exposure (low gradient reaches with numerous beaver ponds).		

Driving Factors Determining Bull Trout Population:

Overlap with brook trout limits the local population throughout much of the HUC. Hybrids are present where overlap occurs. Roads and mining on private lands also reduce habitat quality (temperature and sediment). The arterial roads in RHCAs tend to be under county or private jurisdiction with limited Forest Service ability to change current conditions. Hughes Creek contains a significant amount of low gradient/beaver-dominated reaches that are vulnerable to climate change. Damage from mining on private lands is widespread in the middle reaches of Hughes Creek.

Restoration projects should focus on purchasing and reclaiming lands damaged by mining and coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area.

Confidence in your assessment (H,M,L): M (bull trout information in the lower half of the HUC is pretty good; we have very little information about the more remote and inaccessible upper half of the HUC; little is known about use of the HUC by migratory bull trout, sightings have been rare)

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Hughes Creek - 170102050103							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive							
% Forest Service Ownership in HUC: 99.7% (116 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	50 years	1	$3,000,000*	M	M
Barriers	FA	FA	20 years	2	$120,000	L	H
Pools	FAR	FAR	50 years	1	*	M	M
Sediment	FUR	FAR	50 years	1	*	M	M

* = the 3000k is for purchasing and reclaiming the private mining claims along Hughes Creek. These actions would concurrently benefit temperature, pools, and sediment.

Temperature: GIS rating = FAR, data and professional judgment rating = FAR. Montana DEQ has established a thermal TMDL for Hughes Creek. The TMDL is a 50% reduction in thermal loading from known anthropogenic sources. The water quality goal is a mean-maximum temperature < 15° C at river miles 1.6 and 9.0, and 78% effective shade. The temperature goals are usually exceeded (16-19° C) in all but the coolest of summers. The effective shade goal is not being met. Shade has been lost due to private development (roads, houses, etc.) in RHCAs and mining; however, a confounding factor is the prevalence of low gradient reaches with numerous beaver ponds. These features provide Hughes Creek (and Mine Creek, a main tributary) with a lot of natural solar exposure, and make it difficult to achieve the temperature goals in the present climate. Restoration projects should focus on purchasing and reclaiming the private mining claims along the middle reaches of Hughes Creek. Since 2000, 4.5% of the HUC has been burned by moderate or high severity fire; ECA is 5%

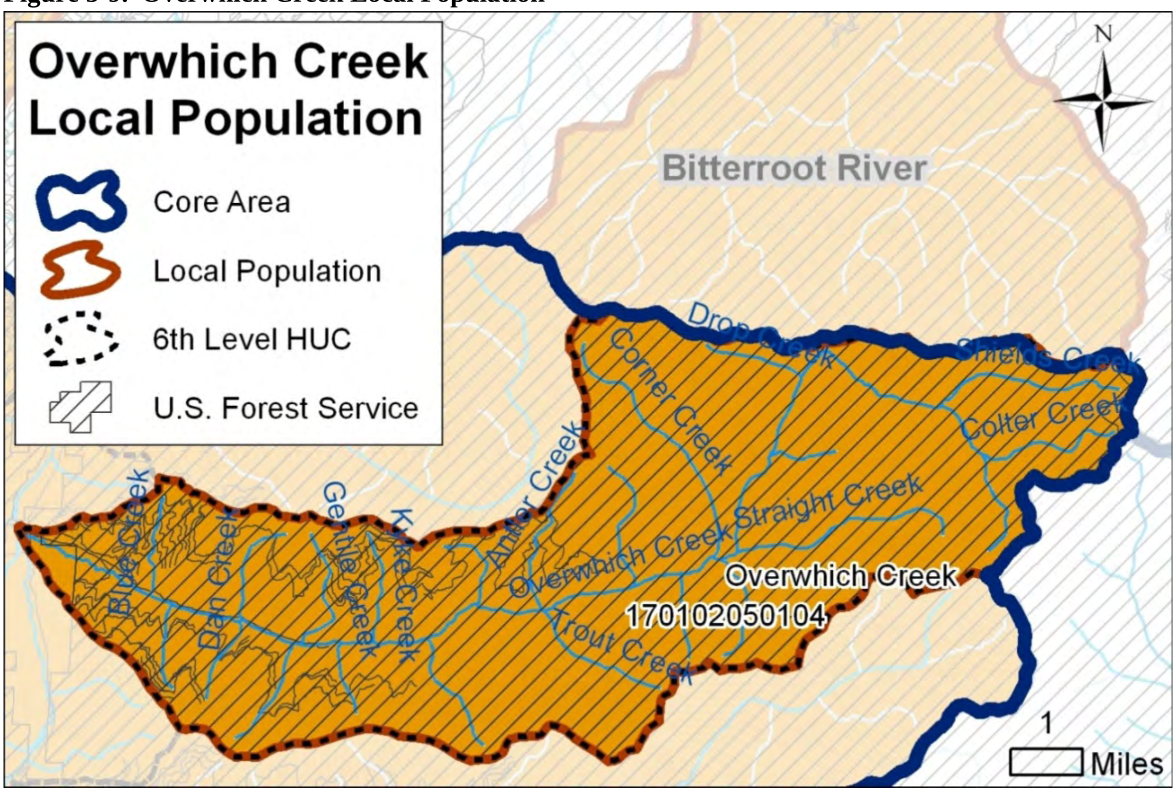
Barriers: GIS rating = FA, data and professional judgment rating = FAR. Most of the suitable bull trout habitat in the HUC is connected and accessible, but there are three small tributaries to Hughes Creek (Taylor Creek, Malloy Gulch, Mill Gulch) that have culvert barriers under the Hughes Creek road (i.e. the main arterial road in the HUC). The culvert barriers on Malloy and Mill Gulches affect very low numbers of juvenile bull trout and contain minimal suitable habitat upstream of the barriers. The culvert barrier on Taylor Creek is only affecting westslope cutthroat trout at this time, but it is a larger stream with about a mile of potential suitable habitat above its barrier. NEPA has been completed (2001 Burned Area Restoration FEIS), but the replacements have been postponed due to the high expenses and logistical difficulties associated with replacing culverts on a busy county road that accesses numerous private residences. Collectively, the three culvert replacements would open up about 1.25 miles of small stream habitat that could potentially support low numbers of juvenile bull trout. The net benefits would be small and the costs would be high.

Pools: GIS rating = FAR, data and professional judgment rating = FAR. On Forest Service lands, habitat surveys indicate that pools are common and of good quality with a rating of FA. However, due to the extent of private lands that have been damaged by past mining, the HUC rating should be FAR. Restoration projects should focus on purchasing and reclaiming the private mining claims in the middle reaches of Hughes Creek. This would concurrently benefit temperature, pools, and sediment.

Sediment: GIS rating = FUR, data and professional judgment rating = FAR. Montana DEQ has established a sediment TMDL for Hughes Creek. The TMDL is a 3% reduction in total load. The water quality goals for C4 reaches are 14-32% fines < 2 mm, 17-49% fines < 6 mm, 3-47 mm D50, and clinger richness > 14. For B4 reaches, the goals are 11-27% fines < 2 mm, 16-38% fines < 6 mm, 7-64 mm D50, and clinger richness > 14. Forest Service reaches are meeting most of these goals. Conditions are worse on private reaches, particularly those where mining has occurred. The main sources of anthropogenic sediment in the HUC are mining and roads. Restoration projects should focus on purchasing and reclaiming reaches damaged by mining, reducing road mileage in RHCAs, and reducing the number of road stream crossings.

Local Population: Overwhich Creek

Figure 5-9. Overwhich Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 5-4. Overwhich Creek Local Population Summary

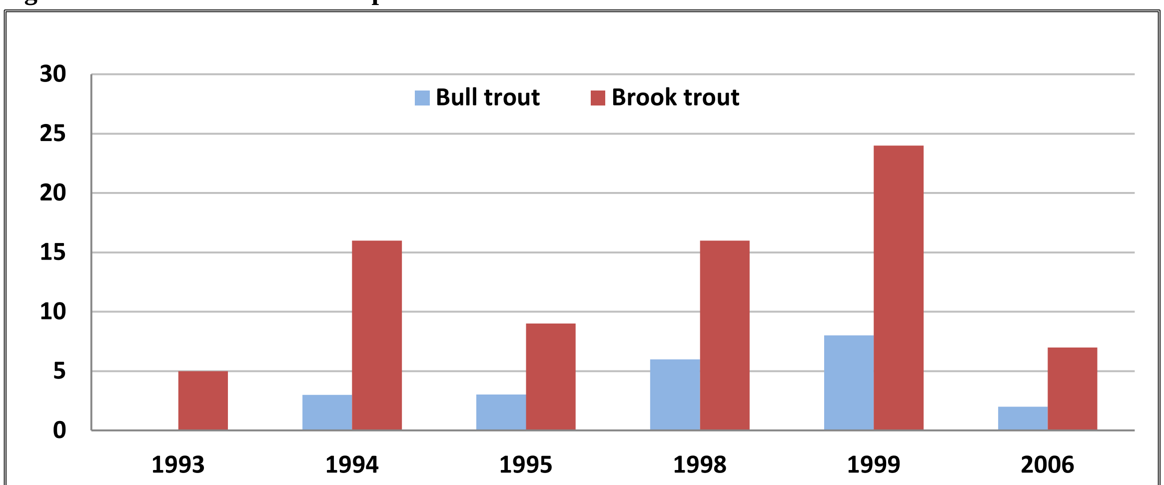
# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
250-500 (residents) 0-50 (migratory)	Unknown/ Stable	Resident dominant, Migratory present but few in number. Connected.	None, but suitable habitat is present	Brook (common in lower 4 miles of Overwhich Creek) Threat = High Hybrids present
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Moderate significance – connected to the West Fork and neighboring bull trout populations in its larger tributaries		High vulnerability due to fire, natural solar exposure, and overlap with brook trout		

Driving Factors Determining Bull Trout Population:

The majority of the Overwhich Creek HUC is unroaded or lightly roaded with good habitat conditions. Brook trout are the primary limiting factor for the local population, particularly in the lower four miles of Overwhich Creek. Hybrids are present where overlap with brook trout occurs. Brook trout are more of a threat to the local population than habitat quality. The RHCA segment of Road 5703 is responsible for some shade losses along the lower four miles of Overwhich Creek. Restoration projects should focus on coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area and relocating Road 5703 out of the Overwhich Creek RHCA. If brook trout were eradicated, habitat quality would likely have minimal impacts on the local population.

Confidence in your assessment (H,M,L): M (little is known about use by migratory bull trout; a few probably spawn in the HUC, but we have no good feel for numbers)

Figure 5-10. Number of trout captured in Overwhich Creek



Number of bull trout and brook trout captured in 1000 feet of Overwhich Creek at river mile 2.0 (downstream end of HUC 0104).

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Overwhich Creek – 170102050104							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive							
% Forest Service Ownership in HUC: 99.9% (21 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	1	$300,000 *	M	L
Barriers	FAR	FA	-	-	$0	-	-
Pools	FUR	FA	10 years	1	*	M	L
Sediment	FUR	FA	10 years	1	*	M	L

* = the 300k is for decommissioning the three miles of Road 5703 upstream of the Road 5706 junction, and converting it to ATV trail. This segment of road is located in the Overwhich Creek RHCA, and its close proximity to the stream is responsible for localized reductions in the riparian overstory. This action would concurrently benefit temperature, barriers, pools, and sediment.

Temperature: GIS rating = FAR, data and professional judgment rating = FAR. Montana DEQ has established a thermal TMDL for Overwhich Creek. The TMDL is a 46% reduction in thermal loading from known anthropogenic sources. The water quality goal is a mean-maximum temperature < 15° C at river mile 2.0, a mean-maximum < 12° C at river mile 7.0, and 45% effective shade. The temperature goals are usually exceeded (15-18° C) in all but the coolest of summers. The effective shade goal is not being met. ECA is 18%; fire accounts for nearly all of that (18% of the HUC has been burned by moderate and high severity fire in the past decade). Fire is the main cause of shade losses; a secondary and more localized cause is the encroached location of Road 5703 which affects about three miles of the Overwhich Creek RHCA. Overwhich Creek also has relatively high natural solar exposure as a result of low gradient reaches. These factors make it difficult to achieve the temperature goals in the present climate. Restoration projects should focus on decommissioning Road 5703 upstream of the Road 5706 junction, converting it to ATV trail, and restoring as much of the conifer overstory as possible.

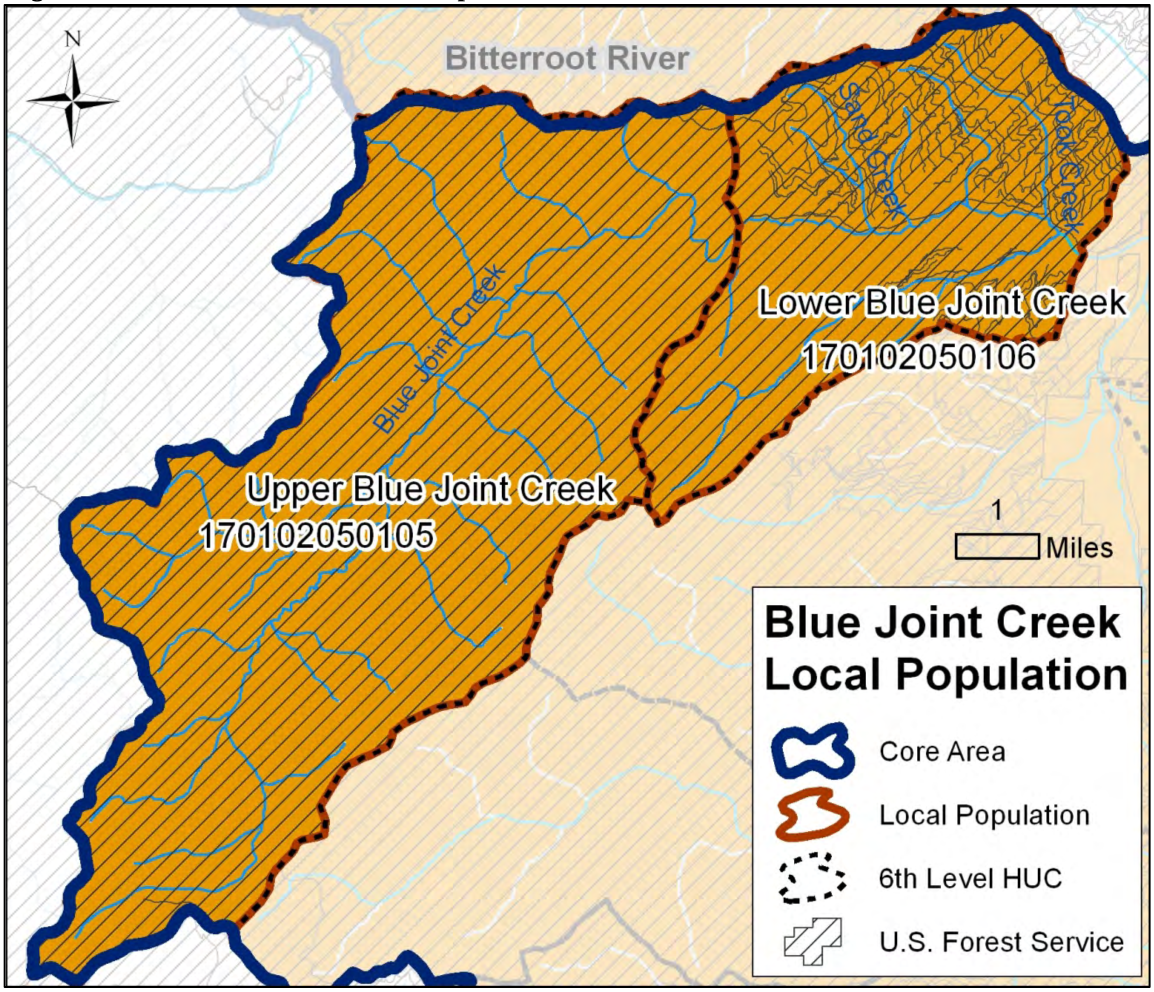
Barriers: GIS rating = FAR, data and professional judgment rating = FA. There is only one man-made fish barrier in the HUC, and it is located on a tiny stream (Gentile Creek, Road 5703) that does not contain suitable bull trout habitat. As a result, the entire suitable bull trout habitat in the HUC is connected and accessible. Overwhich Falls, a natural barrier in the headwaters, blocks the upstream distribution of bull trout.

Pools: GIS rating = FUR, data and professional judgment rating = FA. Pool frequency and quality is believed to be near its natural potential. Habitat surveys indicate that pools are common throughout Overwhich Creek and its tributaries, and pool quality is good. Large wood is common and recruitment of fire-killed snags is high in the upper half of the Overwhich Creek. Roads do not appear to be degrading pool frequency and quality to a significant degree. Restoration projects should focus on decommissioning Road 5703 upstream of the Road 5706 junction, converting it to ATV trail, and restoring as much of the conifer overstory as possible. However, that project would provide more benefits to shade and temperature than pools.

Sediment: GIS rating = FUR, data and professional judgment rating = FA. Habitat surveys indicate that surface fines < 2 mm are typically < 12% in Overwhich Creek. Most of the sediment production in the HUC is believed to come from natural sources. As such, there is limited potential to reduce anthropogenic sediment inputs. Restoration projects should focus on decommissioning Road 5703 upstream of the Road 5706 junction, converting it to ATV trail, and reducing the number of road stream crossings on the upland roads.

Local Population: Blue Joint Creek

Figure 5-11. Blue Joint Creek Local Population



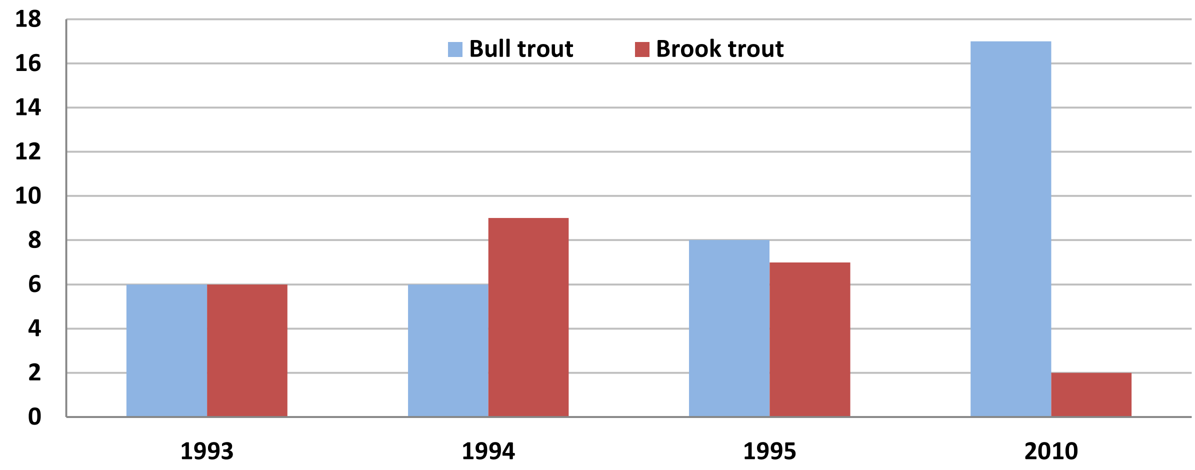
Relative Importance of Population to Core Area (H,M,L): H

Table 5-5. Upper Blue Joint Creek Population Summary

Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
500-1000 (residents) 0-50 (migratory)	Unknown/ Stable	Resident dominant, Migratory present but few in number. Connected.	None, but suitable habitat is present	Brook (incidental in lower 2 miles of Blue Joint Creek) Threat = Moderate Hybrids present

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High significance – flows into Painted Rocks Reservoir; probably one of the major spawning tributaries for migratory bull trout in the reservoir	Moderate vulnerability due to non-natives; overlap with brook trout in the lower two miles of Blue Joint Creek	Pristine habitat throughout HUC; mostly a native fishery

Figure 5-12. Number of trout captured in Upper Blue Joint Creek



Number of bull trout and brook trout captured in 1000 feet of Blue Joint Creek at river mile 5.9 (downstream end of HUC 0105).

Driving Factors Determining Bull Trout Population:

The Upper Blue Joint HUC is a large roadless drainage with habitat in reference condition. Brook trout overlap with bull trout in the lower two miles of Blue Joint Creek, and are probably the limiting factor for the local population. Hybrids are present where overlap occurs. Restoration projects should focus on coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area, which is the only type of restoration needed. Other than brook trout, the local population and its habitat are controlled by natural processes; man has minimal influence.

Confidence in your assessment (H,M,L): M (little is known about use by migratory bull trout; a few probably spawn in the HUC, but we have no good feel for numbers)

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Blue Joint Creek – 170102050105							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100% (0 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: GIS rating = FA, data and professional judgment rating = FA. The temperature regime is controlled by natural processes. During "average" climatic summers, mean-maximum temperatures in Blue Joint Creek near the bottom of the HUC typically range between 14-16° C. During hot summers, mean-maximum temperatures have ranged between 17-18° C. This indicates that Blue Joint Creek is vulnerable to climatic warming. The HUC is unburned; ECA is 0%.

Barriers: GIS rating = FA, data and professional judgment rating = FA. No man-made barriers are present.

Pools: GIS rating = FA, data and professional judgment rating = FA. Pool habitat is controlled by natural processes. Habitat surveys indicate that pools are common throughout the HUC and pool quality is good. Most pools are formed by large wood, which is common.

Sediment: GIS rating = FA, data and professional judgment rating = FA. The sediment regime is controlled by natural processes; hiking trails have negligible influence. A granitic watershed which makes it somewhat sandy, but levels are natural and controlled by natural processes.

Table 5-6. Lower Blue Joint Creek Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250 (resident) 0-50 (migratory)	Unknown/ Stable	Resident dominant, Migratory present but few in numbers. Connected.	None, primarily migratory corridor; limited spawning may occur in Blue Joint & Little Blue Joint	Brook (100% overlap in Blue Joint Creek, also considerable overlap in Little Blue Joint Creek) Threat = High Hybrids present
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High significance – flows into Painted Rocks Reservoir; important migratory corridor that connects good spawning and rearing habitat in HUC with Painted Rocks Reservoir		High vulnerability due to extensive solar exposure resulting from 2000 fires and overlap with brook trout.		Blue Joint Creek portion of HUC is an important migratory corridor; limited amount of spawning and rearing habitat in Blue Joint and Little Blue Joint Creeks

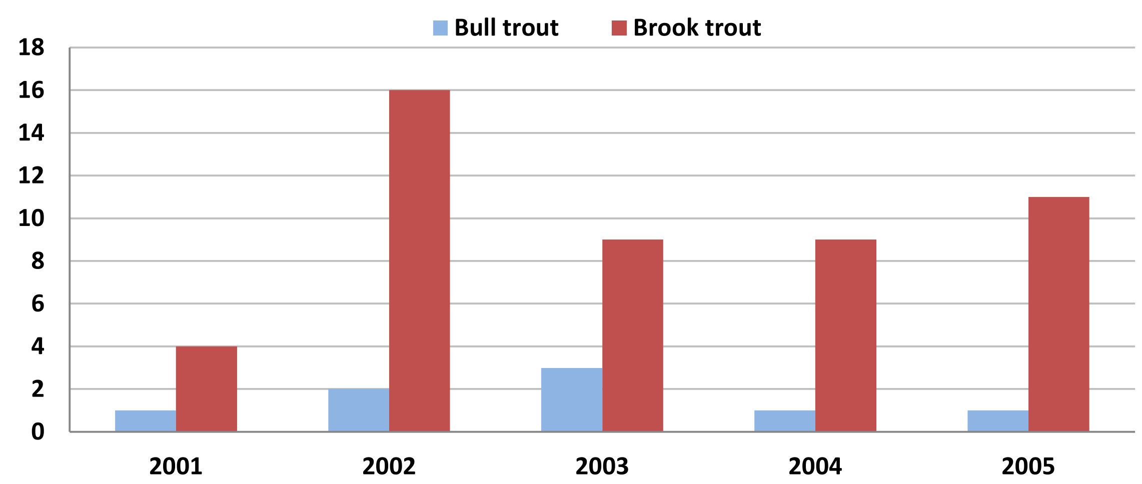
Relative Importance of Population to Core Area (H,M,L): L

Driving Factors Determining Bull Trout Population:

Brook trout are the primary limiting factor for the local population; a secondary limiting factor is fire-caused water temperature increases. Overlap with brook trout affects 100% of the HUC 0106 portion of Blue Joint Creek and at least 50% of Little Blue Joint Creek, which are the only streams currently occupied by bull trout in the HUC. Hybrids are present where overlap occurs. The tributaries (Took, Magpie, Sand, and Fork Creeks) are generally too small to support appreciable numbers of bull trout. Brook trout are incidental in the extreme lower ends of the tributaries. Shade losses resulting from the 2000 fires have substantially increased the solar exposure of Blue Joint and Little Blue Joint creeks, and fire-related temperature increases are believed to impact the local population more than roads and sediment. Road density is high (4.8 miles/mile^2) and so is the number of road crossings on perennial streams (19), but sediment is more of a limiting factor for westslope cutthroat trout habitat in the tributaries than it is for bull trout habitat in Blue Joint and

Little Blue Joint creeks. Restoration projects should focus on coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area, reducing road densities and the number of road stream crossings in the tributary drainages, and minimizing impacts from dispersed camping along Blue Joint Creek. Opportunities to relocate arterial road segments (Roads 362 along Blue Joint Creek and Road 5656 along Little Blue Joint Creek) out of RHCAs are very limited due to topography and high cost. Any opportunity that presents itself should be pursued.

Figure 5-13. Number of Trout captured in Lower Little Blue Joint Creek



Number of bull trout and brook trout captured in 1000 feet of Little Blue Joint Creek at river mile 1.4.

Confidence in your assessment (H,M,L): M (little is known about use by migratory bull trout; a few probably use Blue Joint Creek as a migratory corridor, but we have no good feel for numbers nor know of any spawning areas)

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Blue Joint Creek - 170102050106

Strategy (Active Restoration, Passive Restoration, Conserve): Passive

% Forest Service Ownership in HUC: 100% (0 acres of private)

Relative Contribution of Habitat in Limiting Local Population: High

Functional Significance to Local Pop: Moderate

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Restoration Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FUR	FAR	50 years	1	$300,000*	M	L
Barriers	FAR	FA	-	-	$0	-	-
Pools	FAR	FA	50 years	1	*	L	L
Sediment	FUR	FAR	50 years	1	*	L	L

* = the 300k is for reducing road segments in RHCAs and eliminating road stream crossings on the upland roads that cross the Blue Joint tributaries. This action would benefit sediment and pool quality in the tributaries.

Temperature: GIS rating = FUR, data and professional judgment rating = FUR. The main impact is the loss of overstory shade on Blue Joint and Little Blue Joint Creeks resulting from the 2000 fires. 33% of the HUC has been burned by moderate and high severity fire over the past decade; a considerable length of RHCA was severely burned. ECA is 34%. Restoration projects are limited but should focus on reducing roads in RHCAs, reducing the number of road stream crossings, and minimizing shade losses resulting from dispersed camping and firewood cutting in the Blue Joint Creek RHCA.

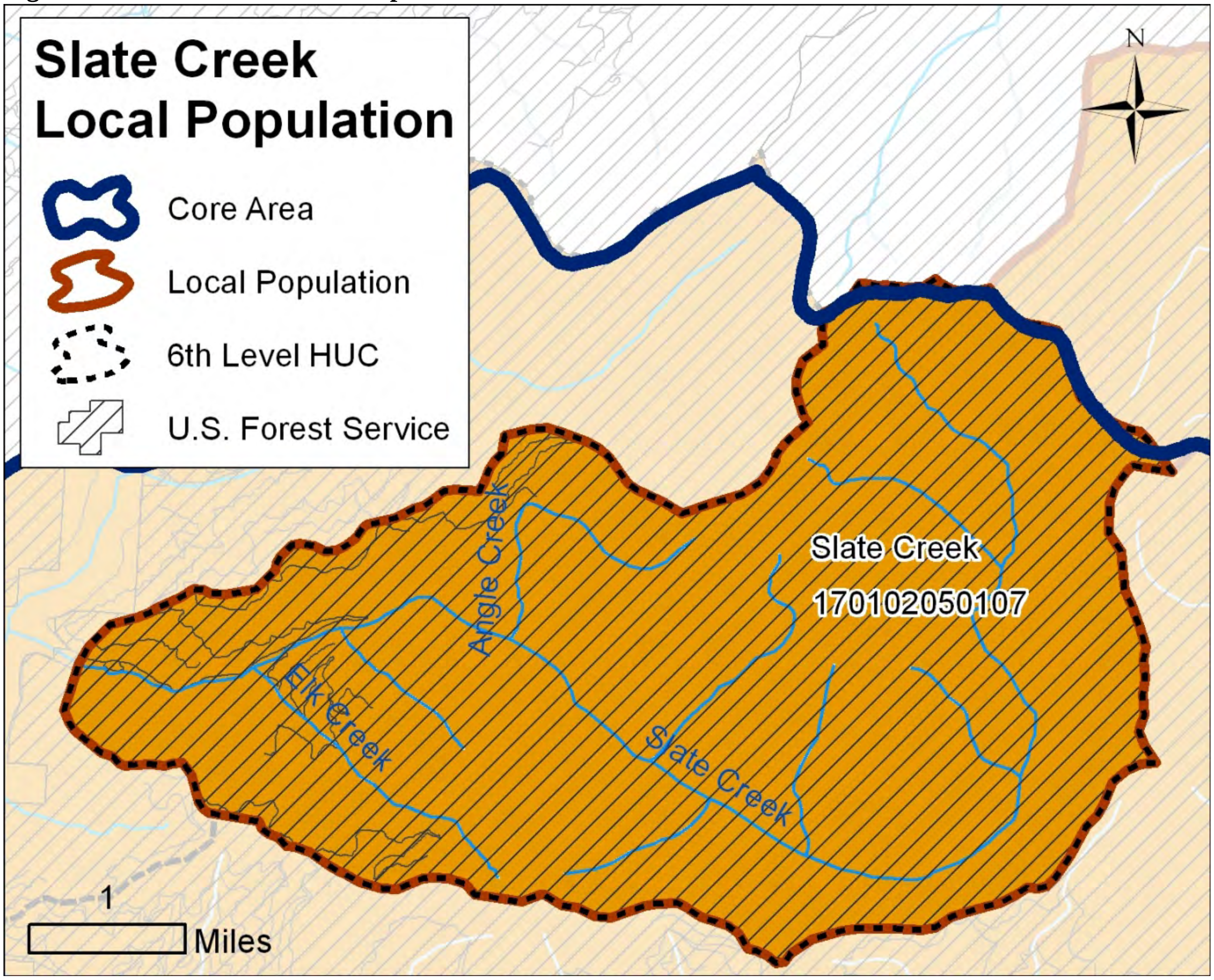
Barriers: GIS rating = FAR, data and professional judgment rating = FA. All of the culvert barriers affect bull trout were replaced with fish passable structures following the 2000 fires. There are still a couple of fish barrier culverts on small tributaries to Blue Joint Creek, but they do not affect bull trout. To the best of our knowledge, the entire suitable bull trout habitat in the HUC is accessible and connected.

Pools: GIS rating = FAR, data and professional judgment rating = FA. In the streams that contain bull trout (Blue Joint and Little Blue Joint Creeks), habitat surveys indicate that pools are common and quality is good. Large wood is abundant and the recruitment of fire-killed snags is high. Roads impact pool quality in the small tributaries to Blue Joint Creek (Took, Magpie, and Sand Creeks), but these streams do not contain bull trout and their sediment contributions to downstream bull trout habitat in Blue Joint Creek do not visibly lower pool quality. Since the 2000 fires, some illegal firewood cutting has occurred in the Blue Joint Creek RHCA, particularly near dispersed camping areas. On the reach and watershed scales, this cutting has had an insignificant effect on pools because of abundant recruitment of fire-killed snags. Restoration projects should focus on reducing roads in RHCAs and reducing the number of road stream crossings.

Sediment: GIS rating = FUR, data and professional judgment rating = FAR. In the streams that contain bull trout (Blue Joint and Little Blue Joint Creeks), habitat surveys indicate that sediment levels are not excessively high (12-20% fines < 2 mm). Roads are responsible for elevated sediment levels that occur in the small tributaries to Blue Joint Creek (Took, Magpie, and Sand Creeks). Restoration projects should focus on reducing roads in RHCAs and reducing the number of road stream crossings.

Local Population: Slate Creek

Figure 5-14. Slate Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 5-7. Slate Creek Local Population Summary

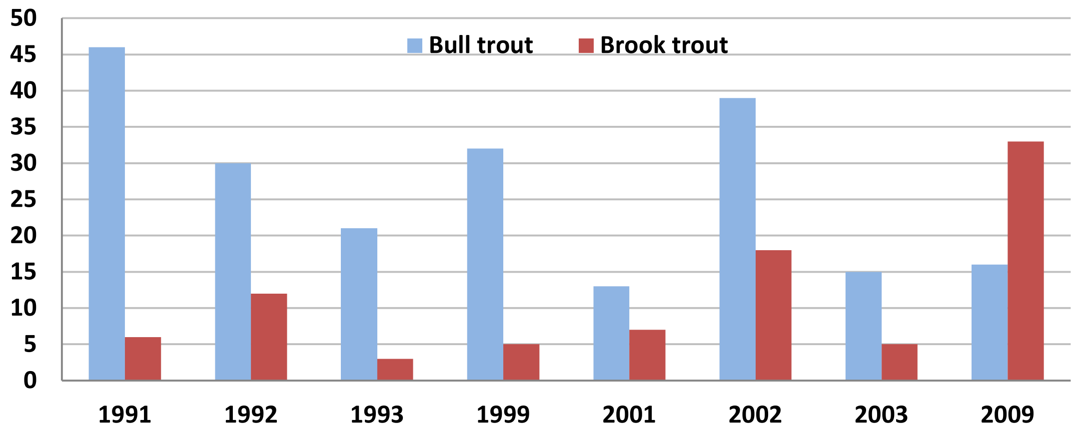
# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
250-500 (residents) 0-50 (migratory)	Unknown/ Stable	Resident dominant, Migratory present but few in number. Connected.	None, but suitable habitat is present	Brook (lower 3 miles of Slate Creek). Threat = High Hybrids present
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High significance – flows into Painted Rocks Reservoir; probably one of the major spawning tributaries for migratory bull trout in the reservoir		High vulnerability due to fire and overlap with brook trout in the lower three miles of Slate Creek		Slate Creek may have the largest migratory spawning run of any of the streams in the West Fork Bitterroot River core area. In July and August 2002, 37 migratory bull trout spawners 12-17" TL were captured in a weir while moving upstream to presumably spawn.

Driving Factors Determining Bull Trout Population:

The majority of the Slate Creek HUC is unroaded or lightly roaded with good habitat conditions. Brook trout are the primary limiting factor for the local population. Population monitoring at river mile 1.6 suggests that bull trout have declined and brook trout have increased in recent years. Hybrids are present and have increased over the past two decades. The RHCA segment of Road 1133 limits habitat quality (sediment and temperature) in the lower three miles of Slate Creek (i.e. where the overlap of bull trout and brook trout primarily occurs). Restoration projects should focus on coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area and relocating Road 1133 out of the Slate Creek RHCA. If brook trout were eradicated, habitat quality would likely have minimal impacts on the local population

Confidence in your assessment (H,M,L): M (little is known about bull trout use in the unroaded reaches in the upper half of Slate Creek)

Figure 5-15. Number of trout captured in Slate Creek



Number of bull trout and brook trout captured in 800 feet of Slate Creek at river mile 1.6 (downstream end of HUC 0107).

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Slate Creek - 170102050107

Strategy (Active Restoration, Passive Restoration, Conserve): Passive

% Forest Service Ownership in HUC: 100% (0 acres of private)

Relative Contribution of Habitat in Limiting Local Population: Low

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Restoration Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FUR	FAR	80 years	1	$1,000,000*	L	L
Barriers	FA	FA	-	-	$0	-	-
Pools	FUR	FA	80 years	1	*	L	L
Sediment	FUR	FAR	80 years	1	*	L	L

* = the 1000k is for relocating Road 1133 out of the Slate Creek RHCA. The feasibility of relocation is questionable due to steep terrain. If it can be done, it would benefit temperature, pools, and sediment over the long-term.

Temperature: GIS rating = FUR, data and professional judgment rating = FAR. During "average" climatic summers, mean-maximum temperatures near the mouth of Slate Creek typically range between 13 and 15° C. Temperatures do not appear to be significantly impaired. 38% of the HUC has been burned by moderate and high severity fire over the past decade, and this has increased risks from climate change. Fire has removed much of the overstory vegetation in the upper 2/3rds of the HUC. Non-fire ECA is low (4%). Fire is the main cause of shade losses; a secondary and more localized cause is the encroached location of Road 1133 which affects some scattered spots along the lower three miles of Slate Creek. Compared to the effects of fire, Road 1133 has a negligible impact on temperature. Restoration projects are limited and should focus on relocating Road 1133 out of the Slate Creek RHCA, if feasible.

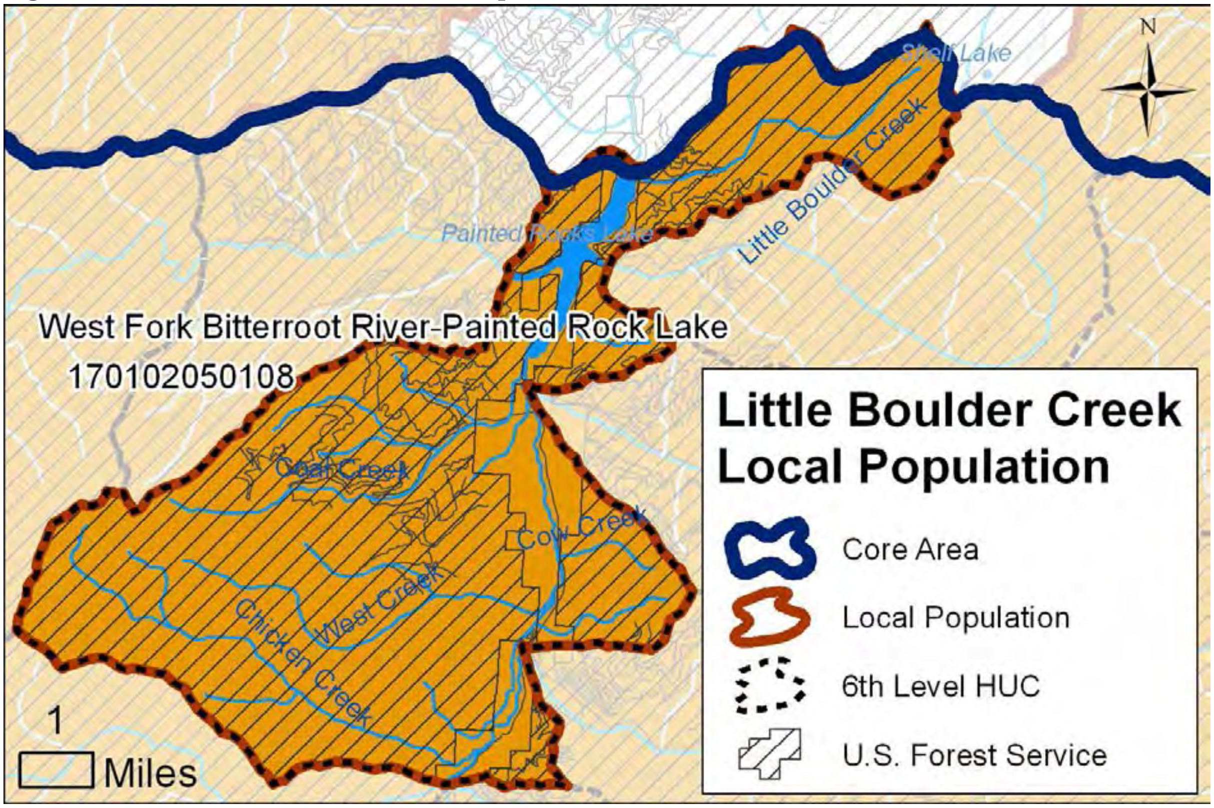
Barriers: GIS rating = FA, data and professional judgment rating = FA. There are no man-made barriers in the HUC. The entire suitable bull trout habitat is connected and accessible.

Pools: GIS rating = FUR, data and professional judgment rating = FA. Pool frequency and quality is believed to be near its natural potential. Habitat surveys indicate that pools are common in Slate Creek and pool quality is good. Large wood is common and recruitment of fire-killed snags is high in the upper 2/3rds of Slate Creek. Roads do not appear to be degrading pool frequency and quality to a significant degree. Restoration projects are limited and should focus on relocating Road 1133 out of the Slate Creek RHCA. However, that project would provide more benefits to shade and temperature than pools. There are no reaches where direct intervention in the form of man-made woody debris additions is needed.

Sediment: GIS rating = FUR, data and professional judgment rating = FAR. Habitat surveys indicate 12% surface fines < 2 mm and 15% surface fines < 6 mm in Slate Creek. These levels are similar to those found in reference streams. Most of the sediment production in the HUC is believed to come from natural sources. As such, there is limited potential to reduce anthropogenic sediment inputs. Restoration projects should focus on relocating Road 1133 out of the Slate Creek RHCA. If that proves to be infeasible, then the RHCA segments should be graveled and BMP upgraded.

Local Population: Little Boulder Creek

Figure 5-16. Little Boulder Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 5-8. Little Boulder Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
0-250 (residents) 0-50 (migratory)	Unknown/ Stable	Resident dominant, Migratory present but few in number. At least partially connected to Painted Rocks Reservoir	None, but suitable habitat is present	Brook trout have not been detected in Little Boulder Creek, but they are present in the lower reaches of the other fish-bearing tributaries to Painted Rocks Reservoir (Slate and Blue Joint Creeks). Threat = Moderate

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High significance – flows into Painted Rocks Reservoir; one of three spawning tributaries for migratory bull trout in the reservoir; has relatively high density of rearing juveniles	High vulnerability due to widespread high/moderate severity fire in its headwaters in 2007 (Rombo Fire) and the presence of brook trout populations in the lower reaches of nearby tributaries to Painted Rocks Reservoir (Slate and Blue Joint Creeks)	Little Boulder Creek has relatively high numbers of rearing juveniles, no brook trout that we know of, and is still used by a few migratory adults

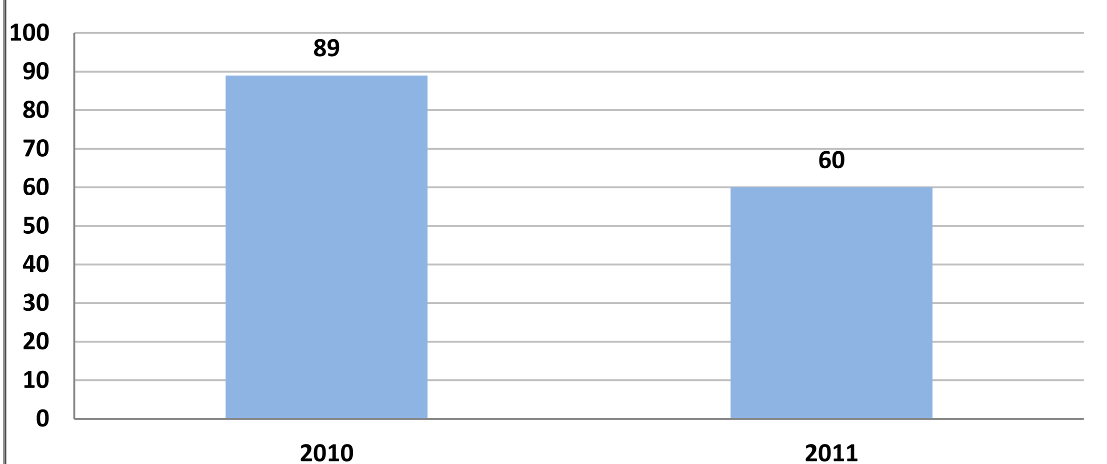
Driving Factors Determining Bull Trout Population:

HUC 0108 consists of Painted Rocks Reservoir, the segment of the West Fork Bitterroot River between the reservoir and Deer Creek, and the fish-bearing tributaries of Little Boulder Creek, Coal

Creek, West Creek, and Chicken Creek. Little Boulder Creek is the tributary that contains the strongest bull trout population in HUC 0108. The lower two miles of Little Boulder Creek contains suitable spawning and rearing habitat for bull trout. Above that point, habitat becomes unsuitable due to naturally high gradients. The lower third of the Little Boulder Creek watershed is moderately roaded, while the upper two-thirds is roadless and undeveloped. Much of the upper portion of the watershed was burned at high/moderate severity in the 2007 Rombo Fire. The fire occurred upstream of occupied fish habitat. Bull trout habitat is in reference condition upstream of the Road 1130 crossing (at stream milepost 1.4), but downstream of the crossing, habitat becomes impaired by high sediment deposition near the West Fork Highway crossing. The culvert under the highway is undersized and when the reservoir is at full pool, water backs up through the culvert and causes the temporary formation of a large pond on the upstream side of the highway fill. This pond functions as a large sediment trap. As reservoir levels decrease throughout summer, the temporary pond is gradually dewatered, leaving behind several feet of soft and unstable sandy substrates. The primary limiting factor for the Little Boulder local population is culvert barriers. There are only two culverts on Little Boulder Creek (West Fork Highway and Forest Road 1130), but both impede bull trout movement to varying degrees. The West Fork Highway culvert is located at the mouth of Little Boulder Creek right before the stream flows into Painted Rocks Reservoir. This culvert is long and undersized, but it has been baffled and the baffles are retaining substrate. The culvert is also completely backwatered between late May and late July A few adult migratory bull trout from Painted Rocks Reservoir have been captured upstream of the highway culvert, so we know the highway culvert is not a complete barrier. Our best guess is that the highway culvert functions as a partial barrier. The recommended restoration action is to replace the undersized highway culvert with an open-bottomed arch or a much larger culvert that maintains stream simulation conditions. Such a structure was installed on the highway crossing of nearby Slate Creek in 2003. The culvert at Forest Road 1130 is probably more of a barrier than the highway culvert, but it is going to be replaced with a stream simulation open-bottomed arch in summer, 2013.

Confidence in your assessment (H,M,L): H (resent survey data coverage is good)

Figure 5-17. Estimated number of bull trout >4 inches in 1000 feet of Little Boulder Creek at river mile 1.4 (lower third of HUC 0108)



Estimated number of bull trout > 4 inches in 1000 feet of Little Boulder Creek at river mile 1.4 (lower third of HUC 0108).

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Fork Bitterroot River-Painted Rocks Lake - 170102050108							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive							
% Forest Service Ownership in HUC: 88% (entire HUC); 100% (Little Boulder Creek watershed only)							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	80 years	3	$800,000*	L	L
Barriers	FUR	FA	20 years	1	$930,000**	H	H
Pools	FUR	FAR	80 years	3	*	L	L
Sediment	FUR	FAR	20 years	2	*	M	H

* = the 800k is for replacing the West Fork Highway culvert on Little Boulder Creek with a stream simulation structure.

** = the 930k includes 800k for replacing the West Fork Highway culvert and 130k for replacing the Forest Road 1130 culvert on Little Boulder Creek

Temperature: GIS rating = FUR for the entirety of HUC 0108, data and professional judgment rating for the Little Boulder Creek watershed portion of the HUC is FA. During “average” climatic summers, mean-maximum temperatures near the mouth of Little Boulder Creek typically range between 13 and 15° C. These temperatures are believed to be controlled largely by natural processes. Roads do not appear to have much influence on water temperatures. Temperatures in lower Little Boulder Creek have warmed by an estimated 1-2° C since the 2007 Rombo Fire. Restoration projects for temperature are custodial in nature and should focus on maintaining as much of the riparian overstory as possible in the Forest Road 1130 corridor.

Barriers: GIS rating = FUR for the entirety of HUC 0108, data and professional judgment rating for the Little Boulder Creek watershed portion of the HUC is FUR. There are only two culverts on Little Boulder Creek (West Fork Highway and Forest Road 1130), but both impede bull trout movement. The West Fork Highway culvert is located at the mouth of Little Boulder Creek right before the stream flows into Painted Rocks Reservoir. The highway culvert probably functions as a partial barrier. The recommended restoration action is to replace the undersized highway culvert with an open-bottomed arch or a much larger culvert that maintains stream simulation conditions. Such a structure was installed on the highway crossing of nearby Slate Creek in 2003. The culvert at Forest Road 1130 is probably more of a barrier than the highway culvert, but it is going to be replaced with a stream simulation open-bottomed arch in summer, 2013.

Pools: GIS rating = FUR for the entirety of HUC 0108, data and professional judgment rating for the Little Boulder Creek watershed portion of the HUC is FA. Pool frequency and quality is believed to be at or near its natural potential throughout the majority of Little Boulder Creek. The exception is the first several hundred feet of stream directly upstream of the West Fork Highway culvert that gets seasonally backwatered by the reservoir and filled in with sediment deposition. Pools in Little Boulder Creek are formed by large wood and boulders. There are no reaches where direct intervention/habitat manipulation is needed.

Sediment: GIS rating = FUR for the entirety of HUC 0108, data and professional judgment rating for the Little Boulder Creek watershed portion of the HUC is FAR. Sediment is believed to be at or near its natural potential throughout the majority of Little Boulder Creek. The 2007 Rombo Fire increased the sediment load of Little Boulder Creek, but that is a natural response that is currently declining. The exception is the first several hundred feet of stream directly upstream of the West Fork Highway culvert – that portion of Little Boulder Creek is seasonally backwatered by the reservoir and is heavily impacted by sediment deposition. The primary restoration action is to replace the highway culvert with a larger stream simulation structure that reduces or eliminates backwatering. A secondary restoration action would be to gravel and BMP upgrade the entire Road 1130 segment between the West Fork Highway and the Forest Road 1130 crossing – a distance of slightly more than a mile. Some of that segment was graveled in 2011.

West Fork Bitterroot River Core Area Summary:

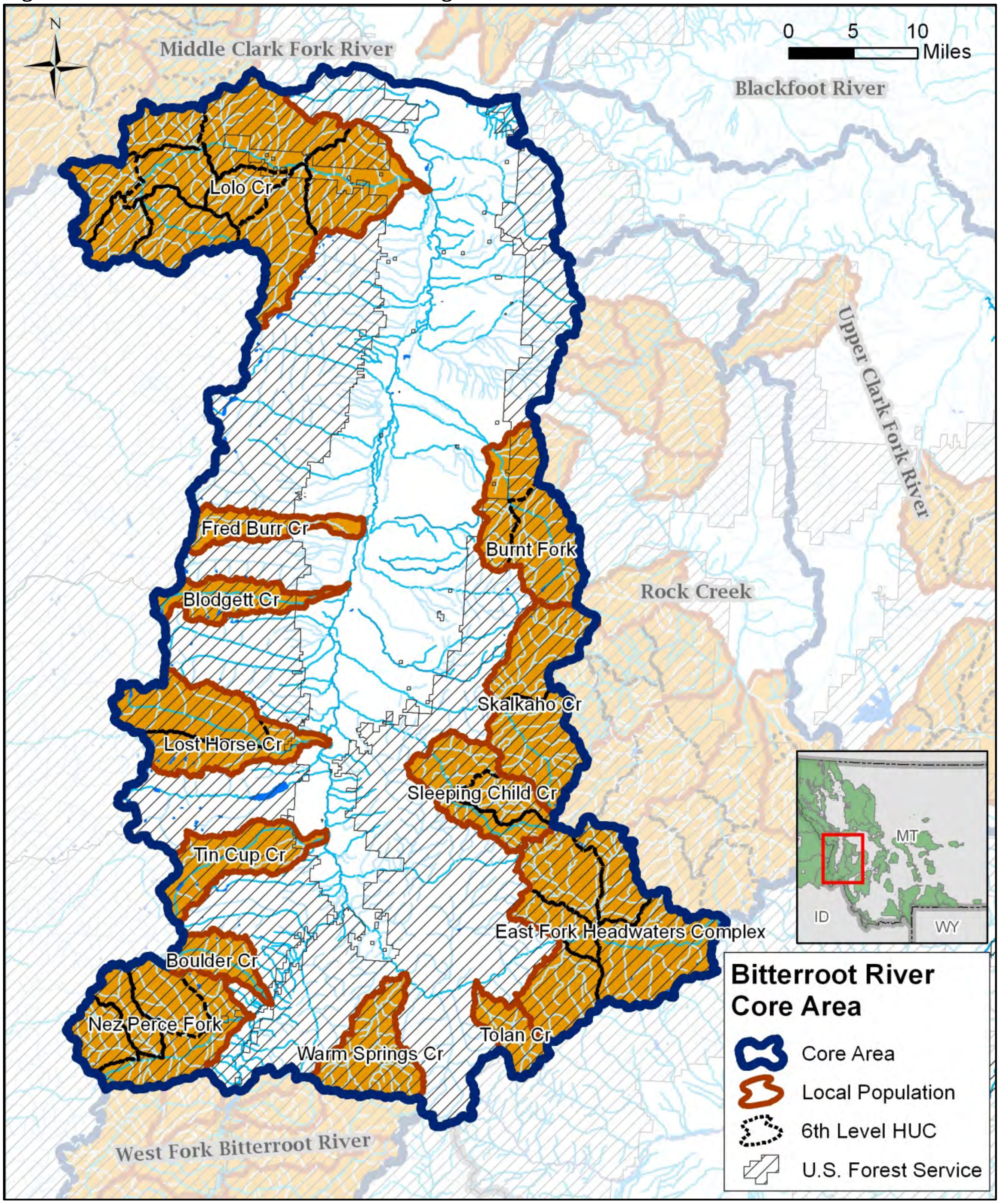
Table 5-9 summarizes relevant information from each of the 6th level HUCs within the local populations. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire West Fork Bitterroot River Core Area within the borders of the Bitterroot National Forest. It does not include necessary restoration activities in watersheds where the BNF has no ownership that may be critical for overall restoration of the bull trout population in the Core Area.

Table 5-9. Summary of important local population attributes and conservation recommendations for the West Fork Bitterroot River Core Area.

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
West Fork Bitterroot River (upper)	West Fork Bitterroot River – Beaver Cr	High	Moderate	Active	Barriers	30 years	$500,000
Deer Creek	Deer Cr	High	Low	Conserve	-	-	-
Hughes Creek	Hughes Cr	Moderate	Moderate	Passive	-	-	-
Overwhich Creek	Overwhich Cr	Moderate	Low	Passive	-	-	-
Blue Joint Creek	Upper Blue Joint Cr	High	Low	Conserve	-	-	-
	Lower Blue Joint Cr	Moderate	High	Passive	-	-	-
Slate Creek	Slate Cr	High	Low	Passive	-	-	-
Little Boulder Creek	West Fork Bitterroot River – Painted Rocks Lake	High	Low	Passive	Barriers	20 years	$930,000

Chapter 6: Bitterroot River

Figure 6-1. Bitterroot River and Surrounding Core Area



Core Area Discussion:

The Bitterroot River Core Area (BRCA) includes all of the Bitterroot River drainage and all tributaries, excluding the separate West Fork Bitterroot Core Area upstream of Painted Rocks Dam. Painted

Rocks Dam, completed in 1940, isolates the West Fork Bitterroot River drainage from its former connectivity with the Bitterroot River, eliminating about one-third of the natural spawning and rearing habitat for the BRCA. The BRCA bull trout population probably originated historically as adfluvial spawning fish from Lake Pend Oreille in northern Idaho. Following construction of Thompson Falls Dam in 1916, bull trout stocks in the Bitterroot River effectively became either fluvial or resident.

Currently, there are believed to be approximately 200 adult fluvial bull trout in the Bitterroot River system. Most bull trout observed through standard electrofishing and snorkeling surveys in tributaries are assumed to have a resident life history form. Bull trout observations in the mainstem Bitterroot River are infrequent. However, there is a high degree of uncertainty regarding the distinction between resident and fluvial stocks because it has been difficult to distinguish between redds of fluvial and resident fish. The belief that most bull trout have the resident life history form is based on the warm water temperatures and dewatering that occurs in much of the mainstem Bitterroot River as well as the lower reaches of many tributaries. These areas are seasonally unsuitable for bull trout.

The Bitterroot River Core Area is an example of a watershed where systematic decline of the migratory life history form of bull trout has resulted in isolated and fragmented populations of resident fish. Nelson et al. (2002) used extensive trapping of migrating fish in three drainages (Sweathouse, Skalkaho, and Sleeping Child Creeks) of the Bitterroot River watershed to evaluate the persistence of migratory bull trout life history forms. They observed that by 1996-1997, the migratory form (which was historically much more common) was now rare or absent in Sweathouse and Skalkaho Creeks, but still present at a low level in Sleeping Child Creek. They determined that in the drainages they studied there were no physical barriers to migratory fish, indicating that other downstream mortality factors such as predation or temperature played a bigger role in the extirpation of those stocks. Nelson et al. (2002) suggested that the isolated, non-migratory remnants of the population were at increased risk of extinction, and that restoration of the migratory form was an important conservation goal.

Brassfield et al. (2006) provides detailed updated survey information for eight west side canyon tributary streams, six of which contained bull trout (Blodgett, Roaring Lion, Lost Horse, Chaffin, Trapper, and Boulder Creeks). It is noteworthy that in most of these streams the habitat occupied by bull trout was restricted to a middle reach 1.3-4.0 miles in length, often overlapping with brook trout distribution. Upstream portions were unoccupied and downstream portions are typically dewatered in summer months. The researchers noted that confidence in detection of bull trout in streams with low levels of occupancy remain problematic.

At this time monitoring indices for this core area are considered largely inadequate for monitoring trend, due in part to the mix of sparse fluvial and fragmented resident populations of bull trout. However, with what is known about the population, the trend appears to be declining and at very low numbers. Fewer fish are captured with similar effort than in previous years and bull trout have declined in the upper East Fork and Warm Springs monitoring sections, both indicators of fluvial populations. Bull trout have disappeared from Rye Creek altogether in the last 15 years, and other monitoring sections are either stable or declining (Clancy, pers. Comm. 2013). Densities are well below their historic levels. The distribution of populations throughout the core area is probably significantly different from historic patterns, as many streams which may have historically contained bull trout, especially the migratory form, now have none, or if they do have bull trout they are typically limited to a very short reach of the stream system. Life form expression is different than historically existed in that adfluvial fish from Lake Pend Oreille can only access the area recently as a result of limited trap and transport around mainstem Clark Fork River dams. Far fewer of the large fluvial fish that remained after the construction of Thompson Falls Dam are now present, likely due to the general unsuitability of mainstem Clark Fork and Bitterroot River summer habitat and angling/poaching losses.

A historical account summarized that in the Bitterroot River bull trout were one of the principal species of fish historically present in most if not all of the river's thirty-nine tributary streams. Many of the fish were apparently of the larger fluvial or adfluvial form. The Salish located their winter camps at places known to have good fishing throughout the cold months. They fished for both westslope cutthroat and bull trout. In the nineteenth century, the main Salish winter camp was located along the Bitterroot River, in the area of Stevensville, Montana (Smith 2010).

Five years after the completion of the Northern Pacific Railroad in 1883, a spur line – the Missoula and Bitter Root Valley Railroad -- was built through the heart of Salish land in the valley. By the following year, 1889, the tribe was overwhelmed by the influx of non-Indian settlement and development of resources in the Bitterroot -- spurred in no small part by the overnight establishment of the city of Hamilton by Marcus Daly. Even the seemingly inexhaustible fishery was being quickly destroyed to feed the workers in Butte and Anaconda.

An early non-Indian settler, Powell Clayton Siria, recalled selling fish from the Bitterroot River for "ten cents a pound." He and other fishermen made the considerable sum of "$5 and $6 per day. Late in the summer, when everybody went fishing, some with giant powder, there were scarcely any fish left in the river." In addition, the same kind of enormous log drives that damaged the Blackfoot River were also being conducted on the Bitterroot River to feed mills that were part of the Anaconda empire. Mr. Siria recalled that "from [18]92 to June of '96 the logging and the river drives were in full blast – the logs were driven down the [Bitterroot] river to the Hamilton Sawmill erected by Marcus Daly." (Smith 2010).

The Bitterroot River is a complex core area containing a mixture of fluvial and resident populations of bull trout. Fourteen local populations are identified, but bull trout occupancy occurs at some level in more tributaries. The high frequency of resident bull trout populations in this drainage makes interpretation of status and trend information difficult. The strong presence of resident populations suggests that fragmentation has eliminated much of the former migratory component (Nelson et al. 2002). Regular redd count monitoring has been conducted since 1994 for only two local populations, in the upper East Fork Bitterroot River (Meadow Creek) and in a tributary of Skalkaho Creek (Daly Creek). Recent redd counts in Daly Creek were relatively consistent, ranging from 30-77 in 2001-2011. As a result of barriers to upstream migration in Skalkaho Creek, Daly Creek bull trout reeds are likely to be made only by resident fish. In Meadow Creek redd counts ranged from 1-21 but were generally in the high single or low double digits since 2001 (MFWP, unpublished data). If these are mostly fluvial fish, as suspected, then it could represent a current adult abundance of around 200 or fewer fish, which seems logical based on observed abundance in the Bitterroot River mainstem. Nyce (2011) postulated that the upper East Fork Bitterroot River and Warm Springs Creek, possibly including tributaries Meadow Creek, Swift Creek and Clifford Creek, were most likely the last remaining strongholds for migratory bull trout in the BRCA.

Much of the fragmentation that occurs in this watershed is due to natural dewatering of groundwater-fed tributaries that go subsurface before reaching the Bitterroot River. Several of these are exacerbated by irrigation and there are large irrigation structures and flumes that mix water sources and complicate connectivity. Most of the irrigation diversions are not screened. In addition, Painted Rocks Dam severs the upper half of the West Fork Bitterroot River drainage from the BRCA core area, and does not allow access to some of the better spawning and rearing habitat, though it does create a separate core area (West Fork Bitterroot Core Area) upstream. Milltown Dam was successfully removed in 2008 and additional passage is gradually being implemented at Thompson Falls, Noxon Rapids and Cabinet Gorge Dams. This will allow greater freedom of bull trout movement within the historically connected Clark Fork drainage, extending to Lake Pend Oreille, and migratory individuals may more freely access various drainages. The Bitterroot enters the Clark Fork a few km downstream of the previous Milltown site and may not benefit as directly as upstream drainages.

In 2000, 2003, and 2007, a series of major fires burned large portions of the bull trout habitat in the Bitterroot River drainage. While these events are part of recurring long-term natural cycle, the scope and severity of the fires was unusual and may have been exacerbated by 20^{th} century fire suppression activities on the forests. Only one sub-watershed experienced immediate and lasting impacts to bull trout populations as a direct result of the fires or post-fire conditions. A small isolated bull trout population in Rye Creek has not been observed since 2000. On a positive note, sediment transport was partially mitigated by burned area rehabilitation activities and favorable post-fire runoff conditions.

Mahlum et al. (2008) studied the effects of fire on stream temperature in the Bitterroot River basin. They examined temperature data from 33 streams in a variety of burned and unburned watersheds. They documented a significant overall increase in late summer water temperature (August-September) over the past 12 years in all streams, which they attributed to climate change. Increases of maximum summer water temperatures of 0.4° C occurred in reference reaches, 1.1° C in below-burn reaches, and 2.8° C within burns. These findings suggest bull trout habitat may be further contracting and fragmentation is likely to increase. Importantly, they found no significant recovery of colder stream temperatures in burned areas five years after wildfires. They concluded the fires have had localized, long-term impacts on water temperatures (Mahlum et al. 2008).

Brassfield et al. (2006) demonstrated upstream range expansion of brook trout in at least two (Blodgett and Chaffin Creeks) of eight surveyed tributary streams. However, it's unknown whether this represents real range expansion or previously undocumented occupancy. Increasing stream temperatures have been documented and this will likely encourage upstream expansion of some brook trout and brown trout populations. Brown trout populations in the mainstem Bitterroot River and some tributaries, such as Sleeping Child Creek, appear to be increasing in the last five years. Whirling disease has also been documented in the Bitterroot River drainage (Leslie Nyce and Chris Clancy, MFWP, personal communication).

An annual agreement reached with Montana DNRC to provide water releases from Painted Rocks Dam (with compensation) to benefit fisheries was recently extended to a permanent agreement. Since the time of listing, ongoing habitat conservation and bull trout monitoring activities in western Montana have continued or increased and new projects have been initiated in many sub-watersheds.

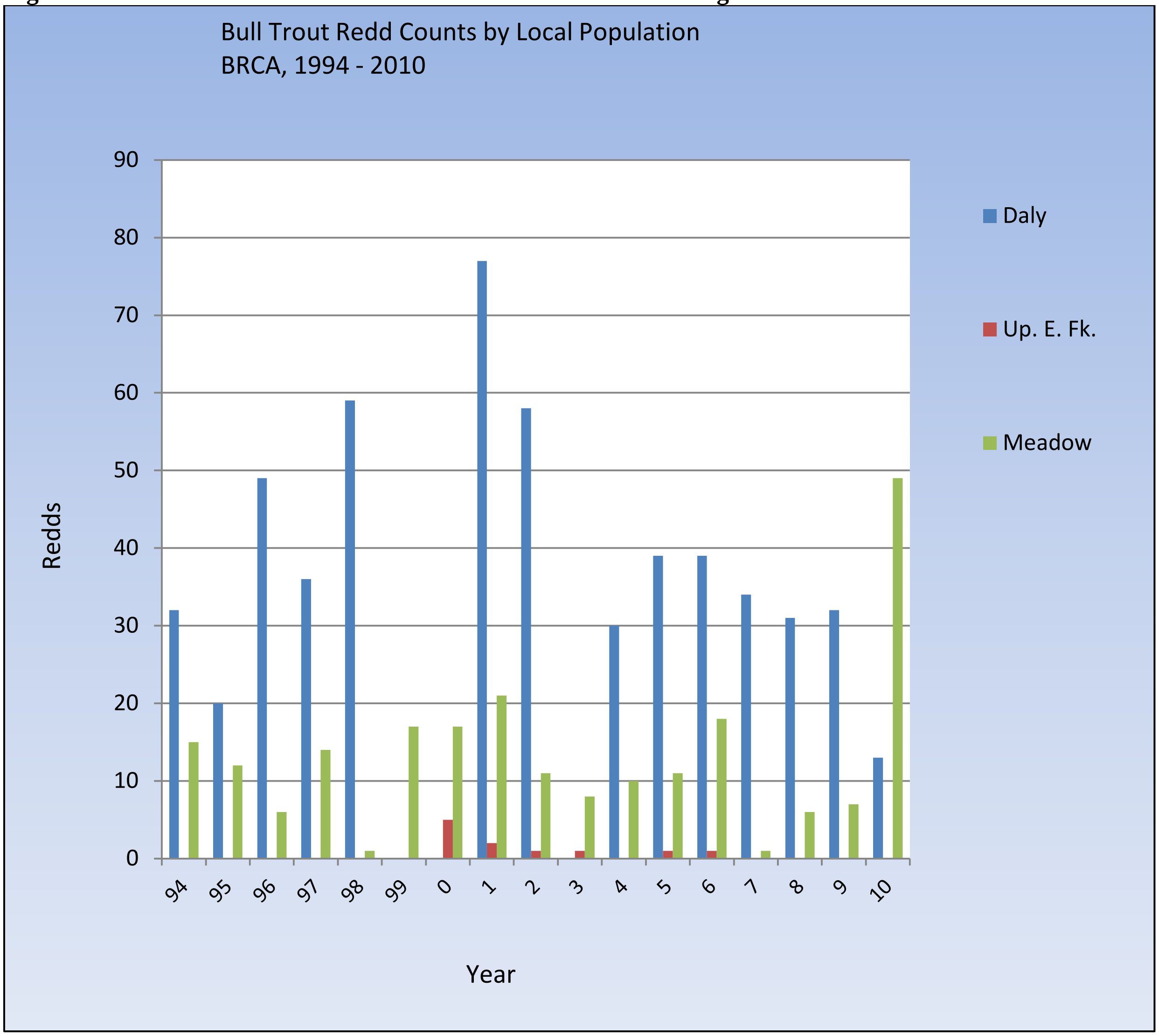
Dewatering, both natural and artificial and the resulting fragmentation of bull trout habitat that results in this system, combined with the synergistic effects of climate change and post-fire increases of stream temperature, represent the greatest threat to bull trout in the Bitterroot River core area. These same factors combine with and are exacerbated by increasing populations of brook trout and brown trout and increasing levels of urbanization along stream corridors.

The habitat trend is expected to decline in this watershed due to extremely high rates of development on private lands, complications of complex multiple ownership patterns, heavy demands for irrigation water, impacts of recent fires, and other factors. Increasing human use and angler pressure, competition with nonnative fish, and other impacts also play important roles. There is also a potential decrease in the magnitude of the fragmentation threat due to fish passage activities at the Lower Clark Fork dams and the recent removal of Milltown Dam.

Of all the core areas in Montana, the Bitterroot is near the top in terms of climate change risk. Populations are already highly fragmented and reverting to the resident life history form, often restricted to small isolated headwater patches of habitat. A major portion of the mainstem habitat is largely unsuitable for occupancy by bull trout in summer. Three main factors lead to these unsuitable conditions – warm water temperatures; irrigation diversions and withdrawals that lead to extremely low flows in portions of the mainstem, further exacerbating temperature issues; and land use changes. Agricultural and home development in the middle and lower portions of the Bitterroot valley has caused changes in riparian conditions. Riprap is commonly used in an attempt to stabilize the banks and protect properties. This may contribute to an imbalanced energy budget within the stream channel, creating more erosion and a wider, shallower, less complex channel that heats up quickly in the summer. Portions of the middle reaches of the main river are affected by land use changes, water diversions, and consequential warm summer water temperatures, but it is difficult to determine the exact level of effect these impacts have on the overall system. These factors may be as important as the lack of tributary access in terms of limiting current bull trout populations in the Core Area. Substantial increase in maximum summer water temperature is occurring over a relatively short period of time, exacerbated by recent landscape scale fire impacts (Mahlum et al. 2008). All of these factors combine to greatly increase vulnerability of this core area to extirpation.

Of the fourteen local populations in the BRCA, only three are surveyed for bull trout redds on a semi-regular basis. Collectively, these three reaches represent the best known habitat for bull trout within the Core Area, but the level to which they accurately represent the overall population is questionable. Daly Creek is primarily resident fish and the upper East Fork is seldom censused. It is unclear what proportion of the total spawning is measured in these three streams. Other concentrations of bull trout spawning have not been located to date. Figure 6-2 shows bull trout redd numbers in the three surveyed reaches from 1994 through 2010 (FWP and USFS unpublished data). Note that blank years are typically when no survey was conducted – they do not indicate zero redds found.

Figure 6-2. Bull trout redd numbers in the BRCA from 1994 through 2010



Currently, the BRCA supports a declining and very much reduced bull trout population (Clancy, pers. Comm. 2013). This population is likely less secure than many populations within the Conservation Strategy analysis area due to extreme dewatering issues that affect access to spawning streams combined with non-native species threats and habitat degradation in the mainstem that results in unsuitable habitat for much of the year.

Bitterroot River Core Area – Bitterroot and Lolo National Forests

There are thirteen local populations within the core area on the Bitterroot National Forest. They include: East Fork Bitterroot River (headwater complex from Meadow Creek upstream), Tolan, Warm Springs, lower West Fork Bitterroot River, Nez Perce Fork, Boulder, Tin Cup, Lost Horse, Sleeping Child, Skalkaho, Blodgett, Fred Burr & Burnt Fork. Lolo Creek, an additional local population in the BRCA, is located on the Lolo National Forest, near the mouth of the Bitterroot River. Fluvial bull trout populations include resident and migratory life history forms. While fluvial bull trout do spawn in other tributaries, these fourteen streams support the majority of the spawning, and redd numbers within them likely represent over 85 percent of the total fluvial spawning that occurs in the basin.

West Fork Bitterroot River below Painted Rocks Reservoir is not included in this conservation strategy. The river is a migratory corridor that contains very few, if any migratory adults. There are only four suitable spawning tributaries, two of which are their own local populations (Boulder & Nez Perce Fork). There are resident bull trout in the remaining two tributaries (Trapper & Piquett Creek), but there is also a lot of overlap with brook trout and brown trout, and hybridization appears to be pretty widespread. Along with the fact that there are few migratory adults left in the West Fork below Painted Rocks Reservoir, the bull trout population is not in good enough shape to be considered a local population in this conservation strategy.

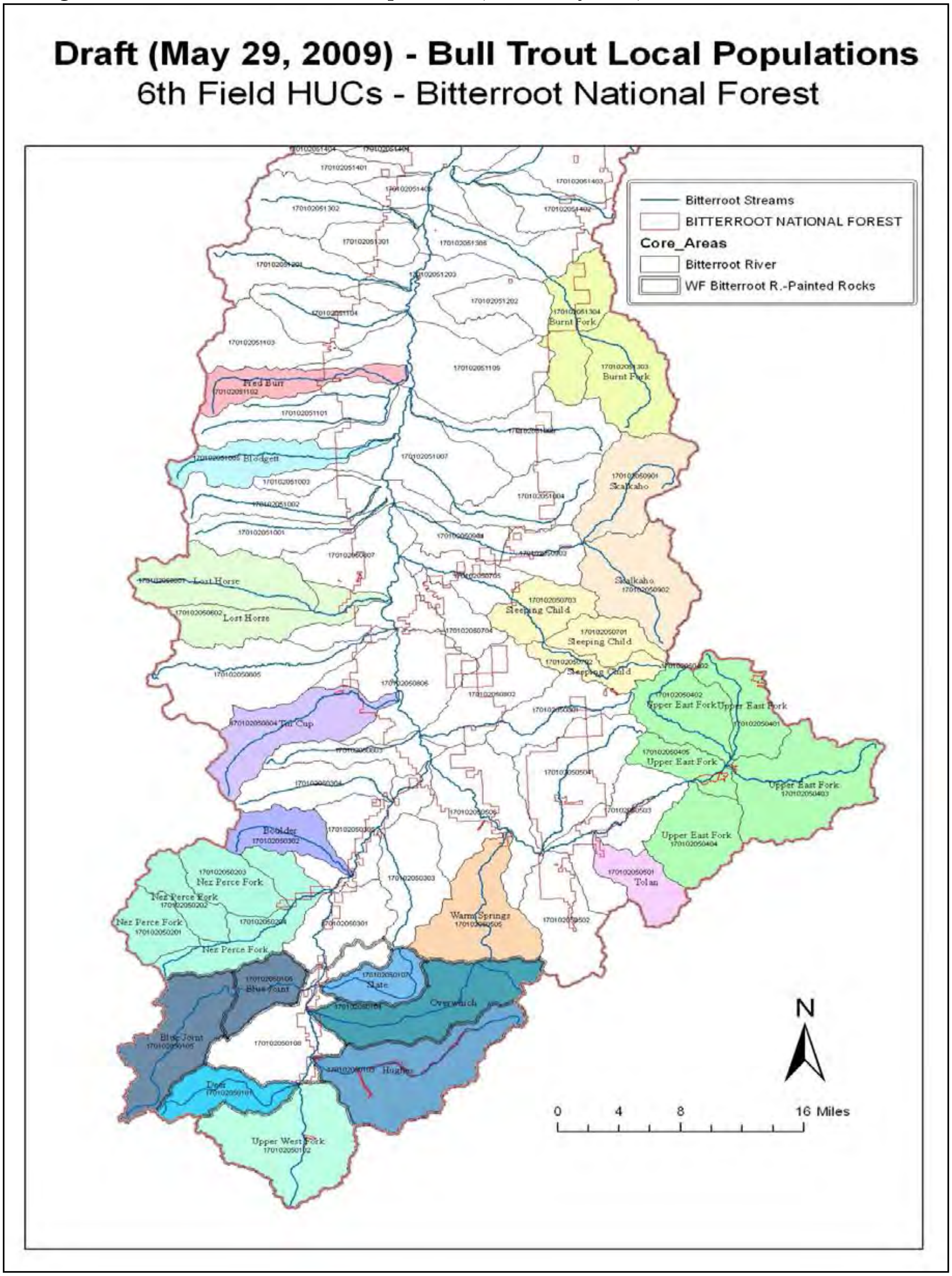
Meadow Creek and the Upper East Fork Bitterroot River (both part of the East Fork Bitterroot River Local Population), currently support the majority of migratory fluvial bull trout spawning in this core area. These streams now appear to have remnant populations of bull trout that express the migratory life history. Historically these streams were just two of many streams in the core area that had spawning areas used by a substantial number of migratory fluvial bull trout.

Daly Creek, a tributary to Skalkaho Creek, has one of the strongest populations of resident bull trout in the Core Area. The redd counts from Daly Creek may or may not be representative of trends in the other disconnected streams such as upper Burnt Fork and upper Sleeping Child creeks. This is because every drainage has a different mix of characteristics such as road densities and road conditions in the watershed, headwater lakes and the species within the lakes, ditches that intersect streams that may block migration or allow non-natives from the ditch to enter the stream system, or historical stocking of the stream with non-native fishes.

Of the fourteen local populations in the core area, Daly Creek (which is a tributary to Skalkaho Creek), Meadow Creek (one of the East Fork Complex streams), and the Upper East Fork Bitterroot River (also part of the East Fork Complex) currently support the majority of bull trout spawning. It is unclear whether these streams supported a majority of the fluvial/adfluvial spawning in the Core Area historically.

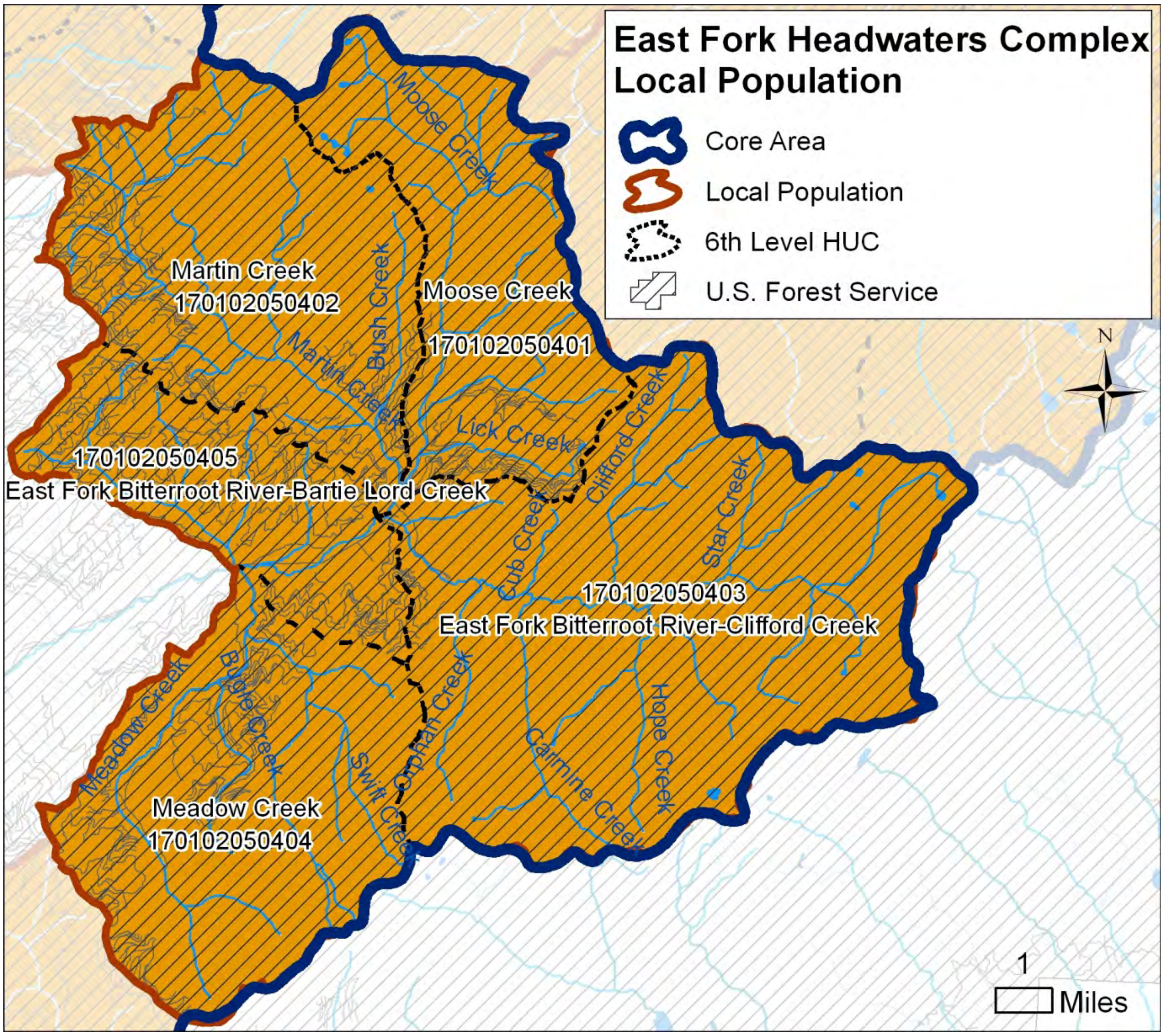
Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Figure 6-3. Bitterroot River Local Populations (Draft, May 2009)



Local Population: East Fork Bitterroot River Headwaters Complex

Figure 6-4. East Fork Bitterroot River Headwaters Complex Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 6-1. East Fork Bitterroot River Headwaters Complex Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1000+ (residents) 50-100 (migratory)	Migratory population declining in the East Fork; resident populations possibly stable in the tributaries	Resident dominant, Migratory present but declining. Connected.	Three – Swift Cr, Meadow Cr, and East Fork between Orphan Cr and Star Falls. None receive concentrated use.	Brook (incidental), Brown (incidental) Threat = Moderate Hybrids have been found in a few areas

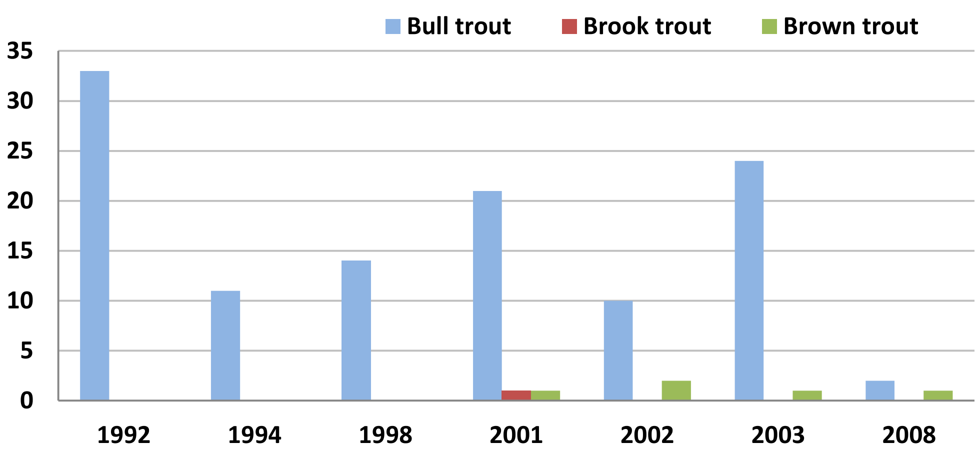
Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High significance – large block of refugia habitat in mostly reference condition	Moderate vulnerability due non-natives and climate change (warming in the lower East fork where migratory fish rear)	Large connected block of good habitat that supports the best remaining (but declining) migratory bull trout population in the Bitterroot River core area

Confidence in your assessment (H,M,L): H (a "data-rich" part of the core area)

Driving Factors Determining Bull Trout Population

Overlap with non-native fish has been minimal in the East Fork Headwaters complex, but in recent years, brown trout have been showing up in increasing numbers in the East Fork Bitterroot River near the Anaconda-Pintler wilderness boundary. At the same time, the number of bull trout has been decreasing. Roads limit the quality of habitat (culvert barriers, sediment, and temperature) in localized spots (Meadow and Bertie Lord drainages), but overall, their impact on habitat quality in the headwaters complex is minimal. Habitat in the headwaters complex is mostly in reference condition and does not appear to be limiting the local population to a large degree. The majority of the complex's area is roadless and/or wilderness. Migratory bull trout in the East Fork Bitterroot River have been declining over the past decade, but it is unclear what is causing the decline. Predation by and competition with brown trout is suspected, as brown trout have increased throughout the East Fork Bitterroot River in recent years. Brook trout are incidental and rare in the complex with the exception of the Bertie Lord drainage (HUC 0405), where they are widespread and common. Restoration projects should focus on coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area and eliminating culvert barriers on spawning and rearing tributaries to Moose Creek (Lick, Reynolds, and Sign Creeks) and Martin Creek (Bush Creek). Particularly helpful would be focusing on brown trout impacts in the downstream reaches of the lower and middle East Fork where migratory juvenile bull trout overwinter and rear.

Figure 6-5. Number of trout captured in the East Fork Bitterroot River



Number of bull, brook, and brown trout captured in 1000 feet of the East Fork Bitterroot River at river mile 31.4 (lower end of HUC 0403).

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Moose Creek – 170102050401							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100% (0 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FUR	FA	20 years	1	$200,000	M	H
Pools	FAR	FA	-	-	$0	-	-
Sediment	FUR	FA	30 years	2	$100,000	L	L

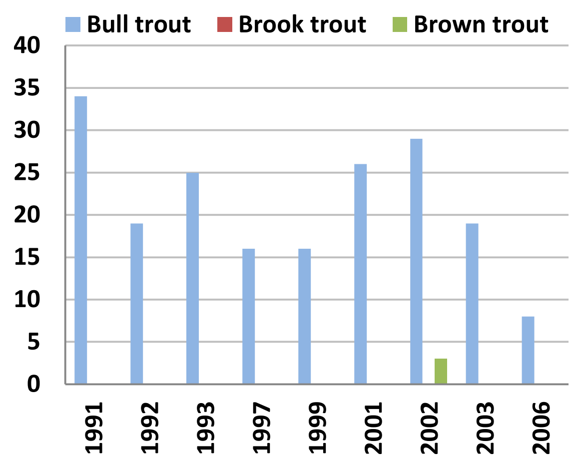
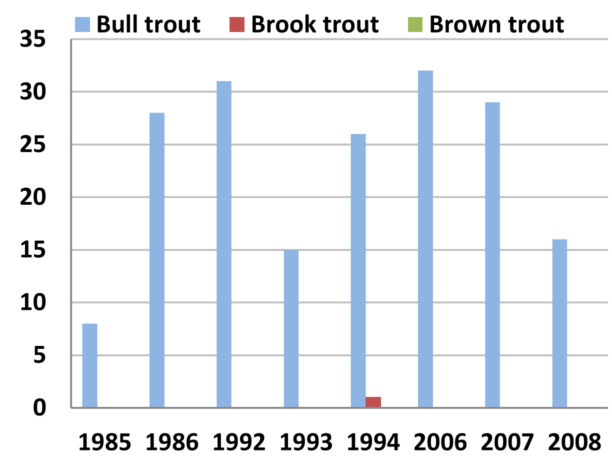
Temperature: GIS rating = FAR, data and professional judgment rating = FAR. The temperature regime in the Moose Creek drainage appears to be largely controlled by natural processes; man's activities are thought to have an insignificant impact on temperatures. During "average" climatic summers, mean-maximum temperatures near the mouth of Moose Creek typically range between 14-15° C. During hot summers, mean-maximum temperatures have ranged between 16-17° C. Only 2% of the HUC has been burned by moderate or high severity fire in the past decade; ECA is 7%. Road 432 is located in the Moose Creek RHCA for about four miles, but its location has not resulted in much shade loss on Moose Creek or its tributaries. As for restoration projects, there may be a few scattered spots along Moose Creek where overstory conifers could be planted and restored, but overall, there isn't much that could be done to improve temperatures.

Barriers: GIS rating = FUR, data and professional judgment rating = FUR. There are four culvert barriers on tributaries to Moose Creek that block/impede access to bull trout spawning and rearing habitat (Road 432 crossings of Lick, Reynolds, and Sign Creeks; Road 5771 crossing of Lick Creek). Restoration projects should focus on eliminated those culvert barriers. When all have been eliminated, then all of the suitable bull trout habitat in the HUC will be connected and accessible.

Pools: GIS rating = FAR, data and professional judgment rating = FA. Pool habitat is thought to be close to its natural potential and largely controlled by natural processes. Habitat surveys indicate that pools are common throughout the HUC and pool quality is good. Most pools are formed by large wood, which is common. Roads have an insignificant effect on woody debris recruitment. As for restoration projects, there may be a few scattered spots along Moose Creek where overstory conifers could be planted and restored, but overall, there isn't much that could be done to improve pool habitat.

Sediment: GIS rating = FUR, data and professional judgment rating = FA. Habitat surveys indicate < 12% surface fines < 2 mm in Moose Creek. The sediment regime appears to be mostly controlled by natural processes. Roads are delivering small quantities of sediment to lower Moose Creek and Lick Creek in a few scattered spots, but sediment is not considered to be a limiting factor to the local population on the reach and watershed scales. The HUC is a granitic watershed which naturally increases the amount of coarse sands in the substrates. Restoration projects should focus on relocating Road 432 out of the Moose Creek RHCA wherever feasible, and reducing the number of road stream crossings on the upland roads.

Figure 6-6. Number of trout captured in Moose Creek

Number of bull trout, brook trout, and brown trout captured in 1000 feet of Moose Creek at river mile 1.4 (near lower end of HUC 0401).	Number of bull trout, brook trout captured in 1000 feet of Moose Creek at river mile 3.6.
	

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Martin Creek – 170102050402

Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration

% Forest Service Ownership in HUC: 100% (0 acres of private)

Relative Contribution of Habitat in Limiting Local Population: Low

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Restoration Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FUR	FA	50 years	-	$0*	-	-
Barriers	FA	FA	10 years	1	$50,000	M	H
Pools	FAR	FA	-	-	$0	-	-
Sediment	FUR	FA	30 years	2	100k	L	H

* = to fully restore temperature, all that is needed is time to let the regenerated overstory completely mature following the 1961 Sleeping Child Fire

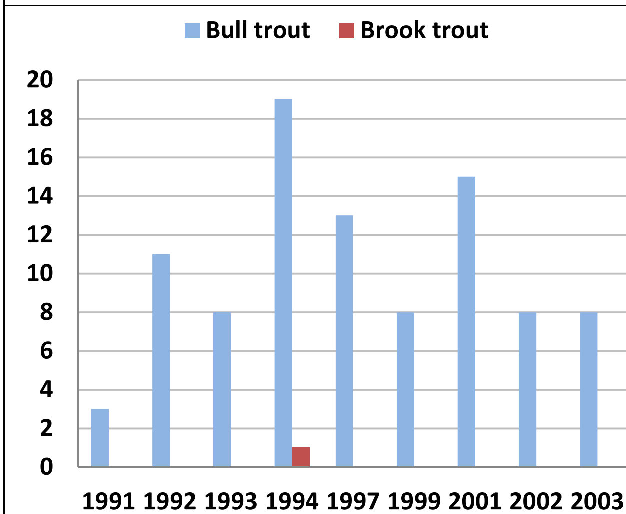
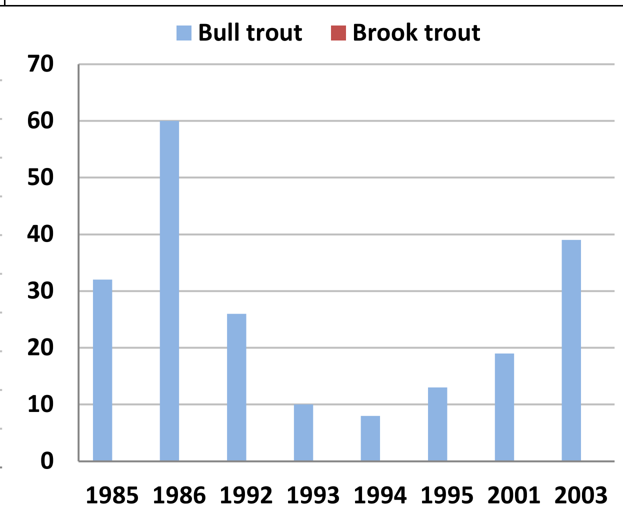
Temperature: GIS rating = FUR, data and professional judgment rating = FAR. The temperature regime in the Martin Creek drainage is believed to be largely controlled by natural processes; man's activities are thought to have an insignificant impact on temperatures. During "average" climatic summers, mean-maximum temperatures near the mouth of Martin Creek typically range between 15-16° C. During hot summers, mean-maximum temperatures have ranged between 16-17° C. Only 2% of the HUC has been burned by moderate or high severity fire in the past decade; ECA is 3%. The 1961 Sleeping Child Fire burned much of the HUC at high severity almost 50 years ago. Those areas are now covered with dense lodgepole pine that is 40-50 feet high. There are presently no active roads that encroach on the Martin Creek RHCA for any significant length. The dense road system that was constructed to salvage the Sleeping Child Fire in the early to mid-1960's is now overgrown with lodgepole pine regeneration. The roads still show up on GIS maps, but functionally, the vast majority of them have been erased by nature. For restoration, there isn't much that could be done to improve temperatures. If any of the old salvage roads are discovered to be adversely affecting temperature, they should be obliterated.

Barriers: GIS rating = FA, data and professional judgment rating = FAR. There is one culvert barrier in the HUC (Bush Creek, Road 726), and it blocks bull trout access to about 2.5 miles of spawning and rearing habitat. Once that barrier is eliminated, all of the suitable bull trout habitat in the HUC will be connected and accessible.

Pools: GIS rating = FAR, data and professional judgment rating = FA. Pool habitat is thought to be close to its natural potential and largely controlled by natural processes. Habitat surveys indicate that pools are common throughout the HUC and pool quality is good. Most pools are formed by large wood, which is common. Roads have an insignificant effect on woody debris recruitment. No restoration projects are needed or recommended.

Sediment: GIS rating = FUR, data and professional judgment rating = FA. Habitat surveys indicate 12-20% surface fines < 2 mm in Martin Creek. The sediment regime appears to be mostly controlled by natural processes. Sediment delivery from roads is insignificant. Sediment is not considered to be a limiting factor to the local population on the reach and watershed scales. The HUC is a granitic watershed which naturally increases the amount of coarse sands in the substrates. Restoration projects should focus on obliterating the old Sleeping Child Fire salvage roads where needed. Most of the roads do not need any treatment because they have naturally recovered on their own.

Figure 6-7. Number of trout captured in Martin Creek

Number of bull trout and brook trout captured in 1000 feet of Martin Creek at river mile 1.3 (near downstream end of HUC 0402).	**Number of bull trout and brook trout captured in 1000 feet of Martin Creek at river mile 7.5.**
	

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): East Fork Bitterroot River – Clifford Creek - 170102050403							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 99.8% (60 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: GIS rating = FA, data and professional judgment rating = FA. Montana DEQ has established a thermal TMDL for the East Fork Bitterroot River (all reaches). The TMDL is a 35% reduction in thermal loading from known anthropogenic sources. The water quality goal is a mean-maximum temperature < 12° C at river mile 31.4 (located near the downstream end of this HUC), and 55% effective shade. The temperature and shade goals are not being met. HUC 0403 is nearly all designated wilderness, and its temperature regime is controlled by natural processes, particularly fire. In 2000, 35% of the HUC was burned at moderate or high severity, including numerous miles of RHCA along the East Fork and its tributaries. Non-fire ECA in the HUC is 0%. Since the 2000 fires, mean-maximum temperatures have increased at river mile 31.4 (site measures temperatures exiting the wilderness) by about 2° C. During "average" climatic summers, mean-maximum temperatures at river mile 31.4 typically range between 15 and 17° C.

Barriers: GIS rating = FA; data and professional judgment rating = FA. There is one culvert barrier on Needle Creek (FSR 724, a partial barrier), but it has a negligible impact on bull trout. Needle Creek is a small spawning and rearing tributary to the East Fork that contains westslope cutthroat trout. Juvenile bull trout are incidental below the culvert barrier, and there is a negligible amount of suitable juvenile rearing habitat above the culvert. The rest of the suitable bull trout habitat in the HUC is connected and accessible.

Pools: GIS rating = FA, data and professional judgment rating = FA. Pool habitat is controlled by natural processes. Habitat surveys indicate that pools are common throughout the HUC and pool quality is good. Most pools are formed by large wood, which is common.

Sediment: GIS rating = FA, data and professional judgment rating = FA. Montana DEQ has established a sediment TMDL for the East Fork Bitterroot River (all reaches). The TMDL is a 2% reduction in total load to the river. The water quality goals are 6-20% fines < 2 mm (C3 reaches), 14-32% fines < 2 mm (C4 reaches), 8-24% fines < 6 mm (C3 reaches), 17-49% fines < 6 mm (C4 reaches), 71-89 mm D50 (C3 reaches), 3-47 mm D50 (C3 reaches), and clinger richness > 14. HUC 0403 has an abundance of both C3 and C4 reaches, and most of these goals are being met. The sediment regime of HUC 0403 is controlled by natural processes; hiking trails have negligible influence. HUC 0403 is also a burned granitic watershed with numerous low gradient reaches, which makes it naturally sandy.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Meadow Creek – 170102050404							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100% (0 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	30 years	1	$2,000,000*	M	L
Barriers	FUR	FA	-	-	$0	-	-
Pools	FUR	FAR	30 years	1	*	M	L
Sediment	FUR	FAR	30 years	1	*	M	L

* = the 2000k is for relocating the first five miles of Road 725 out of the Meadow Creek RHCA, the lower half mile of Road 5764 out of the Swift Creek RHCA, and for decommissioning upland roads and eliminating as many road stream crossings as possible. The feasibility of relocating Roads 725 and 5764 out of the RHCAs may be impossible due to high cost, the steep terrain of the side slopes, and the fact that they are socially desirable arterial roads. Relocation would be the only way to produce substantial improvements in temperature, pools, and sediment over the long-term.

Temperature: GIS rating = FUR, data and professional judgment rating = FAR. The encroached location of Road 725 along the lower five miles of Meadow Creek increases solar exposure; however, temperatures in Meadow Creek are still pretty cold and mean-maximum temperatures typically do not exceed 15° C. 46% of the Meadow Creek drainage was burned by moderate or high severity fire in 2000 (fire occurred mostly in the headwaters); non-fire ECA is 19%. Meadow Creek is vulnerable to climate change because of the losses of riparian overstory caused by the 2000 fires and the encroachment of Road 725. Restoration projects should focus on relocating Roads 725 and 5764 out of RHCAs wherever possible and restoring as much of the riparian conifer overstory as possible. Relocation may be infeasible due to high costs and social controversy.

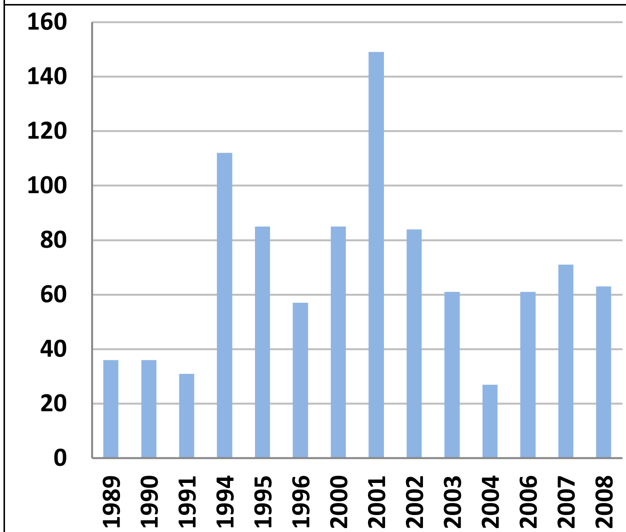
Barriers: GIS rating = FUR, data and professional judgment rating = FA. There are no man-made barriers to bull trout movement in the HUC. The entire suitable habitat is connected and accessible. Several barriers were eliminated between 2003 and 2009.

Pools: GIS rating = FUR, data and professional judgment rating = FAR. Habitat surveys indicate that pools are common in Meadow Creek and its tributaries and pool quality is good. Large wood is abundant and recruitment of fire-killed snags is high in the burned areas. There are localized impacts to pools resulting from riparian livestock grazing (pool widening and infill) and the encroachment of Road 725 (reduced recruitment of large wood). Cows have been fenced out of the most glaring problem areas over the past decade, and restoration of those areas has been strong. Restoration projects should focus on relocating Roads 725 and 5764 out of RHCAs wherever possible and restoring as much of the riparian conifer overstory as possible. Another restoration project is to maintain existing livestock exclosures and possibly construct additional riparian fences if monitoring indicates a need.

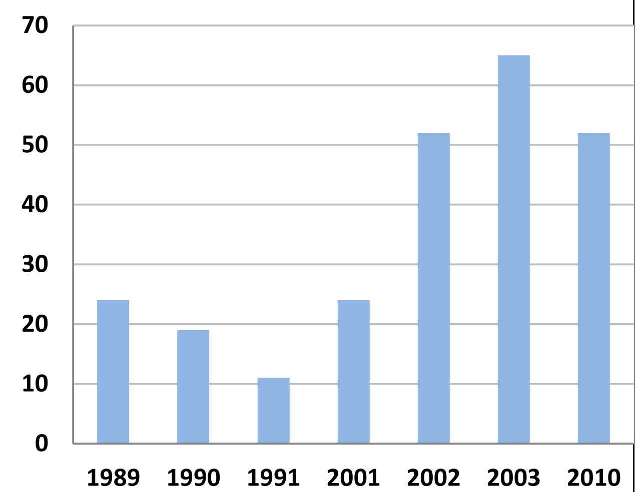
Sediment: GIS rating = FUR, data and professional judgment rating = FAR. Habitat surveys indicate 12-20% surface fines < 2 mm in Meadow Creek. Sediment inputs are higher than natural due to roads and livestock grazing. Also, the HUC is a granitic watershed which naturally increases the amount of coarse sands in the substrates. Restoration projects should focus on relocating Roads 725 and 5764 out of RHCAs, and reducing road densities, the number of road stream crossings, and riparian grazing impacts.

Figure 6-8. Number of Bull Trout captured in Meadow Creek

Number of bull trout captured in 1000 feet of Meadow Creek at river mile 5.6.



Number of bull trout captured in 1000 feet of Meadow Creek at river mile 7.3.



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): East Fork Bitterroot River – Bertie Lord – 170102050405							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 92.7% (800 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	20 years	1	*	L	M
Barriers	FA	FA	10 years	2	$80,000	L	H
Pools	FAR	FAR	20 years	1	*	L	M
Sediment	FUR	FUR	20 years	1	$100,000	L	M

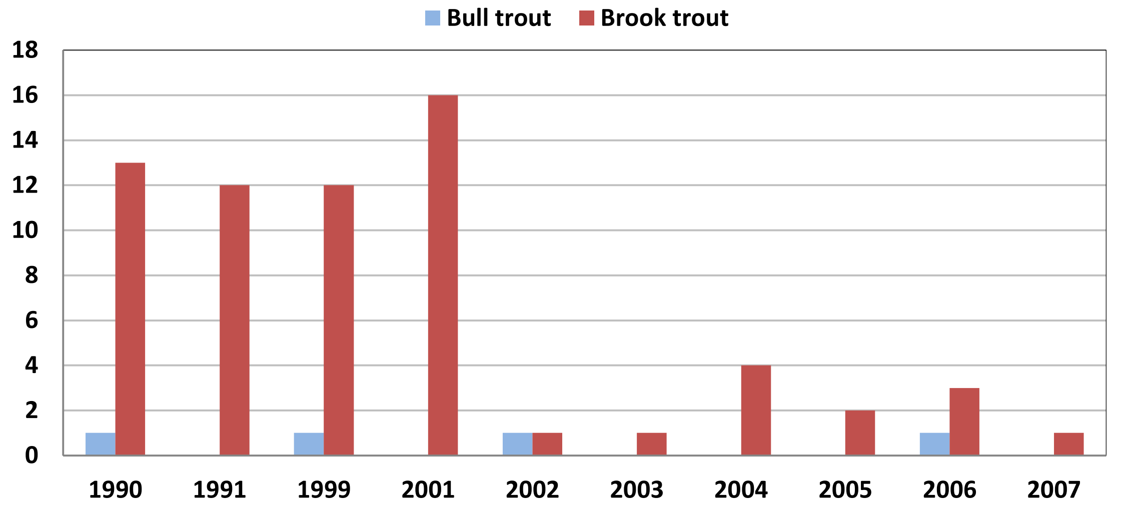
* = the 100k is for decommissioning roads and reducing the number of road stream crossings in the Bertie Lord Creek drainage. These actions would improve the temperature, pools, and sediment indicators in the Bertie Lord drainage, but would not large enough to change the baseline conditions in the East Fork Bitterroot River. There are very few bull trout in the Bertie Lord Creek drainage.

Temperature: GIS rating = FUR, data and professional judgment rating = FAR. Montana DEQ has established a thermal TMDL for the East Fork Bitterroot River (all reaches). The TMDL is a 35% reduction in thermal loading from known anthropogenic sources. The water quality goal is a mean-maximum temperature < 12° C at river mile 31.4 (located a couple of miles upstream of this HUC), a mean-maximum temperature < 15° C at river mile 17.8 (located a few miles downstream of this HUC), and 55% effective shade. The temperature and shade goals are not being met. During "average" climatic summers, mean-maximum temperatures in the HUC 0405 portion of the East Fork typically range between 16-17° C. < 1% of the HUC has been burned by moderate or high severity fire in the past decade; ECA is 12%. Much of the East Fork Bitterroot River is located on private land in this HUC, and the East Fork Highway closely parallels the river. This limits opportunities to improve the current temperature situation. As for the tributaries, only Bertie Lord Creek (the largest tributary) contains bull trout, and those are incidental and rare in the lower mile. The 1961 Sleeping Child Fire burned much of the Bertie Lord drainage at high severity, and those areas are now covered with dense lodgepole pine about 40-50 feet high. So, shade is also recovering naturally in the Bertie Lord RHCAs. Restoration projects (on Forest Service land) should focus on reducing road densities and the number of road stream crossings in the Bertie Lord drainage, and minimizing RHCA impacts caused by the East Fork Highway.

Barriers: GIS rating = FA, data and professional judgment rating = FAR. There are three culvert barriers in the HUC (one on Tepee Creek; two in upper Bertie Lord Creek). None of those culvert barriers currently affect bull trout. At present, all of the suitable bull trout habitat in the HUC is connected and accessible, but bull trout only occur in two streams in the HUC: (1) the East Fork Bitterroot River, which is an important migratory corridor; and (2) the lower end of Bertie Lord Creek, which contains a limited amount of spawning and rearing habitat. It is possible that if bull trout numbers were to substantially increase in the East Fork in future years, bull trout could possibly expand their distribution further upstream in Bertie Lord Creek and benefit from the elimination of cutthroat culvert barriers.

Pools: GIS rating = FAR, data and professional judgment rating = FAR. Roads reduce pool frequency and quality in HUC 0405. For the East Fork, the main impacts are highway encroachment and riverfront development on private lands. For Bertie Lord Creek, the main impact is high road densities on Forest Service land. On all ownerships, road density is 5.8 miles/mile^2, and 60% of the perennial stream length in the HUC is located within 300 feet of roads. Restoration projects (on Forest Service land) should focus on reducing road densities and the number of road stream crossings in the Bertie Lord drainage, and minimizing RHCA impacts caused by the East Fork Highway.

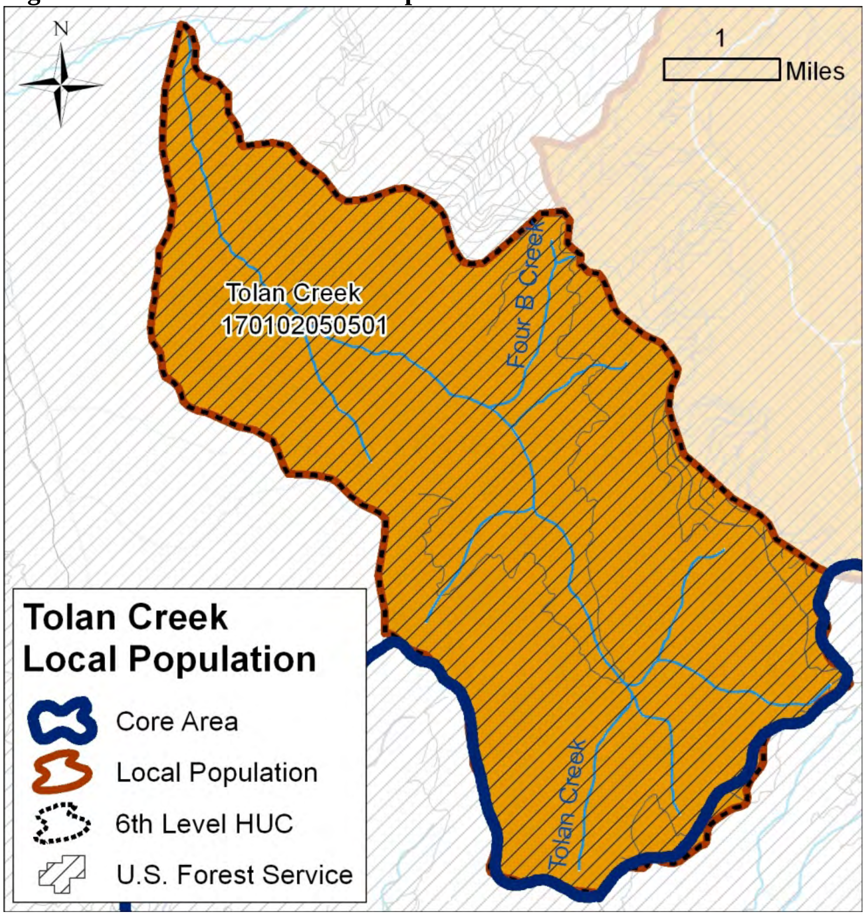
Figure 6-9. Number of Bull and Brook trout captured in Bertie Lord Creek



Number of bull trout and brook trout captured in 600 feet of Bertie Lord Creek at river mile 0.2.

Local Population: Tolan Creek

Figure 6-10. Tolan Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 6-2. Tolan Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
500-1000 (residents) 0-50 (migratory)	Unknown/ Stable	Resident dominant, Migratory possibly present but few in numbers. Connected.	None, but suitable habitat is present	Brook (uncommon), Brown (uncommon) Rainbow (uncommon) Non-natives are present in the lower 2 miles of Tolan Creek Threat = High Hybrids (bull X brook) are present
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Moderate significance – Tolan Creek is the only bull trout stream in the middle portion of the East Fork drainage. However, recruitment of bull trout to the East Fork may be minimal (most bull trout in Tolan are residents?).		Moderate vulnerability due to non-natives and climate change. Tolan Creek is still one of the colder bull trout streams in the Bitterroot, but mean-max temperatures have warmed about 2° C as a result of the 2000 fires.		Strong resident population, but connection to the East Fork is sometimes sketchy (good connection at high flows, but not at low flows during drought years when water is being diverted for irrigation)

Confidence in your assessment (H,M,L): M (“data-rich” on FS land, but lack information on private land – the limiting area – because of inaccessibility)

Driving Factors Determining Bull Trout Population:

Tolan Creek contains about eight miles of suitable spawning and rearing habitat for bull trout. The first two miles flow through private rangeland; the upper six miles are located in a lightly roaded Forest Service drainage with habitat at or near its natural potential. The local population is primarily impacted in the lower two miles on private land. The main limiting factor is non-native fish (brook, brown, and rainbow trout – bull X brook hybrids are present); secondary limiting factors are riparian livestock grazing and irrigation dewatering. There is one unscreened ditch diversion near river mile 1.0 that removes above half of Tolan Creek’s flow during the summer irrigation season. During drought years, this removal significantly reduces wetted perimeter and base flow depth and may create a seasonal passage barrier. Restoration projects should focus on coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area, ensuring year-round passable stream flows, and improving riparian grazing practices. These actions require the support and cooperation of the private landowner.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Tolan Creek - 170102050501							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 96.9% (402 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Moderate (private land)							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FA	80 years	1	$0*	L	H
Barriers	FA	FA	15 years	1	$25,000**	M	L
Pools	FAR	FA	15 years	2	Unknown***	L	L
Sediment	FUR	FA	15 years	2	Unknown***	L	L

* = restoring temperature requires decades of time to let the overstory burned in 2000 recover adequate shade; it also would benefit from improved grazing practices on private land

** = would require obtaining adequate instream flows between the East Fork and the diversion at river mile 1.0

*** = requires improved grazing practices on private land

Temperature: GIS rating = FUR, data and professional judgment rating = FA. Prior to the 2000 fires, Tolan Creek was probably the coldest bull trout stream on the Bitterroot National Forest. In 2000, 29% of the Tolan Creek drainage was burned by moderate or high severity fire, which resulted in mean-maximum temperatures increasing by about 2° C post-fire. At present, mean-maximum temperatures during “average” summers range between 13-15° C, which is still a suitable temperature range for bull trout and ranks Tolan Creek among the colder bull trout streams on the Forest. Despite high ECA (58% - mostly resulting from fire), the temperature regime is controlled by natural processes on Forest Service land. Temperatures are expected to gradually cool as the riparian overstory recovers. Restoration projects should focus on improving riparian grazing practices on private land. This will require the support and close cooperation of the landowner.

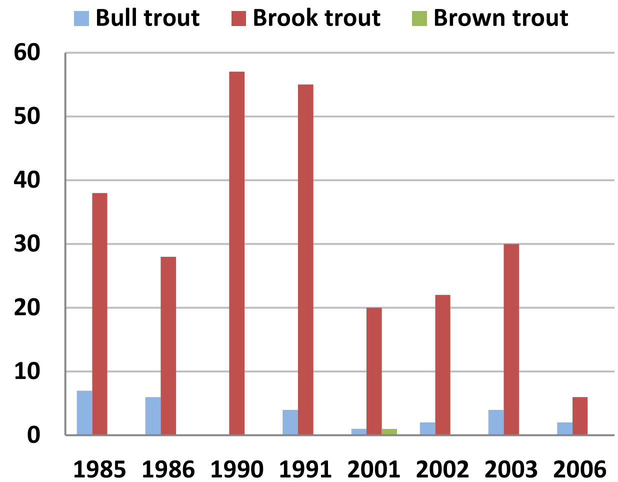
Barriers: GIS rating = FA, data and professional judgment rating = FAR. No man-made barriers and no action needed in the Forest Service portion of the HUC. On private land, the ditch diversion near milepost 1.0 is a potential seasonal barrier during drought years because of reduced wetted perimeter and base flow depth. Restoration projects should focus on obtaining sufficient year-round instream flows downstream of the diversion, and screening the diversion to prevent entrainment of bull trout.

Pools: GIS rating = FAR, data and professional judgment rating = FA. Habitat surveys indicate that pools are common in the Forest Service portion of Tolan Creek and pool quality is good. Large wood is abundant and recruitment of fire-killed snags is high in the burned areas. On private land, riparian livestock grazing has generally produced wider and shallower pools with reduced shrub density along the banks. Restoration projects should focus on working with the landowner to improve riparian grazing practices on private land.

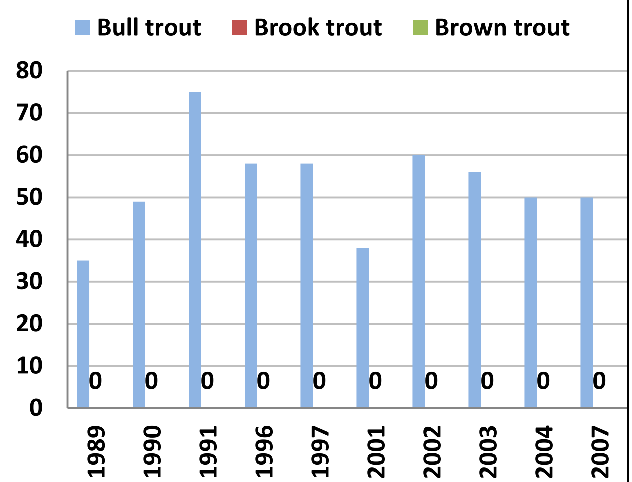
Sediment: GIS rating = FUR, data and professional judgment rating = FA. Habitat surveys indicate 12-20% surface fines < 2 mm in the Forest Service portion of Tolan Creek. On Forest Service land, the sediment regime appears to be mostly controlled by natural processes. Sediment delivery from roads is insignificant, and sediment is not considered to be a limiting factor to the local population on the reach and watershed scales. The HUC is a granitic watershed which naturally increases the amount of coarse sands in the substrates. Sediment inputs are higher on private land as a result of riparian livestock grazing. Restoration projects should focus on working with the landowner to improve riparian grazing practices on private land.

Figure 6-11. Number of trout captured in Tolan Creek

Number of bull trout, brook trout, and brown trout captured in 1000 feet of Tolan Creek at river mile 2.1 (where stream exits Forest and enters private land).

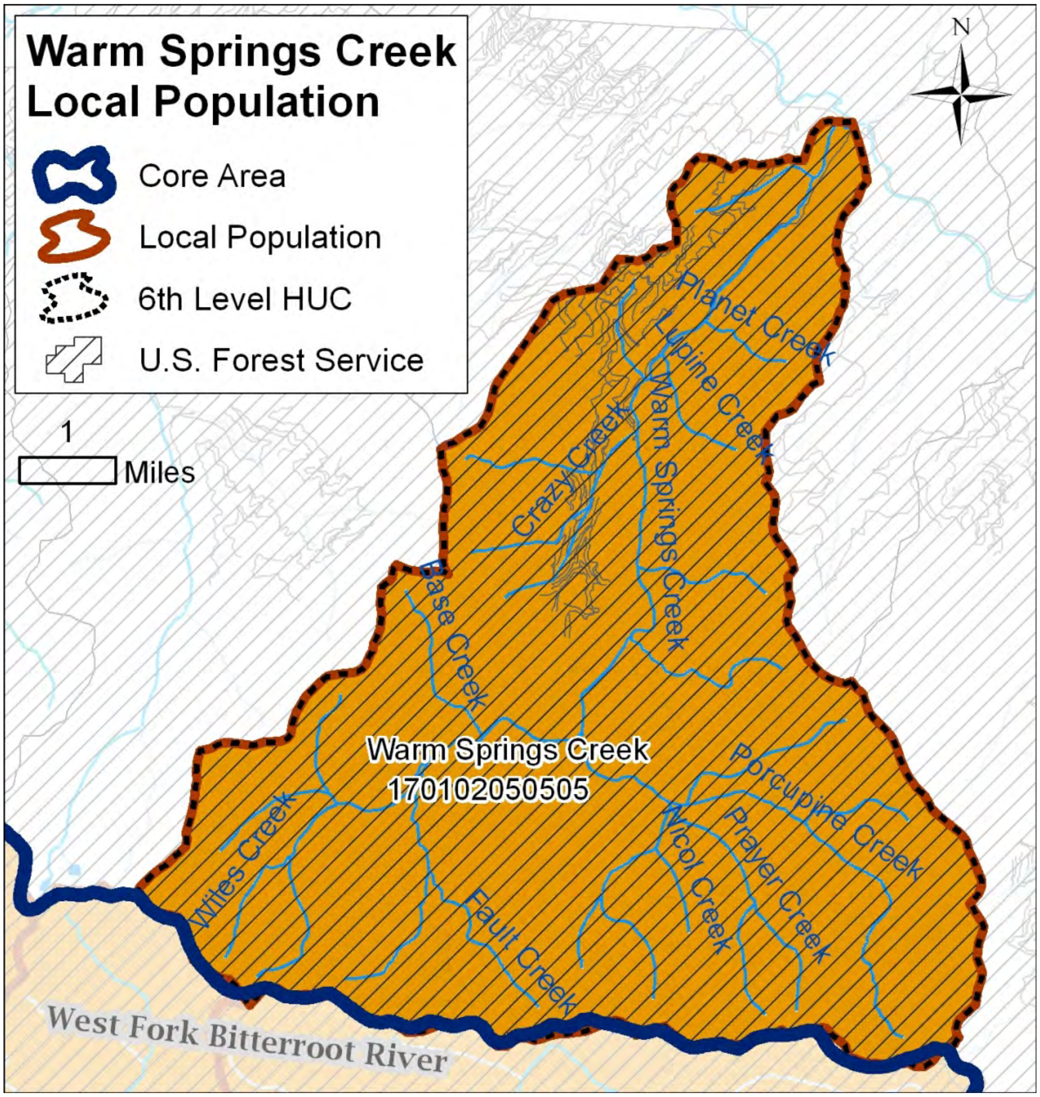


Number of bull trout, brook trout, and brown trout captured in 1000 feet of Tolan Creek at river mile 5.1.



Local Population: Warm Springs Creek

Figure 6-12. Warm Springs Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 6-3. Warm Springs Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
250-500 (residents) 0-50 (migratory)	Declining	Resident dominant, Migratory present but few in number and declining. Partially connected.	None, but suitable habitat is present	Brook (common on private), Brown (uncommon on private) Rainbow (uncommon on private) Threat = High Hybrids (bull X brook) are present

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High significance – only spawning tributary with a sizeable amount of suitable habitat downstream of Sula	High vulnerability due to fires and overlap with non-natives.	The only real good spawning and rearing tributary for bull trout in the lower East Fork drainage between Sula and Conner.

Confidence in your assessment (H,M,L): H (local population is declining; suspected to be associated with the decline of migratory bull trout in the lower East Fork Bitterroot River)

Driving Factors Determining Bull Trout Population:

The Warm Springs Creek drainage is a large, lightly roaded drainage on Forest Service land with habitat that is generally in reference condition. Limiting factors are generally restricted to the roaded portion of the drainage downstream of the USFS Crazy Creek campground. These factors include overlap with non-native fish (brook, brown, and rainbow trout), RHCA road impacts, and the scarcity of migratory bull trout in the East Fork Bitterroot River in the vicinity of Warm Springs Creek. Brook and brown trout overlap bull trout in the lower four miles of Warm Springs Creek, and bull X brook hybrids are present. Roads limit habitat quality (one culvert barrier at the Road 370 crossing, sediment, and temperature) along the four mile-long segment of Road 370 that is located in the Warm Springs Creek RHCA. The number of migratory bull trout in the East Fork that could potentially enter the Warm Springs drainage and spawn appears to have sharply declined since the mid 1990's. A substantial portion (35%) of the HUC was burned by moderate and high severity fire in 2000 and 2007. The connection to the East Fork is partially impaired by the Road 370 culvert at river mile 1.0. The Road 370 culvert is scheduled to be replaced with a new bridge in 2011. The U.S. Highway 93 culvert (an undersized concrete box culvert) at the mouth of the stream is not a stream simulation structure, but it appears to be passable, albeit not ideal. Restoration projects should focus on coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area, minimizing RHCA impacts from Road 370, and eliminating the Road 370 culvert barrier. Assuming that non-native fish and the culvert barriers could be eliminated, habitat would not be expected to limit the local population to a large degree.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Warm Springs Creek – 170102050505

Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration

% Forest Service Ownership in HUC: 99.4% (160 acres of private)

Relative Contribution of Habitat in Limiting Local Population: Low

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Restoration Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FA	80 years	-	0 *	L	H
Barriers	FUR	FAR	1 year	1	$100,000**	H	H
Pools	FAR	FA	30 years	2	$200,000***	L	L
Sediment	FAR	FA	30 years	2	$200,000***	L	L

* = restoring temperature requires decades of time to let the overstory burned in 2000 recover

** = Road 370 culvert is the only barrier to eliminate. It will be replaced with a new bridge in 2011

*** = relocating segments of Road 370 out of the Warm Springs Creek RHCA and reducing the number of road stream crossings on upland roads

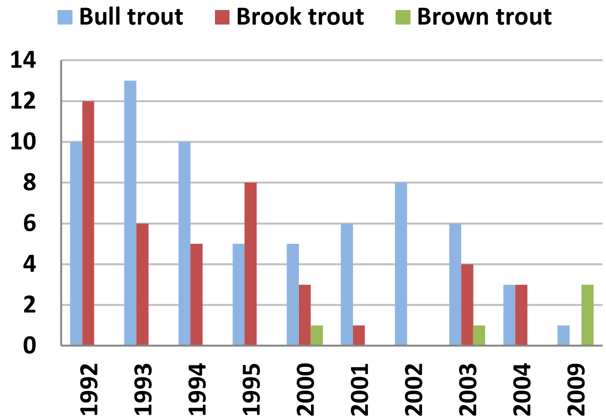
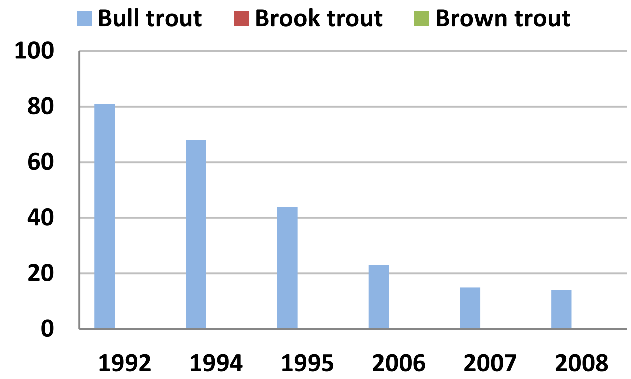
Temperature: GIS rating = FAR, data and professional judgment rating = FAR. During "average" climatic summers, mean-maximum temperatures near the Forest boundary on Warm Springs Creek typically range between 14-16° C. The temperature regime appears to be largely controlled by natural processes. 35% of the HUC has been burned by moderate and high severity fire over the past decade, and this has increased risks from climate change. Fire has removed a considerable amount of overstory vegetation in the upper half of the HUC and accounts for most of the ECA (21%). Fire is the main cause of shade losses; a secondary and more localized cause is the encroached location of Road 370 which affects some scattered spots along the lower four miles of Warm Springs Creek. Compared to the effects of fire, Road 370 has a negligible impact on temperature. Restoration projects are limited and should focus on relocating segments of Road 370 out of the Warm Springs Creek RHCA, if feasible.

Barriers: GIS rating = FUR, data and professional judgment rating = FAR. There is one man-made fish barrier in the HUC, the Road 370 culvert at milepost 1.0 of Warm Springs Creek. The culvert is thought to be a partial barrier to upstream bull trout movement. It will be removed in 2011 and replaced with a new bridge. Once the new bridge is completed, all of the suitable bull trout habitat in the HUC will be connected and accessible. The U.S. Highway 93 culvert (a concrete box culvert at the mouth of Warm Springs Creek) is not a stream simulation structure, but it appears to be passable, albeit undersized.

Pools: GIS rating = FAR, data and professional judgment rating = FA. Habitat surveys indicate that pools are common in the Forest Service portions of Warm Springs Creek and its tributaries, and pool quality is good. Large wood is abundant and recruitment of fire-killed snags is high in the burned areas. Upstream of the USFS Crazy Creek campground, pool frequency and quality is controlled entirely by natural processes. The encroachment of Road 370 in the Warm Springs RHCA generally has a small impact on pools because the road mostly stays > 100 feet away from the stream and has not resulted in the removal of the riparian overstory canopy along the majority of the stream banks. On private land (i.e. the lower mile of Warm Springs Creek), pool quality is reduced in some areas due to residential development and grazing. Restoration projects (on Forest Service land) should focus on relocating segments of Road 370 out of the Warm Springs RHCA, where feasible, and reducing upland road densities and the number of road stream crossings.

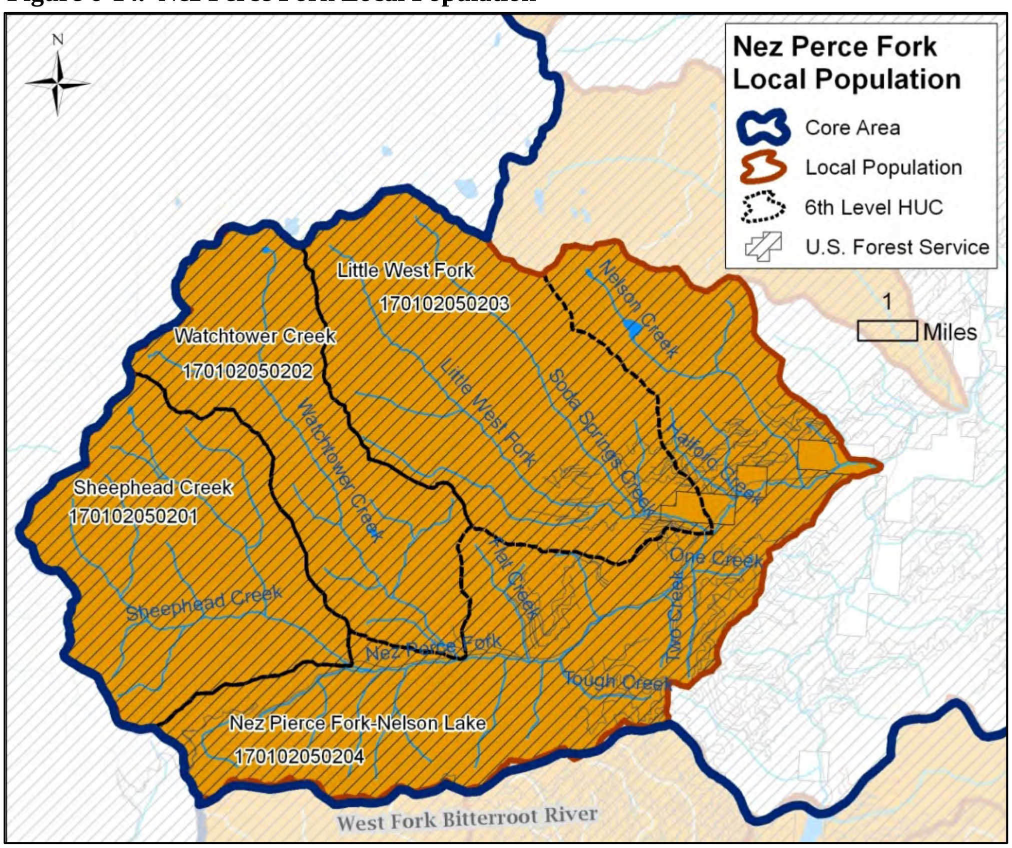
Sediment: GIS rating = FAR, data and professional judgment rating = FAR. Habitat surveys indicate 16% surface fines < 2 mm in the Forest Service portion of Warm Springs Creek. Upstream of the USFS Crazy Creek campground, the sediment regime is controlled entirely by natural processes. Downstream of the campground, roads contribute some sediment but inputs are not excessive. Overall, sediment is not considered to be a limiting factor to the local population on the reach and watershed scales. Road 370 is not a large sediment producer because it has been graveled and BMP upgraded, and it does not closely approach Warm Springs Creek in many spots. The Warm Springs drainage is also a granitic watershed which naturally increases the amount of coarse sands in the substrates. Restoration projects (on Forest Service land) should focus on relocating segments of Road 370 out of the Warm Springs RHCA, where feasible, and reducing upland road densities and the number of road stream crossings.

Figure 6-13. Number of trout Captured in Warm Springs Creek

Number of bull trout, brook trout, and brown trout captured in 1000 feet of Warm Springs Creek at river mile 3.5 (lower end of HUC 0505).	Number of bull trout, brook trout, and brown trout captured in 1000 feet of Warm Springs Creek at river mile 7.4.
	

Local Population: Nez Perce Fork

Figure 6-14. Nez Perce Fork Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 6-5. Nez Perce Fork Local Population Summary

<table>
<tr><th># Spawning Adults</th><th>Short-Term (5yr) Pop Trend</th><th>Life History, Connectivity</th><th># Known Spawn Reaches</th><th>Nonnative Species, threat</th></tr>
<tr><td>1000+ (residents)

0-50 (migratory)</td><td>Unknown/ Stable</td><td>Resident dominant, Migratory present but few in number. Connected.</td><td>None, but suitable habitat is present</td><td>Brook (common),
Brown (uncommon)
Threat = High, overlap with brook in most of Nez Perce Fork and lower ends of tributaries, brown are more incidental
Hybrids (brook X bull) are present</td></tr>
<tr><th colspan="2">Significance of geographical location</th><th colspan="2">Vulnerability to Climate Change</th><th>Unique Population Attributes</th></tr>
<tr><td colspan="2">High significance – the only major spawning area for bull trout in the West Fork below Painted Rocks Dam; important spawning drainage for westslope cutthroat trout (and possibly bull trout) from the Bitterroot River</td><td colspan="2">High vulnerability due to the combination of non-natives and considerable solar exposure of the main stem of the Nez Perce Fork resulting from RHCA road encroachment.</td><td>The only relatively strong population in West Fork below Painted Rocks Dam. Cutthroat telemetry study found the Nez Perce drainage to be a hot spot for migratory cutthroat. Some migratory bull trout are also found scattered throughout the drainage, but never in concentrated numbers or locations.</td></tr>
</table>

Driving Factors Determining Bull Trout Population:

The main limiting factors are overlap with non-native fish (mostly brook trout, brown trout more incidental) and habitat reductions (increased temperature and sediment, reduced woody debris recruitment) caused by the encroachment of Road 468. Overlap with brook and brown trout limits the local population throughout most of the main stem Nez Perce Fork and in the lower couple of miles of the major spawning and rearing tributaries (Sheephead, Watchtower, Little West Fork, Soda Springs, and Nelson creeks). Bull X brook hybrids are present in all of the areas of overlap. Snorkel surveys conducted in 2008 suggest that brook trout have not significantly expanded their upstream distribution or numbers in Sheephead, Watchtower, Little West Fork, Soda Springs, and Nelson creeks since the early 1990's. Limiting habitat factors include temperature, sediment, and reduced woody debris recruitment in the main stem of the Nez Perce Fork (HUC 0204). The main cause is the encroached location of Road 468 which closely parallels the Nez Perce Fork for about 13 miles. The major tributaries to the Nez Perce Fork (Sheephead Creek, HUC 0201; Watchtower Creek, HUC 0202; and the Little West Fork, HUC 0203) drain large intact blocks of habitat that are either roadless/wilderness (Sheephead and Watchtower) or lightly roaded (Little West Fork). Restoration projects should focus on coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area and relocating Road 468 out of the Nez Perce Fork RHCA. Road 468 may be impossible to relocate because of very high cost and public use. It is the only road that accesses the Selway River drainage from the Montana side. Even if Road 468 cannot be relocated, all possible measures should be taken to reduce its impact on habitat in the Nez Perce Fork (e.g. surfacing with gravel or pavement, moving short segments further from the stream, restoring conifer overstory where there are opportunities).

Confidence in your assessment (H,M,L): H (nine long-term population reaches in this local population; a few migratory bull trout are found incidentally in the larger streams, but we know little about their numbers, spawning areas, or overwintering areas)

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Sheephead Creek – 170102050201							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100% (0 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: GIS rating = FA, data and professional judgment rating = FA. The temperature regime is controlled by natural processes. During "average" climatic summers, mean-maximum temperatures near the mouth of Sheephead Creek typically range between 13-15° C. During hot summers, mean-maximum temperatures have ranged between 16-17° C. The HUC is unburned; ECA is 0%.

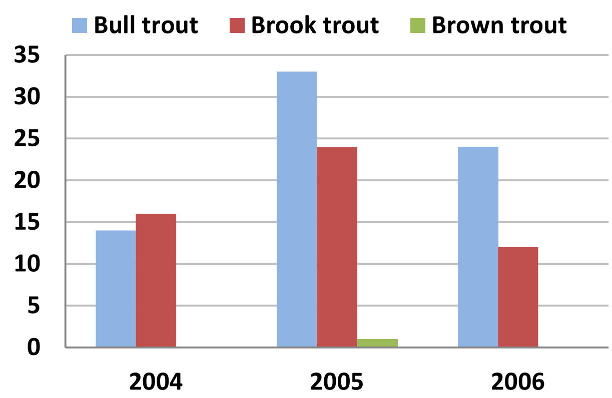
Barriers: GIS rating = FA, data and professional judgment rating = FA. No man-made barriers are present.

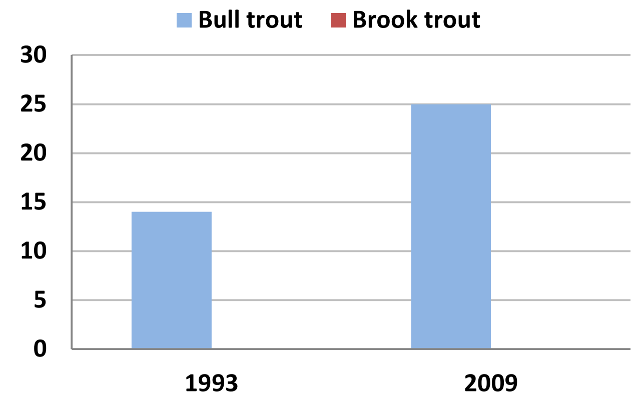
Pools: GIS rating = FA, data and professional judgment rating = FA. Pool habitat is controlled by natural processes. Habitat surveys indicate that pools are common throughout the HUC and pool quality is good. Most pools are formed by large wood, which is common.

Sediment: GIS rating = FA, data and professional judgment rating = FA. The sediment regime is controlled by natural processes; hiking trails have negligible influence. A granitic watershed which makes it somewhat sandy, but levels are natural and controlled by natural processes.

Figure 6-15. Trout captured in Sheephead Creek

Number of bull trout, brook trout, and brown trout captured in 1000 feet of Sheephead Creek at river mile 0.2 (downstream end of HUC 0201).	Number of bull trout and brook trout captured in 600 feet of Sheephead Creek at river mile 2.5.





Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Watchtower Creek – 170102050202							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100% (0 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: GIS rating = FA, data and professional judgment rating = FA. The temperature regime is controlled by natural processes. During "average" climatic summers, mean-maximum temperatures near the mouth of Watchtower Creek typically range between 14-16° C. During hot summers, mean-maximum temperatures have ranged between 17-18° C. The HUC is unburned; ECA is 1%.

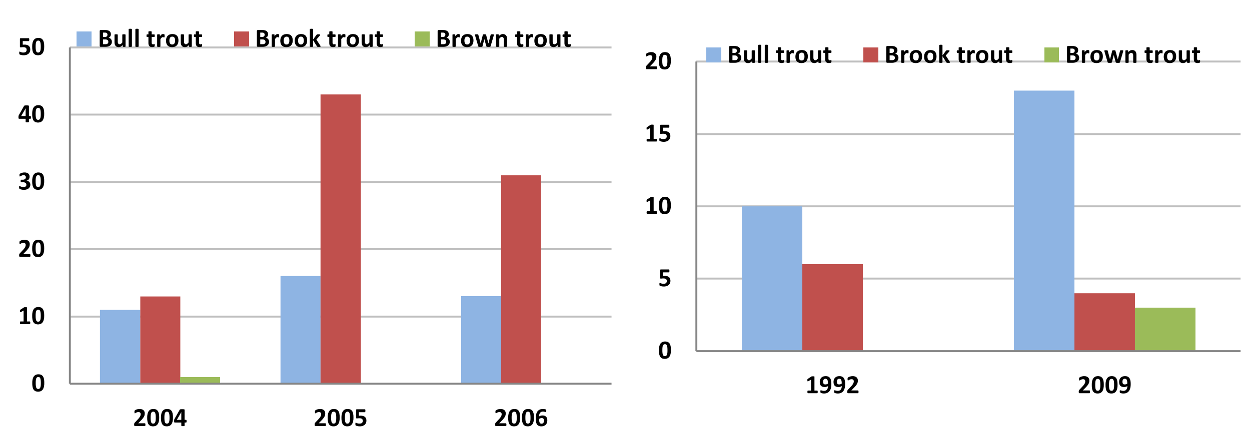
Barriers: GIS rating = FA, data and professional judgment rating = FA. No man-made barriers are present.

Pools: GIS rating = FA, data and professional judgment rating = FA. Pool habitat is controlled by natural processes. Habitat surveys indicate that pools are common throughout the HUC and pool quality is good. Most pools are formed by large wood, which is common.

Sediment: GIS rating = FA, data and professional judgment rating = FA. The sediment regime is controlled by natural processes; hiking trails have negligible influence. A granitic watershed which makes it somewhat sandy, but levels are natural and controlled by natural processes.

Figure 6-16. Trout captured in Watchtower Creek

Number of bull trout, brook trout, and brown trout captured in 1000 feet of Watchtower Creek at river mile 0.1 (downstream end of HUC 0202).	Number of bull trout, brook trout and brown trout captured in 800 feet of Watchtower Creek at river mile 0.8.



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Little West Fork – 170102050203							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 98.9% (168 acres of private)							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FAR	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

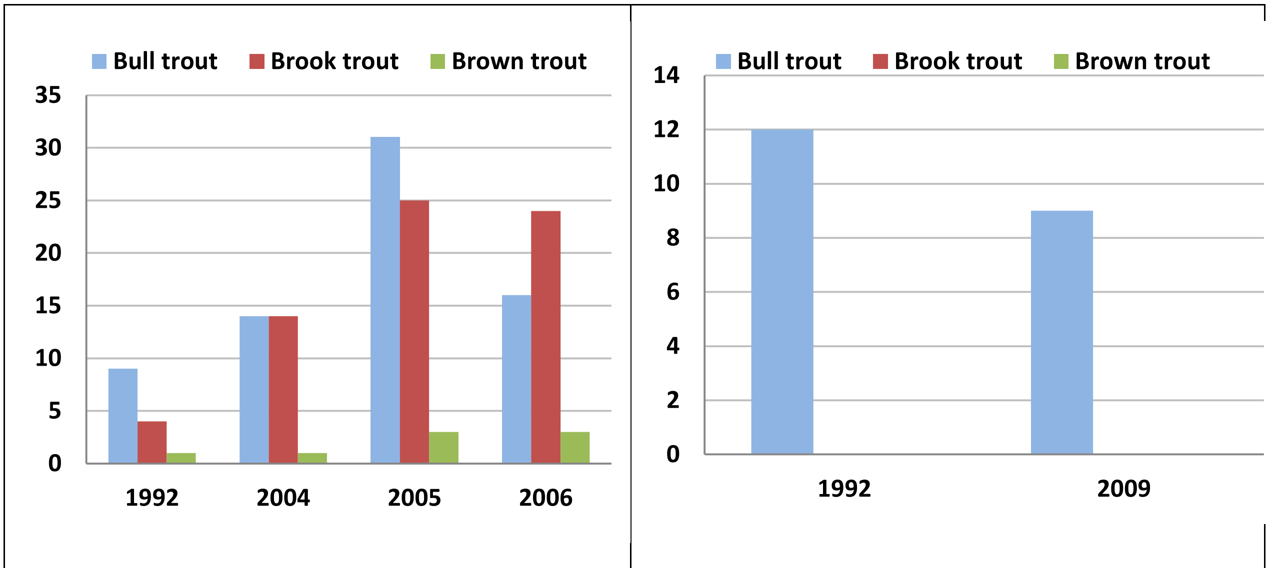
Temperature: GIS rating = FAR, data and professional judgment rating = FAR. The temperature regime in the Little West Fork drainage appears to be largely controlled by natural processes; man's activities are thought to have a negligible impact on temperatures. The Little West Fork contains low gradient reaches that have naturally high solar exposure. There are some road stream crossings in the lower 1/3rd of the HUC, but they cross at perpendicular angles and are not located in the RHCAs for significant lengths. During "average" climatic summers, mean-maximum temperatures near the mouth of the Little West Fork typically range between 15-16° C. During hot summers, mean-maximum temperatures have ranged between 17-18° C. The HUC is unburned; ECA is 3%.

Barriers: GIS rating = FAR, data and professional judgment rating = FA. There are no man-made barriers in the HUC. The entire suitable bull trout habitat is connected and accessible.

Pools: GIS rating = FA, data and professional judgment rating = FA. Pool habitat is controlled by natural processes. Habitat surveys indicate that pools are common throughout the HUC and pool quality is good. Most pools are formed by large wood, which is common. Roads have an insignificant effect on woody debris recruitment.

Sediment: GIS rating = FA, data and professional judgment rating = FA. The sediment regime is controlled by natural processes; roads are delivering insignificant amounts of sediment to streams. A granitic watershed which makes it somewhat sandy, but levels are natural and controlled by natural processes.

Figure 6-17. Trout captured in Little West Fork



Number of bull trout, brook trout, and brown trout captured in 1000 feet of the Little West Fork at river mile 1.3 (downstream end of HUC 0203).

Number of bull trout, brook trout and brown trout captured in 600 feet of the Little West Fork at river mile 3.1.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Nez Perce Fork – Nelson Lake – 170102050204

Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration

% Forest Service Ownership in HUC: 96.4% (873 acres of private)

Relative Contribution of Habitat in Limiting Local Population: High

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Restoration Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FAR	80 years	1	$1,500,000 *	H	L
Barriers	FAR	FA	30 years	2	$200,000	L	M
Pools	FAR	FA	80 years	1	*	H	L
Sediment	FUR	FAR	80 years	1	*	H	L

* = the 1500k is for relocating Road 468 out of the Nez Perce RHCA, and for decommissioning upland roads and eliminating as many road stream crossings as possible. The feasibility of relocating Road 468 out of the Nez Perce RHCA may be impossible due to high cost, the steep terrain of the side slopes, and the fact that it is the only road from Montana that accesses the Selway River drainage. Relocation would be the only way to produce substantial improvements in temperature, pools, and sediment over the long-term.

Temperature: GIS rating = FAR, data and professional judgment rating = FAR. Montana DEQ has established a thermal TMDL for the Nez Perce Fork. The TMDL is an 11% reduction in thermal loading from known anthropogenic sources. The water quality goal is a mean-maximum temperature < 15° C at river mile 1.0, a mean-maximum < 12° C at river mile 11.0, and 45% effective shade. The temperature goals are being exceeded at both sites (lower site 17-19° C; upper site 14-15° C). The effective shade goal is not being met. The main cause of the temperature impairment is Road 468 which closely parallels the Nez Perce Fork for about 13 miles. Significant blocks of overstory shade have been lost due to road location near the stream. The Nez Perce Fork is also dominated by low gradient reaches that have naturally high solar exposure. These factors make it difficult to achieve the temperature goals in the present climate. The HUC is unburned; ECA is 7%. Restoration projects should focus on relocating Road 468 out of the Nez Perce Fork RHCA wherever possible and restoring as much of the riparian conifer overstory as possible.

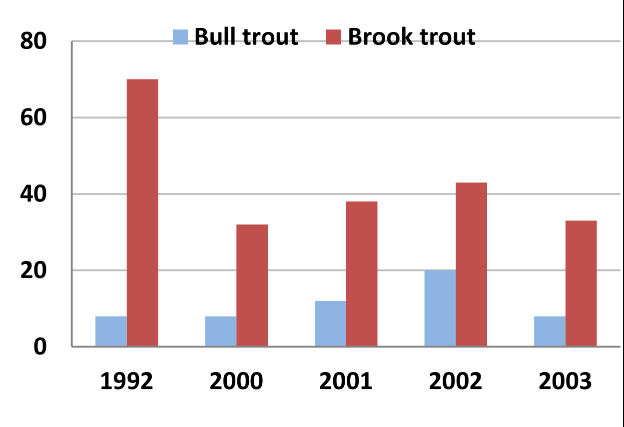
Barriers: GIS rating = FAR, data and professional judgment rating = FAR. There are three culvert barriers in the HUC that potentially limit bull trout distribution (Flat Creek, Road 468; upper and lower paved Road 468 crossings of the upper Nez Perce Fork). There are four other culvert barriers in the HUC (Gemmell, Tough, and Two Creeks) that limit westslope cutthroat trout, but not bull trout at this time. Eliminating the culvert barrier on Flat Creek is the #1 priority – it could potentially open up about 1.7 miles of small stream spawning and rearing habitat. Replacing the upper and lower paved Roads 468 culverts has minimal potential to benefit bull trout because both culverts are located high in the watershed with < 0.5 miles of suitable small stream rearing habitat upstream of their barriers. Also, both culverts are covered by deep fills and pavement, and replacement will only occur if and when Road 468 is ever reconstructed. Due to their small stream sizes, replacing the culvert barriers on Gemmell, Tough, and Two Creeks would benefit westslope cutthroat trout, but probably not bull trout.

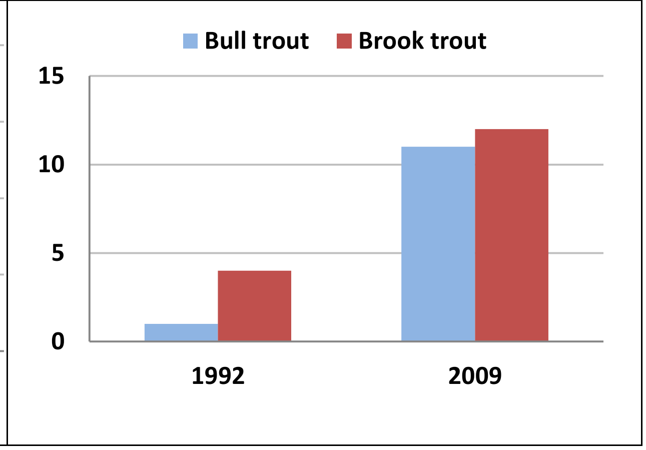
Pools: GIS rating = FAR, data and professional judgment rating = FAR. Pool frequency and quality is impaired because of road encroachment (67% of the perennial stream length in the HUC is located within 300 feet of roads). Large wood is the dominant feature that forms pools, and the recruitment of large wood is impaired by the encroached location of Road 468. Road location near the stream also provides easy access for illegal firewood cutting in the RHCA, which does occur in some spots. Restoration projects should focus on relocating Road 468 out of the Nez Perce Fork RHCA wherever possible and restoring as much of the riparian conifer overstory as possible.

Sediment: GIS rating = FUR, data and professional judgment rating = FAR. Habitat surveys indicate that surface fines < 2 mm typically range between 12-20% in the road encroached reaches of the Nez Perce Fork. These levels are somewhat higher than reference, but not excessively high. The encroached segments of Road 468 have been graveled and are generally located on relatively flat terrain. For those reasons, Road 468 delivers some sediment to the Nez Perce Fork, but not large quantities. Restoration projects should focus on relocating Road 468 out of the Nez Perce RHCA and eliminating as many road stream crossings on its tributaries as possible. Where relocation is infeasible, spot paving should be evaluated.

Figure 6-18. Trout captured in Nez Perce Fork

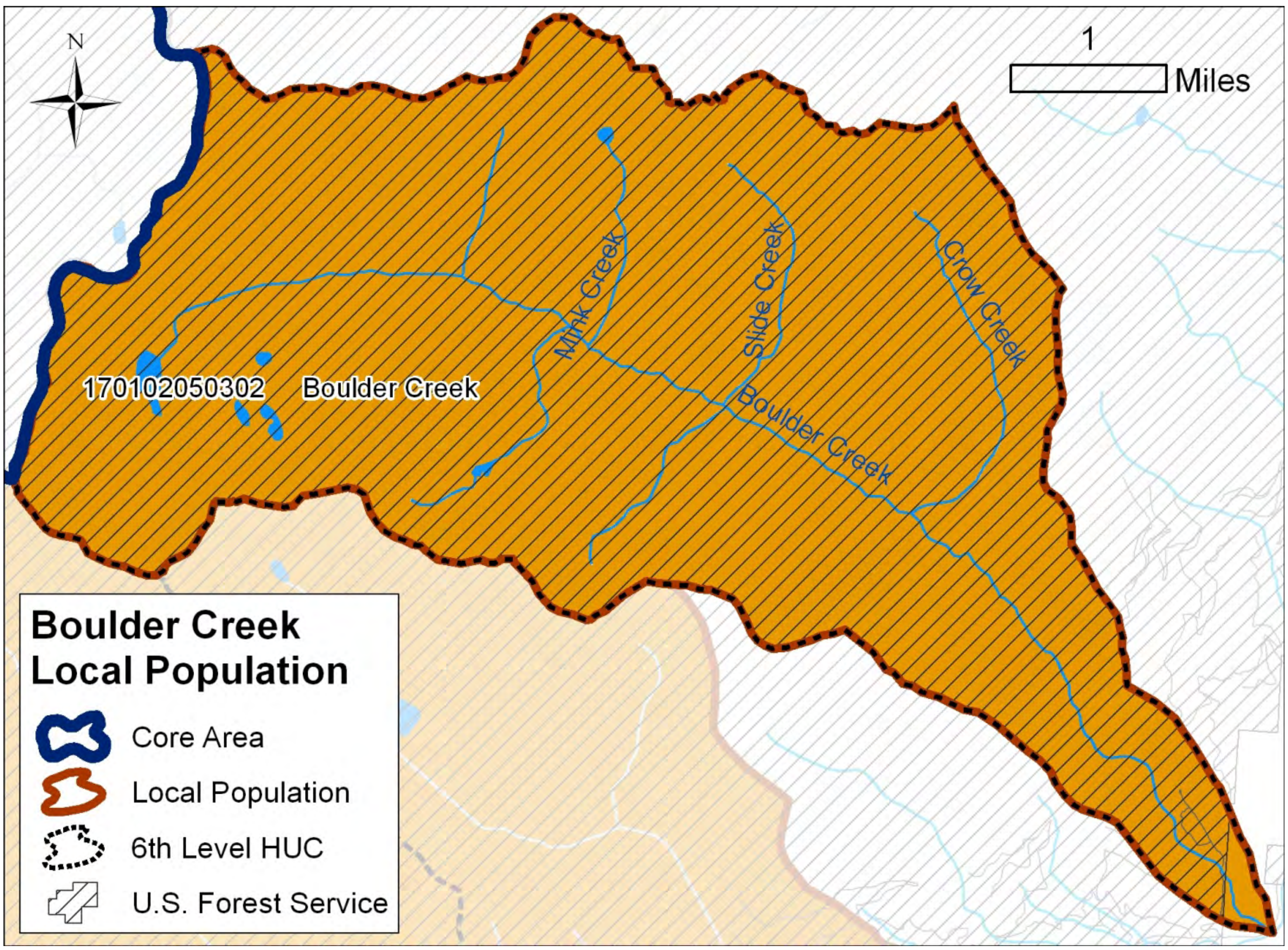
Number of bull trout and brook trout captured in 1000 feet of the Nez Perce Fork at river mile 9.8.	Number of bull trout and brook trout captured in 700 feet of the Nez Perce Fork at river mile 11.8.





Local Population: Boulder Creek

Figure 6-19. Boulder Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 6-6. Boulder Creek Local Population Summary

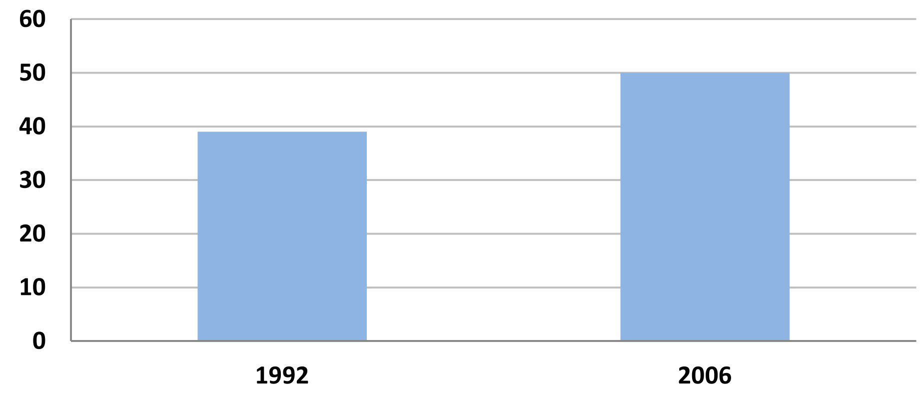
# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
500-1000 (residents) 0? (migratory)	Unknown/ Stable	Resident dominant. Migratory fish not found, a few migratory fish could be present provided they are able to swim through the West Fork Highway culvert, which is questionable	None, but suitable habitat is present	None presently known, a few non-natives may occur in the lower 0.5 miles on private land – it has not been surveyed Threat = Low, will increase if the culvert barrier under the West Fork Highway is eliminated because brown and rainbow trout are common in the West Fork
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Moderate significance – one of only four large tributaries to the West Fork below Painted Rocks Dam		High vulnerability – suitable habitat is limited to 4.8 miles due to culvert barrier under the West Fork Highway (river mile 0.0) and natural falls at river mile 4.8		The only relatively strong population in the lower West Fork below the Nez Perce Fork. However, most (or all?) fish are thought to be residents. Only native fish have been found in the HUC.

Confidence in your assessment (H,M,L): M (need to survey on private land near mouth; know little about movement – or lack of – between Boulder Creek and the West Fork Bitterroot River)

Driving Factors Determining Bull Trout Population:

The local population is limited by: (1) a culvert barrier under the West Fork Highway at the mouth of the stream (i.e. culvert is at least a partial barrier, and possibly a complete barrier); (2) the presence of a natural waterfall barrier (Boulder Falls) at stream mile 4.8, which blocks the upstream distribution of bull trout; and (3) a natural scarcity of spawning and rearing habitat caused by the predominance of high gradient reaches and large substrates. Non-native fish have not been found in the HUC, but surveys have not been conducted in the lower half mile of Boulder Creek on private land. There could be a few brook, brown, or rainbow trout in that area because it is very close to the West Fork Bitterroot River, which has all three species. Nearly all of the Boulder Creek HUC is roadless and/or wilderness, and habitat is in reference condition. The only restoration project that needs to be implemented is to eliminate the culvert barrier under the West Fork Highway. This will be very costly because the culvert is covered by deep fill and the feasibility of constructing a temporary by-pass for highway traffic in a tight canyon is questionable. The benefits of fully reconnecting Boulder Creek to the West Fork Bitterroot River will have to be carefully weighed against the risk of invasion by non-native trout – that is why it is important to determine if any non-native fish are already present in the lower end of Boulder Creek. If they are, then eliminating the culvert barrier under the highway may not pose that big of a risk of invasion because there are already non-natives upstream of the barrier.

Figure 6-20. Number of bull trout captured in Boulder Creek



Number of bull trout captured in 1000 feet of Boulder Creek at river mile 2.0.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Boulder Creek – 170102050302

Strategy (Active Restoration, Passive Restoration, Conserve): Conserve

% Forest Service Ownership in HUC: 99.7% (47 acres of private)

Relative Contribution of Habitat in Limiting Local Population: Low

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Restoration Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	30 years	1	$500,000*	H	L
Pools	FAR	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

* = the 500k is for eliminating the culvert barrier on the West Fork Highway

Temperature: GIS rating = FA, data and professional judgment rating = FA. The temperature regime is controlled by natural processes. During "average" climatic summers, mean-maximum temperatures near the mouth of Boulder Creek typically range between 15-16° C. During hot summers, mean-maximum temperatures have ranged between 17-18° C. About 7% of the HUC has been burned by moderate or high severity fire over the past decade; non-fire ECA is 0%.

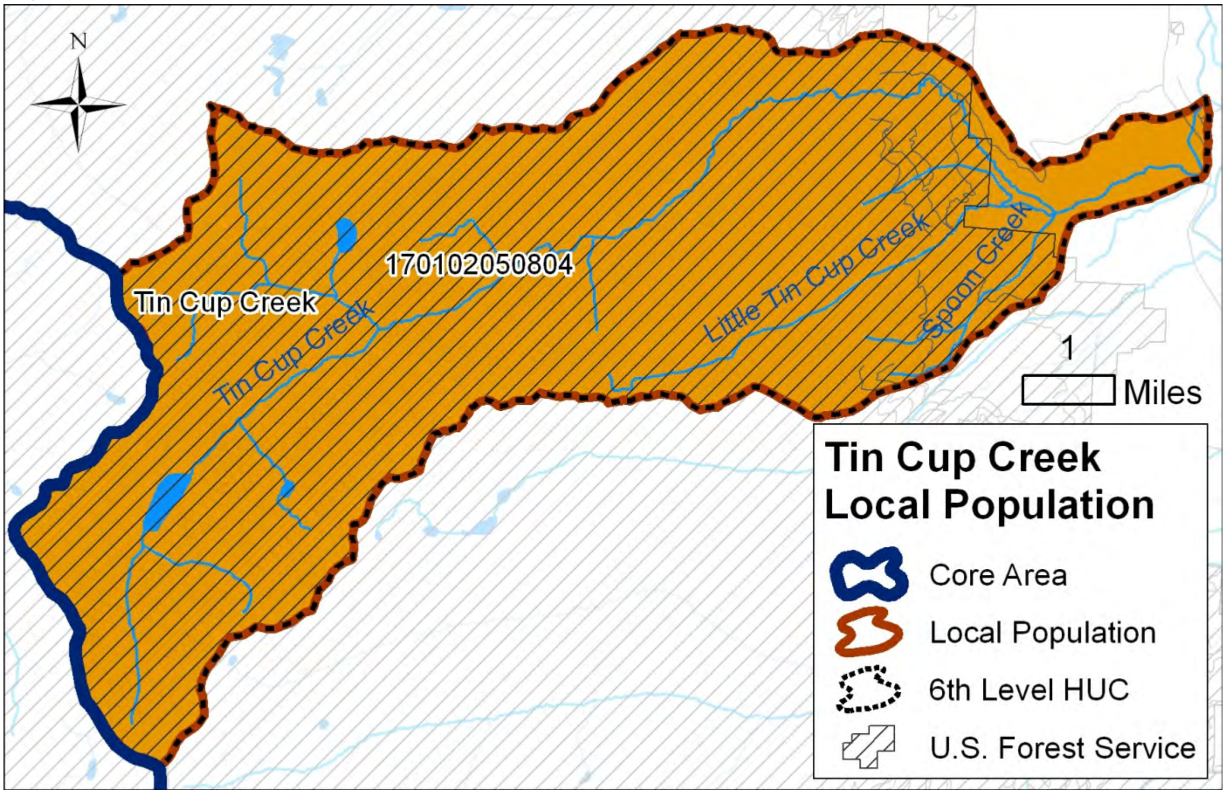
Barriers: GIS rating = FA, data and professional judgment rating = FAR. The culvert under the West Fork Highway (river mile 0.0) is the only man-made barrier in the HUC; however, it is a major one because it may isolate the entire drainage and blocks all or most fish attempting to enter Boulder Creek from the West Fork Bitterroot River. The barrier should be eliminated, but the logistics of replacement will be very costly and difficult.

Pools: GIS rating = FAR, data and professional judgment rating = FA. Pool habitat is controlled by natural processes. Habitat surveys indicate that pools are common throughout the HUC and pool quality is good. Pools are formed by a combination of boulder steps (A reaches) and large wood (B and C reaches). The USFS Sam Billings Campground and its access road (Road 5731) that are located in the lower end of the HUC have insignificant impacts on pools and large wood recruitment.

Sediment: GIS rating = FA, data and professional judgment rating = FA. The sediment regime is controlled by natural processes; hiking trails have negligible influence. A granitic watershed which makes it somewhat sandy, but levels are natural and controlled by natural processes.

Local Population: Tin Cup Creek

Figure 6-21. Tin Cup Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 6-7. Tin Cup Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
500-1000 (residents)	Stable	Resident, Fragmented	None known	Brook and Brown Threat = High Brook overlap with bulls for 6 of 7 occupied miles.
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Moderate significance – between north and south extremes.		High vulnerability due to habitat fragmentation, specifically connection with other local populations, and overlap with brook trout.		Possibly strongest west-side (Bitterroot Range) population besides those in West Fork.

Driving Factors Determining Bull Trout Population:

Key limiting factor is the lack of connectivity to the rest of the core area and non-native brook and brown trout overlap. The Clark Fork Coalition and the Tin Cup County Water and Sewer District are working on increasing storage and improving flow (connectivity) by cooperatively improving the headwater dam at Tin Cup Lake and screening one of the largest two diversions from the lower creek.

Confidence in your assessment (H,M,L): L. Electrofishing and snorkeling in 2010 found very few bull trout. Low conductivity compromises electrofishing effectiveness.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Tin Cup Creek – 170102050804							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 95%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FAR	FA	2 years	3	$20,000	L	M
Barriers[1]	FAR	FA	2 years	1	$100,000	M	H
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: FA. Road density is low (83% Wilderness) and ECA is 2% (only small fires).

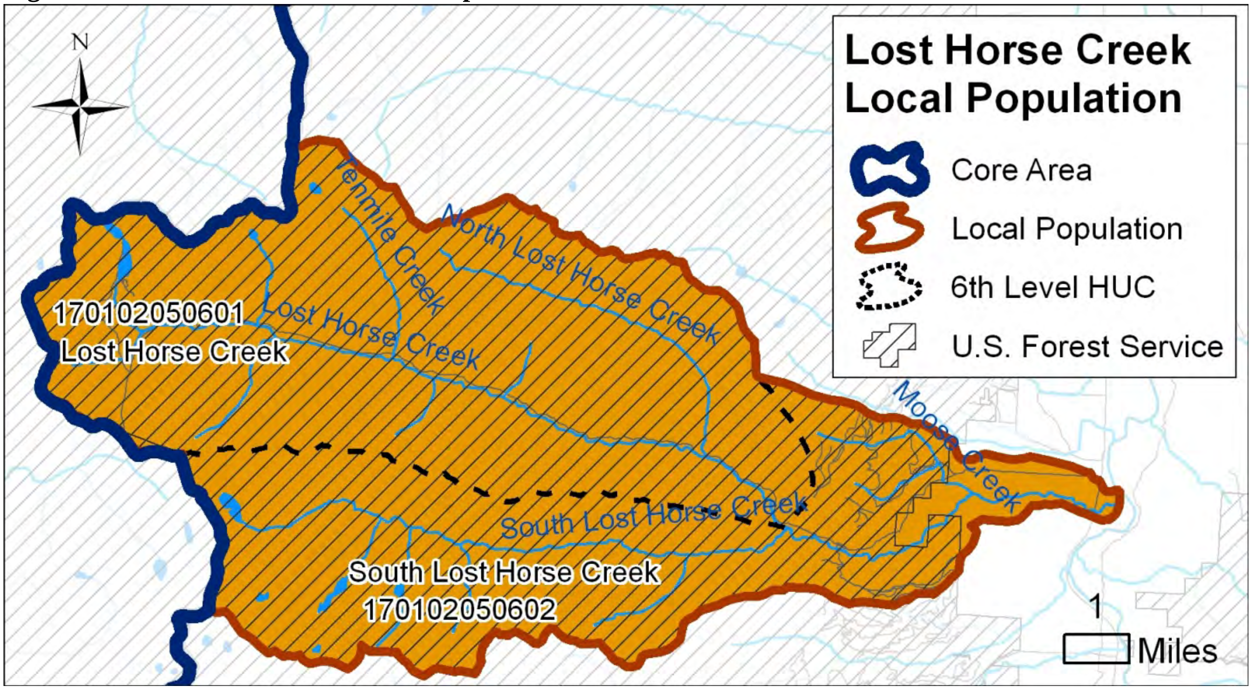
Barriers: One barrier to WCT has been identified in the headwaters (Spoon Cr) and NEPA has been done for removal after planned timber harvest. ***More importantly***[1]: The Clark Fork Coalition and the Tin Cup County Water and Sewer District are working on increasing storage and improving flow (connectivity) by cooperatively improving the headwater dam at Tin Cup Lake and screening one of the largest two diversions from the lower creek. Estimated cost may be more for assisting as a partner, planning, and monitoring than for implementation costs.

Pools: FA.

Sediment: FA.

Local Population: Lost Horse Creek

Figure 6-22. Lost Horse Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 6-8. Lost Horse Creek Local Population Summary

<table>
<tr><th># Spawning Adults</th><th>Short-Term (5yr) Pop Trend</th><th>Life History, Connectivity</th><th># Known Spawn Reaches</th><th>Nonnative Species, threat</th></tr>
<tr><td>50-250 (residents)</td><td>Stable</td><td>Resident, Fragmented</td><td>None known</td><td>Brook trout
Threat = high</td></tr>
<tr><th colspan="2">Significance of geographical location</th><th colspan="2">Vulnerability to Climate Change</th><th>Unique Population Attributes</th></tr>
<tr><td colspan="2">Moderate significance – fluvial component thought to be absent.</td><td colspan="2">High vulnerability due to habitat fragmentation, specifically connection with other local populations. Also limited habitat upstream at higher elevation.</td><td>Length of occupied stream is limited to about 3 miles, but bull trout appear to be geographically separated from brook trout (2008 data).</td></tr>
</table>

Driving Factors Determining Bull Trout Population:

Key limiting factor is the lack of connectivity to rest of core area. Secondarily, non-native brook trout downstream probably impact the genetic purity and distribution of bull trout. There are migration problems in late summer, downstream of this HUC and the Forest boundary.

Twin Lakes in headwaters of Lost Horse Creek are stocked annually with westslope cutthroat trout. Water releases from the lakes is managed for agriculture, the effect of the releases are unknown.

Confidence in your assessment (H,M,L): M (information on the number of adults and population trends are especially weak)

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lost Horse Creek – 170102050601							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	1 year	3	$10,000	L	M
Barriers	FAR	FAR	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FAR	FAR	-	-	$0	-	-

General Note: Forest Road 429 is the primary access road in the long narrow canyon. The road is very popular as it extends to the Idaho border, further into the Bitterroot Range than other motorized access between Lolo and Darby, MT. The paralleling road is in close proximity to the stream in a few locations. Almost eight miles of the 28 miles of perennial stream are within 300 feet of a road. The location of Rd. 429 is also unlikely to change because of the narrow valley and steep rocky topography. Condition and maintenance of the road has improved considerably in the last decade.

Temperature: FAR. The effect of the road on diminishing shade is unlikely to improve. The effect of water management at Twin Lakes is unknown, and will be investigated.

In 2009 and 2010 summer-long water temperatures were collected near the center of the section that was documented as being occupied by bull trout in 2008 (Ohio Slide section). In 2010 a few sections around the Ohio Slide section were also sampled. This data will be analyzed in the near future.

Barriers: FAR. On the Forest, in this hydrologic unit, there is only one 2nd order barrier: at Tenmile Creek. Repairing this very steep crossing would have no beneficial effect on bull trout. Natural stream gradient is assumed to limit the upper extent of bull trout distribution. This Condition should be rated as FA for this hydrologic unit, but FAR may be a better description of the situation in the Lost Horse Creek watershed because of irrigation withdrawal effects downstream (see HUC 170102050602).

Pools: FAR. Large wood that creates stream complexity and quality pools may be slightly reduced as a result of the road that allow the public access to firewood cutting. The HUC is closed to firewood cutting, but there is some cutting by campers, and illegal firewood collecting. Road in the narrow canyon is very popular and not likely to change in its location. There is little to do to improve the current situation. Placement of large wood might be a short-term improvement in the parts of the stream that are lower gradient.

Sediment: FAR. The roads in the drainage have been incrementally improved over the last 10 years. A closure is implemented in the spring and early summer every year to control traffic until the road is capable of handling traffic. Paving the road has been discussed, but would likely lead to dramatic increase in use. The positive effect of a reduction in sediment would probably be offset by an increase in other destructive human activities (dispersed camping, firewood gathering, OHV use).

Substrate sampling and monitoring may actually show that this stream is at or near FA for levels of fine sediment. The glacially scoured geology is generally resistant to erosion, and the stream's water is rarely, if ever, substantially clouded by fine sediment.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): South Lost Horse Creek – 170102050602							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 92%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA*	FA	0 years*	3	$100,000	L	M
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

General Note: This HUC includes the South Fork Lost Horse, and mid and lower mainstem Lost Horse Creek, where most human activity occurs. Bull trout have not been observed in this part of the main Lost Horse Creek, but are likely to use this section as a migratory route.

The effect of the South Fork headwater lake, Fish Lake reservoir, and the rainbow trout in it is unknown, and could be investigated. In Fish Lake, rainbow trout are self-sustaining and the only species known to be that high in the system. Fish Lake is dammed, but water is not managed. There are concerns with the long-term stability of Fish Lake Dam.

There is very little overlap with brook trout in the South Fork, and less than 2 miles of known occupied bull trout habitat.

Temperature: FAR. Roads in the canyon are very popular and their density and locations (hence their effects) are not likely to change dramatically. According to the baseline there are 2.2 miles of roads with 300 feet of the almost 20 miles of perennial stream.

There is little if any affect from the 11% of land in an active cattle allotment. Dispersed camping and horseback riding has more, but still minor affect.

Barriers: FA. This should be **FAR**. During spring run-off the combination of a confined channel and diversion dam at the BRID Supply ditch diversion (near the Forest boundary) may be a seasonal barrier. Although not a barrier, the BRID supply ditch that leaves Lost Horse near the FS boundary is known to be a spawning ground for brook trout and takes a large amount of water for an extensive time period and is not screened. The FS discretion over this water diversion is limited as it may be an "Outstanding Right." The Forest Service's authority to condition use of an outstanding right is limited to those conditions which the Forest Service determines to be needed to prevent unacceptable or unnecessary impacts to National Forest System lands and resources (Policy 2730).

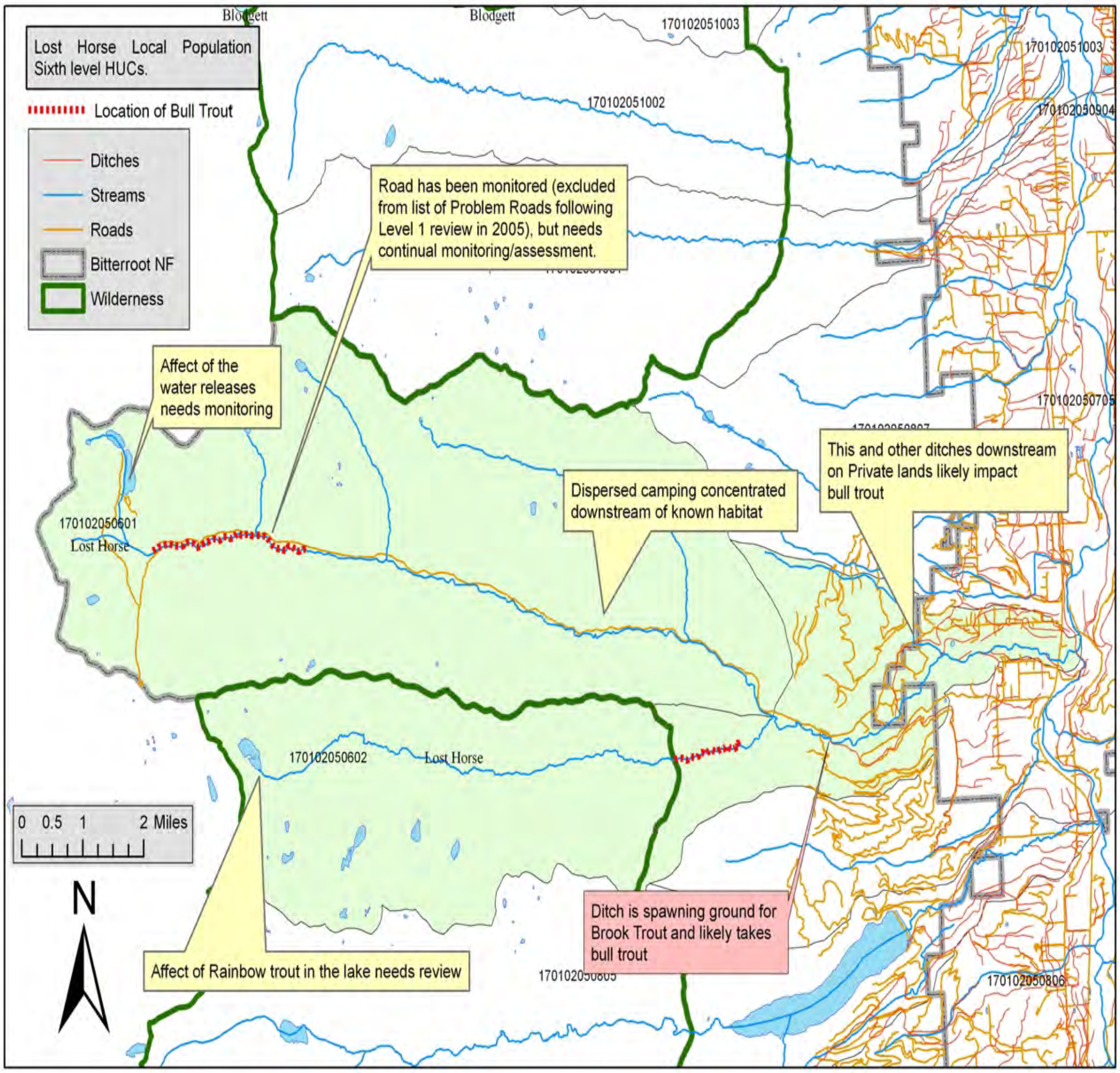
A thermal barrier may occur during the late summer near Hwy 93 as flows are reduced to a fraction of the flows above the Forest boundary.

The timeframe and cost to fix these issues is left vague because of the lack of Forest discretion regarding the diversions and low-head dams.

Pools: FA. The drainage is closed to firewood cutting, and because of its popularity the closure appears to be somewhat effective. Campers cut small amount of firewood and relatively minor amounts of illegal firewood cutting have minor localized effects.

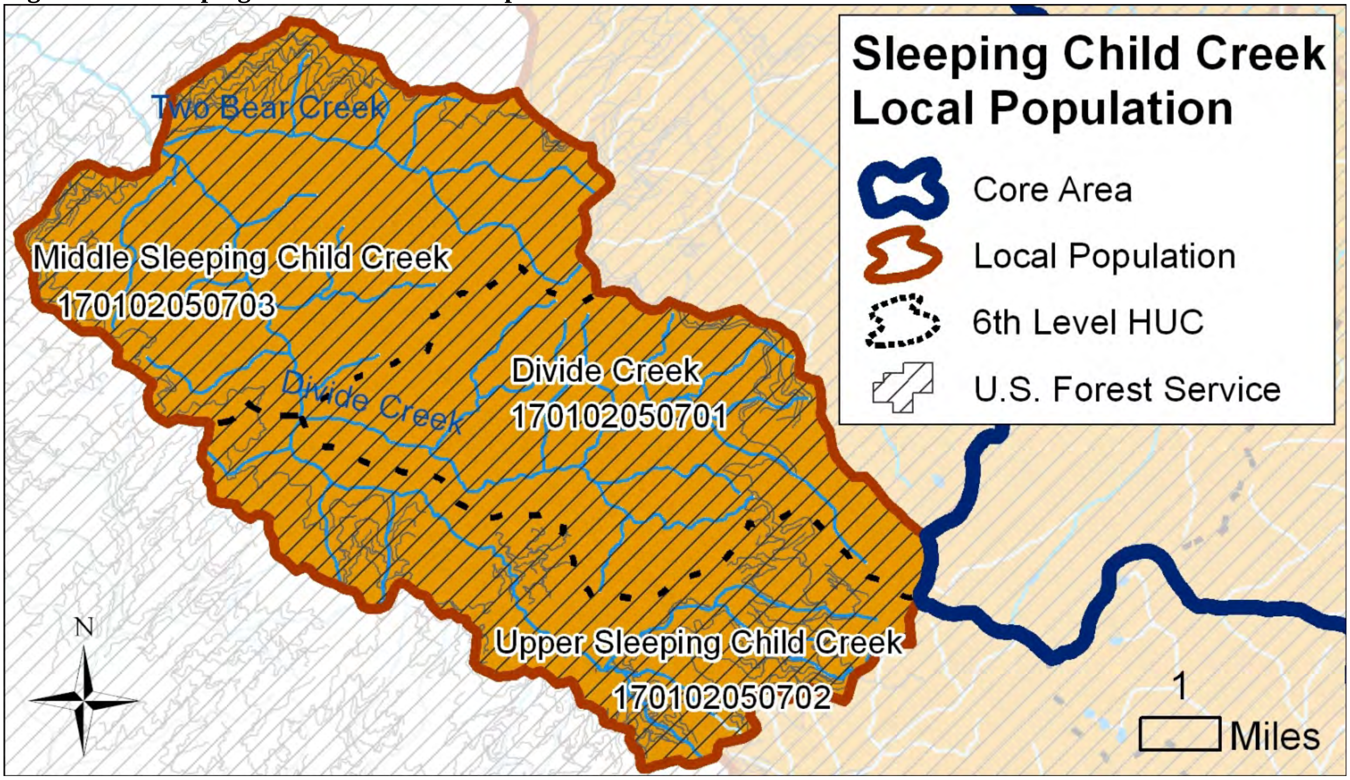
Sediment: FA.

Figure 6-23. Map of Lost Horse Local Population, Including Roads & Ditches



Local Population: Sleeping Child Creek

Figure 6-24. Sleeping Child Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 6-9. Sleeping Child Creek Local Population Summary

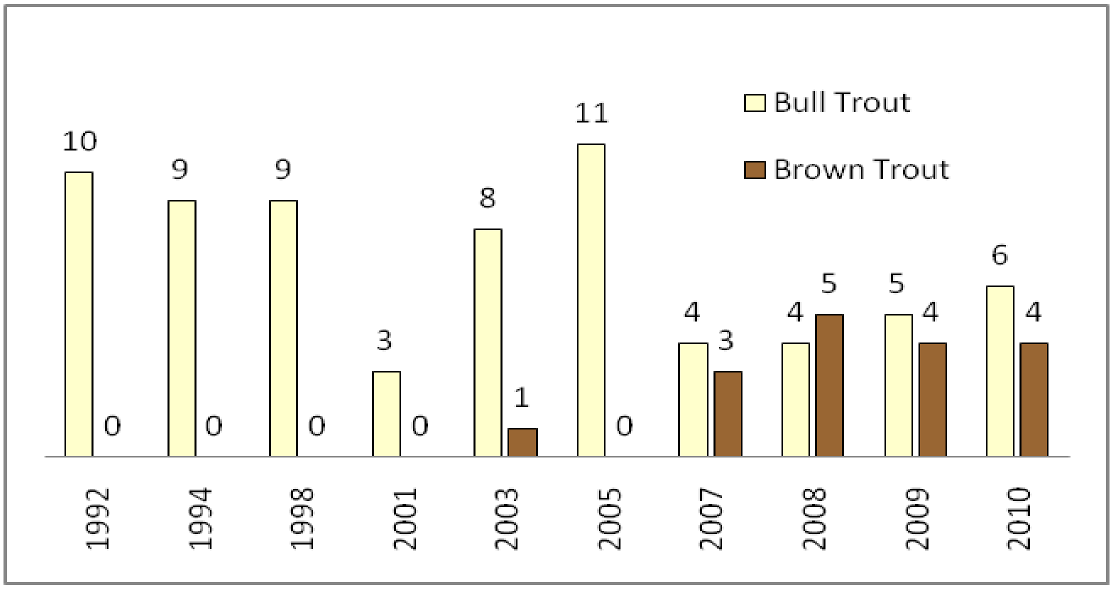
# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
250-500 (residents)	Stable/declining	Resident, Fragmented	None known	Brook and Brown Threat = High Browns increasing at RM 10.2
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Moderate significance – fluvial component thought to be absent, Adjacent to Skalkaho		Moderate vulnerability due to habitat fragmentation, specifically connection with other local populations.		Length of occupied stream is substantial.

Driving Factors Determining Bull Trout Population:

Key limiting factor is the lack of connectivity to the rest of the core area. Non-native brown trout appear to be increasing, which is a substantial concern. Lower reaches are warm in summer, and one diversion dam on private land is blocking upstream fish passage. Local landowner claims brown trout navigate the ditches and circumvent the barrier at the private diversion dam.

Confidence in your assessment (H,M,L): M (limited knowledge regarding the movement of fishes between the river and Forest)

Figure 6-25. Number of trout captured in Sleeping Child Creek



Number of bull trout and brown trout captured in 1000 feet of stream in Sleeping Child Creek, near the historical gauging station (RM 10.2).

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Divide Creek - 170102050701

Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration

% Forest Service Ownership in HUC: 100%

Relative Contribution of Habitat in Limiting Local Population: High

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Restoration Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FAR*	-	-	$0	L	L
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

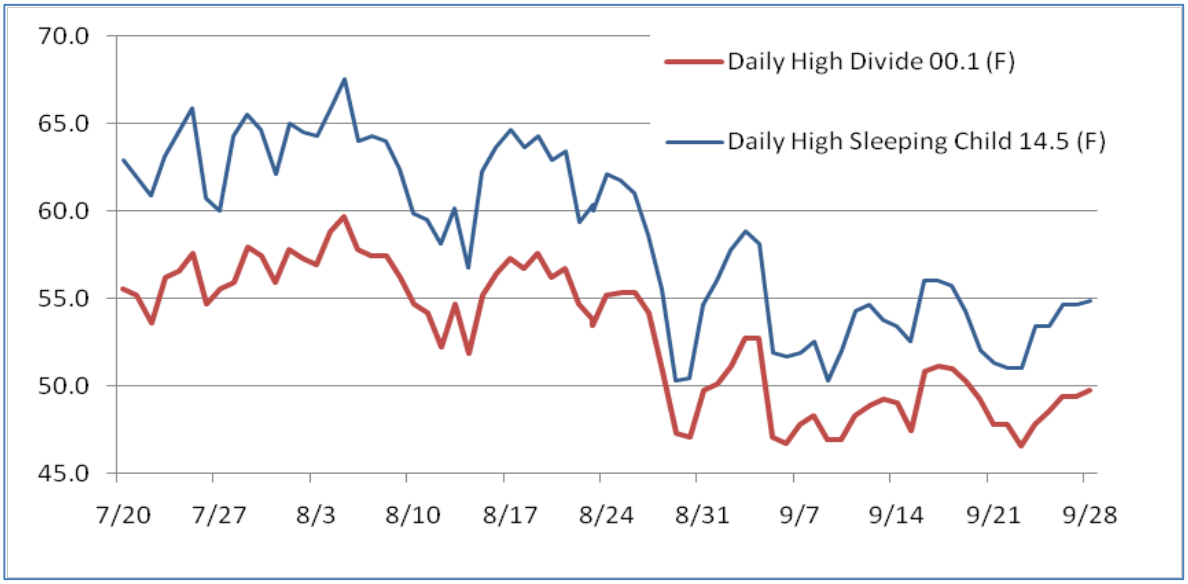
Temperature: ECA is calculated to be 11% from 2000 fires, and roads have little impact on temperature (86% roadless). Two closely spaced temperature loggers were placed in the drainage in 2009 and 2010, one near the mouth of Divide Creek and one in Sleeping Child. They indicated very high mid-summer daily highs (~67F) in one stream, but not the other. The cause is unknown and will be retested in 2011. Electrofishing in these same areas in the heat of the summer (July 28, 2010) indicated low densities of cutthroat and bull trout at both sites.

Barriers: FA. However, a barrier to WCT was identified in the headwaters (at Rd. 75) in 2009. It has no effect on bull trout.

Pools: FA.

Sediment: FA.

Figure 6-26. 2010 Temperature Data for Sleeping Child Creek



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Sleeping Child Creek – 170102050702							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FA	5 years	2	$300,000	L	H
Barriers	FA	FA	10 years	3	$100,000	L	H
Pools	FAR	FA	5 years	3	$10,000	L	L
Sediment	FUR	FA	5 years	2	$1,000,000	L	H

Temperature: FUR. Road density is high (acquired Darby Lumber Lands) and ECA is 23% from 2000 fires. Monitoring has shown that mid-summer daily highs in upper Sleeping Child are in the in the mid-60s, this is warmer than expected. Divide Creek, a tributary with similar elevation, drainage area, and aspect, is much cooler.

The Forest watershed resource group is currently leading NEPA analyses on the acquired heavily roaded lands, so the timeliness to implement restoration projects is high. The response by fishes is likely to be long-term (slow).

Barriers: FA. However, 2 barriers to WCT were identified in the headwaters (in the Deer Meadows area) in 2009.

Pools: FAR. Natural riparian growth, with limited restoration opportunities along near-stream roads is expected to improve this indicator.

Sediment: FUR. The Forest watershed resource group is currently leading NEPA analyses on these acquired lands, so the timeliness is high. Removal of a ford in upper sleeping Child Creek is included in most alternatives of the ongoing travel planning NEPA.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle Sleeping Child Creek – 170102050703							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	3	$50,000*	L	L
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FAR	FA	10 years	3	*	L	L

General Note: Several first order drainages experienced slides and debris torrents in this section following the 2000 fires. Dramatic changes in channel alignment were caused by large amounts of sediment and wood entering the channel. The "current baseline condition" in the table above does not account for the magnitude of the slides and torrents. Brown trout have been seen more often since 2000.

Temperature: FAR should probably be FUR, based on observation of pools that formed behind debris jams. These pools are exposed to the sun as they are within the 2000 burned area. Road density is high (2.1 mi/sq. mi), but most roads are not near streams (baseline spreadsheet reports that two miles of stream is within 300 feet of road). ECA is 26%, mostly a result of the 2000 fires.

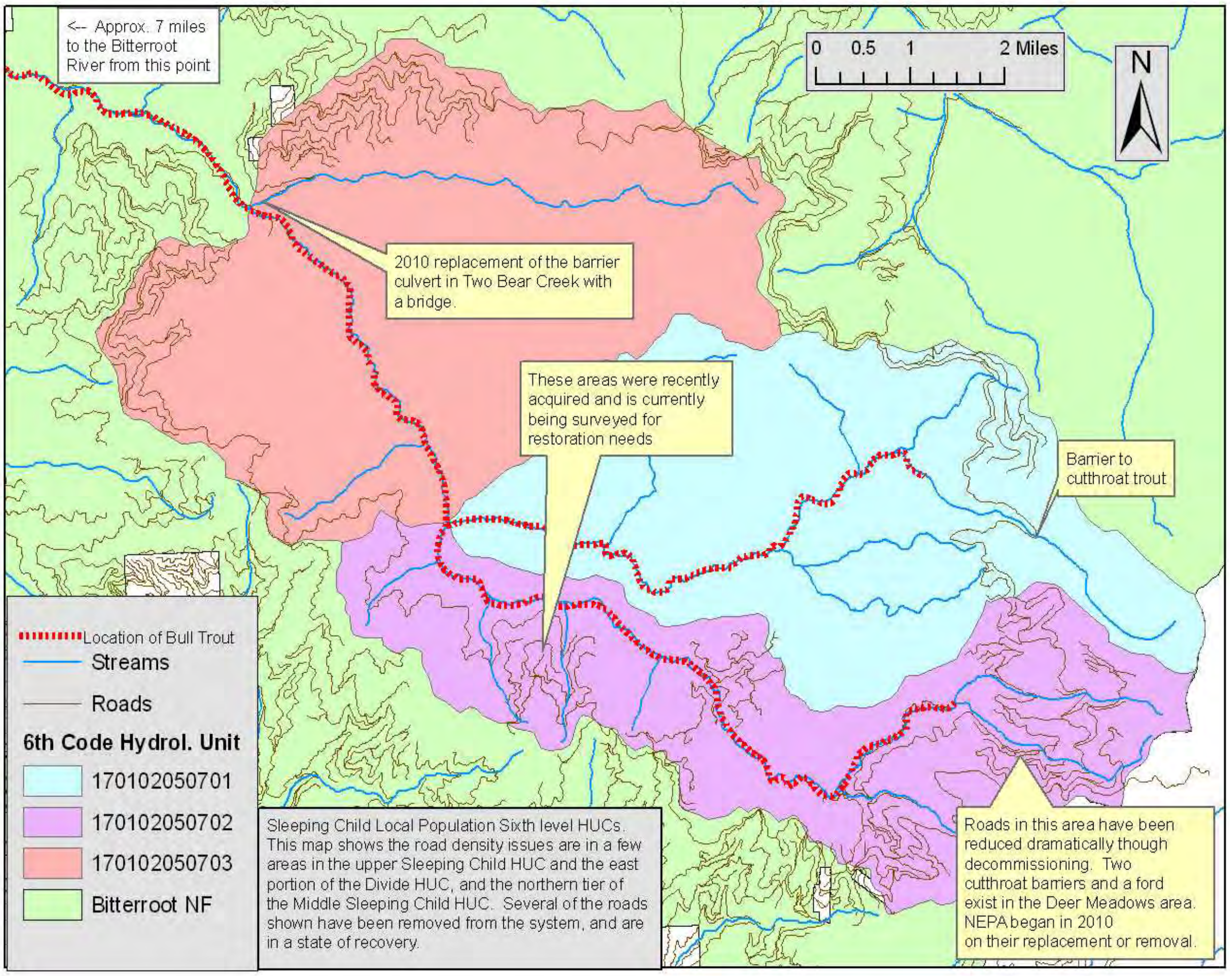
The long timeline and relatively low cost of restoration is based on the premise that most of the restoration will occur naturally as the burned area becomes forested.

Barriers: FA. One major barrier (associated with water diversion) on private land exists downstream, in the lowermost HUC.

Pools: FA. The stream does seem to have a clumpy, but adequate supply of large wood. Except for lower Two Bear Creek, there is not much access to the RHCA for illegal firewood gathering.

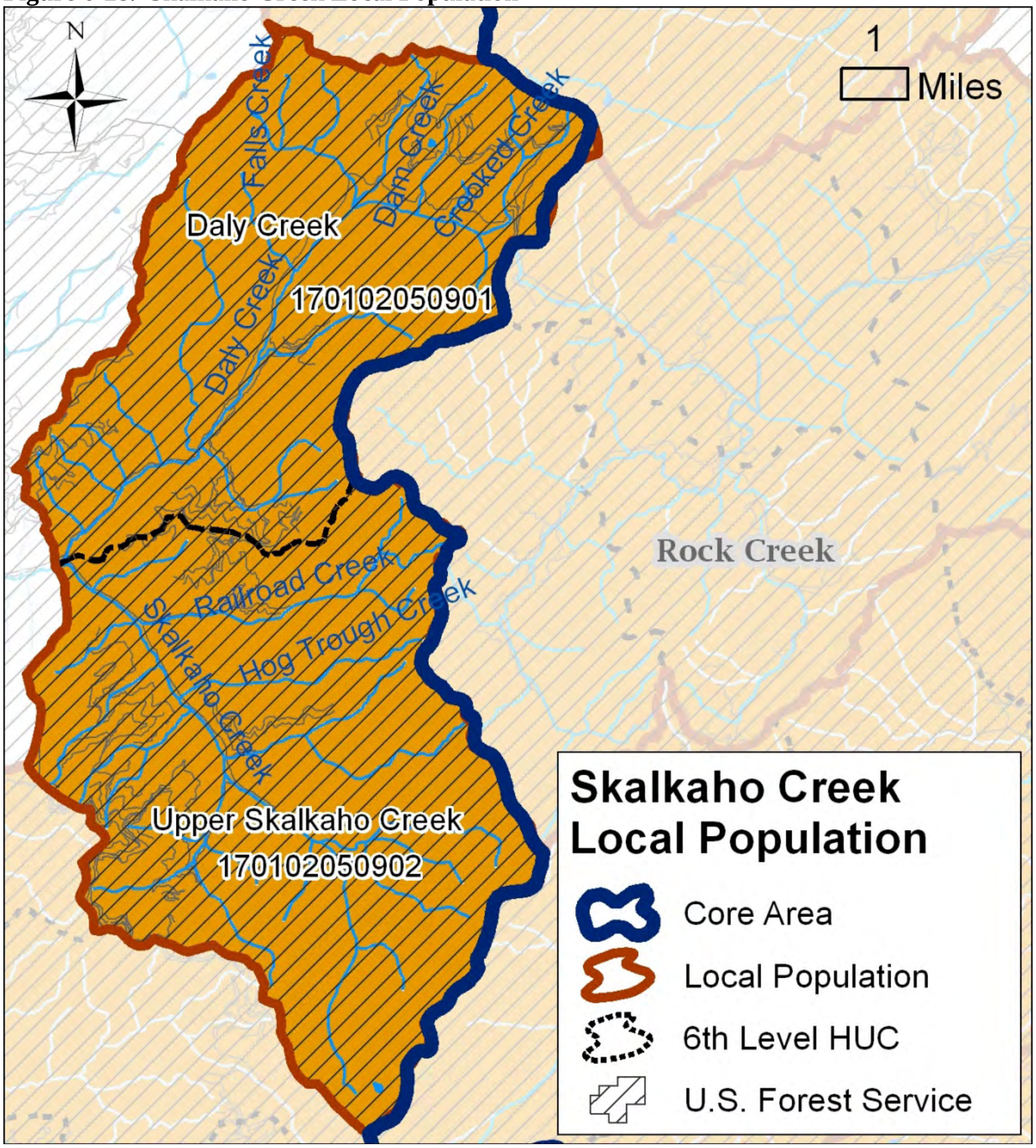
Sediment: FAR should probably be FUR, based on observation of pools that formed behind debris jams. These pools have filled with fine sediment from the debris torrent first order drainages. Road density is high (2.1 mi/sq. mi) and ECA is 26% from 2000 fires. The road density may need to be reevaluated as several roads in the Two Bear drainage have been decommissioned. Also, as depicted on the map, the majority of the roads are not along major streams. The Darby Lumber Lands NEPA process, being initiated in 2011, will address the most problematic roads in the drainage. See notes and costs in temperature.

Figure 6-27. Map of Sleeping Child Creek Local Population, Including Roads



Local Population: Skalkaho Creek

Figure 6-28. Skalkaho Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 6-10. Skalkaho Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1000+ (residents)	Stable	Resident, Fragmented	1 Daly Creek RM 3.3 to 4.3	Brook and Brown Threat = Medium

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Moderate significance – fluvial component thought to be absent, extensive stream length (15 miles) with resident population	Moderate vulnerability due to habitat fragmentation, specifically connection with other local populations.	Length of occupied stream is substantial. Daly Creek has an unusually high population of bull trout.

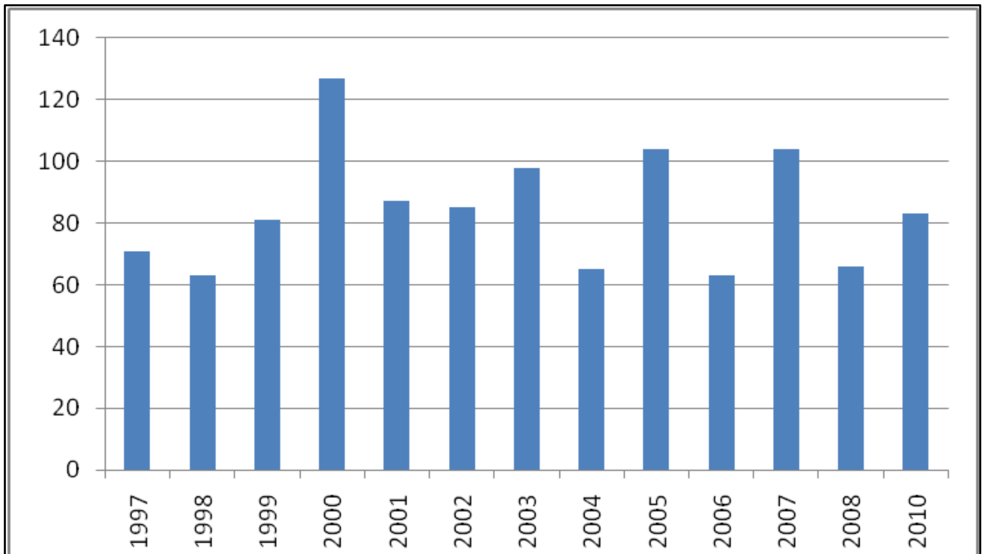
Driving Factors Determining Bull Trout Population:

Key limiting factor is the lack of connectivity to the rest of the core area. Lower reaches, are warm and dewatered in late summer as diversions on private become more substantial. Two of the valley's largest irrigations systems (Hedge and Republican) have been recently siphoned under Skalkaho to avoid mixing water and blocking downstream movement. The BRID system has had a siphon for years. Upstream movement is still problematic and is complicated by non-native fish access risk.

DNA extracted from fin clips taken from char sampled in 2008 found that 2% were bull x brook trout hybrids in Daly Creek, and 11% of the samples in upper Skalkaho were bull x brook trout hybrids (Leary note to Clancy, Oct. 2009).

Confidence in your assessment (H,M,L): H

Figure 6-29. Population Estimates for Bull Trout Greater than 5"in Skalkaho Creek



Population estimates for Bull Trout greater than 5" for 1000 feet of stream at Skalkaho river mile 16.8.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Daly Creek - 170102050901							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	2	*	L	M
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FA	10 years	2	$10,000	L	M
Sediment	FUR	FA	10 years	2	$200,000*	L	M

Temperature: The most offensive road in the Daly Creek drainage is State Hwy 38. Although the paving in the lower few miles improved the situation greatly, it still has many negative influences on the stream. ECA is 14% from 2000 fires and timber harvest.

Barriers: FA. This would be FAR if there was consideration for barriers on non-FS lands in the Baseline analysis, because there is one 2nd order barrier under state highway 38. Major barriers exist in lower Skalkaho (in the downstream-most HUC). Those are associated with water diversions on private land. Major state and federal investments have been made to partially rectify the situation.

Pools: Generally pools appear to be near natural levels. LWD is cut along Hwy 38 along lower few miles of Daly Cr. This is partially a result of road hazard management, but more significantly is the action of illegal firewood collectors.

Sediment: The most offensive road is State Hwy 38 (not included in cost estimate), but several other small roads and dispersed sites, that are under the discretion of the FS need attention.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Skalkaho Creek – 170102050902							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	20 years	2	*	L	M
Barriers	FUR	FA	5 years	1	$100,000	L	H
Pools	FAR	FA	20 years	2	$20,000	L	M
Sediment	FUR	FA	20 years	2	$200,000*	L	L

Temperature: FAR. Almost 1/3 of the stream is within 300 feet of roads. ECA is 17% from 2000 fires and timber harvest. The main paralleling road (FS #75) is a major route and its location is unlikely to change much in the foreseeable future

Barriers: The 3rd order barrier is the (partial) barrier on Rd 75 in Skalkaho Cr. It is currently scheduled for survey and design. Major barriers exist in lower Skalkaho (associated with water diversions) on private land, but major investments have been made to partially rectify the situation.

Pools: Generally pools appear to be near natural levels. LWD is cut along roads as firewood even though it is clearly illegal on maps and permits. Investment in public education, enforcement, and signing may help.

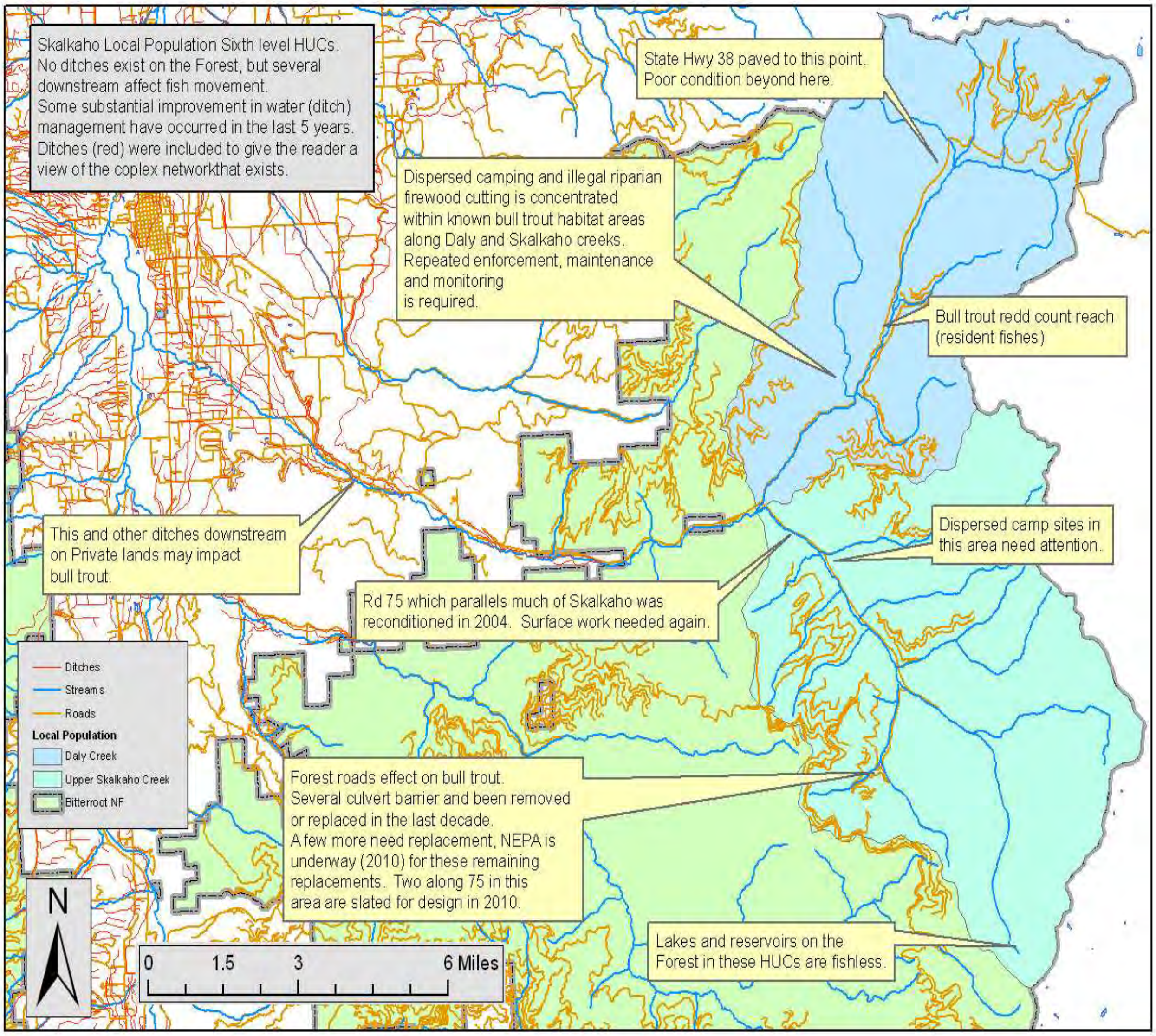
Sediment: Several roads and dispersed sites need attention. Roads and their crossings have been evaluated and improved in the last decade. Ongoing travel planning, implementation of that plan, and updating the minimum road system for the drainage are likely to be completed in the next few years.

Two specific areas for consideration are elimination of the 711 road along Railroad Creek (which would be controversial) and riparian restoration of a short segment of Hog Trough Creek.

Dispersed sites are generally being maintained at their current size. Their effect is minor, but cumulative and chronic. Maintenance of them is done with a combination of recreation (cleaning) and fisheries (motor vehicle barrier placement and replacement, and revegetation) funds.

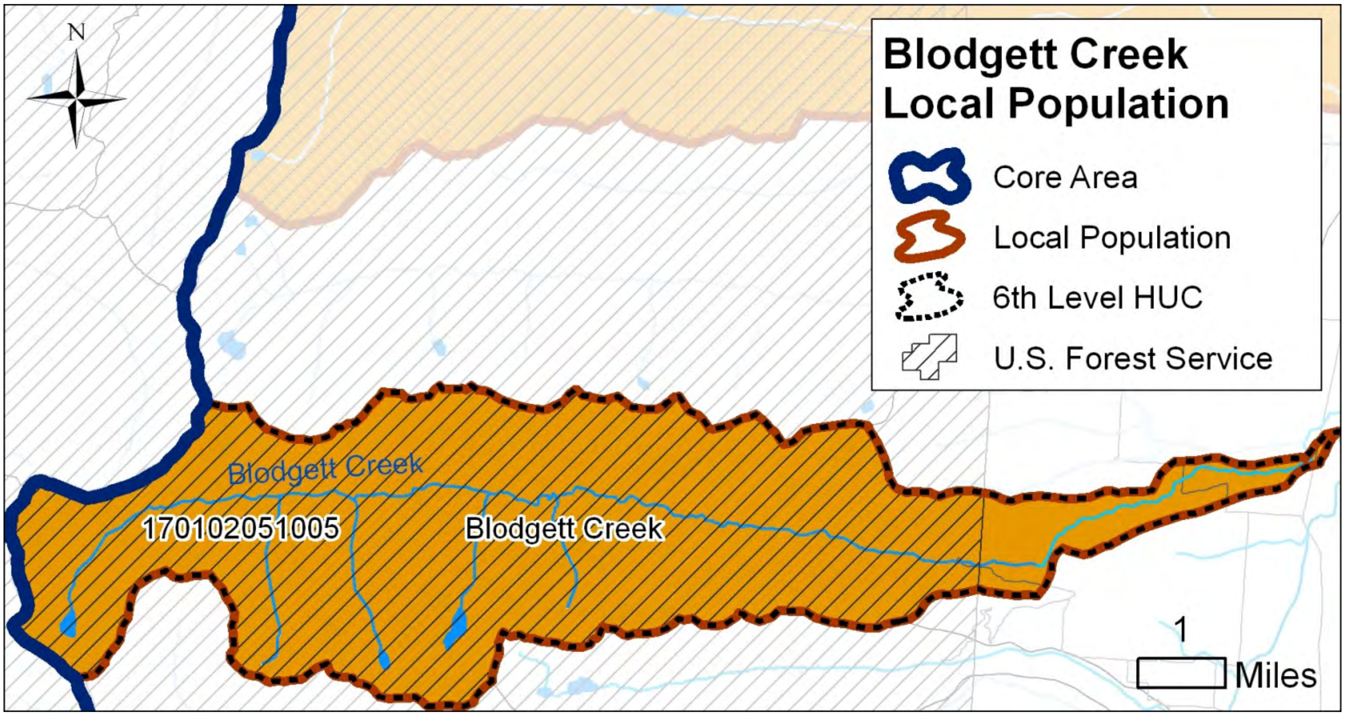
Timeliness was listed as low in the table above because of the need to complete travel planning, and then other NEPA before possibly implementing most of these projects.

Figure 6-30. Map of Skalkaho Creek Local Population, Including Roads & Ditches



Local Population: Blodgett Creek

Figure 6-31. Blodgett Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 6-11. Blodgett Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250 (residents) 0-50 (migratory)	Unknown/ stable	Resident, Fragmented, Rare migrant	None known	Brook, Brown, Rainbow. Threat = High
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Moderate significance – fluvial component hanging by a thread, moderately strong resident pop with non-natives present.		Extreme vulnerability due to fragmentation and falls blocking upstream movement into cooler water.		Snorkelers occasionally find one or two large migratory fish. Resident component seems to be stable (although trend data is insufficient to say for sure).

Driving Factors Determining Bull Trout Population:

Key limiting factors are the lack of connectivity to the rest of the core area and the effect of non-native species. Downstream of FS boundary on private lands, the stream becomes warm and dewatered, adding complication to reconnecting stream with Core Area.

The influence of brown trout has become more of a concern. Although they may not interbreed with bull trout like brook trout do, the brown trout may be more of a competitor with bull trout. Brown trout may be more similar to bull trout relative to the niche they occupy. Brown trout had been reported in Blodgett Creek in previous years, but in 2010 FS observed many brown trout and observed them over a mile onto the Forest. Therefore, brown trout now overlap with bull trout in approximately 50% of the recently documented bull trout habitat. In 2010, one bull trout was observed in four 300-foot snorkeling sections on the Forest, whereas 86 brown trout were observed on these sections. Consideration should be given to the idea of moving bull trout upstream of the barrier falls as a measure to offset the influence of invasive non-native trout and climate change.

Cutthroat trout were the most numerous species. High Lake in the headwaters contains rainbow trout. This non-native species could affect bull trout. FWP is considering converting the High Lake rainbow population to cutthroat. This may at least change the inter-specific competition influence to a more natural situation.

Confidence in your assessment (H,M,L): M The population trend is troubling because it is difficult to detect changes when the population size is so small and fish are widely distributed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Blodgett Creek – 170102051005							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 92%							
Relative Contribution of Habitat in Limiting Local Population: Moderate (FS = Low)							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Conditio n**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

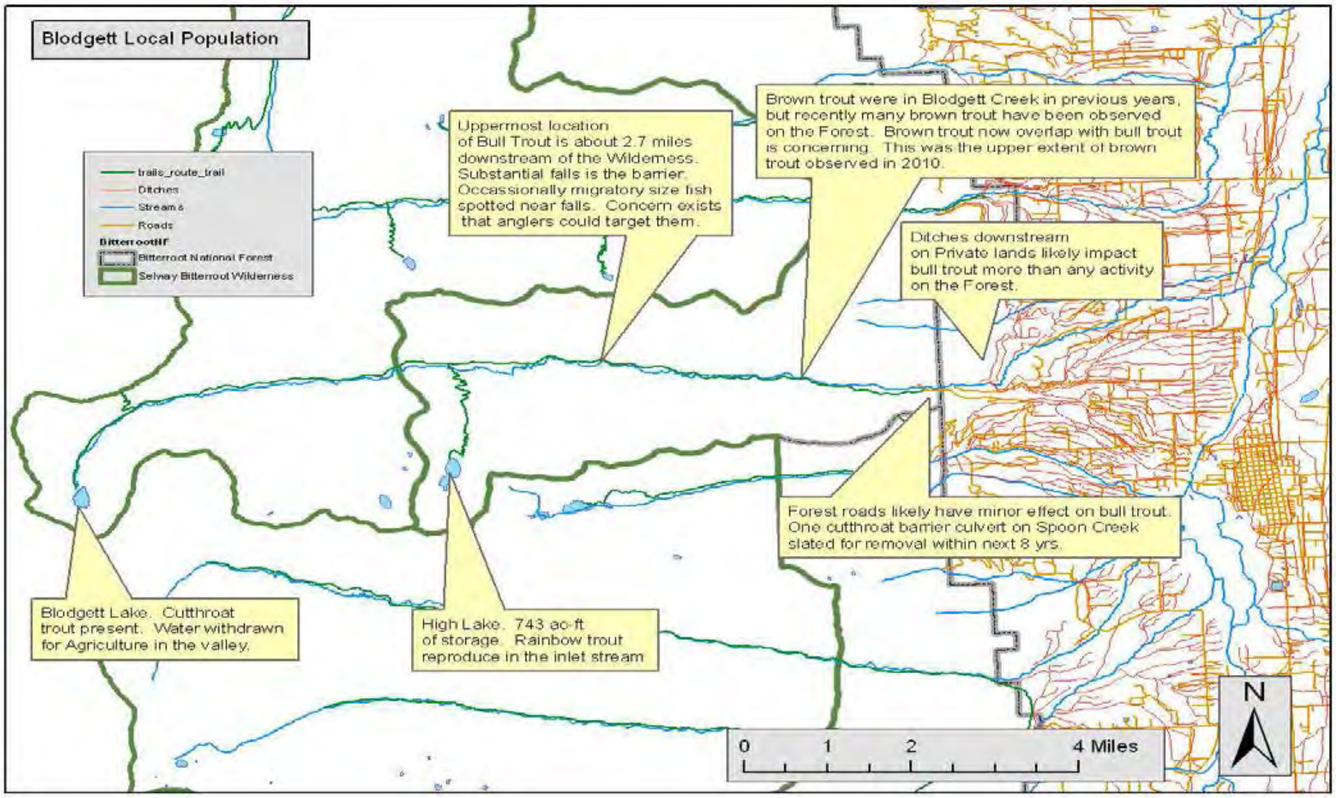
Temperature: FA. Road density is low, only 2% of perennial stream is within 300 feet of a road. The ECA is 0%.

Barriers: FA. There are no man-made barriers on the Forest.

Pools: FA. The lack of roads results in almost no impact from firewood cutting or other tree removal. There is a campground near the Forest boundary. Hazard tree cutting reduces the large wood component in the floodplain. When the trailhead was expanded a few years ago the large trees that were cut were placed in and along the stream. Some of the large wood from this project still remain, and some was carried downstream with high-water.

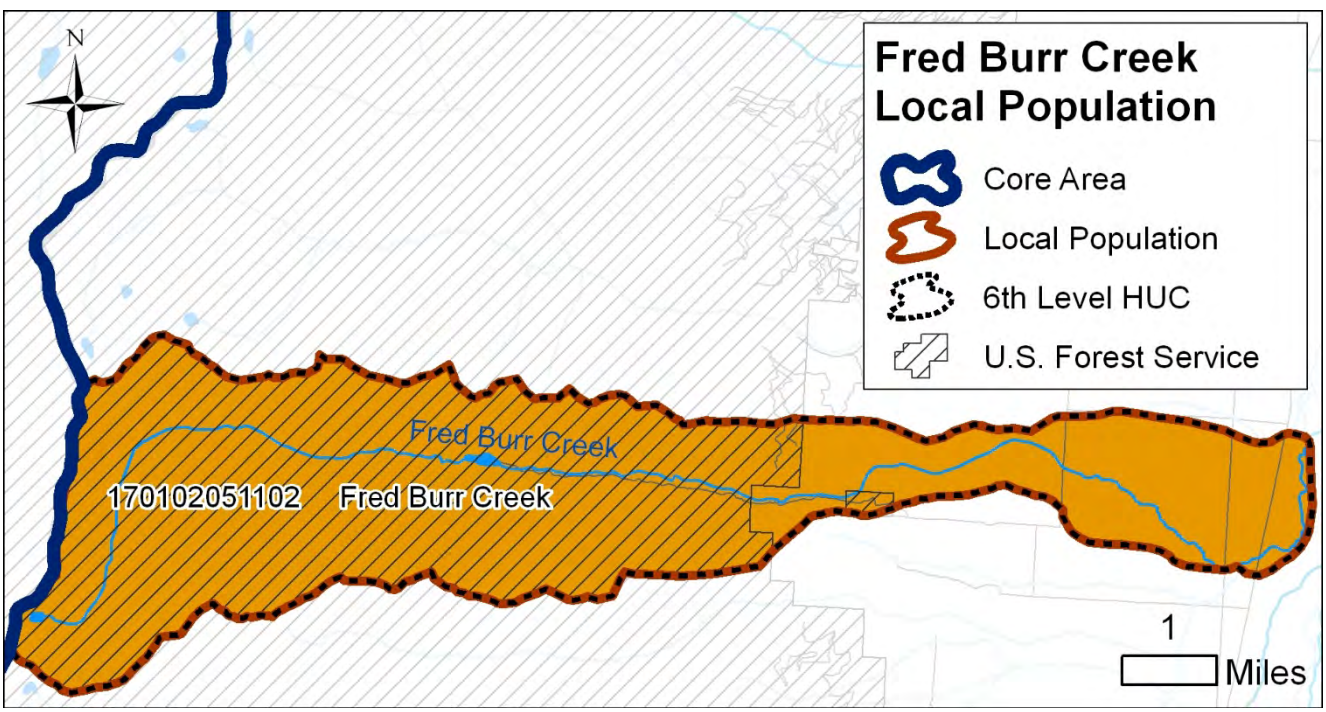
Sediment: FA.

Figure 6-32. Map of Blodgett Local Population, Including Ditches and Roads



Local Population: Fred Burr Creek

Figure 6-33. Fred Burr Creek Local Population



Relative Importance of Population to Core Area (H,M,L): L

Table 6-12. Fred Burr Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250 (residents)	Unknown/ stable	Resident, Fragmented	None known	None upstream of reservoir Downstream = Brook and Brown Threat = High

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Moderate significance – fluvial component thought to be absent, moderately strong resident population with no non-natives upstream of reservoir.	Moderate vulnerability due to habitat fragmentation, specifically connection with other local populations. Stream below reservoir appears to be a population sink. Small watershed, but main population is relatively high in watershed.	Resident component seems to be stable (although trend data is insufficient). Dam blocks non-natives, protecting part of the bull trout population from invasive species.

Driving Factors Determining Bull Trout Population:

Key limiting factor is the lack of connectivity to the rest of the core area. The reach below the reservoir gets very warm in late season as reservoir is drawn down. Diverted flows downstream, near the primary FS boundary, on private land, add complications to restoring connectivity with Core Area.

Secondarily, downstream of the Fred Burr Lake dam, non-native brook and brown trout are an issue. Brown trout, though reported to be in the creek below the dam by local water users, had not been observed during snorkeling until 2010. In 2010, fifteen brown trout were observed in the beaver dam complex 0.5 miles downstream of the dam.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Fred Burr Creek – 170102051102

Strategy (Active Restoration, Passive Restoration, Conserve): Conserve

% Forest Service Ownership in HUC: 74%

Relative Contribution of Habitat in Limiting Local Population: Moderate

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Restoration Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FA[1]	FAR	5 years	3	$50,000	L	M
Barriers	FA[1]	FAR	5 years	3	$0	-	-
Pools	FA[1]	FA	-	-	$0	-	-
Sediment	FA[1]	FAR	5 years	3	$10,000	L	L

1General Note: The GIS derived Baseline data does not capture the situation for Fred Burr Creek.

An operation and maintenance plan was requested from the DNR for the Fred Burr Lake in 2008. To the FS knowledge such a plan does not exist. It would help formulate a plan in which the effect to bull trout could be reduced.

Both the dams are included in a list of special uses being considered for Ditch Bill Easements. A Forest Service inter-regional team will research possible improvements for the fisheries related to authorization of the Ditch Bill Easement.

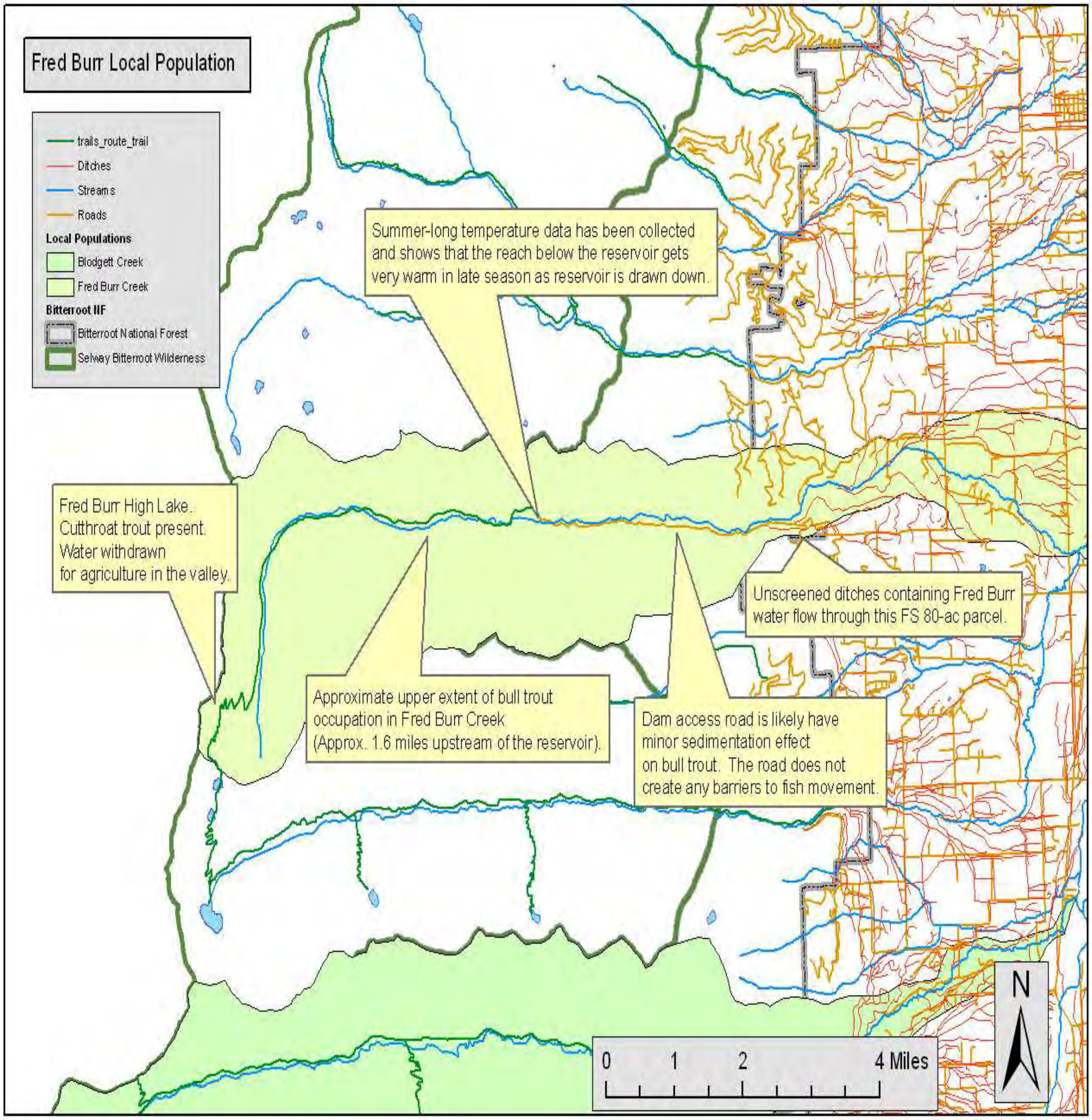
Temperature: FA should be FUR. Summer water temperature downstream of the Fred Burr Lake reservoir is highly modified by storage and release of reservoir water. Restoration projects could include further evaluation of storage and release options and working with Montana DNRC to improve conditions for native species. A smaller reservoir, Fred Burr High Lake, also influence flow and temperature, but to a lesser extent.

Barriers: FA should probably be FAR. The State's dam at the Fred Burr Lake, which is within NFS lands is a complete upstream barrier to fish. The barrier dam appears to have positive and negative aspects. The stream downstream of the dam may be a population sink for bull trout. Importantly, the dam also prohibits non-native fish from accessing Fred Burr Creek upstream of the dam. Only native trout appear to be present (cutthroat may not be pure as a result of historical lake stocking).

Pools: FA. Generally pools appear to be near natural levels. The Forest has discussed the possibility of retaining a minimum pool in the Fred Burr Lake for the benefit of native fishes. The Forest, State, and the irrigators all have concerns with dam safety. Specifically there was concern regarding the effect of ice on the dam and outlet works, the effect of changing the wetting/drying cycle of the dam, and the effect of possibly speeding the deterioration of the dam by sending more high energy water over the spill way or through the conduit.

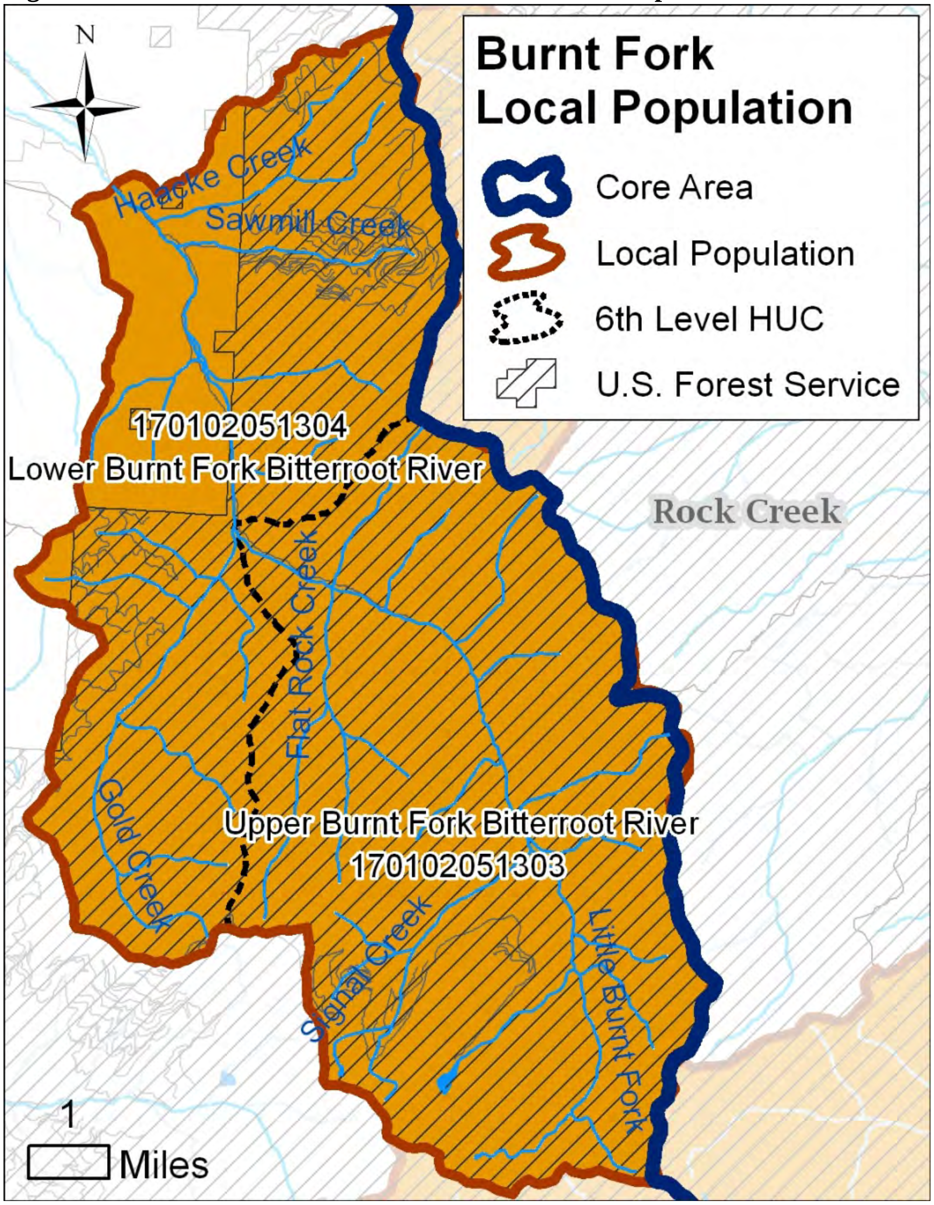
Sediment: FA should be FAR. Sediment is stored in the dam during water storage (June to August) and released into the stream downstream of the dam in the early fall (September) during the last stages of drawdown. It is possible that this could affect a portion of the spawning that may occur in the reach below the dam. A narrow low maintenance road used to access the dam parallels the creek. Generally this road adds minor amounts of sediment to the stream. A couple of sections of the road have a tendency to erode periodically.

Figure 6-34. Map of Fred Burr Local Population, Including Roads & Ditches



Local Population: Burnt Fork of the Bitterroot River

Figure 6-35. Burnt Fork of the Bitterroot River Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 6-13. Burnt Fork of the Bitterroot River Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1000+ (residents)	Stable/ decline in 2007 and 08	Resident, Fragmented	None known	Brook Threat = Medium

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Moderate significance – fluvial component thought to be absent, extensive stream length (15 miles) with resident population.	Moderate vulnerability due to habitat fragmentation, specifically connection with other local populations. Stream is generally cold summer-long.	Length of occupied stream is substantial.

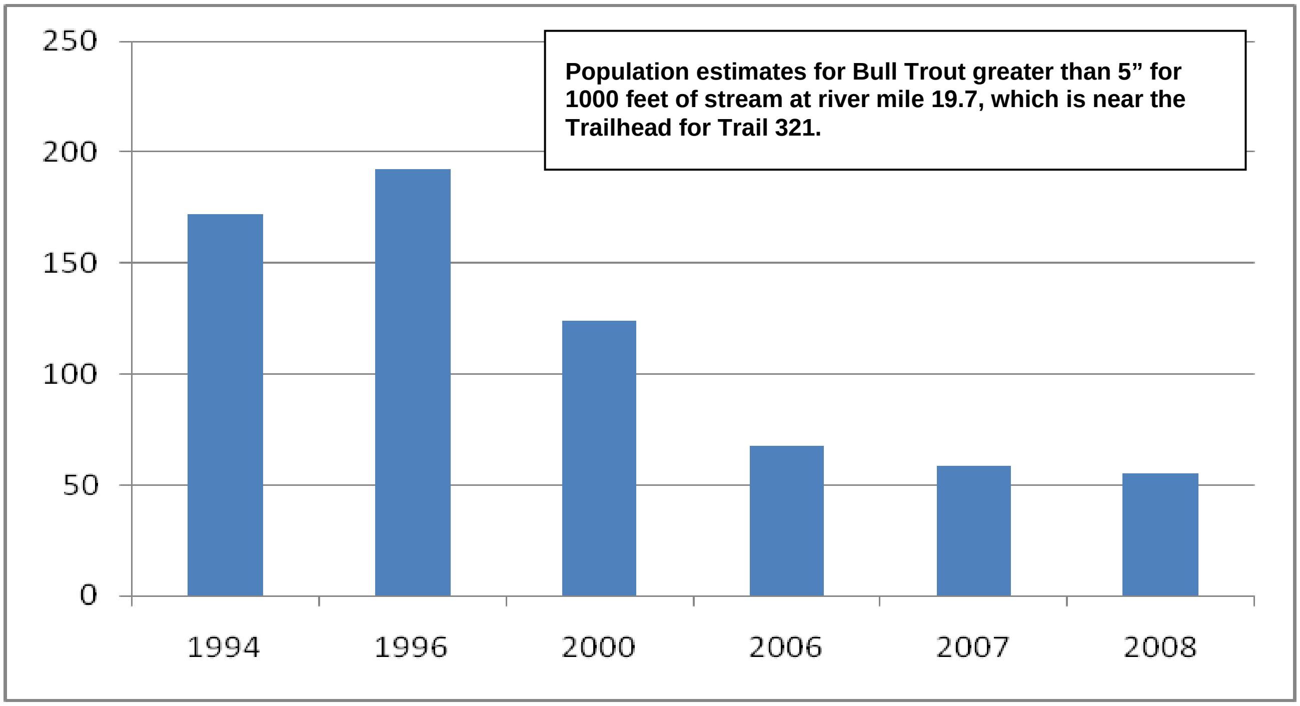
Driving Factors Determining Bull Trout Population:

Key limiting factor is the lack of connectivity to the rest of the core area. Reaches downstream of the Forest are warm and dewatered in late summer as diversions on private become more substantial. Two of the valley's largest irrigations systems (BRID and Supply) intersect Burnt Fork, mixing water and blocking, or at least complicating, upstream and downstream movement of fish and water. Water management at the mouth, by the Lee Metcalf Refuge blocked movement of fish in most seasons, but the blockages may be permanently modified soon because the situation is being addressed by the refuge. The refuge also has water rights which may assist in establishing connectivity.

DNA extracted from fin clips taken from char sampled in 2008 found that 6% were bull x brook trout hybrids (Leary note to Clancy, Oct. 2009).

Confidence in your assessment (H,M,L): H

Figure 6-36. Population Estimates for Bull Trout greater than 5" Near Trail 321



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Burnt Fork Bitterroot River – 170102051303							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$20,000	L	M
Pools	FA	FA	-	1	$200,000	M	L
Sediment	FA	FA	-	2	$50,000	L	M

Temperature: FAR. Only 14% of the stream is within 300 feet of roads. ECA is 0% according the Baseline. However Flat Rock drainage and Boulder Basin of Burnt Fork burned hot in 2003, so this data needs to be evaluated.

Burnt Fork at the trailhead is a long-term temperature monitoring site. Burnt Fork, at this point, is consistently one of the coldest streams on the north half of the Forest. It may rate FA for that reason (review of data needed).

Barriers: FA. Two first order culverts, Arasta and Grizzly creeks, would be removed if the road can be removed and converted to a trail, which could occur after the travel plan completed. This would not directly affect bull trout as they are unlikely to use the habitats upstream of these crossings.

Pools: FA. Generally pools appear to be near natural levels. LWD is cut along roads as firewood even though it is clearly illegal on maps and permits. Investment in public education, enforcement, and signing may help.

The $200k assigned to Pools is based on the cost to close and stabilize Rd 312 from Gold Creek Campground to the existing trailhead and to create a replacement trailhead. Timing for this project is dependent on the completion of the Forest-wide Travel Plan. Pools may benefit the most because one of the effects from having this road open is the removal of large dead trees, and sometimes green trees, from the riparian zone.

Sediment: FA. The main road along Burnt Fork (#312) and dispersed sites need continual attention. Projects in 2010 restored a few dispersed sites along Burnt Fork Creek that were being impacted by vehicle use. The baseline condition is expected remain in an FA condition, but there will be some expense to maintain it.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Burnt Fork Creek – 170102051304							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 77%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Restoration Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	3	$0	L	L
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	20 years	3	$2,000/yr	L	L
Sediment	FUR	FAR	20 years	3	$500,000	L	L

Temperature: FAR. In this HUC 39% of the stream is within 300 feet of roads according to the GIS derived Baseline. Many of these roads are in the Sawmill Creek drainage which needs further review, because many of these roads are gated or otherwise closed, and some of those have grown shut (naturalized to some degree).

ECA is 8% from 2003 fires and limited timber harvest.

The reason for the baseline condition not being expected to change is because the road location is not likely to move out of the narrow canyon, where the road (312) and the stream are close and parallel.

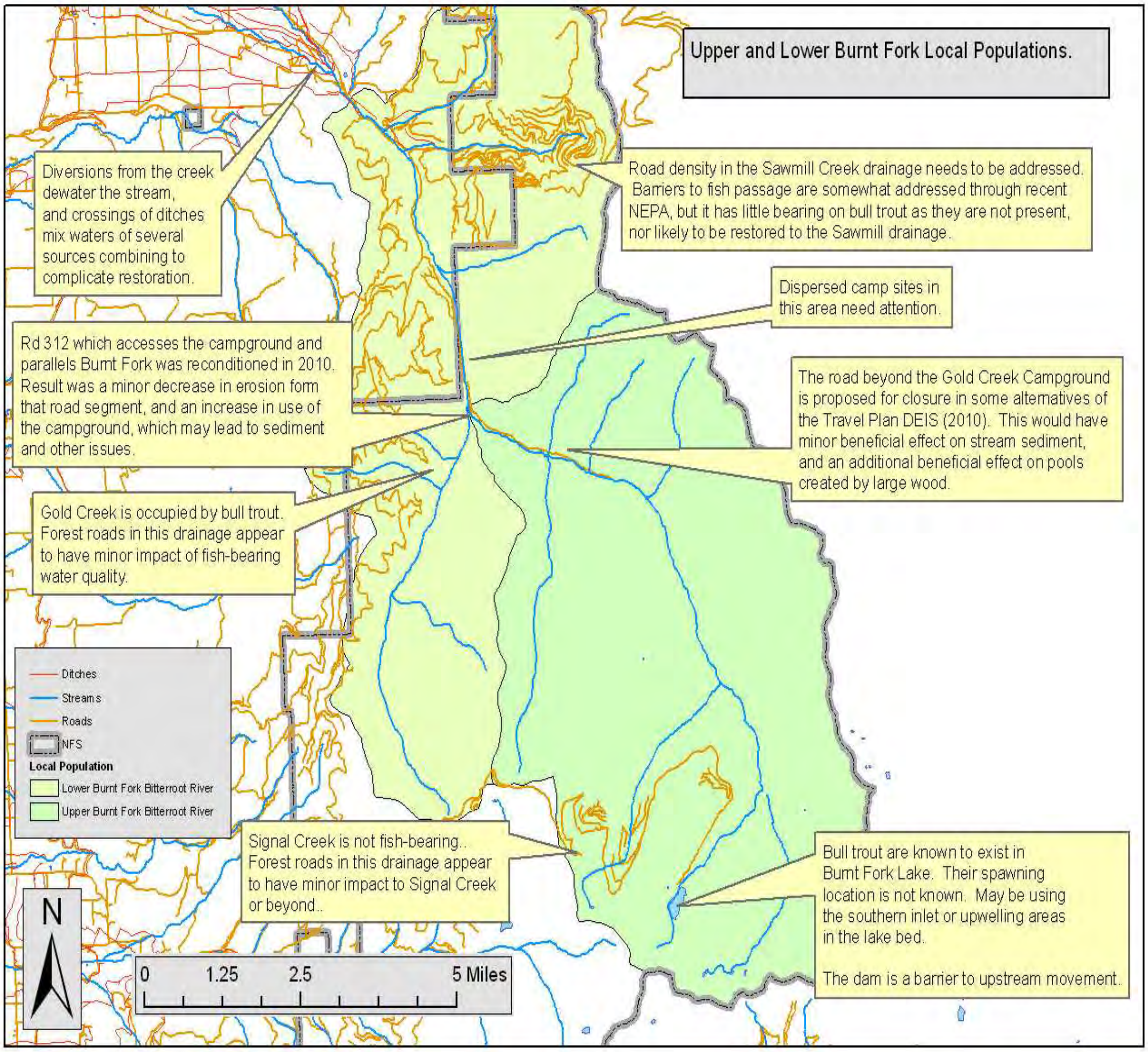
Barriers: FA. No bull trout barriers exist on the Forest. There are some in cutthroat habitat in Sawmill Creek which are in the 2011 North Zone Culvert Passage NEPA.

Pools: FAR. Generally pools appear to be near natural levels. LWD is cut along roads as firewood even though it is clearly illegal on maps and permits. Investment in public education, enforcement, and signing may help ($2,000 per year). The baseline is not predicted to improve and just maintaining the current condition will cost money (monitoring, education, enforcement).

Sediment: Road density is high (2.2 mi/sq. mi). Many roads are seasonally closed and the majority are high in the tributary watersheds (Sawmill, Haacke), so pay-off may be marginal.

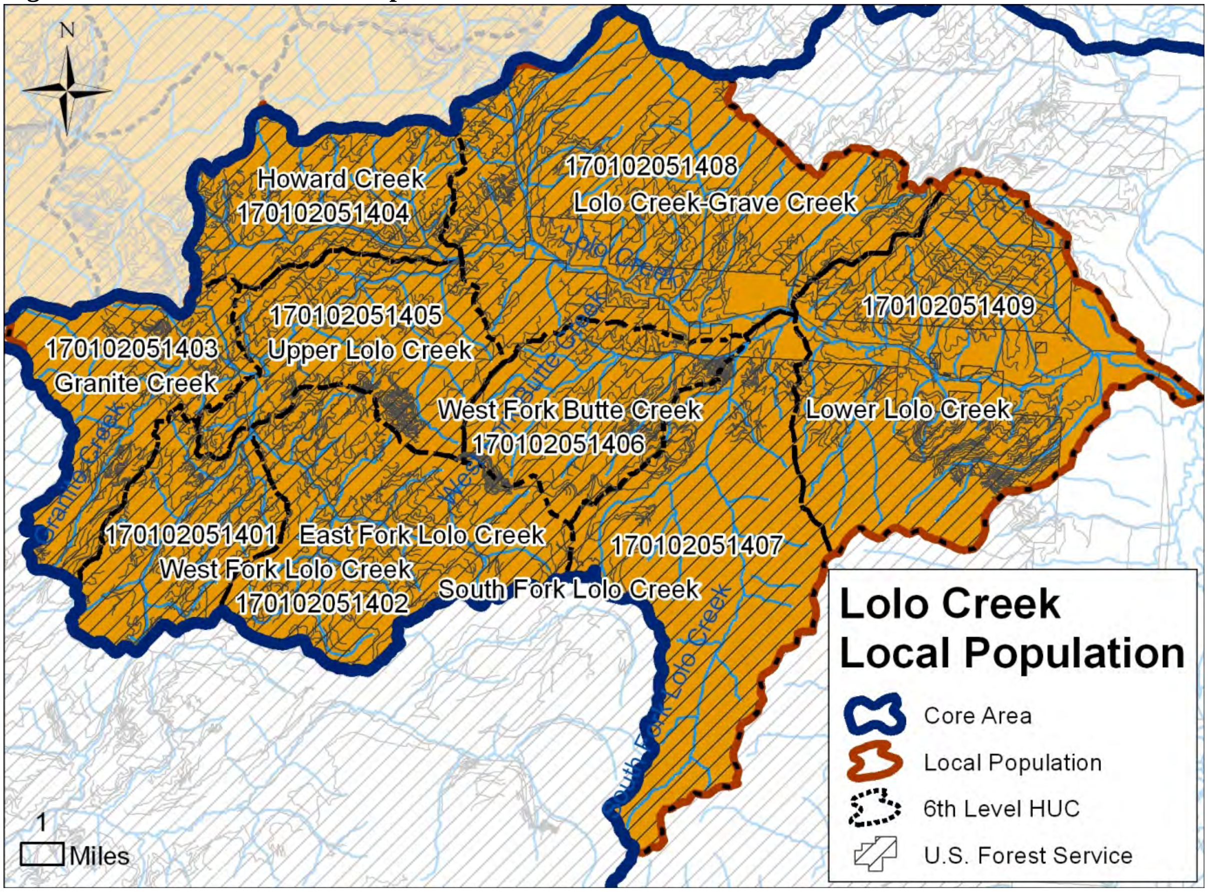
The baseline condition is expected to improve with implementation of a minimum roads analysis for the Sawmill Creek drainage. Minor improvement could also occur in Gold Creek.

Figure 6-37. Map of Lower Burnt Fork Local Populations, Including Roads and Ditches



Local Population: Lolo Creek

Figure 6-38. Lolo Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 6-14. Lolo Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
0-50 Migratory 250-500 Res	Stable	Resident, Connected	0 (migratory)	High. Lolo Creek and most tributaries contain brook trout, although the South Fork (one of the known tributaries containing bull trout) is relatively free of non-natives in the upper half.
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High – Lolo Creek is the only large watershed in the lower half of the Bitterroot River. For long-term recovery of bull trout, this watershed seems to be necessary.		Low. This is a large, high elevation watershed in a high precipitation zone, with some of the colder water temperatures on the forest (in tributaries, not the mainstem).		High. The middle and upper South Fork Lolo Creek are unique in that they contain a large patch of relatively pristine habitat with no non-native fish species and high bull trout densities.

Driving Factors Determining Bull Trout Population:

Habitat is variable, ranging from heavily impacted in many tributaries (primarily from extensive timber harvest and roading) to largely natural (South Fork Lolo Creek and upper North Fork Granite Creek). The main limiting factor to bull trout, however, is the lack of a functional fluvial population in the Bitterroot River. Warm temperatures, lack of tributary access, diversions, and non-native species have combined to almost completely eliminate the fluvial component in the lower Bitterroot. However, some bull trout from the Middle Clark Fork River Core Area may ascend Lolo Creek, given its close proximity to the MCFRCA. If there were more fluvial bull trout in the Bitterroot River, Lolo Creek would likely support significant numbers of spawners.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): South Fork Lolo Creek - 170102051407							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 97%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	5 years	3	$100,000	M	M
Barriers	FAR	FA	5 years	3	$100,000	M	M
Pools	FA	FA	-	3	$0	-	-
Sediment	FAR	FA	10 years	3	$100,000	M	M

The South Fork supports a strong population of bull trout; however, most are likely resident due to the small size of the fluvial population in the Bitterroot River system. There are two minor barriers on Dick Creek – these are probably not directly restricting bull trout access due to their location high on tributaries, but they should be assessed for this. The road system in Dick Creek provides some opportunity to reduce impacts to sediment and temperature as well. There are some effects on private land in the lower portion of the South Fork. One diversion exists, however a fish ladder is in place while water is diverted and the diversion is passable from September to July when water is not being diverted. The current structure is a check-board structure that should be replaced with rock cross vanes to better accommodate stream dynamics, however it doesn't affect bull trout significantly.

Temperature: Temperatures in the South Fork are only slightly affected by roads and probably some by grazing on private lands. There are numerous opportunities to add large woody debris to the lower portion of the drainage – this would most directly improve pool conditions, but would also improve temperatures if done at a large enough scale. Cooperative projects to address grazing on private lands that will result in lower width:depth ratios over the long-term would most directly benefit temperature patterns.

Barriers: The diversion on the lower South Fork should be replaced with rock cross vanes to better accommodate stream dynamics, however it doesn't affect bull trout significantly at the present time and passage isn't a big issue because a ladder is installed when water is being diverted. There is a large diversion on the mainstem of Lolo Creek downstream of the South Fork (Maclay diversion) that partially blocks fish passage and thereby affects access to the South Fork. In addition, the crossings on Dick Creek should be assessed to determine the affect they have on bull trout and these should be removed if necessary.

Pools: The baseline indicator call for pools is FA. However, there are opportunities to add large woody debris and create large debris jams in the mainstem. This would directly benefit bull trout.

Sediment: There are some opportunities to improve the sediment baseline in the South Fork Lolo Creek by removing roads. Some of these were recently addressed by the Butte Lookout Timber Sale, but implementation on all of them has not taken place, and additional funding would allow these projects to occur.

Most important activities to improve bull trout population:

1. Implement travel planning for the South Fork watershed to determine minimum roads needed and capable of being maintained given engineering budgets.
2. Assess the potential to construct large woody debris jams on National Forest and private lands along the South Fork and important tributaries to improve fish habitat and create temperature refugia. Construct large woody debris complexes where identified.
3. Assess barriers in Dick Creek and lower South Fork and eliminate if necessary.
4. Coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Granite Creek - 170102051403							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$100,000	M	H
Barriers	FUR	FAR	10 years	3	$300,000	H	H
Pools	FAR	FA	5 years	3	$50,000	H	H
Sediment	FUR	FAR	10 years	3	$300,000	M	H

The population in this HUC is likely resident as well. However, this HUC is critical to long-term recovery of the larger Lolo Creek population in that it supports a significant population in the headwaters and would be the likely source for natural recolonization of the rest of the watershed. The recent Montana Legacy project will make improvement of habitat conditions throughout Lolo Creek a possibility, with most of the previously owned Plum Creek lands going to the Forest Service. There are extensive road and culvert issues in this HUC that should be addressed. This would directly improve all four habitat indicators and would significantly benefit bull trout. This HUC would likely be important for bull trout under predicted climate change scenarios due to its high elevation and cold water.

Temperature: Temperatures in Granite Creek are likely elevated due to roads and timber harvest. There are numerous opportunities to improve temperature patterns by removing roads and improving riparian vegetation and function due to the recent change in land ownership brought about by the Montana Legacy Project. This is one of the high priority areas where great benefits to bull trout and other aquatic resources can be achieved on the forest. In addition, adding large woody debris to some of the large systems would indirectly improve temperature patterns while directly improving pools.

Barriers: The extensive roading in the HUC makes it likely that barriers exist that are either directly affecting bull trout populations by restricting access or indirectly affecting populations via their effect on sediment and woody debris transport. An overall assessment, in conjunction with focused travel planning, would allow a better understanding of the issues and priorities. There is a large diversion on the mainstem of Lolo Creek downstream of the South Fork (Maclay diversion). A cooperative project between MTFWP and Trout Unlimited provided for fish passage at this site in 2012.

Pools: The baseline indicator call for pools is FAR. There are opportunities to add large woody debris and create large debris jams in many places. These should be tied in with areas where riparian roads are being removed to assure the long-term benefits of these types of projects and also to reduce the potential for fishing impacts. This would directly benefit bull trout.

Sediment: There are numerous opportunities to improve the sediment baseline in the Granite Creek HUC by removing roads. A large-scale roads analysis is necessary to identify the relative impacts and benefits of road removal for each road. With the recent Montana Legacy Project, opportunities exist to remove road systems at a scale that wasn't possible under mixed checkerboard ownership. This is an extremely high priority for this watershed.

Most important activities to improve bull trout population:

1. Implement travel planning and minimum roads analysis under Subpart A of the travel planning regulations to determine minimum roads needed and capable of being maintained given engineering budgets.

2. Assess the potential to construct large woody debris jams on National Forest and private lands in Granite Creek and important tributaries to improve fish habitat and create temperature refugia. Construct large woody debris complexes where identified.

3. Assess barriers throughout the HUC in conjunction with travel planning/minimum roads analysis and take actions where necessary.

4. Coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Lolo Creek - 170102051409							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 69%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FUR	FAR	10 years	3	$100,000	H	M
Barriers	FUR	FAR	10 years	3	$100,000	H	M
Pools	FAR	FA	10 years	3	$50,000	M	M
Sediment	FUR	FAR	20 years	3	$100,000	M	M

This HUC contains the lower mainstem of Lolo Creek and Mormon Creek. Mormon Creek is currently the only area that supports bull trout; however the mainstem of Lolo Creek would be important if there were a significant fluvial component in the Bitterroot River. Opportunities to improve pools and temperature through addition of large woody debris are abundant in the lower mainstem of Lolo Creek, and these would benefit native species and, to the extent that they were present, bull trout. Mormon Creek has minor impacts from roads and logging, and some opportunities exist to improve conditions in this tributary. It provides extremely cold water to the system, so it is important to bull trout under climate change predictions. There may be diversion issues near the mouth – this should be looked into further.

Temperature: Temperatures in Lolo Creek are elevated due to roads, grazing, water diversions, and riparian impacts on private lands. There are opportunities to improve temperature patterns by removing roads and improving riparian vegetation and function. In addition, adding large woody debris to the mainstem of Lolo Creek would indirectly improve temperature patterns while directly improving pools. Recent efforts by the Montana Water Trust have been successful in improving instream flows, and these should be supported.

Barriers: A short portion of the mainstem of Lolo Creek, downstream of the Highway 93 bridge, goes dry in drought years. It is unclear how much affect this currently has on bull trout since there appears to be little, if any, fluvial use of the watershed. Under a different scenario where fluvial fish from the Bitterroot and Clark Fork Rivers were ascending Lolo Creek, this would be a bigger issue. There is a large diversion on the mainstem of Lolo Creek downstream of the South Fork (Maclay diversion) but passage issues at this site were addressed by MTFWP and TU in 2012. There are also barriers in the lower reaches of Mormon Creek (diversions). These need to be looked into further.

Pools: The baseline indicator call for pools is FAR. This call is probably accurate for the Mormon Creek portion of the HUC. However, the mainstem of Lolo Creek supports hardly any pools and would be rated FUR. There are opportunities to add large woody debris and create large debris jams in many places, and these would directly benefit any bull trout that might be coming into the system to a significant degree.

Sediment: There are numerous opportunities to improve the sediment baseline. A large-scale roads analysis is necessary to identify the relative impacts and benefits of road removal for each road.

While sediment levels are elevated in the HUC, the main area of concern would be in Mormon Creek, since spawning does not likely occur in other portions of the HUC.

Most important activities to improve bull trout population:

1. Work with MFWP and the landowners to provide fish passage and reduce or eliminate entrainment at the Maclay diversion.
2. Support the Montana Water Trust in pursuing further instream flow opportunities.
3. Add large woody debris complexes to the lower mainstem of Lolo Creek to create large, complex pool habitat.
4. Determine whether barriers exist in lower Mormon Creek and take actions to address these if they exist.
5. Identify road related sediment issues in Mormon Creek and implement actions to eliminate these.
6. Coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Fork Lolo Creek - 170102051401							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	20 years	3	$100,000	M	M
Barriers	FAR	FAR	20 years	3	$100,000	L	L
Pools	FAR	FA	10 years	3	$50,000	M	M
Sediment	FUR	FAR	20 years	3	$100,000	M	M

This HUC contains the West Fork of Lolo Creek upstream of the East Fork. The West Fork has only about 3 miles of habitat that historically supported bull trout downstream of Snowshoe Falls. The only other significant tributary in this HUC is Lee Creek, which has moderate potential to support bull trout. Lee Creek is relatively small, but it has an abundance of low gradient habitat that would provide suitable spawning for bull trout given a higher density in the Local Population. Opportunities to improve pools and temperature through addition of large woody debris are abundant in Lee Creek and the lower West Fork. These would benefit native species and, to the extent that they were present, bull trout. Lee Creek has impacts from roads and logging, and opportunities exist to improve conditions by removing roads and allowing the vegetation to naturally recover. The West Fork is heavily impacted by Highway 12 and winter sanding operations. Highway sand affects sediment level in the mainstem of Lolo Creek for its entire length. There are numerous opportunities to work with the State DOT to reduce impacts from this highway.

Temperature: Temperatures are elevated due to the highway and logging roads. There are opportunities to improve temperature patterns by removing logging roads and improving riparian vegetation and function. There is little opportunity to reduce the effect of Highway 12 on temperatures. However, working with the State DOT to reduce brushing may have some benefit.

Barriers: The only known barrier on streams capable of supporting bull trout is Snowshoe Falls, which is a natural waterfall. There are likely smaller barriers that affect the transport of sediment and large woody debris, but these don't directly affect bull trout connectivity or movement patterns. There is a large diversion on the mainstem of Lolo Creek downstream of the South Fork (Maclay diversion) but fish passage at this site was addressed by MTFWP and TU in 2012.

Pools: The baseline indicator call for pools is FAR. This call is probably accurate for the Lee Creek portion of the HUC. However, the West Fork of Lolo Creek has few pools due to the presence of the highway, and would be rated FUR. There are opportunities to add large woody debris and create large debris jams in many places in Lee Creek.

Sediment: There are numerous opportunities to improve the sediment baseline. A large-scale roads analysis is necessary to identify the relative impacts and benefits of road removal for each road. While sediment levels are elevated in the HUC, the main direct source is the sanding of Highway 12. Cooperative discussions should be initiated to develop alternative practices to reduce sediment from this source. .

Most important activities to improve bull trout population:

1. Add large woody debris complexes Lee Creek to create large, complex pool habitat.
2. Identify road related sediment issues and implement actions to eliminate these.
3. Coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): East Fork Lolo Creek - 170102051402							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$100,000	H	M
Barriers	FAR	FA	10 years	3	$100,000	M	M
Pools	FAR	FA	10 years	3	$100,000	H	H
Sediment	FUR	FAR	10 years	3	$200,000	H	M

This HUC contains the East Fork of Lolo Creek and Lost Park Creek. Lost Park Creek is a tributary to the East Fork, and supported a resident population of bull trout up until the last several years. This HUC is critical in the long-term recovery of bull trout in Lolo Creek because it contains miles of suitable spawning habitat and the stream systems are relatively large. They also maintain cold water due to the high elevation, high precipitation zone that the HUC lies in. There are extensive road networks throughout the HUC. Many of these roads have been cost-share roads with Plum Creek, and therefore opportunities to remove them have been limited in the past. However, with the Montana Legacy Project, the Lolo National Forest now owns the roads, and there is an unprecedented opportunity to remove roads and restore both aquatic and terrestrial habitats at a large scale. In addition, there are currently high densities of brook trout in the HUC, and discussions with FWP regarding brook trout suppression seem timely.

Temperature: Temperatures the East Fork are low; however, they are likely elevated above natural due to roads, past grazing, and impacts from riparian harvest. There are opportunities to improve temperature patterns by removing roads and improving riparian vegetation and function. In addition, adding large woody debris to the East Fork and Lost Park Creek would indirectly improve temperature patterns while directly improving pools.

Barriers: Known barriers on LNF administered bull trout streams have been removed over the last several years. However, it is very likely that there are barriers on old Plum Creek roads, and an intensive assessment of these, along with recommendations for removal, is necessary as a first step. Following this, removal of any critical barriers would be important in the short-term.

Pools: The baseline indicator call for pools is FAR. While there is some pool habitat available in low gradient reaches of these streams, there is an overall lack of large, debris created pools that bull trout rely on. With the change in ownership, and the remoteness of the HUC relative to main road systems, there is a prime opportunity to develop large debris jams on both the East Fork and Lost Park Creek. In addition, there are opportunities to add large wood to the channel to allow the natural process of pool formation to occur. This is a high priority project in the HUC.

Sediment: There are numerous opportunities to improve the sediment baseline. A large-scale roads analysis is necessary to identify the relative impacts and benefits of road removal for each road. It is likely that there will be significant opportunity to reduce sediment by significantly reducing road densities in the HUC.

Most important activities to improve bull trout population:

1. Add large woody debris complexes and large individual pieces to the East Fork and Lost Park Creek to create large, complex pool habitat.
2. Determine whether barriers exist on previously owned and managed Plum Creek roads and take actions to address these.
3. Undertake a large-scale roads analysis to determine the minimum road system necessary and maintainable given likely LNF road maintenance budgets. Take actions to eliminate roads that are resulting in added sediment to streams.
4. Coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Howard Creek - 170102051404							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	20 years	3	$100,000	M	M
Barriers	FUR	FAR	20 years	3	$100,000	H	M
Pools	FAR	FA	10 years	3	$50,000	M	M
Sediment	FUR	FAR	20 years	3	$100,000	M	M

This HUC contains Howard Creek. Bull trout have not been detected in Howard Creek since the late 1990's. Howard Creek is a relatively large drainage with numerous stream reaches capable of supporting fluvial bull trout. Logging and road development in the watershed have been extensive, however, and habitat is heavily impacted. With the recent Montana Legacy Project, there is a great opportunity to make significant changes to aquatic habitat conditions in Howard Creek, mainly in the form of road density reductions and allowing vegetation to naturally recover.

Temperature: Temperatures in Howard Creek are elevated due to roads and riparian impacts from past timber harvest. There are also lingering effects of past grazing that altered channel morphology. There are numerous opportunities to improve temperature patterns by removing roads and improving riparian vegetation and function. In addition, adding large woody debris to the mainstem of Howard Creek would indirectly improve temperature patterns while directly improving pools.

Barriers: The box culvert under Highway 12 at the mouth of Howard Creek is a barrier to upstream fish passage at moderate to high flows. This has been identified as a problem for years, and several trips with the State DOT have been taken to develop alternatives to allow for fish passage. To date, no action has been taken. There are also barriers on smaller streams throughout the HUC that indirectly affect bull trout, and there are likely barriers that exist on the previously owned and managed Plum Creek roads. An analysis of these conditions and opportunities to improve passage, followed by actions to address the highest priority problems, would benefit bull trout and other native species in the HUC. There is a large diversion on the mainstem of Lolo Creek downstream of the South Fork (Maclay diversion) that partially blocks fish passage and thereby affects access to the Howard Creek.

Pools: There are many prime opportunities to add large woody debris and create large debris jams throughout Howard Creek, especially given the change in ownership and the fact that most roads will now be managed solely by the LNF. Improving pool size, quality, and complexity would directly benefit bull trout, especially if the barrier at the mouth was fixed to allow passage at all flows.

Sediment: The sediment baseline is FUR due to the extensive road system throughout the watershed. There are numerous opportunities to improve the sediment baseline. A large-scale roads analysis is necessary to identify the relative impacts and benefits of road removal for each road.

Most important activities to improve bull trout population:

1. Add large woody debris complexes to Howard Creek to create large, complex pool habitat.
2. Work with MDOT to improve year-round fish passage at the Highway 12 crossing of Howard Creek. Determine whether barriers exist in other portions of the watershed on recently acquired roads, and take actions to address these if they exist.
3. Identify the minimum road system needed and capable of being maintained given LNF road maintenance budgets, and take actions to reduce roads to this level.
4. Coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Lolo Creek - 170102051405							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	20 years	3	$100,000	H	M
Barriers	FAR	FAR	20 years	3	$100,000	M	M
Pools	FAR	FA	10 years	3	$50,000	H	M
Sediment	FUR	FAR	20 years	3	$100,000	M	M

This HUC contains the middle mainstem of Lolo Creek and Cloudburst Creek. Cloudburst Creek has minimal potential to support fluvial bull trout due to its size. The mainstem of Lolo Creek in this reach was significantly altered by the construction of highway 12. There have been efforts to mitigate effects to habitat over the years, but these have largely failed. In addition, grazing and active removal of willows along the streambank on private lands has had additional significant effects. The stream currently lacks habitat complexity and is primarily a migration corridor due to these impacts. Historically, this reach probably supported significant over-winter and juvenile rearing habitat, along with abundant spawning habitat for fluvial bull trout. While efforts to restore the mainstem of Lolo Creek are very important in the overall recovery of bull trout in the watershed, most of the impetus and funding for these changes will need to come from the state DOT and private landowners.

Temperature: Temperatures in Lolo Creek are elevated due the presence of the highway along virtually the entire length and the changes in riparian vegetation caused by ranching activities on private lands. There are opportunities to improve temperature patterns by planting along the highway and adding large woody debris to the stream system. There are also opportunities to improve the temperature baseline by working with the ranch owner to allow riparian vegetation to re-establish. Initiating these activities will take the efforts of state agencies and NGO's to make contacts and begin the dialogue.

Barriers: There are likely some minor barriers on recently acquired Plum Creek roads that should be looked into. However, these are probably on small streams that aren't important for bull trout movement capabilities.

Pools: The baseline indicator call for pools is FAR. This call should be FUR based on impacts from the highway and management of private lands. There are opportunities to improve the baseline by allowing vegetation to recover without pulling it out along the mainstem, and by adding large woody debris as well. Cooperative discussion with major landowners should be developed.

Sediment: There are numerous opportunities to improve the sediment baseline. A large-scale roads analysis is necessary to identify the relative impacts and benefits of road removal for each road. In addition, working with the State DOT to identify alternative to road sanding may prove productive.

Most important activities to improve bull trout population:

1. State agencies and NGO's should initiate conversations with ranch managers to develop different riparian vegetation objectives along the mainstem of Lolo Creek.

2. Add large woody debris complexes to the middle mainstem of Lolo Creek to create large, complex pool habitat.

3. Identify road related sediment issues and implement actions to eliminate these.

4. Coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Fork Butte Creek - 170102051406							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	20 years	3	$100,000	M	M
Barriers	FUR	FAR	10 years	3	$100,000	M	M
Pools	FAR	FA	10 years	3	$50,000	M	M
Sediment	FUR	FAR	20 years	3	$100,000	M	M

This HUC contains West Fork Butte Creek. West Fork Butte Creek is a tributary to the South Fork of Lolo Creek in its lower reaches. It is a relatively large watershed that may support resident bull trout and probably historically supported fluvial bull trout, however, no recent surveys have detected them. The Missoula Ranger District recently completed the Butte Lookout project, which identified several roads to remove in order to improve aquatic conditions. Funding and implementation of these projects is unsure at this point.

Temperature: Temperatures in West Fork Butte Creek are elevated due to roads and past timber harvest. Road reduction and allowing the vegetation to naturally recover will improve this baseline over time.

Barriers: The main barrier was the large culvert on the West Fork Butte Creek. This was replaced in 2010 and now provides fish passage. There are no other known barriers that would directly affect bull trout, but there may be constrictions on some smaller streams. The baseline call should be changed to FAR.

Pools: The baseline indicator call for pools is FAR. There are opportunities to add large woody debris and create large debris jams in many places, and these would directly benefit any bull trout that might be coming into the system to a significant degree.

Sediment: There are numerous opportunities to improve the sediment baseline. The Butte Lookout analysis identified many of these issues and they will be addressed as funds become available.

Most important activities to improve bull trout population:

1. Implement all water and fish restoration measures identified in the Butte Lookout Project.
2. Add large woody debris complexes to West Fork Butte Creek to create large, complex pool habitat.
3. Coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Grave Creek - 170102051408							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 86%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$100,000	H	M
Barriers	FUR	FAR	20 years	3	$100,000	M	M
Pools	FAR	FA	10 years	3	$50,000	H	M
Sediment	FUR	FAR	10 years	3	$100,000	M	M

This HUC contains Graves Creek and a significant portion of the mainstem of Lolo Creek between the South Fork of Lolo Creek and Howard Creek. Graves Creek has moderate potential to support bull trout, although none have been detected in any recent surveys. Habitat in Graves Creek is affected by logging roads in the upper 2/3 of the watershed and ranching/grazing in the lower 1/3. The mainstem in this section is heavily impacted by ranching in the form of riparian clearing and direct grazing impacts. Highway 12 impacts the stream to some extent in the upper portion of the HUC, but less in the lower reaches. There is also some home development in the lower portions of the HUC that has some negative impact.

Temperature: Temperatures in the mid-lower reaches of Lolo Creek are elevated due to clearing of much of the riparian vegetation, presumably to increase grazing and cattle access to the stream. The lower 1/3 of Graves Creek is affected in much the same way, though the clearing of riparian vegetation happened longer ago. There are opportunities for conservation organizations to begin discussions with ranch managers to initiate changes in management practices to allow riparian vegetation to re-establish. This would help to reduce temperatures. This activity is most important in the mainstem of Lolo Creek, as thermal issues are potentially more impactive to bull trout in the mainstem than in tributaries.

Barriers: There are some minor barriers in the Grave Creek watershed. This indicator needs to be looked into further to determine the extent of this issue.

Pools: There are many prime opportunities to add large woody debris and create large debris jams throughout the mainstem of Lolo Creek and Graves Creek. Improving pool size, quality, and complexity would directly benefit bull trout, especially in the mainstem, where any over-wintering and juvenile rearing habitat improvement might directly benefit bull trout.

Sediment: The sediment baseline is FUR due to the extensive road system, primarily in Graves Creek. There are numerous opportunities to improve the sediment baseline. A large-scale roads analysis is necessary to identify the relative impacts and benefits of road removal for each road.

Most important activities to improve bull trout population:

1. Add large woody debris complexes to the mid-lower mainstem of Lolo Creek and Graves Creek to create large, complex pool habitat.
2. Work with private ranchers, through NGOs to initiate changes in riparian management to favor healthier riparian zones.
3. Identify the minimum road system needed and capable of being maintained given LNF road maintenance budgets, and take actions to reduce roads to this level.
4. Coordinating with FWP to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area.

Bitterroot River Core Area Summary:

Table 6-15 summarizes relevant information from each of the 6th level HUCs within the local populations. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire Bitterroot River Core Area within the borders of the Bitterroot and Lolo National Forests. It does not include necessary restoration activities in watersheds where the BNF/LNF have no ownership that may be critical for overall restoration of the bull trout population in the Core Area.

Table 6-15. Summary of important Local Population attributes and conservation recommendations for the Bitterroot River Core Area.

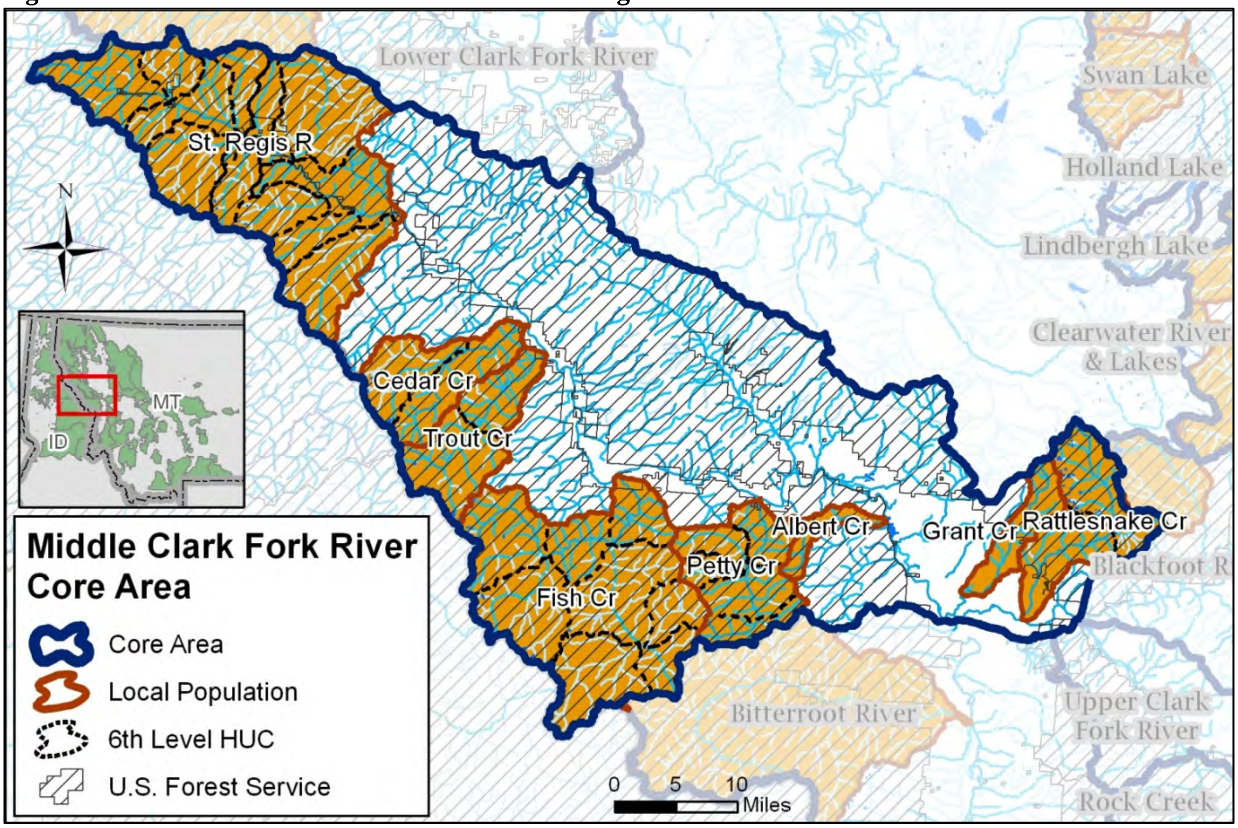
Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
East Fork Bitterroot River (headwaters)	Moose Cr	High	Low	Passive	-	-	-
	Martin Cr	High	Low	Passive	-	-	-
	East Fork Bitterroot – Clifford Cr	High	Low	Conserve	-	-	-
	Meadow Cr	High	Low	Active	-	-	-
	East Fork Bitterroot – Bertie Lord Cr	Moderate	Moderate	Passive	-	-	-
Tolan Creek	Tolan Cr	High	Moderate	Passive	-	-	-
Warm Springs Creek	Warm Springs Cr	High	Low	Passive	Barriers	1 year	$100,000
Nez Perce Fork	Sheephead Cr	High	Low	Conserve	-	-	-
	Watchtower Cr	High	Low	Conserve	-	-	-
	Little West Fork	High	Low	Conserve	-	-	-
	Nez Perce Fork – Nelson Lake	High	High	Active	Temperature, Pools & Sediment	80 years	$1,500,000
Boulder Creek	Boulder Cr	High	Low	Conserve	Barriers	30 years	$500,000
Tin Cup Creek	Tin Cup Cr	Moderate	Low	Conserve	-	-	-
Lost Horse Creek	Lost Horse Cr	High	Low	Conserve	-	-	-
	South Lost Horse Cr	Moderate	Low	Conserve	-	-	-
Sleeping Child Creek	Divide Cr	High	High	Active	-	-	-
	Upper Sleeping Child Cr	High	High	Active	-	-	-
	Middle Sleeping Child Cr	High	High	Active	-	-	-
Skalkaho Creek	Daly Cr	High	Moderate	Active	-	-	-
	Upper Skalkaho Cr	High	High	Active	-	-	-
Blodgett Creek	Blodgett Cr	High	Moderate	Conserve	-	-	-
Fred Burr Creek	Fred Burr Cr	High	Moderate	Conserve	-	-	-
Burnt Fork of the Bitterroot River	Upper Burnt Fork Bitterroot River	Moderate	Moderate	Passive	-	-	-
	Lower Burnt Fork Bitterroot River	High	Moderate	Passive	-	-	-
Lolo Creek	South Fork Lolo Cr	High	Moderate	Active	-	-	-

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
	Granite Cr	High	High	Active	Barriers & Pools	5-10 years	$350,000
	Lower Lolo Cr	High	High	Active	Temperature & Barriers	10 years	$200,000
	West Fork Lolo Cr	Low	High	Passive	-	-	-
	East Fork Lolo Cr	High	High	Active	Temperature, Pools & Sediment	10 years	$400,000
	Howard Cr	Moderate	High	Active	Barriers	20 years	$100,000
	Upper Lolo Cr	Moderate	High	Passive	Temperature & Pools	10-20 years	$150,000
	West Fork Butte Cr	Moderate	High	Active	-	-	-
	Grave Cr	Moderate	High	Passive	Temperature & Pools	10 years	$150,000

Chapter 7: Middle Clark Fork River

Core Area Discussion:

Figure 7-1. Middle Clark Fork River and Surrounding Core Areas



The Middle Clark Fork River Core Area (MCFR) includes the Clark Fork River and all tributaries from the confluence of the Flathead River downstream to the confluence of the Blackfoot River upstream. Current distributions of bull trout are significantly restricted from historical patterns. Many large streams that once likely supported strong fluvial populations now contain few, if any bull trout. Numerous small streams that once contained healthy resident populations with a minor fluvial component now contain no bull trout (for example, while the entire St. Regis River is shown below as a local population, bull trout currently only exist in two of eight 6th level HUCs). Remaining fluvial populations, however, are geographically distributed throughout the core area, which increases the potential for recovery. The proportion of fluvial to resident forms is likely much different than historical, due to the extremely low numbers of fluvial fish in the population (Montana Fisheries Information System (MFISH), MFWP unpublished data, USFS unpublished data, Knotek, personal communication). As with most core areas, bull trout densities were historically much higher than they are today.

Forest Service Biologists estimate that as many as 700 to 1320 fluvial redds may have been present in the MCFR Core Area historically. As with most bull trout populations, overall numbers were likely highly variable from year to year, based on natural variability in local environmental conditions and disturbance patterns.

Bull trout populations in the MCFR Core Area were first exposed to human-caused impacts over 140 years ago. In 1869, gold was discovered in Cedar Creek, and miners poured into the area (Light and Horstman, 1996, Ed DeClava, personal communication). Large bull trout streams like Cedar Creek, Trout Creek, Ninemile Creek, and Quartz Creek were extensively mined. Both placer and hydraulic mining practices were employed, and both resulted in a nearly complete turnover of the stream channel and riparian bottom. Large woody debris was removed, pool habitat was destroyed, and spawning gravels were washed out of the system, resulting in huge changes to bull trout habitat and populations. It's likely that bull trout were a common food fish for mining camps as well. Mining continued to impact populations through the early 1900's.

By 1900, logging was also beginning to impact bull trout populations. Harvest of large, easy to get to trees in riparian zones depleted many key spawning streams of future woody debris sources. In 1910, large fires burned over extensive portions of the MCFR, probably resulting in significant mortality of bull trout (spawners were probably already in tributary streams when the fires occurred). A reburn of much of the area occurred in 1919. While these fires likely impacted bull trout populations in the short-term, there was probably a short-term positive response in populations associated with increased nutrients in burned over streams and a longer-term positive response through the 1930's as large woody debris and spawning gravels recruited to burned over streams and healthy, vigorous riparian zones re-established.

From the 1930's through the 1950's, brook trout were planted extensively throughout high mountain lakes and streams in the region (Montana FWP 2006, MFWP stocking records). The pervasive effects of these plantings on native fish populations have continued through today.

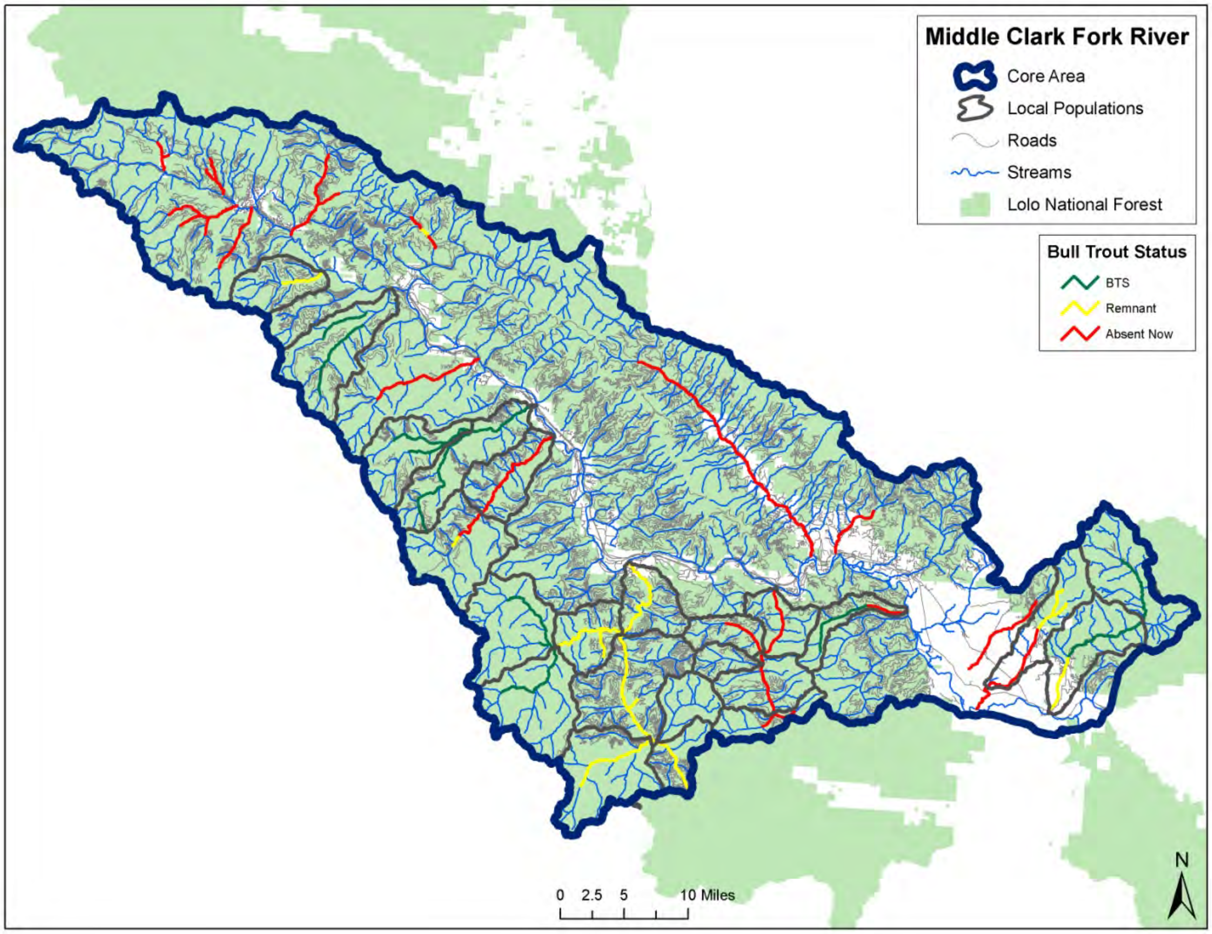
From the 1940's through the 1970's, bull trout populations in the MCFR continued to decline due to a host of developments and increasing land utilization that impacted stream habitats. The St. Regis River was heavily impacted by US Highway 10 (which became Interstate 90 in 1974), built in a narrow valley that already contained a railroad grade and numerous access roads along the stream. Rattlesnake Creek was dammed to provide a water source for Missoula. Most of the wide riparian valleys in other spawning tributaries like Ninemile, Petty, and Fish Creeks were heavily impacted by mining, grazing, logging, or often a combination of these. Planting of non-native brown trout throughout the larger streams in the area also resulted in interspecific competition threats and potential predation to fluvial populations.

The 1970's and 1980's saw a rapid expansion of road construction and logging in areas that were, up to this time, refugia for bull trout populations. Steep slopes in the middle and upper portions of most drainages were logged, resulting in high sediment loads that exceeded the transport capacity of streams. The sediment eventually settled out in lower gradient spawning reaches and larger streams and rivers, causing systemic changes in the stream systems and aquatic communities they supported. Chronic erosion and sediment addition from the extensive road network constructed during this period still occurs today. This period of heavy road construction also resulted in extensive fragmentation of bull trout populations at undersized culvert crossings.

These impacts to stream habitat also contributed to increased interactions with non-native fish species. As stream temperatures, sediment levels, and fragmentation increased and pool quality and complexity decreased, non-native brook trout and brown trout were able to expand and maintain a competitive advantage over bull trout. This resulted in long-term downward pressures on existing bull trout populations that continue to this day.

By the 1990's, bull trout populations had been eliminated or severely reduced throughout much of the MCFR. Small fluvial populations still existed in many of the larger, less developed watersheds. However, chronic impacts from existing developments, combined with climate change and a drought that caused low flows and warm water, further impacted populations. As a result, many of the streams that supported a few bull trout in the early 1990's now contain none (or too few to detect) (MBTSG 1996, MFWP and USFS unpublished data). The current distribution of local populations reflects only a small portion of the historic range of occupied habitat for bull trout in the MCFR (Figure 7-2).

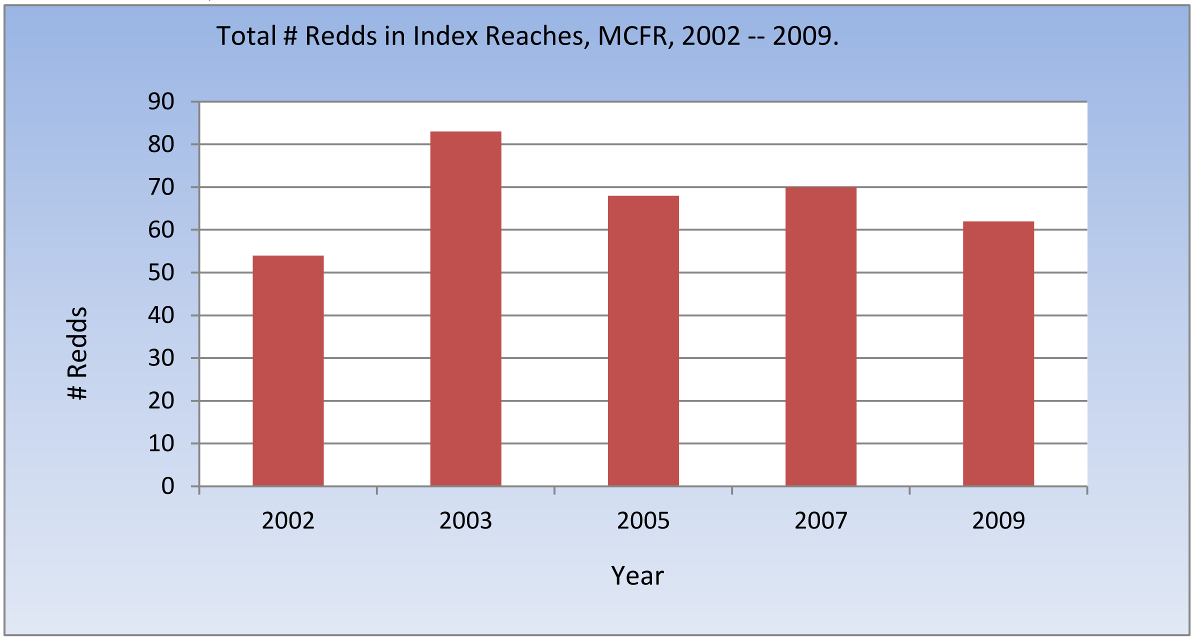
Figure 7-2. This map shows bull trout strongholds (BTS – where significant numbers of fluvial bull trout remain), bull trout remnant (remnant – where resident populations remain, but fluvial fish are rare), and absent (absent – where no bull trout have been detected in recent surveys) populations in the MCFR at the current time (MFWP and USFS unpublished data, Knotek, personal communication, 2011).



Some of the past impacts have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. Logging and road construction have decreased considerably, but the effects of the existing road networks throughout many watersheds are still prevalent. The drought seems to have subsided, and the Core Area does contain a large amount of high elevation, north facing watersheds that will likely be more resilient to future warming patterns associated with climate change. Fishing regulation changes do not allow people to keep, or intentionally fish for, bull trout, and angling restrictions have been established at the mouths of many important spawning streams to reduce incidental mortality and discourage poaching of bull trout.

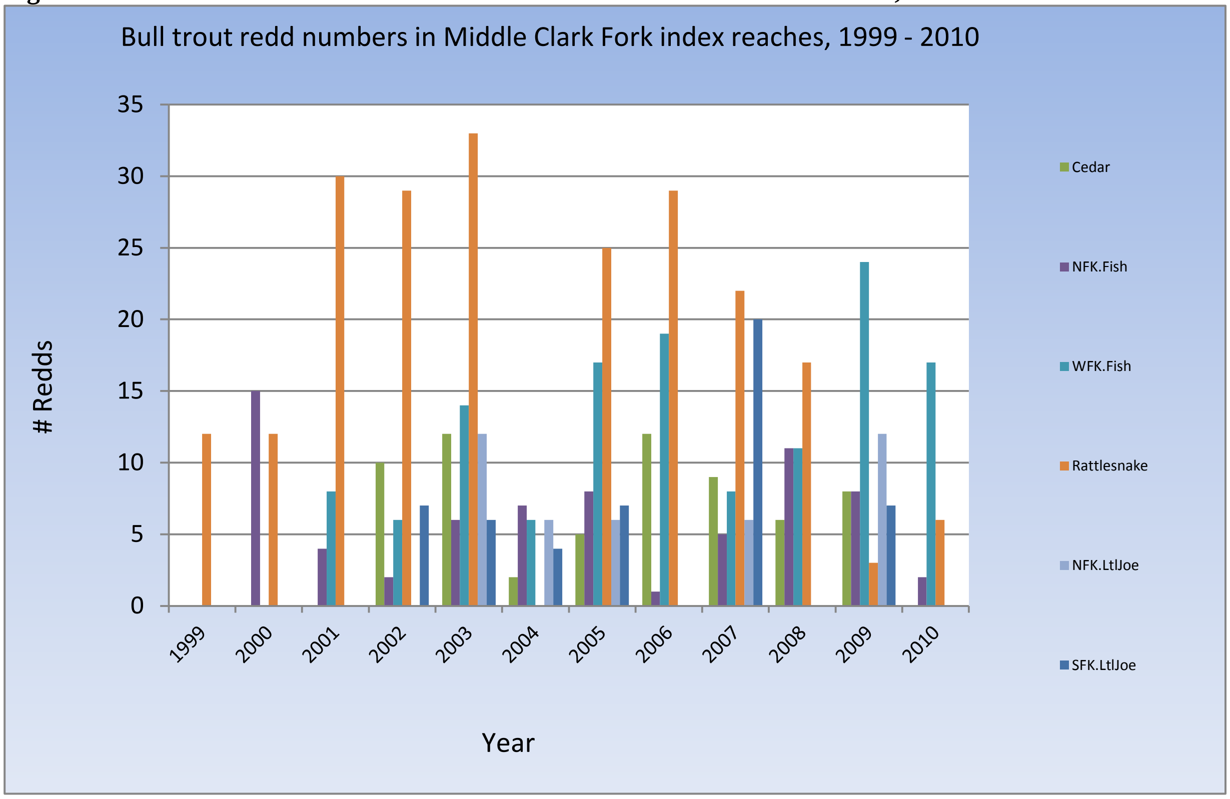
Overall, current bull trout numbers in the MCFR Core Area are at very low levels. Figure 7-3 shows combined redd counts for the years where the four main spawning streams (Fish, Rattlesnake, Cedar, and Little Joe Creeks) were all sampled. It is likely that a few more fluvial redds exist annually throughout the MCFR Core Area in streams like Trout Creek and Petty Creek. However, numbers are so low that we have discontinued annual counts in these streams. In addition, it should be noted that many redds in Little Joe Creek, Cedar Creek, and Rattlesnake Creek are likely from resident, not fluvial bull trout, so the numbers in the graph probably portray a slightly higher fluvial population than actually exists.

Figure 7-3. Annual bull trout redd numbers combined across four primary spawning streams in the MCFR Core Area, 2002 - 2009.



Redd numbers for local populations in the MCFR are very low and exhibit significant annual fluctuations (Figure 7-4). This is of concern because it may indicate that the populations are on the verge of extirpation. Trends in local populations are difficult to discern given the short time-frame associated with the dataset. (Note that years showing zeroes are from years when surveys were not conducted – they don't show that no redds were present).

Figure 7-4. Bull trout redd numbers in index reaches of the MCFR Core Area, 1999 - 2010.



These data show that bull trout populations within MCFR index reaches are typically strongest in Fish Creek and Rattlesnake Creek, but annual variability within local populations is high. Individual index reach numbers generally translate to populations of 5 – 50 bull trout (a large portion of which may be resident). Annual redd counts in all index reaches combined average approximately 65 – 70, and electrofishing estimates in the mainstem show approximately 1 – 2 adults per mile (spanning 120 miles) (Knotek, 2011). These data suggest that over the entire MCFR Core Area, the fluvial (non-resident) adult bull trout population currently ranges from about 120 to 300 fish annually. Given this, it appears that fluvial bull trout densities may be 5 – 10 percent of what they were historically.

While the short-term relatively stable trend across the core area over the past several years is encouraging, it should not be taken to indicate that the population is secure. As stated above, current numbers of fluvial bull trout are extremely low. In addition, nearly all of the remaining fluvial bull trout are concentrated in only four streams throughout the entire core area. Low population numbers and limited distributions are significant concerns for species conservation. When population numbers get low, they are more prone to stochastic effects that can result in local extinctions. Limited distribution also poses a risk because neighboring populations aren't nearby to support or refound populations that experience these events. Therefore, recovery actions, while not necessarily as urgent as some places are still important and should proceed at a relatively rapid pace.

There are currently many factors that limit recovery of bull trout in the MCFR Core Area. Mainstem river dams in the Lower Clark Fork restrict upstream access from Lake Pend Oreille. Recent work through the PPL and AVISTA relicensing process has focused on addressing this issue and providing connectivity through the system (this is discussed in more depth in the Lower Clark Fork River Core Area portion of the Conservation Strategy). While passage is now possible at Thompson Falls Dam (as of 2011), trap and transport efforts at Noxon and Cabinet Gorge Dams only provides passage to a small percent of the migratory population.

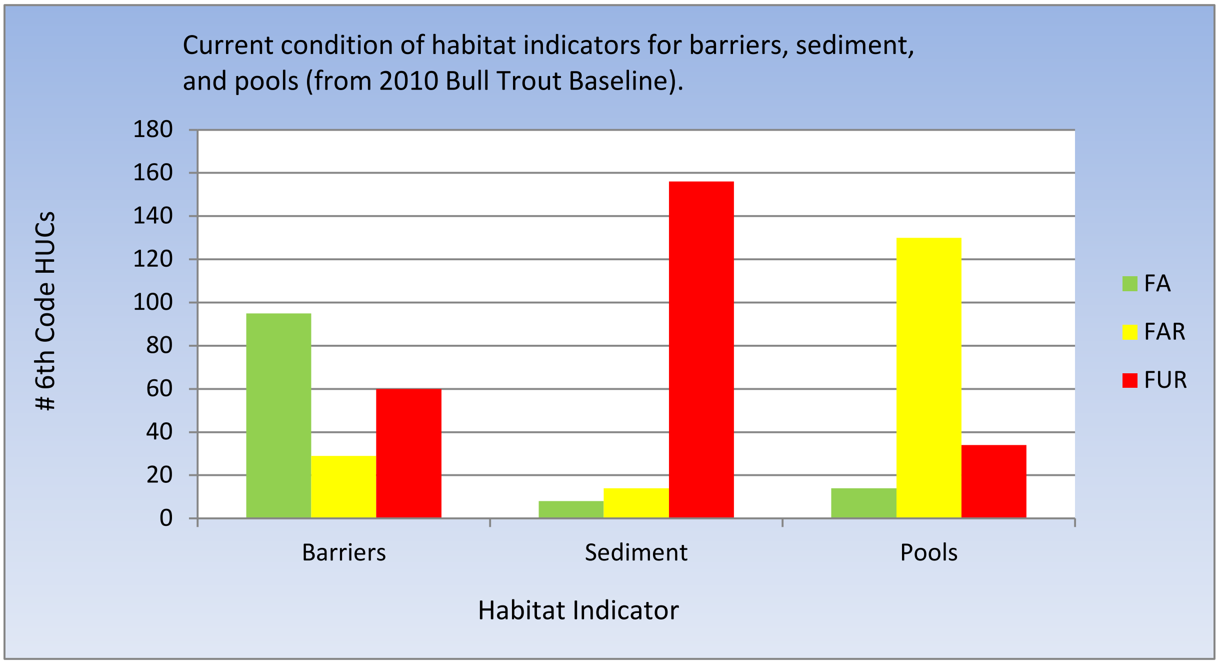
One of the most widespread impacts in the MCFR Core Area is the continued existence of logging road networks in tributary watersheds (Figure 7-5). While mining and logging are presently not as extensive as in the past, the legacy of these activities (extensive road networks and placer mined stream channels) continues to impact stream systems today (USFS unpublished data, ICBEMP 1997, MBTSG 1996).

Figure 7-5. This is an aerial photo of a typical watershed in the St. Regis River (Ward Creek) showing the extensive logging road network developed in the 1970's and 1980's.

In-stream sediment levels are elevated in most watersheds due to chronic erosion and sediment delivery from road systems, and many habitats are still fragmented by road crossings. Large woody debris, especially in the form of big, complex logjams, is well below natural due to past harvest, stream channel woody debris removal, and the presence of hundreds of road system culverts that restrict the downstream movement of wood and the development of large structure that creates pools in stream channels (Figure 7-6). Predictably, current bull trout populations are generally restricted to areas that were not extensively logged in the past and have low road densities (Figure

7-2). Bull trout habitat in watersheds affected by these impacts will not recover until road densities, streamside roads, and road crossings are significantly reduced.

Figure 7-6. 2010 Bull Trout Baseline indicator calls for sediment, pools, and barriers on the Lolo National Forest.*



*FA=Functioning Appropriately, FAR=Functioning At Risk, FUR=Functioning At Unacceptable Risk.

Another widespread factor limiting bull trout recovery is the extensive non-native fish communities that exist throughout the system (mainly brook trout in mountain lakes and smaller tributaries and brown trout in the mainstem of the Clark Fork and some of the larger tributaries,). Brook trout populations have dispersed throughout many stream systems from their original stocking locations in the 1930's to 1950's. They currently represent both a competition and hybridization threat to bull trout. Stocking of brown trout occurred in the main river until the late 1980's, and populations of this species, although relatively low, may reduce survival of juvenile bull trout, and limit available habitat capacity for both juvenile and adult bull trout in the mainstem. Further research into these interactions would be valuable.

In specific watersheds, residential and agricultural development on private lands has a significant impact on bull trout populations and bull trout habitat. The lower reaches of Petty, Ninemile, Rattlesnake and Grant Creeks, and the middle and lower portions of the St. Regis River, all have significant impacts from home development and small-scale ranching (Figure 7-7). While these impacts are significant where they occur, they are not as widespread and pervasive as the effects of existing road networks and non-native fish species mentioned above.

Figure 7-7. This is an aerial photo of Petty Creek showing ranches and home development. This scenario is typical of many of the low-elevation streams with wider valley bottoms throughout western Montana.

Perhaps the most concerning aspect of the MCFR Core Area is the fact that many populations in tributary streams have become extirpated (or nearly so) over just the last fifteen to thirty years. Streams like Petty Creek, Surveyor Creek, White Creek, Spring Gulch, Tamarack Creek, Timber Creek, Big Creek, Dry Creek, and Twelvemile Creek all contained important bull trout populations in the late 1980's (Lolo NF unpublished data, MTFWP unpublished data, MBTSG, 1996). Today, these streams contain few, if any, bull trout. Other streams like Trout Creek and Ward Creek contain so few fluvial bull trout that conducting annual redd count reaches is not productive. Small streams that supported low numbers of bull trout (Sixmile, Butler, Grouse, Silver, Oriole, Lost Park, Cooper) ten to twenty years ago (LNF unpublished data) appear to have none at the present time (MTFWP unpublished data).

The loss of populations in these streams does not show up in the overall trend graph for the MCFR because the redd counts are conducted in the few best remaining strongholds. Extensive electrofishing efforts conducted by MTFWP over the past 12 years confirm this restricted distribution (MTFWP unpublished data). Nevertheless, losing these populations does represent a significant risk to our long-term ability to recover bull trout in the Core Area. It is uncertain whether recovery is even possible with only four contributing local populations. It also suggests that remaining bull trout populations are at high risk of extinction, and that viability of bull trout in the MCFR Core Area overall is tenuous.

While none of the previously mentioned impacts is easy to address, it will be necessary to change them in order to expect to maintain a long-term population of bull trout in the MCFR Core Area. It is likely that the impacts from any one of these sources cannot be eliminated entirely, but rapid and successive improvement in each will contribute synergistically to a stronger population, and this will allow us time to work further towards reducing additional impacts.

For example, the current fish passage work at the three lower Clark Fork River dams will result in improved movement of bull trout, but it is unlikely that impacts will be eliminated entirely. However, huge gains can be made which will improve the overall connectivity of populations and will directly improve the long-term persistence of populations in the MCFR. Similarly, it is unlikely that road densities in all bull trout tributaries will be reduced to levels seen prior to logging and mining. However, significantly reducing road densities in the most important bull trout tributaries, and systematically lowering road densities in other tributaries as opportunities arise will result in healthier stream channels and lower sediment levels that will contribute to overall improved habitat conditions and healthier, more robust bull trout populations.

It is also unlikely that we would be able to address all non-native fish issues in the MCFR. To date, significant negative interactions between rainbow trout and bull trout have not been observed, and over 90% of the non-native fish in the mainstem of the Middle Clark Fork River are rainbows or rainbow x cutthroat hybrids. However, changes in fishing regulations, as well as focused direct management efforts (i.e., electrofishing, trapping, etc.) in the most important bull trout tributary watersheds might reduce populations of brook trout and brown trout (where they occur). With unfilled habitat and less competition, westslope cutthroat and bull trout populations may respond with an increase in populations and distribution. USFS biologists should coordinate with MTFWP biologists to consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the Core Area. The combined effects of these activities would directly benefit bull trout populations and the entire aquatic community in the MCFR. Synergistically, the impacts of these activities would likely result in greater improvements to bull trout populations than any one conservation activity by itself.

Specific restoration activities and types of activities aimed at addressing habitat impacts on federal lands are discussed in detail below.

Middle Clark Fork Core Area: Lolo National Forest

The entire MCFR Core Area lies within the boundary of the Lolo National Forest. This is the only core area of the seven with portions on the LNF that doesn't have shared Forest Service ownership. Habitat management on federal lands is therefore almost entirely dependent on LNF management decisions.

There are eight local populations within the MCFR Core Area:

1. Rattlesnake Creek,
2. Grant Creek,
3. Albert Creek,
4. Petty Creek,

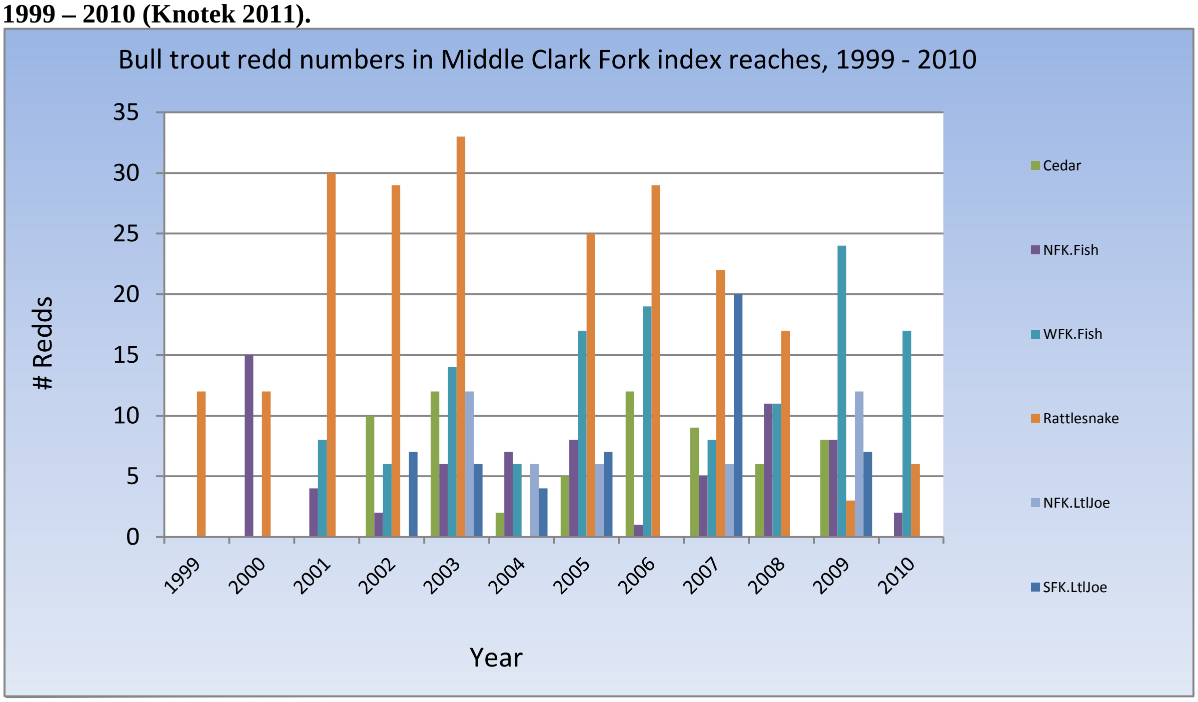
5. Fish Creek,
6. Trout Creek,
7. Cedar Creek, and
8. St. Regis River.

Twenty-four 6th level HUCs make up these eight populations. Some, like the St. Regis River, Petty Creek, and Fish Creek, have three to eight named (by 6th level HUC) populations, while others, like Grant Creek and Albert Creek, have only one. The delineation of local populations is somewhat inconsistent in that all of the 6th level HUCs in some tributaries (i.e. Fish Creek) are considered part of the local population (or are local populations themselves), while only some 6th level HUCs in other tributaries (i.e. St. Regis River) are included in the list. The descriptions of each 6th level HUC in the following tables, and its relevance to the overall population, however, serves to provide some clarity and context.

While some bull trout likely spawn in tributaries other than these throughout the MCFR, the streams listed support the vast majority of fluvial spawning, and redd numbers within them likely represent over 80 percent of the total fluvial spawning that occurs. To the best of our knowledge, two of the eight Local Populations (Grant Creek and Albert Creek) support only resident populations (a few fluvial fish may still be able to migrate into Grant Creek in exceptional water years). Annual redd surveys are only conducted on six index reaches (four streams) of the 24 listed HUCs because spawning is so limited on the remainder that surveys are not meaningful.

Figure 7-8 shows redd count data from the six index streams over the 1999 – 2010 time period. As can be seen, redd numbers in any given stream are highly variable from year to year. This is partly a result of the extremely low numbers within index reaches. With the exception of Rattlesnake Creek and West Fork Fish Creek, most streams usually support less than ten bull trout redds per year.

Figure 7-8. Bull trout redd counts within the six local population index streams on the MCFR Core Area, 1999 – 2010 (Knotek 2011).



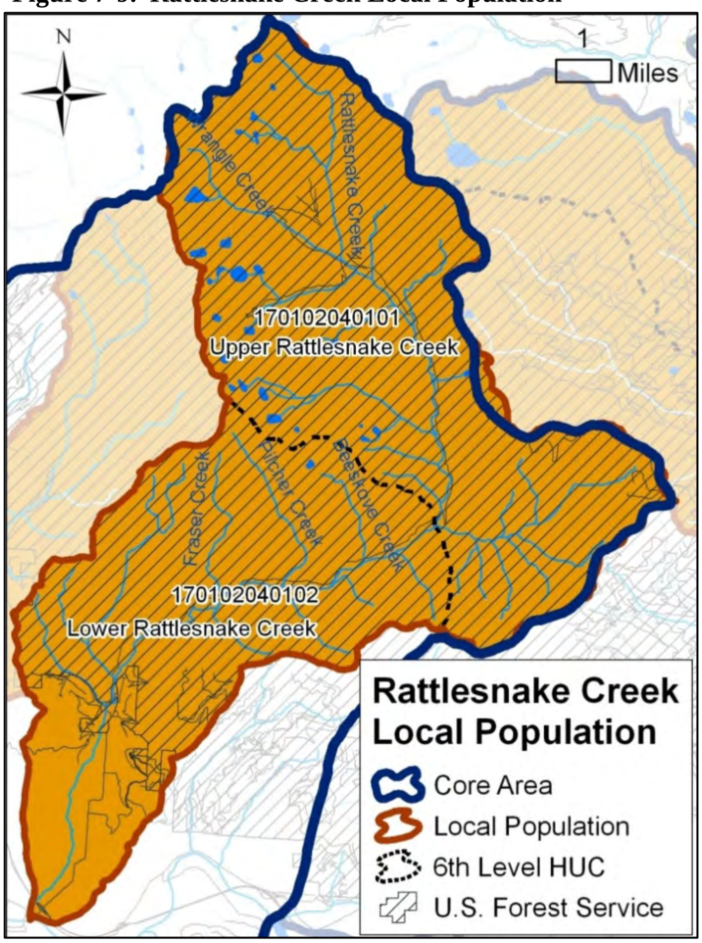
Of the six index reaches, Rattlesnake Creek and West Fork Fish Creek are currently the strongest. They generally support more redds than the remaining four combined. While there are several historical accounts of high numbers of large bull trout spawning in Rattlesnake Creek (Smith 2010), it is unlikely that the current proportion of spawning in other streams throughout the MCFR resembles patterns that existed historically. Several large tributaries such as Big Creek, Twelvemile Creek, Ward Creek, Packer Creek, etc. in the St. Regis River basin suggest that historical spawning was likely much greater in this system than it is today. Similarly, large streams like Ninemile Creek, Petty Creek, and Quartz Creek probably supported significant numbers of fluvial bull trout in the past, but are absent from the current picture.

During the 11-year period of record, bull trout redd densities indicate that populations are extremely low (MTFWP unpublished data). Some appear to be increasing and others decreasing in the short term, but it should be noted that this is a short time period, and bull trout spawning is inherently variable from year to year, so conclusions about the trend of these populations are tentative. More discussion regarding these populations will be provided in the individual 6th level HUC descriptions below.

The next several pages give a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Local Population: Rattlesnake Creek

Figure 7-9. Rattlesnake Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 7-1. Rattlesnake Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250 Migratory 50-250 Res	Stable	Migratory, Connected	1	EB, RBT, BRN. High
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Significant number of spawners for MCFR2. Large watershed. Half WZ, so relatively secure. Upper end of MCFR2, just downstream of Blackfoot.		Moderate vulnerability. Drains high elevation, Point Six to Wishard – high precipitation and elevation, but south facing. Mountain Water Co. Dams on lakes may elevate temperatures.		Larger fluvial fish than most pops – typical depressed migratory pop size with high potential.

Driving Factors Determining Bull Trout Population:

Rattlesnake Creek is a moderate sized watershed containing two 6th level HUCs. Anecdotal evidence suggests that it historically supported a large fluvial bull trout population, both in terms of numbers and average size of fish (Smith 2010). Its significance in the MCFR Core Area is high, as it generally supports the second highest number of redds (behind Fish Creek). It drains high elevation watersheds and maintains relatively stable base flows throughout the winter and summer. It has the potential to be relatively resilient to changes from global warming due to its mean elevation; however the effects of the dams in the headwaters on stream temperatures are unknown. Rattlesnake Creek is the uppermost large tributary in the MCFR Core Area, lying just downstream of the confluence of the Blackfoot and Upper Clark Fork Rivers. This makes it important from a geographical standpoint in terms of providing high quality fluvial spawning habitat for the upper portion of the MCFR Core Area. Rattlesnake Creek is a very high priority watershed for conservation of bull trout within the MCFR Core Area.

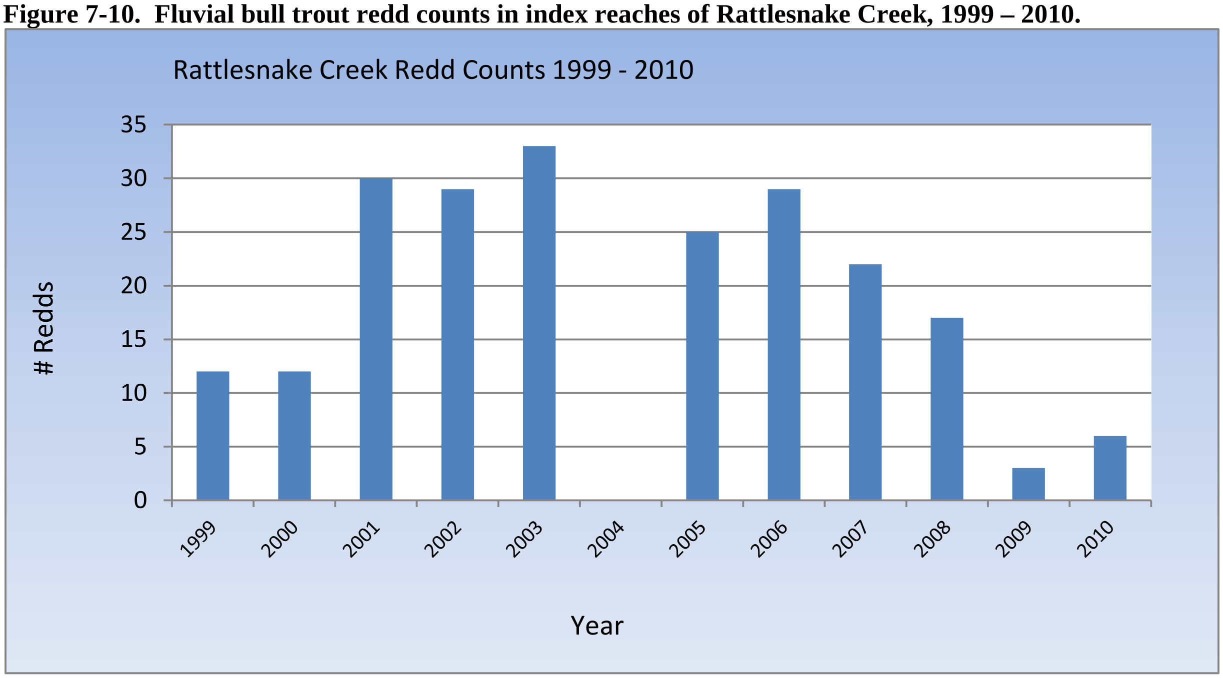
Historically, bull trout likely occupied most of the second order and larger tributaries in Rattlesnake Creek, and probably extended up the mainstem to somewhere near the mouths of Wrangle and Lake Creeks (similar to the current distribution). The construction of the Mountain Water Company dam approximately 5 miles up from the mouth effectively eliminated all upstream migration of fluvial bull trout in 1903. This negatively impacted the population for nearly a century. Passage was made possible in 2001 through a cooperative interagency project that installed a fish ladder around the dam. The current distribution is probably similar to historic, with some restrictions due to the smaller overall population size. Spawning is concentrated in one reach, with incidental spawning occurring in other locations throughout the mainstem. However, spawning concentrations seem to be moving as new areas have developed in recent years. Non-native brook, rainbow, and brown trout are all present in the watershed. Brook trout densities are high above the dam and particularly in the current fluvial spawning areas. Rainbow populations are likely not significant in affecting the bull trout population as there is no evidence in the literature to suggest interactions between the two species at the current time. Brown trout populations are relatively high, and likely affect bull trout to some degree.

Annual redd counts over the past 12 years have ranged from a high of 33 to a low of 3. There are several points of note regarding this data. Redd counts prior to 2000 averaged about 12 per year and then increased substantially as a result of Montana Fish, Wildlife and Parks and Lolo NF

Fisheries efforts to manually move large, migratory fish past the Mountain Water Company dam from 2001 to 2003. Following completion of the fish ladder, manual transport was discontinued, and redd counts appeared to remain relatively stable until 2008. Since 2008, redd numbers in index reaches have been extremely low, at only 3 to 6 redds observed per year. This decline also coincides with removal efforts (2006-2010) of Milltown Dam and associated upstream toxic sediments on the Clark Fork River not far upstream from the mouth of the Rattlesnake. An untested hypotheses is that adult bull trout spawning in Rattlesnake Creek prior to Milltown Dam removal were fish that hatched in the Blackfoot and Upper Clark Fork River Core Areas, and therefore the reduction in redds in Rattlesnake Creek is simply a result of some fish being able to access their natal streams. However, bull trout telemetry studies by MTFWP found that tagged bull trout near the dam site prior to removal did not relocate to adjacent watersheds such as the Rattlesnake (David Schmetterling MTFWP personal communication). Also, it is unclear what role, if any, associated short term water quality and channel effects that accrued downstream during sediment and dam removal activities may have had on adult bull trout using the main Clark Fork near Rattlesnake Creek.

It is unclear what proportion of the decrease in redds within Rattlesnake Creek is attributable to the removal of Milltown Dam (and the ability of some fish to return to their natal streams), the possibility that some fluvial spawners died or moved out of the area as a result of metals and sediment suspension, or simply natural variability in the spawning population. In any case, the information suggests that the fluvial component of the bull trout population in Rattlesnake Creek warrants a closer look to determine what measures can be taken to stabilize the population.

Figure 7-10. Fluvial bull trout redd counts in index reaches of Rattlesnake Creek, 1999 – 2010.

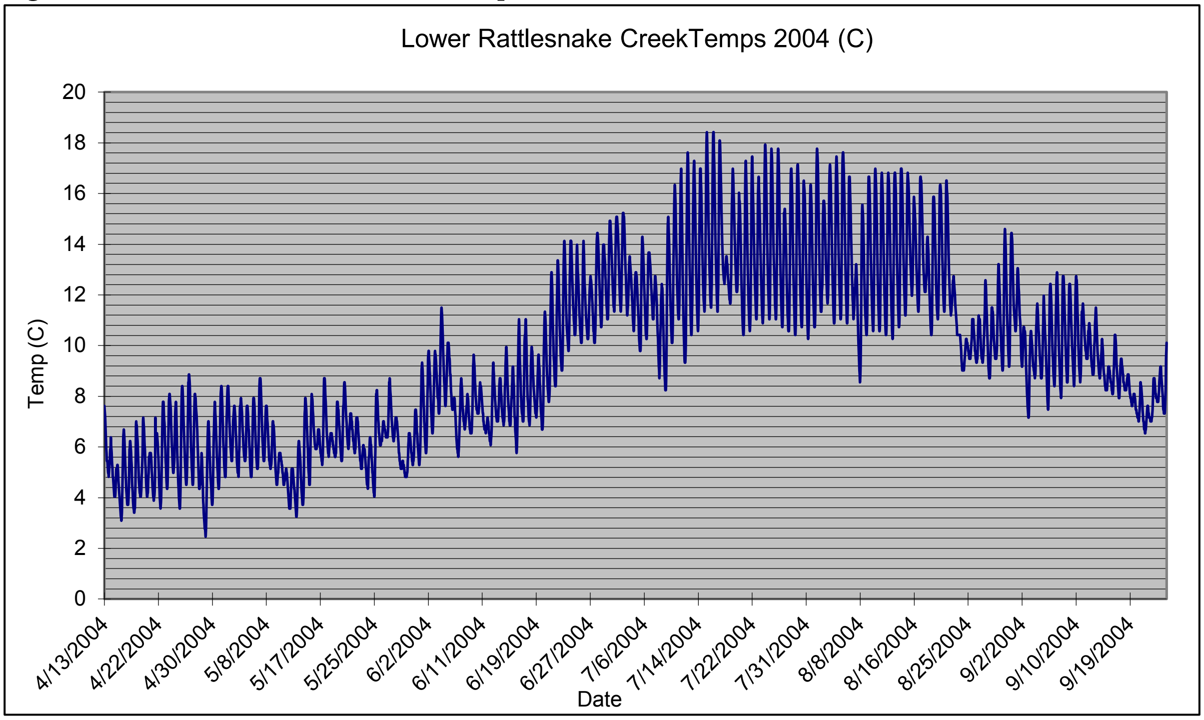


The Rattlesnake Creek watershed has a varied history. The upper reaches, on National Forest land, are primarily undeveloped and contained within the Rattlesnake Wilderness Area. However, prior to the 1960's, this area was not designated wilderness, and differing land uses including logging, road development, and dam construction all occurred in the watershed. The main road along the valley bottom still exists (with use restrictions), along with the dams on several mountain lakes that store water as a backup for Missoula's drinking water system. The lower reaches, below the Mountain Water Company Dam, are extensively developed, with small ranchettes and subdivisions along both banks for most of the 5 mile reach. There are six relatively large diversions which take a significant flow volume (up to 32 cfs) out of the stream throughout the summer. While four of these diversions now have fish screens, the operation and maintenance of the screens is problematic and not always effective in eliminating entrainment of bull trout.

The stream corridor also has a long history of impacts, including logging and log drives down the stream channel which devastated aquatic habitat and fish populations. Historically, large logjams existed throughout the mainstem. These provided critical spawning and overwintering habitat for bull trout. Log drives and logging of the riparian zone, along with development, all but eliminated these components of the aquatic ecosystem except in undeveloped areas near the headwaters. The lack of large debris jams in the main stream channel results in few depositional, energy dissipation zones for complex habitat and spawning substrates to establish.

Water temperature is also an issue in Rattlesnake Creek (Knotek 2011) (Figure 7-11). Rattlesnake Creek is the only south facing drainage in the MCFR with a measurable fluvial bull trout population, and temperatures in the lower reaches commonly approach 18 C in the summer. It is unclear what effect the aspect, historic management activities, or dams in the headwater lakes have on current temperature patterns, but the fact that temperatures regularly approach levels of concern for bull trout is of concern.

Figure 7-11. Lower Rattlesnake Creek Temperatures 2004



Low fluvial bull trout numbers in the MCFR Core Area as a whole are another factor limiting the strength of the local population in Rattlesnake Creek. There are currently about 60 --70 redds on average throughout the entire MCFR Core Area per year, and a high percentage of these are resident fish. With the overall MCFR Core Area population being this low, the ability of any local population to increase in size is limited because there are no other robust populations nearby to act as source populations or for exchange of genetic material.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Rattlesnake Creek - 170102040101							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	1 year	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FAR	FA	1 year	3	$0	-	-

This HUC is important for bull trout conservation in terms of the cold, clean water it provides to downstream reaches. The canyon section in this reach also isolates upstream bull trout from brook trout populations downstream. It is therefore a relatively secure stronghold for bull trout at the present time. It is unclear whether the canyon would effectively limit brook trout introgression if the downstream population increases significantly.

Aquatic habitat is generally in good condition, however stream gradients are relatively steep, and bull trout habitat is naturally limited. Most of the bull trout spawning and use occurs downstream in the Lower Rattlesnake HUC. There are two activities in the HUC that could potentially impact bull trout populations – the dams on the lakes in the headwaters, and the access road to these dams. The temperature call is driven by the road alongside the stream for much of its length. However, this road generally does not affect shade or woody debris recruitment since it is well away from the stream on the terrace for most of its length. In addition, there is no hazard tree or firewood cutting, and there are no stream crossings that limit the movement of woody debris through the system (all are bridges). The dams present on several lakes in the extreme headwaters result in slightly higher storage capacities in the lakes, but the effect on flows is minimal since none of them are flow regulating structures and the natural hydrograph is mostly maintained. The effect of these dams on mid-summer temperature patterns in Rattlesnake Creek is unclear.

Overall, there are few opportunities to significantly improve conditions and contribute to bull trout recovery in the upper Rattlesnake Creek watershed. However, studies addressing the effect of the dams on stream temperature should be pursued.

Temperature: The riparian zone is healthy and not affected to a great degree by the valley bottom road (since it is elevated on a terrace and generally well away from the stream, on flat ground). No overstory removal occurs along the riparian corridor at the current time; however significant impacts did occur in the past. While these impacts are probably not fully recovered, it is unlikely that any additional restoration would benefit the system. There may be an effect to temperature resulting from the low amount of woody debris in the stream; however this is more of an issue in the Lower Rattlesnake Creek HUC on both private and National Forest Service land. The temperature call in the Upper Rattlesnake HUC may be able to be changed to FA if monitoring information was collected to substantiate the change and studies were conducted to determine if the dams have any influence on temperature patterns.

Barriers: There are no barriers in the HUC, and no needs to address this indicator.

Pools: The baseline indicator for pools is FAR. Pool habitat and complexity has been affected throughout the HUC by the valley bottom road and past logging, but these effects are minimal and are mostly recovered at the present time. There may be an effect to pools resulting from the low amount of woody debris in the stream; however this is more of an issue in the Lower Rattlesnake Creek HUC on both private and National Forest Service land. Adding woody debris to the mainstem in this HUC could result in some benefits to downstream pool habitat as the woody debris migrates downstream over time. However, this activity would be relatively low priority compared to directly adding woody debris to downstream reaches. Therefore, no activities aimed at changing the indicator for pools are recommended at the current time.

Sediment: The baseline indicator for sediment is FAR. This is driven largely by the presence of the road up the valley bottom through much of the HUC. This road is closed to all but administrative traffic, however, and sediment impacts are therefore light. This indicator could likely be upgraded after collecting data to substantiate the change. There are no activities proposed to change this indicator at the current time.

Most important activities to improve bull trout population:

Work with MTFWP to eliminate brook trout and brown trout from Rattlesnake Creek.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Rattlesnake Creek - 170102040102							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 59%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	1 year	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	1 year	3	$0	-	-
Sediment	FAR	FAR	1 year	3	$0	-	-

This HUC supports the majority of the local population in Rattlesnake Creek. Habitat conditions on Forest Service land are generally good. Habitat conditions downstream of Forest Service land on private are considerably less optimal, with subdivision along most of the stream. Through these reaches, the riparian zone is intermittently impacted and large woody debris and complex pool habitat is minimal. The baseline calls are currently FAR for three indicators due to the road that goes up the valley bottom. However, this road is relatively unimpactive, and it is closed to all but administrative use, so sediment effects are minimal.

There is a moderate sized dam (approximately 10 feet high) that was constructed in 1903 in the middle of the HUC. This dam blocked all upstream fish passage prior to 2000 when a ladder was installed. The ladder was selectively opened and closed during peak spawning runs for different fish species in an attempt to allow native species (westslope cutthroat and bull trout) to pass and retain some restriction on the number of non-natives (primarily brown trout) that migrate upstream for several years. Approximately three years ago, however, Mountain Water Company began leaving the radial gate open periodically to assist native trout migrations. In 2012, access to the control for the gate was removed, and now the gate is open year-round. At this point, it would be advantageous for MTFWP, USFS, and Mountain Water Company to coordinate discussions to determine the best long-term solution regarding what to do with the dam. It appears to serve little function but continues to impact stream dynamics upstream and downstream, and it may be beneficial to both Mountain Water Company and native trout in the system to discuss removing it.

There are six diversions that likely have some effect by entraining bull trout – two of these are on NFS lands. The larger diversion (Quast) has a Forest Service installed screen that is functional most of the time. The smaller ditch (Williams) has a screen that is dysfunctional. There are four additional diversions (not on NFS lands) – two have been screened and two are unscreened. All six diversions impact bull trout habitat by reducing base flows. The total amount of water appropriated for diversion in this HUC is approximately 32 cfs – a significant portion of the flow volume during summer months – and this impacts bull trout rearing throughout the lower reaches. There may be some loss of bull trout down the unscreened ditches, but MTFWP has shocked these ditches over multiple years and has seen no entrainment of bull trout since screens were installed (Knotek, pers. Com. 2013).

Overall, there are numerous opportunities to improve conditions and contribute to bull trout recovery in the lower Rattlesnake Creek watershed. However, the main impacts are in the lower few miles on private land, and there are numerous landowners, so coordination would be difficult. Initiation and coordination of these activities would likely be through Montana Fish, Wildlife and Parks, Trout Unlimited, or other NGO's. Projects designed to improve the complexity of instream habitat through adding large woody debris would be relatively straight forward, would avoid much of the landowner coordination issue, and would provide direct benefits to pool habitat, complexity, and possibly stream temperatures. Removal of brook and brown trout populations upstream of the dam/ladder is an important opportunity that would provide long-term security benefits to the bull trout population.

Temperature: Temperatures in the mainstem of Lower Rattlesnake Creek are probably elevated due to water diversions combined with the overly wide channel resulting from historic logging and log drives down the stream. The dams in the upper HUC may also contribute to high summer temperatures. The riparian zone is also currently impacted by development on private lands. There are opportunities to add large woody debris to the stream and begin to restore the habitat complexity that historically existed in the creek. This would improve temperatures to some degree. Any progress towards reducing the amount of water diverted during the summer months would help considerably as well. Most of these activities would take place downstream of NFS lands, so the baseline call may not change as a result of the projects.

Barriers: There are no barriers in the HUC.

Pools: The baseline indicator for pools is FAR. Pool habitat and complexity has been affected throughout the HUC by the valley bottom road, the dam, past logging and log drives, private home development, and poor riparian conditions. There are opportunities to add large woody debris to the system to begin to restore pool habitat and complexity. However, this will require maintenance, as it is unlikely that private land management or the presence of the dam will change any time soon to allow for a more functional riparian zone and natural input and movement of large woody debris. The baseline call will likely remain FAR.

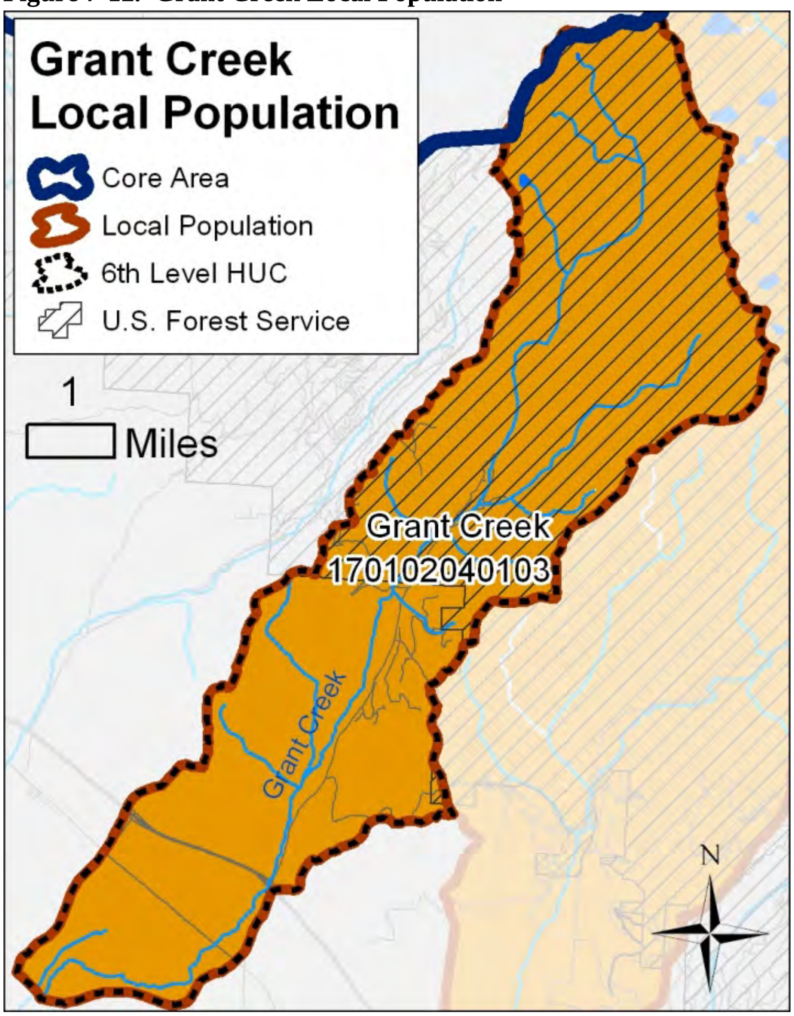
Sediment: The baseline indicator for sediment is FAR. This is driven largely by the presence of the road up the valley bottom through much of the HUC. This road is closed to all but administrative traffic, however, and sediment impacts are therefore light. This indicator could likely be upgraded after collecting data to substantiate the change. However, sediment conditions in the HUC overall are affected a lot more by the home and subdivision road networks, and these impacts will likely not change in the near future. There are few easily addressable ways to reduce sediment in this HUC. However, pool quality is a much bigger issue from a bull trout perspective, and so the fact that the sediment indicator will not likely change is of little consequence.

Most important activities to improve bull trout population:

1. Work with cooperating agencies and NGO's to reduce the amount of water diverted out of the stream during the summer months.
2. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in the watershed.
3. Add significant amounts of large woody debris to the stream channel throughout most of the 5 miles downstream of the dam to increase pool habitat and complexity, and indirectly reduce sedimentation.
4. Coordinate with Mountain Water Company and FWP to determine the desirability of removing the MWC Dam.

Local Population: Grant Creek

Figure 7-12. Grant Creek Local Population



Relative Importance of Population to Core Area (H,M,L): L

Table 7-2. Grant Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50 Migratory 50-250 Res	Unknown	Resident, Fragmented	1	Eastern Brook Trout; High
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Relatively low significance – fluvial component largely absent. It's also located right next to Rattlesnake Creek. Relatively small watershed.		High vulnerability due to fragmentation and lack of refounding ability. Water withdrawals and private land also an issue. Small watershed, no known upwellings. Does drain relatively high elevation.		None

Driving Factors Determining Bull Trout Population:

Grant Creek is a relatively small watershed with widely varying aquatic habitat conditions. The headwaters are high elevation and mostly undeveloped. Aquatic conditions in these reaches are high quality. The lower half of the watershed flows through private property, and then through the city of Missoula. Conditions for bull trout in these reaches are poor. From I-90 downstream, Grant Creek is essentially an irrigation ditch with seasonal flows to its confluence with the Middle Clark Fork River. Grant Creek currently supports a small, resident population of bull trout. There is little fluvial use due to poor connectivity with the Clark Fork River and the fact that there are few fluvial bull trout remaining in the main river. Grant Creek generally reaches the Clark Fork for only two to three months in the spring. The stream naturally loses water as it flows through the porous Missoula valley for several miles. Diversions are an issue, but much of the irrigation water on private lands along Grant Creek is actually supplied by the Clark Fork River through the Hellgate Ditch, so it's unclear to what degree irrigation is currently affecting flows in Grant Creek. No redd counts are conducted due to the fact that the population is small and resident fish redds are hard to count due to their small size. The status and trend of the population is not well understood, however, bull trout are still routinely observed in electrofishing surveys conducted by FWP. Bull trout in Grant Creek exhibit a relatively high degree of hybridization with brook trout.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Grant Creek - 170102040103							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 56%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FAR	FAR	-	3	$0	-	-

This HUC supports a primarily resident population of bull trout due to the lack of year-round connectivity to the Clark Fork River, and the fact that the overall bull trout population in the Middle Clark Fork is severely depressed. There may be limited fluvial movement, but the population is probably mostly limited to Grant Creek itself. Brook trout are common throughout Grant Creek, and hybridization with bull trout is common. Since there is little new genetic material from fluvial bull trout entering this population, the effects of hybridization are likely to compound in successive generations. It is therefore likely that this population will become functionally extinct at some point, without relatively urgent actions taken to remove brook trout and increase the likelihood of fluvial bull trout entering the population.

Habitat conditions are poor downstream of Forest Service land, but relatively good upstream where the baseline calls apply. There are few opportunities to improve conditions on Federal land. Numerous opportunities to improve habitat conditions exist on private lands, especially between I-90 and NFS ownership. Habitat improvement efforts should be focused on those reaches that maintain year-round flow. In these areas, addition of large woody debris to improve large pool habitat and complexity may benefit the population. These projects would be cooperative projects between state agencies or NGO's and private landowners.

The main projects that would improve this population are to coordinate with FWP and consider management that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in Grant Creek and to improve connectivity to the Clark Fork. Secondarily, projects should focus on improving habitat conditions and improving instream flows through private land on the lower several miles of stream.

Temperature: Temperatures in Grant Creek are probably conducive to supporting a healthy bull trout population in the upper watershed due to the fact that it is undeveloped and relatively high in elevation. While stream characteristics in the lower watershed would suggest that temperatures may be a problem, the stream doesn't maintain surface flow during the summer in these reaches, so it is probably a moot point. There appears to be no immediate need to improve temperature conditions in the HUC.

Barriers: The baseline call for barriers is FA due to the fact that there are no barriers on NFS lands. Until recently, there were at least four major obstacles to upstream migrating fish. All but one of these has been addressed in recent years. The remaining barrier is a on a private diversion that is open except from about July through September of each year. Permanent passage around this barrier should be addressed through non-federal agency partnerships. The culvert under Interstate 90 may also be an upstream migration obstacle. It is approximately 300 feet long, and concentrates flow at levels above base flow to where velocities may be an issue. Some movement of adult fluvial bull trout through this culvert may occur, but it is likely hindered to some degree. It is unclear whether changes to this culvert are warranted.

Pools: The baseline indicator for pools is FAR. On NFS lands, the watershed is primarily roadless, and pool habitat is expected to be at natural levels. No action is needed to address this indicator. Pool habitat on private land could be improved to benefit bull trout. Habitat improvement efforts should be focused on those reaches that maintain year-round flow. In these areas, addition of large woody debris to improve large pool habitat and complexity may benefit the population. These projects would be cooperative projects between state agencies or NGO's and private landowners

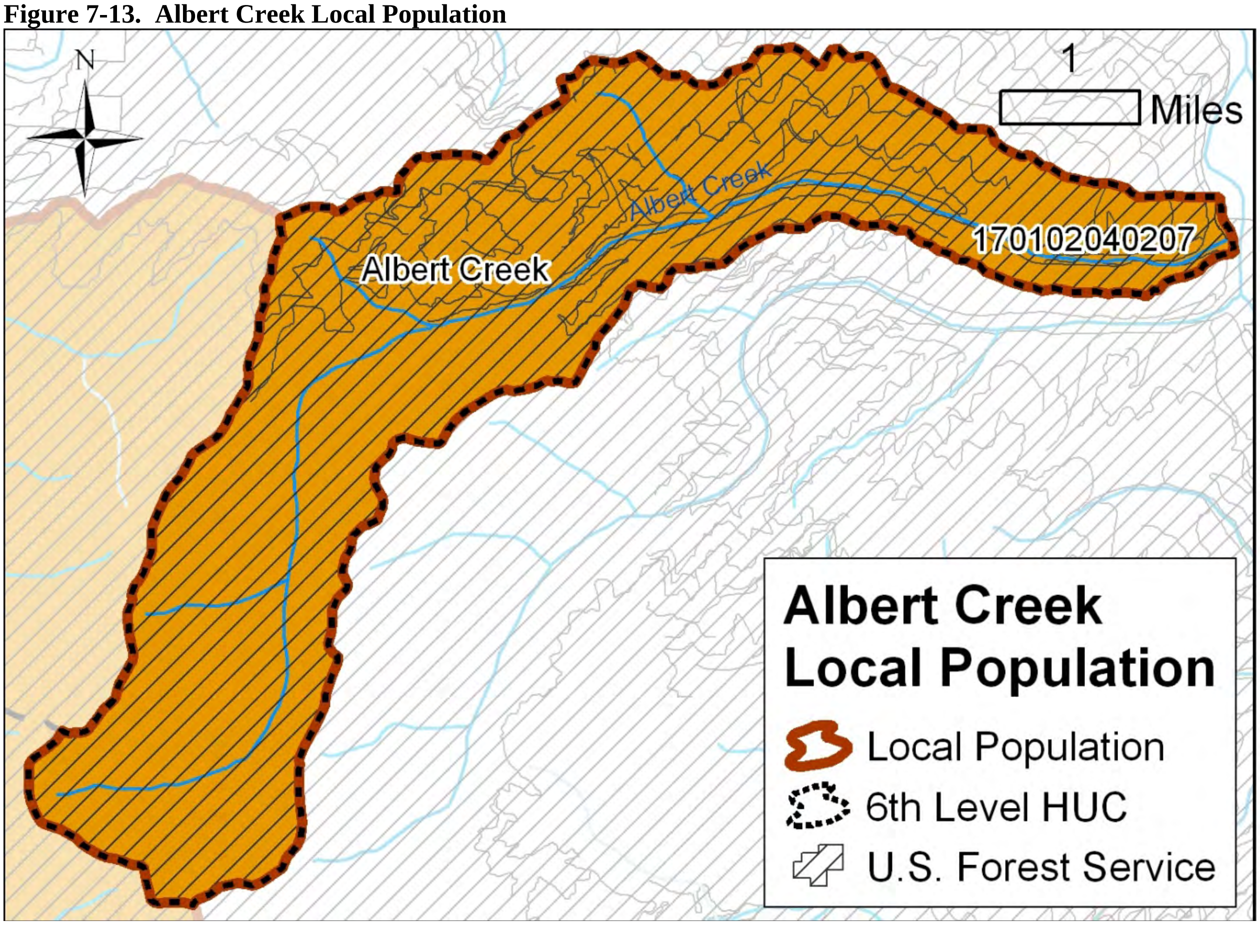
Sediment: The baseline indicator for sediment is FAR. On NFS lands, the watershed is primarily roadless, and sediment levels are expected to be near natural levels. No action is needed to address this indicator. On private lands, road densities are extremely high due to subdivision and development. Most of these roads are paved, however, and sediment erosion is not considered a large issue. Streambank and channel erosion in the lower watershed (downstream of I-90) is a significant issue due to the confined state of the channel through the city of Missoula. This creates a high sediment load that the stream cannot process, and habitat is therefore negatively affected. Significant improvements to habitat could be made in these reaches by developing a floodplain and allowing the channel to have some room for energy release under higher flows.

Most important activities to improve bull trout population:

1. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in the watershed.
2. Improve year-round connectivity to the Clark Fork, or at least increase the length of time that surface flows reach the Clark Fork.
3. Improve habitat conditions through private land on the lower several miles of stream.

Local Population: Albert Creek

Figure 7-13. Albert Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 7-3. Albert Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
0 Migratory (assumed) 50-250 Res	Unknown	Resident, Fragmented	0	None
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Moderate significance – fluvial component largely absent, but this stream maintains strong resident pop with few or no non-natives. It's also located a low elevation watershed on south side – Petty Creek is the only other similar watershed. Relatively small watershed.		High vulnerability due to fragmentation and lack of refounding ability. Water withdrawals and private land also an issue. Small watershed, no known upwellings. Drains low elevation, so vulnerability to warmer temps is high.		Strong resident component that seems to be stable (although trend data is insufficient to say this for sure).

Driving Factors Determining Bull Trout Population:

Albert Creek is a relatively small watershed with widely varying aquatic habitat conditions. The headwaters are mostly undeveloped. Aquatic conditions in these reaches are high quality. The lower half of the watershed flows through private property and becomes dewatered before entering the Middle Clark Fork River. Conditions for bull trout in these reaches are poor. Albert Creek currently supports a moderate sized population of resident bull trout. We assume there is no fluvial use at the current time, but this is largely unsubstantiated because sampling efforts have not been thorough enough to discount fluvial use. Two culvert barriers exist on roads in the lower two miles of Albert Creek. These barriers pose 2-3 foot jumps that may be passable for an adult fluvial fish under certain flow regimes. In addition, there is a diversion on private land just upstream of these that poses a slightly greater jump and may be more of a barrier. The diversion exacerbates low flow problems. Most years there is no surface flow within the lower 1 mile of the stream, and no connectivity to the river during low flow periods. There is generally year-round connectivity during runoff periods of April through June, which is when fluvial bull trout would generally migrate. No redd counts are conducted on Albert Creek due to the fact that resident fish redds are hard to count due to their small size. The status and trend of the population is not well understood, however, bull trout are still routinely observed in electrofishing surveys conducted by MTFWP.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Albert Creek - 170102040207							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High – Only HUC in Local Pop							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	20 years	3	$50,000	M	L
Barriers	FUR	FAR	10 years	3	$200,000	H	M
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FUR	FAR	20 years	3	$50,000	L	L

The HUC contains all of Albert Creek. The key limiting factor is access to the middle Clark Fork River. Effects to habitat indicators in the lower reaches of the HUC are what drive the baseline calls – the mid-upper reaches are in good condition. Road systems, including a valley bottom road that parallels the stream are the cause for sediment and temperature calls and could be addressed with focused transportation planning/implementation. This watershed is currently mostly important as a resident population, but with removal of the barrier and improved flows could be a more important fluvial stream. Providing fish passage at these locations would need to be discussed with MTFWP because there are genetically pure westslope cutthroat upstream of the barriers that may be compromised by rainbow trout introgression. From purely a bull trout conservation perspective, however, providing access is important. The significance of Albert Creek in terms of its overall contribution of fluvial bull trout to the core area, however, will always be somewhat limited by its relatively small size.

In 2010, the Lolo NF completed a restoration project on a dispersed camping site that was receiving heavy use and significant stream damage. This project was successful at restoring stream conditions, however the longevity of the project is questionable since ORV access is difficult to eliminate. With the exception of this site, there are few opportunities to improve conditions on Federal land. Numerous opportunities to improve habitat conditions exist on private lands, however. Discussions are currently underway that address the irrigation diversion and its impact on flows and fish passage/entrainment. Until flows in the lower reaches are improved, habitat improvement efforts should be focused on those upstream reaches that maintain year-round flow. In these areas, addition of large woody debris to improve large pool habitat and complexity may benefit the population. These projects would be cooperative projects between state agencies or NGO's and private landowners.

Temperature: Temperatures in Albert Creek are probably higher than optimal for supporting a healthy bull trout population due to the fact that Albert Creek is a relatively low elevation watershed that loses flow in the lower reaches. Temperatures could be improved by working with the landowners that manage the irrigation ditch to keep more surface flow in the stream. The Lolo NF, along with Montana Fish, Wildlife, and Parks and the Clark Fork Coalition are currently discussing options with the landowner. Temperature could also be improved by adding large woody debris to the mainstem on private land. However, the likely benefit associated with this in terms of reducing temperatures may be small since most fish are likely upstream in response to low flows during the summer.

Barriers: The baseline call for barriers is FUR. The two culverts in the lower reaches and the diversion dam are barriers. In addition, the stream only maintains surface flow during the spring in the lower reaches. Part of this is natural due to the highly porous nature of the substrate in these reaches, and some of it is exacerbated by an existing water diversion. Removal of these barriers would provide direct benefits to the bull trout population by connecting the fluvial component and therefore reducing long-term genetic and stochastic risks associated with the isolated resident population. These three projects (diversion structure and two barriers) should be taken on as one package to improve fluvial access to Albert Creek, as removing one by itself will not likely benefit the resident population to any significant degree without providing fluvial connectivity. This is a relatively high priority project for bull trout, but not as immediate of a need as some projects on larger streams.

Pools: The baseline indicator for pools is FAR. On NFS lands, the watershed is in relatively good condition overall. While some woody debris could be added to the system, there is no immediate need to address this indicator. Pool habitat on private land could be improved to benefit bull trout. Adding woody debris to these reaches would increase pool habitat and may also increase the ability of the channel to maintain year-round flows by increasing the storage capacity of the riparian zone.

It would also provide summer and winter pool refugia when reaches go dry. This type of project would have to be relatively large-scale, to ensure that small pools that strand fish and then dry up aren't created, resulting in a population sink. These projects would be cooperative projects between state agencies or NGO's and private landowners

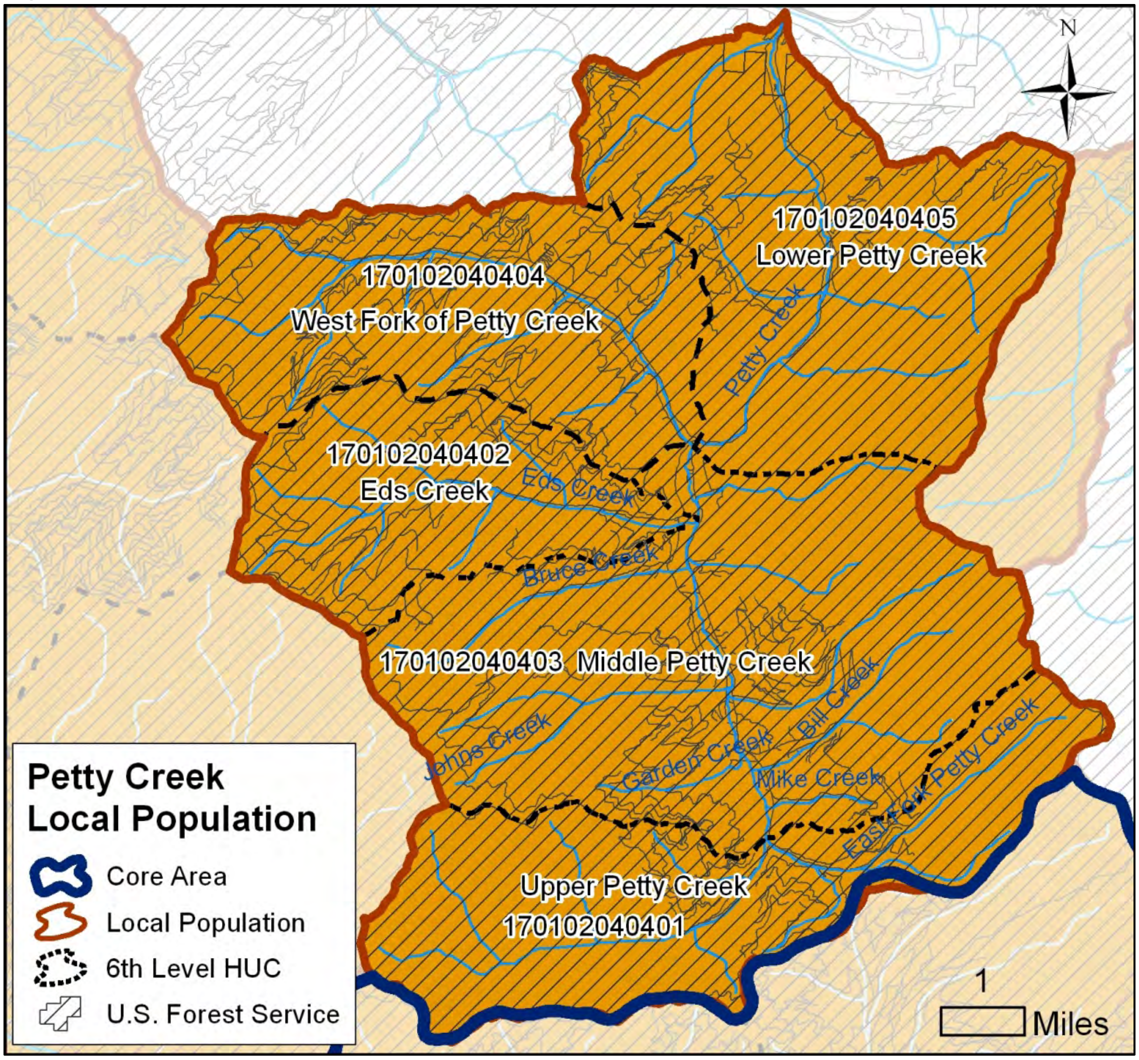
Sediment: The baseline indicator for sediment is FUR. On NFS lands, the watershed has low road densities overall, and sediment levels are expected to be near natural. There are isolated instances of ORV access in the riparian zone that create sediment impacts, and these are expected to continue. The Lolo NF will address these on a site by site basis as part of normal land management responsibilities as they occur. On private lands, road densities are higher, and sediment addition is an issue. Overall, there are limited opportunities to improve this indicator without the instigation of private landowners or outside agency/NGO's.

Most important activities to improve bull trout population:

1. Eliminate the barriers in the lower reaches of Albert Creek
2. Improve surface flows by working with the landowner to reduce diversions and by adding large woody debris complexes to the lower reaches to increase large pool habitat and riparian water storage. This may be a good location to reintroduce beaver to help restore the capacity of the riparian zone to store water.

Local Population: Petty Creek

Figure 7-14. Petty Creek Local Population



Relative Importance of Population to Core Area (H,M,L): L

Table 7-4. Petty Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
0 - 50 Migratory 0 – 250 Res	Decline or Absent	Migratory, Connected	0	Eastern Brook Trout, High
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Large watershed in the middle of MCFR2, but Fish Creek and Albert Creek are nearby.		High vulnerability. Relatively low elevation and low precipitation zone.		None This watershed supported migratory fish historically and is still connected but bull trout are absent in recent sampling.

Driving Factors Determining Bull Trout Population:

Petty Creek is a relatively large watershed that lies between Fish Creek and Albert Creek. The headwaters originate in the Grave Creek Range, and are lower elevation than Fish Creek – consequently, flows are less and temperatures are warmer in the summer. Habitat conditions are generally degraded from extensive road systems and past logging, combined with development of private lands along the riparian zone throughout most of the stream length. There is one roadless area in the eastern portion of the watershed that drains moderately high elevation lands around Petty Mountain.

Redd surveys have not been conducted in Petty Creek due to a lack of bull trout occupying the stream. Both MTFWP and the Lolo National Forest found bull trout in Petty Creek (likely resident fish, based on small size) in the 1990's, however, no bull trout have been found in any sampling efforts since then (MTFWP unpublished data, LNF unpublished data). It appears that bull trout have been extirpated from this drainage.

Nevertheless, the stream is relatively large and maintains connectivity with the middle Clark Fork River throughout the spring and into mid-summer of most years. It therefore has the potential to support bull trout in the future and is listed as a Local Population (USFWS) and Bull Trout Priority Watershed (USDA Forest Service, Region 1, unpublished data). The development of these listing categories occurred when bull trout were still believed to be present in Petty Creek.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Petty Creek - 170102040401							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FUR	FAR	10 years	3	$150,000	L	L
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FUR	FAR	10 years	3	$150,000	L	L

Current data indicates that bull trout are likely not present in Upper Petty Creek, at least at levels that would be detected through standard electrofishing surveys. There are no index redd count reaches on this stream. Habitat in this HUC varies from good to poor condition, depending on a variety of factors. There are some barriers on small streams, but they likely have little effect on bull trout at the present time, and would not promote recovery since few, if any bull trout are present. This HUC is important in providing relatively cold water to the remainder of the Petty Creek watershed. If there were more bull trout in the MCFR Core Area and the Petty Creek Local Population, it is likely that a limited resident population would occur in the watershed.

Temperature: Temperatures in Upper Petty Creek are probably slightly lower than average in the Petty Creek watershed due to the headwater location. No action is proposed to address this indicator because of the low importance of this stream for fluvial bull trout currently.

Barriers: The barriers call in the baseline assessment may be slightly lower than actual conditions, since most of the culverts are on relatively small streams that would not likely contain bull trout. There is a risk of sediment if the culverts were to fail, but it isn't of the magnitude that would warrant extensive restoration in the HUC.

Pools: The baseline indicator for pools is FAR. No action is needed to address this indicator.

Sediment: The baseline indicator for sediment is FUR. This is likely due to road densities and roads along streams in the HUC. There are probably opportunities to reduce sediment by removing or relocating roads and these should be addressed at the project level as integrated projects are developed.

Most important activities to improve bull trout population:

1. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in the watershed.
2. Take advantage of opportunities to reduce road densities and fish barriers as other projects are developed in the HUC.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Eds Creek - 170102040402							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 50%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$50,000	M	L
Barriers	FUR	FAR	10 years	3	$150,000	L	L
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FUR	FAR	10 years	3	$150,000	L	L

Current data indicates that bull trout are likely not present in Eds Creek, at least at levels that would be detected through standard electrofishing surveys. There are no index redd count reaches on this stream. Habitat in this HUC is generally below average, largely due to timber and road management on both NFS and Plum Creek lands. Private lands along the bottom are also impacted. There are some barriers on small streams, but they likely have little effect on bull trout at the present time, and would not promote recovery since few, if any bull trout are present. If there were more bull trout in the MCFR Core Area and the Petty Creek Local Population, it is likely that a limited resident population would occur in the watershed.

Temperature: Temperatures in Eds Creek are probably slightly elevated due to riparian roads and riparian vegetation management activities that have occurred. Cooperative work with landowners along the mainstem provides an opportunity to improve temperature conditions.

Barriers: The barriers call in the baseline assessment may be slightly lower than actual conditions, since most of the culverts are on relatively small streams that would not likely contain bull trout. There is a risk of sediment if the culverts were to fail, but it isn't of the magnitude that would warrant extensive restoration in the HUC.

Pools: The baseline indicator for pools is FAR. No action is needed to address this indicator.

Sediment: The baseline indicator for sediment is FUR. This is likely due to road densities and roads along streams in the HUC. There are probably opportunities to reduce sediment by removing or relocating roads and these should be addressed at the project level as integrated projects are developed.

Most important activities to improve bull trout population:

1. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in the watershed.
2. Take advantage of opportunities to reduce road densities and fish barriers as other projects are developed in the HUC.
3. Work with partners and landowners to develop a riparian management plan that moves towards restoration of a functional corridor with healthy overstory to maintain low water temperatures.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle Petty Creek - 170102040403							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 50%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$50,000	M	L
Barriers	FAR	FAR	-	3	$0	-	-
Pools	FUR	FAR	10 years	3	$150,000	L	L
Sediment	FUR	FAR	10 years	3	$150,000	L	L

Current data indicates that bull trout are likely not present in Middle Petty Creek, at least at levels that would be detected through standard electrofishing surveys. However, this HUC, along with the Lower Petty HUC, is the most likely to have some remnant bull trout population, and the most likely to support a recovery of bull trout if it were to occur in the future. There are no index redd count reaches on this stream. Habitat in this HUC is variable, with reaches on the mainstem suffering from upstream disturbances and valley bottom roads, and reaches in the Petty Mountain area being in relatively good condition. Private lands along the bottom are also impacted. There are some barriers on small streams, but they likely have little effect on bull trout at the present time, and would not promote recovery since few, if any bull trout are present. If there were more bull trout in the MCFR Core Area and the Petty Creek Local Population, it is likely that a limited resident population, with possibly some fluvial component, would occur in the watershed.

Temperature: Temperatures in Middle Petty Creek are probably slightly elevated due to riparian roads and riparian vegetation management activities that have occurred. Temperatures in streams originating near Petty Mountain are probably near natural. Cooperative work with landowners along the mainstem provides an opportunity to improve temperature conditions.

Barriers: The barriers call is probably accurate and no activities are proposed to address this indicator.

Pools: The baseline indicator for pools is FUR. There may be opportunities to improve pools along the mainstem by adding large woody debris to the stream system. Past efforts to increase pools through log drop structures have largely washed out.

Sediment: The baseline indicator for sediment is FUR. This is likely due to road densities and roads along streams in the HUC. There are probably opportunities to reduce sediment by removing or relocating roads and these should be addressed at the project level as integrated projects are developed.

Most important activities to improve bull trout population:

1. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in the watershed.
2. Take advantage of opportunities to reduce road densities and fish barriers as other projects are developed in the HUC.
3. Work with partners and landowners to develop a riparian management plan that moves towards restoration of a functional corridor with healthy overstory to maintain low water temperatures.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Fork Petty Creek - 170102040404							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 50%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$50,000	M	L
Barriers	FUR	FAR	10 years	3	$150,000	L	L
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FUR	FAR	10 years	3	$150,000	L	L

Current data indicates that bull trout are likely not present in the West Fork of Petty Creek, at least at levels that would be detected through standard electrofishing surveys. There are no index redd count reaches on this stream. Habitat in this HUC is variable – the stream has the potential to support bull trout due to its size, however, habitat conditions are somewhat impacted. There are some barriers on small streams, but they likely have little effect on bull trout at the present time, and would not promote recovery since few, if any bull trout are present. If there were more bull trout in the MCFR Core Area and the Petty Creek Local Population, it is likely that a limited resident population, with possibly some fluvial component, would occur in the watershed.

Temperature: Temperatures in the West Fork of Petty Creek are probably slightly elevated due to riparian roads and riparian vegetation management activities that have occurred. Cooperative work with landowners along the mainstem provides an opportunity to improve temperature conditions.

Barriers: The barriers call is probably accurate. There will likely be opportunities to remove barriers through integrated projects.

Pools: The baseline indicator for pools is FUR. There may be opportunities to improve pools along the mainstem by adding large woody debris to the stream system.

Sediment: The baseline indicator for sediment is FUR. This is likely due to road densities and roads along streams in the HUC. There are probably opportunities to reduce sediment by removing or relocating roads and these should be addressed at the project level as integrated projects are developed.

Most important activities to improve bull trout population:

1. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in the watershed.
2. Take advantage of opportunities to reduce road densities and fish barriers as other projects are developed in the HUC.
3. Work with partners and landowners to develop a riparian management plan that moves towards restoration of a functional corridor with healthy overstory to maintain low water temperatures.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Petty Creek - 170102040405							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 50%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FUR	FAR	10 years	3	$150,000	L	L
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FUR	FAR	10 years	3	$150,000	L	L

Current data indicates that bull trout are likely not present in Lower Petty Creek, at least at levels that would be detected through standard electrofishing surveys. However, this HUC, along with the Middle Petty HUC, is the most likely to have some remnant bull trout population, and the most likely to support a recovery of bull trout if it were to occur in the future. There are no index redd count reaches on this stream. Habitat in this HUC is affected by past management, with reaches on the mainstem suffering from upstream disturbances and valley bottom roads. Private lands along the bottom are also impacted. There are some barriers on small streams, but they likely have little effect on bull trout at the present time, and would not promote recovery since few, if any bull trout are present. If there were more bull trout in the MCFR Core Area and the Petty Creek Local Population, it is likely that a limited resident population, with possibly some fluvial component, would occur in the watershed.

Temperature: Temperatures in Lower Petty Creek are probably slightly elevated due to riparian roads and riparian vegetation management activities that have occurred. There are opportunities to improve riparian conditions along the main Petty Creek road. Cooperative work with landowners along the mainstem also provides an opportunity to improve temperature conditions.

Barriers: The barriers call is probably accurate and opportunities to address small barriers should be addressed as other projects are developed.

Pools: The baseline indicator for pools is FAR. There may be opportunities to improve pools along the mainstem by adding large woody debris to the stream system. Past efforts to increase pools through log drop structures have largely washed out.

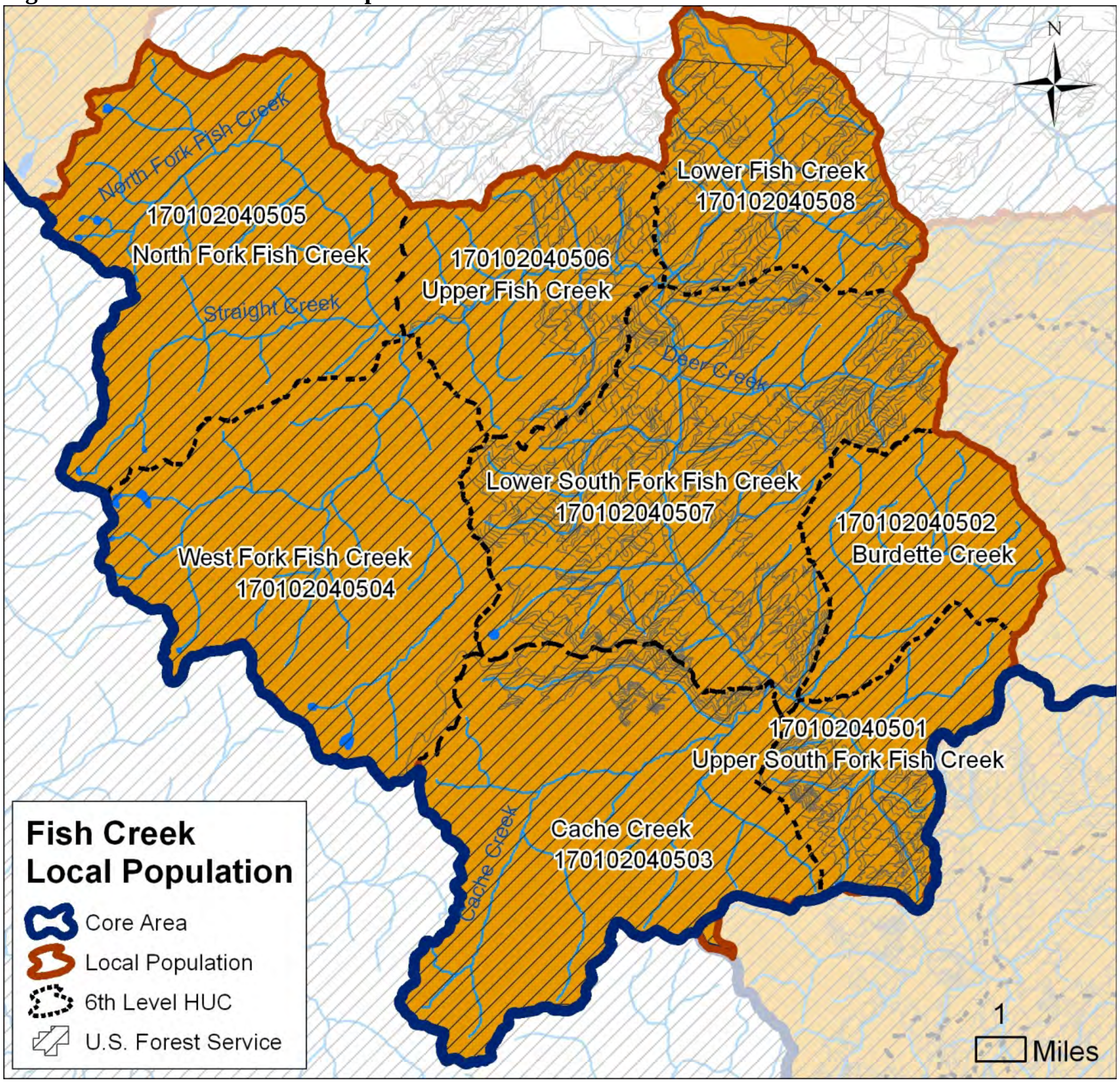
Sediment: The baseline indicator for sediment is FUR. This is likely due to road densities and roads along streams in the HUC. There are probably opportunities to reduce sediment by removing or relocating roads and these should be addressed at the project level as integrated projects are developed.

Most important activities to improve bull trout population:

1. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in the watershed.
2. Take advantage of opportunities to reduce road densities and fish barriers as other projects are developed in the HUC.
3. Work with partners and landowners to develop a riparian management plan that moves towards restoration of a functional corridor with healthy overstory to maintain low water temperatures.

Local Population: Fish Creek

Figure 7-15. Fish Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 7-5. Fish Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250 Migratory 250-500 Res	Stable	Migratory, Connected	3	EB, BRN. Moderate
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Significant as core of MCFR2 spawning pop. Large watershed. Proposed WZ in headwaters. Middle of MCFR2.		Low vulnerability. Drains stateline – high precipitation and elevation.		None – typical depressed migratory pop size with high potential.

Driving Factors Determining Bull Trout Population:

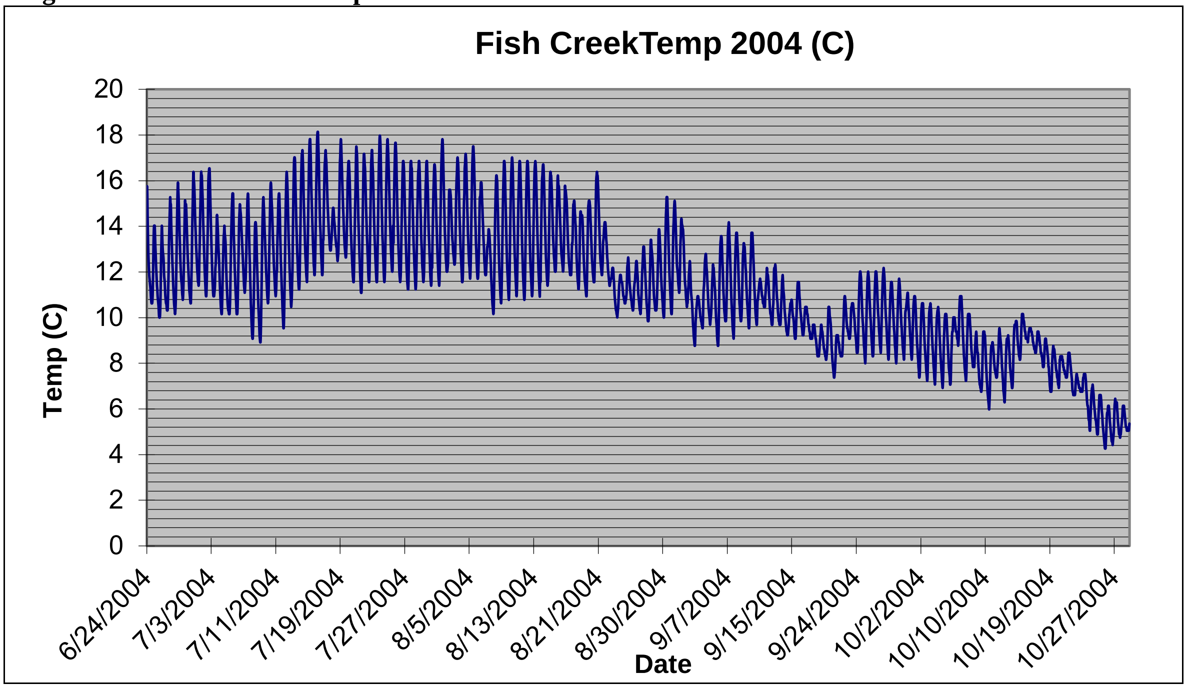
Fish Creek is a large watershed with widely varying aquatic habitat conditions. It currently supports the greatest number of fluvial bull trout redds in the MCFR Core Area, averaging approximately 20 redds per year within the index reaches (MTFWP unpublished redd count data). Significant portions of the watershed are roadless or proposed wilderness (West Fork, North Fork, Cache Creek, Burdette Creek), while the remainder is heavily managed timber land. Recent acquisition of thousands of acres of Plum Creek land by Montana Fish, Wildlife and Parks through the Montana Legacy Project has created a significant opportunity for improved management of both aquatic and terrestrial landscapes.

The mainstem of Fish Creek has an extensive history of logging, including log drives down the stream channel which devastated aquatic habitat and fish populations. Historically, large logjams existed throughout the mainstem. These provided critical spawning and overwintering habitat for bull trout. Log drives and intensive logging of the riparian zone, along with construction of the main Fish Creek road, all but eliminated these components of the aquatic ecosystem except in undeveloped areas. Currently, accumulations of large woody debris have re-developed in the first four miles downstream of the forks, and these provide important limited habitat niches for bull trout.

As with many areas, bull trout populations are currently restricted to tributaries with low road densities. Drainages that have been extensively logged have high sediment levels, limited channel complexity, and few, if any, bull trout. The widespread impacts of logging and road development throughout the watershed have systemic repercussions to habitat in the mainstem as well. High sediment and bedload levels from tributary streams, combined with riparian logging and a major haul road along the mainstem, have resulted in channel instability throughout many portions of Fish Creek. The lack of large debris jams in the mainstem exacerbates this problem, as there are few depositional, energy dissipation zones for complex habitat and spawning substrates to establish.

The extensive road network throughout the developed portions of the watershed continues to result in chronic sediment input to the stream and negatively affects the input and movement of substrates and woody debris through the system. Streamside roads and logging of riparian zones have resulted in warmer than natural stream temperatures that approach 18 C throughout the summer (Knotek 2011) (Figure 7-16). Low fluvial bull trout numbers in the Core Area as a whole are another key limiting factor.

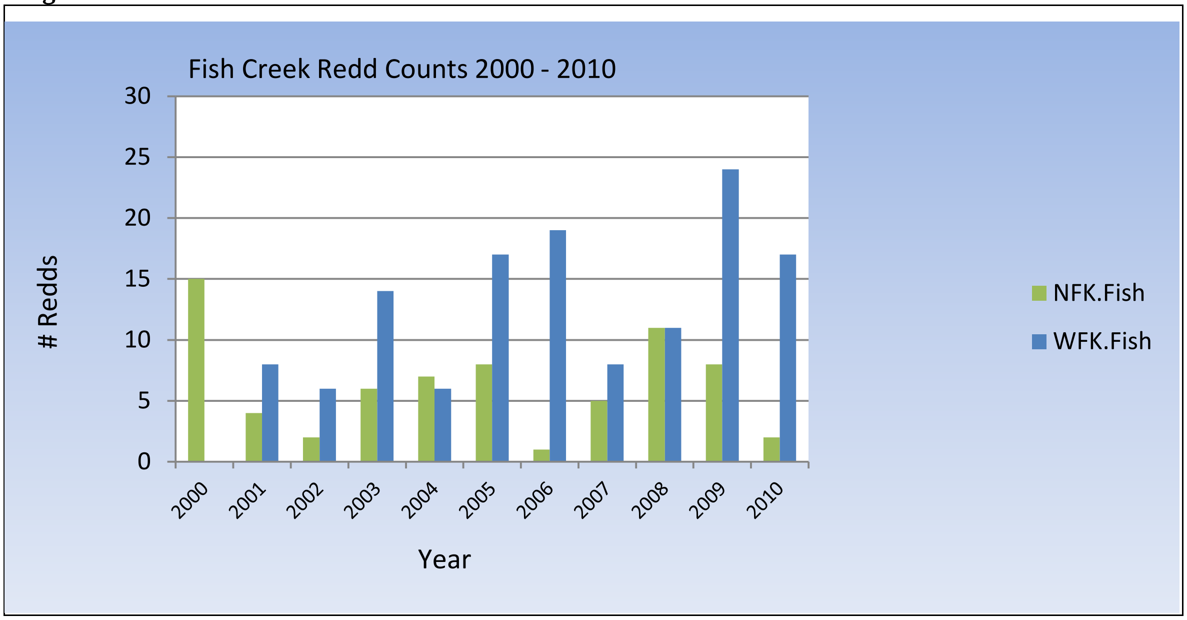
Figure 7-16. Fish Creek Temperature 2004



The following table shows bull trout redd counts in Fish Creek between 2000 and 2010. When the North Fork and West Fork index reaches are combined, the overall trend during these years is relatively stable (due to the short period of record, trend assessments should be considered tentative). However, when viewed separately, it is obvious that the West Fork supports a more robust, and apparently more secure spawning population. High variability in annual redd count numbers is a concern, especially in the West Fork. The relatively high number of spawners (compared to other streams in the Core Area), and the fact that spawning is not limited to only one area indicate that this local population may be more secure than others in the Core Area. However, Fish Creek is a very large watershed, containing eight 6th level HUCs. The fact that only 20 fluvial redds exist within index reaches in this large of a watershed, and that this is the strongest local population in the MCFR Core Area is worthy of note.

Confidence in your assessment (H,M,L): M

Figure 7-17. Fish Creek Redd Counts 2000-2010



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Burdette Creek - 170102040502							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FUR	FA	1 year	3	$0	-	-
Pools	FA	FA	-	3	$0	-	-
Sediment	FA	FA	-	3	$0	-	-

Current data indicates that bull trout are likely not present in Burdette Creek, at least at levels that would be detected through standard electrofishing surveys. There are no index redd count reaches on this stream. High densities of brook trout exist in the watershed. Habitat in this HUC is in nearly pristine condition. There are no barriers. The only culvert is on the main Fish Creek road, near the mouth, and this doesn't appear to be a significant barrier (however, it is not in the database, so should be evaluated and added, with appropriate baseline change noted). The watershed is naturally warmer with relatively low flows (for Fish Creek) due to its elevation and aspect. It may not provide significant bull trout habitat under any scenario due to these natural characteristics. However, Wig Creek, which is a similar stream adjacent to Burdette Creek, currently supports fluvial westslope cutthroat trout and a resident bull trout was observed by FWP in Wig Creek near the mouth, so there is potential for bull trout to occur in Burdette Creek as well. If there were more bull trout in the MCFR Core Area and the Fish Creek Local Population, it is likely that a limited amount of fluvial spawning (and some resident population) would occur in the watershed.

Temperature: Temperatures in Burdette Creek are probably slightly higher than average in the Fish Creek watershed due to the low mean elevation, southwest aspect, and relatively open overstory. The watershed is almost entirely roadless, and temperature patterns are probably natural for the HUC. No action is needed to address this indicator.

Barriers: The barriers call should be changed in the baseline to FA (hence the 1year, $0 columns). The only crossing is at the mouth, and this isn't a significant barrier. It may be a partial barrier under high flows, but even this is questionable, and the amount of influence it has on bull trout movement is probably undetectable. It should be evaluated from a westslope cutthroat standpoint. The only action needed for this indicator is to change the baseline call.

Pools: The baseline indicator for pools is FA. The watershed is primarily roadless, and pool habitat is expected to be at natural levels. No action is needed to address this indicator.

Sediment: The baseline indicator for sediment is FA. The watershed is primarily roadless, and sediment levels are expected to be at natural levels. No action is needed to address this indicator.

Most important activities to improve bull trout population:

1. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in the watershed. This applies to Fish Creek and the middle Clark Fork as well.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Cache Creek - 170102040503							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FA	FA	5 years	3	$50,000	H	H
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FUR	FAR	10 years	3	$75,000	M	H

Cache Creek is a large tributary to Fish Creek, upstream of the West Fork. It includes important tributaries like Montana Creek, Pebble Creek, and White Creek. The Cache Creek watershed historically supported large fluvial runs of bull trout (as recently as the late 1980's), but numbers are down to single digits at present. Redd counts are not conducted annually due to the extremely low numbers of bull trout that currently spawn in the watershed. This HUC has the highest amount of unfilled habitat for bull trout in Fish Creek system. A culvert barrier and historical mine site and barrier are the largest single contributors in limiting the current population. These are being fixed through the South Fork Fish Creek project, which will begin in 2010. There is a moderate amount of roads in the Montana Creek portion of the watershed contributing to the FUR call for sediment. These are almost all being removed through the above mentioned project. Some will take outside funding and may take up to 10 years to complete, but should adjust the baseline condition when completed. There are no significant issues in the watershed that are not being addressed through the SFF project.

Temperature: Temperatures in the HUC are probably slightly higher than what occurred historically. The baseline call is FAR, largely due to the presence of a riparian road along a portion of Montana Creek. This road probably has some effect on temperature, sediment and pools. Through the SFF project, the road and all crossings will be removed, and the stream channel will be restored where the crossings occurred. The baseline call may still remain FAR due to the amount of stream that flows along talus, unvegetated slopes, but this is natural. There are no further actions needed to address this indicator, once implementation of the SFF project is complete (expected in 2012).

Barriers: The current indicator call for barriers is FA. This call is incorrect, and should be FUR. A significant barrier exists on Montana Creek at an old mine site and road crossing. This barrier and crossing will be completely removed and restored through the SFF project in 2012. At that time, the indicator call will appropriately be FA. There are no other barriers in the HUC, and no further action is needed.

Pools: Pool habitat in the HUC is probably slightly below natural. The baseline call is FAR, largely due to the presence of a riparian road along a portion of Montana Creek. This road probably has some effect on temperature, sediment and pools. Through the SFF project, the road and all crossings will be removed, and the stream channel will be restored where the crossings occurred. The baseline call may still remain FAR due to the amount of stream that flows along talus, unvegetated slopes, but this is natural. There are no further actions needed to address this indicator, once implementation of the SFF project is complete (expected in 2012).

Sediment: The baseline indicator for sediment is FUR. Sediment levels are influenced by roads in the Montana Creek watershed, particularly the riparian road that is being removed through the SFF project. The baseline indicator is also influenced by the valley bottom trail that follows Cache Creek for much of its length. The trail, however, contributes little sediment due to its location, condition, and level of use. Mid-slope roads in Montana Creek also currently contribute to higher than natural sediment levels. Almost all of these are being removed through the SFF project (a small portion of one road will remain). There are no significant further actions needed to address this indicator.

Most important activities to improve bull trout population:

1. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in the watershed. This applies to Fish Creek and the middle Clark Fork as well.
2. All other significant needs in the HUC have been addressed through the SFF project and will be implemented in 2012.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper South Fork Fish Creek - 170102040501							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$100,000	H	H
Barriers	FUR	FA	25 years	3	$250,000	M	M
Pools	FAR	FA	5 years	3	$50,000	H	H
Sediment	FUR	FAR	10 years	3	$200,000	M	H

This HUC currently supports few, if any bull trout. Limited survey data is available. No redd counts are conducted due to the fact that no (or few) fluvial bull trout likely spawn in this HUC at the current time. The stream is relatively small, but would likely provide some amount of habitat and spawning if the fluvial bull trout population overall was larger. Habitat is moderately impacted by roads and crossings – sediment levels are high and there are numerous culverts that affect the movement of large woody debris and bedload. One culvert is a minor, partial barrier to bull trout and could be replaced with the SFF project. Road BMP’s and further closures would also improve conditions. Addition of large woody debris complexes throughout this HUC would improve pools and temperature conditions, and directly improve bull trout habitat. These projects would need to be coordinated with brook trout removal/suppression efforts to assure that brook trout don’t expand as an unintended consequence of improving the habitat. The streams in this HUC currently support high densities of brook trout. Removal or suppression of these populations would likely benefit bull trout (and westslope cutthroat trout) significantly.

Temperature: Temperatures in the Upper South Fork Fish Creek (USFS) are elevated due to impacts on private lands along the mainstem of the upper South Fork, timber harvest, and riparian roads. These activities have resulted in a widespread reduction in overhead stream canopy and shade. Much of the riparian zone along the mainstem in this HUC is devoid of large trees – they have been cleared over the last century, and the valley bottom has been grazed or developed to where only a thin ribbon of shrubs exists along the creek (Figure 7-18).

Figure 7-18. Aerial photo of the Upper South Fork Fish Creek showing the open riparian area along the mainstem.

It is likely that winter temperature patterns are also affected. The baseline call is FUR. This is an important indicator to address, because the effects of warmer water temperatures on bull trout likely extend downstream, outside of this immediate HUC. Warm temperatures in the mainstem South Fork Fish Creek may be one reason why bull trout numbers have decreased in watersheds like Cache Creek, where habitat is relatively good overall. The most direct way to improve temperatures over the long-term is to work cooperatively with landowners to improve riparian conditions (this would likely be an FWP or TU lead partnership). In the short-term, adding significant amounts of large woody debris to the stream, in organizational conglomerates that increase the amount of large, deep pool habitat, will help to alleviate temperature issues, while also directly improving pool conditions, which are currently FUR as well. Activities to address the temperature indicator are important to address relatively soon. The addition of large woody debris, if sufficient in scope, could change the indicator to FAR (these activities need to be coordinated with brook trout removal/suppression efforts). However, changing to FA will require decades until overhead canopy begins to re-establish in sufficient size to adequately provide cover to the stream.

Barriers: The current indicator call for barriers is FUR. This call is based on the culvert on Road #4212 across the mainstem USFF. While the stream could support bull trout upstream of this barrier, it is beginning to get small, and the amount of bull trout habitat is limited. There are several partial barriers on smaller streams that affect westslope cutthroat, but these don't affect bull trout movement patterns directly due to the small size of the stream systems. This indicator should be changed to FAR. The current South Fork Fish project identified the Road #4212 barrier as a high priority for replacement. After further field review, however, we decided to use the money for this project to improve passage at a culvert on Surveyor Creek, which is a much higher priority for bull trout. The Road #4212 barrier is a partial barrier. It should be re-assessed for replacement in the future, if bull trout begin to utilize the USFF again. At the present time, it would not benefit bull trout to replace it. Opportunistic culvert replacements on smaller streams in the USFF in the future would benefit the overall aquatic ecosystem, and therefore bull trout. Pursuing these projects could move the indicator from FAR to FA. This work is not as high priority as work designed to increase pools, decrease temperatures, and decrease sediment.

Pools: Pool habitat in the USFF is impacted by ranching on private lands along the mainstem of the upper South Fork, timber harvest, and riparian roads. These activities have resulted in a widespread impact on riparian conditions, which has resulted in fewer pools of less quality (i.e., smaller, less complex) for bull trout. Much of the riparian zone along the mainstem in this HUC is devoid of large trees – they have been cleared over the last century, and the valley bottom has been grazed or developed to where only a thin ribbon of shrubs exists along the creek. Timber harvest and road development along streams has had similar impacts. As a result, there is little instream large woody structure to provide scouring that develops pools and complexity within these pools. The baseline call is FAR. This is an important indicator to address, because large bull trout are dependent on large, complex pools for over-summer and over-winter needs. Large pools with adequate cover and structure also serve to moderate temperature extremes. The most direct way to improve pool habitat over the long-term is to work cooperatively with landowners to improve riparian conditions (this would likely be an FWP or TU lead partnership). In the short-term, adding significant amounts of large woody debris to the stream, in organizational conglomerates that increase the amount of large, deep pool habitat, will directly improve pool conditions. Activities to address the pool indicator are important to address relatively soon. The addition of large woody debris, if sufficient in scope, could change the indicator to FA (this needs to be coordinated with brook trout removal/suppression efforts). However, maintaining the FA call will require periodic additions of large woody debris or a commitment to a more natural and functional riparian zone over the long-term.

Sediment: The baseline indicator for sediment is FUR. Sediment levels are influenced by high road densities in the HUC. The main Fish Creek road that parallels the South Fork is especially problematic. This road is a chronic sediment producer, and parallels the stream within 300 feet for most of its length. It also receives heavy traffic, so maintaining effective BMP's is difficult. The South Fork Fish Creek project will result in a slight reduction in overall road densities for the HUC. However, there are still numerous opportunities to reduce roads, and therefore sediment levels to lower levels that would be more conducive to maintaining a healthy and resilient aquatic ecosystem. Sediment loads from this HUC can affect downstream pool habitat throughout Fish Creek, as this is the headwaters. It is therefore an important indicator to address, even though the direct benefits to bull trout within the HUC would not be readily apparent.

Most important activities to improve bull trout population:

1. Add large woody debris complexes throughout the HUC to increase the amount of large, complex pool habitat and also improve temperature conditions. In conjunction, work with MTFWP to remove/suppress brook trout so that they don't expand into the improved habitat.
2. Work with private landowners to cooperatively improve riparian conditions along the mainstem of the Upper South Fork. Activities would include fencing, riparian planting, and possible conservation easements to protect the riparian zone over the long-term.
3. Reduce road densities and install/maintain BMP's to reduce sediment in stream channels, thereby improving interstitial spaces that provide important habitat for juvenile bull trout.
4. Remove or replace current culverts that are partial barriers and negatively impact the movement patterns of bedload and large woody debris through the system.

5. Coordinate with FWP and consider management in Fish Creek and the middle Clark Fork River that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower South Fork Fish Creek - 170102040507							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: (The database says 100%, but this is incorrect – lots of PC)							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FA	10 years	3	$300,000	H	H
Barriers	FUR	FA	5 years	3	$100,000	H	H
Pools	FAR	FA	5 years	3	$50,000	H	H
Sediment	FUR	FAR	10 years	3	$200,000	M	H

This HUC contains the lower mainstem South Fork Fish Creek and the Surveyor, Thomson, and Deer Creek drainages. There is little bull trout use at present, however bull trout were found in Surveyor Creek as recently as the late 1980's. All of these streams are large enough to support modest runs of fluvial bull trout. Habitat is heavily impacted throughout this HUC from road development and logging. There was a large fire in the Deer Creek watershed approximately 7 or 8 years ago. Most of the culverts and roads in that watershed were removed following the fire, and recovery is proceeding nicely. The baseline shows this HUC as being 100 percent NFS ownership, however, significant portions were previously owned by Plum Creek Timber Company, and these have been extensively logged. Through the MT Legacy project, most of the Plum Creek lands in this HUC have been sold to Montana Fish, Wildlife and Parks. Trout Unlimited and The Nature Conservancy have already removed a significant amount of problem roads and crossings prior to the land transfer and this will continue under MTFWP management. Opportunities are extremely high for coop projects to make significant changes to this HUC. The main focus area would be Surveyor Creek, and then probably the mainstem of the South Fork. The main Fish Creek road is also in need of relocation away from the stream and floodplain to improve riparian and stream conditions. The Lolo NF is currently developing a plan for this. Passive recovery of the landscape is also greatly needed due to the extensive logging history.

Temperature: Temperatures in the Lower South Fork Fish Creek (LSFF) are elevated due to extensive timber harvest and road development in the HUC. Extremely high road densities exist throughout nearly every watershed, including high densities of riparian roads and high numbers of stream crossings. Riparian harvest has also been extensive (Figure 7-19).

Figure 7-19. Aerial photo of part of the LSFF showing the extremely high road densities, extensive harvest (including riparian zones), and high number of stream crossings.

These activities have resulted in a widespread reduction in overhead stream canopy and shade, and a wide, shallow stream channel that is unable to maintain cool temperatures through the summer. It is likely that winter temperature patterns are also affected. The baseline call is FUR. This is an important indicator to address, because the effects of warmer water temperatures on bull trout likely extend downstream, outside of this immediate HUC. Warm temperatures in the mainstem South Fork Fish Creek may be one reason why bull trout numbers have decreased in watersheds like Cache Creek, where habitat is relatively good overall (i.e., fish may not migrate through this warm portion to get to Cache Creek, and juveniles may not have adequate rearing habitat due to warm temperatures).

The most direct way to improve temperatures over the long-term is to actively reduce road densities (especially those within 300 feet of streams), and allow vegetation (especially riparian zones) to recover over the next several decades. Simply following the SMZ law for riparian harvest will not achieve the objective of recovering riparian vegetation to support a healthy and thermally resilient aquatic system because it allows for continuous removal of the large trees that provide the shade and structure in this zone.

In the short-term, adding significant amounts of large woody debris to the stream, in organizational conglomerates that increase the amount of large, deep pool habitat, could help significantly to alleviate temperature issues, while also directly improving pool conditions, which are currently FUR as well. These projects would need to be coordinated with brook trout removal/suppression efforts to assure that brook trout don't expand as an unintended consequence of improving the habitat. The streams in this HUC currently support high densities of brook trout. Removal or suppression of these populations would likely benefit bull trout (and westslope cutthroat trout) significantly. Activities to address the temperature indicator are important to address relatively soon. The addition of large woody debris, if sufficient in scope, could change the indicator to FAR. However, changing to FA will require decades until overhead canopy begins to re-establish in sufficient size to adequately provide cover to the stream.

Barriers: The current indicator call for barriers is FUR. There are numerous stream crossings in the HUC that impede bull trout movement. In the last four years, the Lolo National Forest and The Nature Conservancy have removed the most significant barriers in Surveyor Creek. The South Fork Fish project, which will get underway in 2011, will remove the remaining barriers so that the entire watershed should be accessible to bull trout within three years. All of the significant barriers on LNF lands in the Deer Creek watershed were removed approximately eight years ago following a large fire in that drainage. There are still barriers in the Thompson Creek watershed, on previously owned Plum Creek lands, that should be addressed. There are several partial barriers on smaller streams throughout the HUC that affect westslope cutthroat, but these don’t affect bull trout movement patterns directly due to the small size of the stream systems. Following complete implementation of the South Fork Fish project, this indicator should change to FAR. Opportunistic culvert replacements on smaller streams in the LSFF in the future would benefit the overall aquatic ecosystem, and therefore bull trout. Improving passage throughout the Thompson Creek watershed on previously owned Plum Creek lands would also improve conditions for bull trout. Pursuing these projects could move the indicator from FAR to FA. This work is not as high priority as the current projects that are underway.

Pools: Pool habitat in the LSFF is negatively affected by extensive timber harvest and road development in the HUC. Extremely high road densities exist throughout nearly every watershed, including high densities of riparian roads and high numbers of stream crossings. Riparian harvest has also been extensive. These activities have resulted in a significant reduction in large woody debris recruitment to the system, and a wide, shallow stream channel that provides very little habitat for large, fluvial bull trout. The baseline call is FAR. This portion of the mainstem South Fork itself has high potential in terms of providing both spawning and rearing habitat for fluvial bull trout because of its size. Without large, complex pools, however, bull trout use is limited. The most direct way to improve pool habitat is by adding significant amounts of large woody debris to the stream, in large complex structures that resemble logjams that were historically common throughout the system. Over the long-term, it is important to actively reduce road densities (especially those within 300 feet of streams), and allow vegetation (especially riparian zones) to recover over the next several decades so that pool creation and maintenance can naturally occur. Simply following the SMZ law for riparian harvest will not achieve the objective of improving pool habitat because it allows for continuous removal of the large trees that provide the long-term structure that forms pools. Activities to address the pool indicator (adding large woody debris) are important to address relatively soon, and will provide direct benefits to bull trout. The addition of large woody debris, if sufficient in scope, could change the indicator to FA. However, maintaining the FA call will require a long-term commitment to manage the riparian zone for benefits to the aquatic system, rather than for timber products.

Sediment: The baseline indicator for sediment is FUR. Sediment levels are influenced by high road densities in the HUC. Nearly every watershed has an extremely dense network of logging roads crossing the hillsides at regular intervals. These all combine to produce much higher than natural sediment loading. The main Fish Creek road that parallels the South Fork is a chronic sediment producer also. It receives heavy traffic, so maintaining effective BMP’s is difficult. The South Fork Fish Creek project will result in a slight reduction in overall road densities for the HUC. However, there are still numerous opportunities to reduce roads, and therefore sediment, to lower levels that would be more conducive to maintaining a healthy and resilient aquatic ecosystem. Sediment loads from this HUC can affect downstream pool habitat throughout Fish Creek, as this is near the headwaters. It is therefore an important indicator to address, even though the direct benefits to bull trout within the HUC would not be readily apparent.

Most important activities to improve bull trout population:

1. Add large woody debris complexes throughout the HUC to increase the amount of large, complex pool habitat and also improve temperature conditions. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in the watershed
2. Improve riparian conditions along the mainstem of the Lower South Fork by eliminating timber harvest in the valley bottom and allowing trees to naturally recruit to the stream channel at normal rates and frequencies.
3. Reduce road densities and install/maintain BMP's to reduce sediment in stream channels, thereby improving interstitial spaces that provide important habitat for juvenile bull trout.
4. Provide adequate passage at all crossings that affect bull trout.
5. Remove or replace current culverts that impact the movement patterns of bedload and large woody debris through the system.
6. Coordinate with FWP and consider management in Fish Creek and the middle Clark Fork River that reduces numbers and distributions of non-native trout if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Fish Creek - 170102040508							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: Database says 100% but is incorrect – lots of PC – now FWP							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$50,000	M	H
Barriers	FUR	FA	1 year	3	$0	-	-
Pools	FAR	FA	5 years	3	$50,000	H	H
Sediment	FUR	FAR	10 years	3	$500,000	L	H

This HUC is primarily a migratory corridor for fluvial bull trout. The loss of large complexes of woody debris in the main stream channel over time is probably the single most limiting factor. This is most prevalent in the section upstream of Beaver Slough Creek (MTFWP unpublished data). The lack of woody debris could be addressed in the short-term by adding significant amounts of large wood to the stream. This would directly improve both large pool habitat and temperature conditions, and would provide cover and holding water for both migrating fluvial spawners and outmigrating juveniles. It may also provide important refugia habitat for river fish during periods of thermal stress in the summer when they seek out the cold water of Fish Creek, especially if climate conditions continue to warm and dry. These efforts should be coordinated with non-native brook trout removal to assure that they don't expand as a result of improving habitat.

The other factor that may be influencing bull trout populations in this HUC is the presence of brown trout in the middle and lower reaches. These fish are fluvial spawners from the Clark Fork River, and residents within Fish Creek itself, and they interact and compete for limited resources with native species such as bull trout, resulting in fewer bull trout in the local population. There are no known barriers to bull trout – this indicator should be checked for accuracy. There are significant impacts from extensive past logging and road development, but these are primarily sediment related and don't have a huge effect on bull trout in this HUC (since it's a migratory corridor). There are also opportunities for improvement/realignment of the main road in this HUC.

Temperature: Temperatures in the Lower Fish Creek HUC are elevated due to extensive timber harvest and road development in the HUC. Extremely high road densities exist throughout nearly every watershed. Riparian harvest has been extensive. These activities have resulted in a widespread reduction in overhead stream canopy and shade, and a wide, shallow, unstable stream channel that is unable to maintain cool temperatures through the summer. It is likely that winter temperature patterns are also affected. The baseline call is FUR. This is an important indicator to address because bull trout congregate at the mouth of Fish Creek (immediately downstream of this HUC) during the summer when water temperatures in the middle Clark Fork River get high. They seek the cooler waters of Fish Creek as thermal refugia to survive during these stressful times. The best way to improve temperatures over the long-term is to actively reduce road densities (especially those within 300 feet of streams), and passively allow vegetation (especially riparian zones) to recover over the next several decades. Simply following the SMZ law for riparian harvest will not achieve the objective of recovering riparian vegetation to support a healthy and thermally resilient aquatic system because it allows for continuous removal of the large trees that provide the shade and structure in this zone. In the short-term, adding significant amounts of large woody debris to the stream, in organizational conglomerates that increase the amount of large, deep pool habitat, could help significantly to alleviate temperature issues, while also directly improving pool conditions. Activities to address the temperature indicator are important to address relatively soon. The addition of large woody debris, if sufficient in scope, could change the indicator to FAR. These should be coordinated with brook trout removal/suppression efforts. However, changing to FA will require decades until overhead canopy begins to re-establish in sufficient size to adequately provide cover to the stream.

Barriers: There are no known barriers to bull trout in this HUC. The indicator should be assessed to determine if the call is accurate, and changed if not. There were several partial barriers on smaller streams throughout the HUC that affected westslope cutthroat, but these didn't affect bull trout movement patterns directly due to the small size of the stream systems. All of these culverts have been pulled over the past year as roads were stored and removed (Ladd Knotek, personal communication).

Pools: Pool habitat in the LSFF is negatively affected by extensive timber harvest and road development in the HUC. Extremely high road densities exist throughout nearly every watershed, including high densities of riparian roads and high numbers of stream crossings. Riparian harvest has been extensive. These activities have resulted in a significant reduction in large woody debris recruitment to the system, and a wide, shallow stream channel that provides very little habitat for large, fluvial bull trout. The baseline call is FAR. Pool habitat is important in this portion of Fish Creek because it provides holding and resting habitat for upstream migrating spawners, and it provides rearing habitat for juvenile fish prior to moving to the larger river system. Without large, complex pools, however, bull trout use is limited, and the functionality of this HUC as a migration corridor is also suppressed.. The most direct way to improve pool habitat is by adding significant amounts of large woody debris to the stream, in large complex structures that resemble logjams that were historically common throughout the system. Over the long-term, it is important to actively reduce road densities (especially those within 300 feet of streams), and allow vegetation (especially riparian zones) to recover over the next several decades so that pool creation and maintenance can naturally occur. Simply following the SMZ law for riparian harvest will not achieve the objective of improving pool habitat because it allows for continuous removal of the large trees that provide the long-term structure that forms pools. Activities to address the pool indicator (adding large woody debris) are important to address relatively soon, and will provide direct benefits to bull trout. The addition of large woody debris, if sufficient in scope, could change the indicator to FA. However, maintaining the FA call will require a long-term commitment to manage the riparian zone for benefits to the aquatic system, rather than for timber products.

Sediment: The baseline indicator for sediment is FUR. Sediment levels are influenced by high road densities in the HUC. Nearly every watershed has an extremely dense network of logging roads crossing the hillsides at regular intervals. These all combine to produce much higher than natural sediment loading. The main Fish Creek road is a chronic sediment producer as well. It receives heavy traffic, so maintaining effective BMP's is difficult. There are numerous opportunities to reduce roads, and therefore sediment, to lower levels that would be more conducive to maintaining a healthy and resilient aquatic ecosystem. However, reducing sediment in this HUC will not yield the same benefits as working on other areas, or other indicators, in the watershed.

Most important activities to improve bull trout population:

1. Add large woody debris complexes throughout the HUC to increase the amount of large, complex pool habitat and also improve temperature conditions. In conjunction, work with MTFWP to remove/suppress brook trout so that they don't expand into the improved habitat
2. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in Fish Creek and the middle Clark Fork River if it would benefit bull trout recovery in the watershed.
3. Improve riparian conditions along the mainstem of Fish Creek by allowing trees to naturally recruit to the stream channel at normal rates and frequencies.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Fish Creek - 170102040506							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: Database says 100% but incorrect – lots of PC							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	5 years	3	$50,000	M	H
Barriers	FUR	FA	1 year	3	$0	L	H
Pools	FAR	FA	5 years	3	$50,000	M	H
Sediment	FUR	FAR	10 years	3	$200,000	M	H

This HUC contains the Lower West Fork and Bear Creek. Fluvial bull trout use is primarily as a migratory corridor at present, however, there is potential for some use in Bear Creek and probably in the West Fork itself as a spawning location given a larger population. Both the mainstem and

Bear Creek are important rearing areas for bull trout. There is extensive road development and logging in the lower half of the HUC, and there are numerous opportunities to improve conditions via the TNC/MTFWP Legacy project. Addition of large woody debris complexes to the mainstem would improve pool conditions, cover, stream complexity, temperature, and other habitat components important to fluvial bull trout. Brook trout removal/suppression is an important component of any LWD addition project. The most significant current threat is a private in-holding that encompasses approximately 1 mile of the West Fork – this land has recently been clear-cut and is being offered for development.

Temperature: Temperatures in the Upper Fish Creek HUC are elevated due to past timber harvest and road development. High road densities exist in the lower half of the HUC, and timber harvest has been extensive, including riparian zones of tributary streams. These activities have resulted in slightly higher than natural temperatures through the summer. It is likely that winter temperature patterns are also affected. The baseline call is FUR. We have no temperature data for this HUC; however, temperatures are probably better than this call would indicate due to the relatively pristine condition of the upstream watersheds contributing to this HUC. It would be useful to obtain temperature data in this HUC to determine whether bull trout movement into the North and West Forks is influenced to a significant degree. There is a short section of the mainstem West Fork that has been impacted by past logging, and adding large woody debris to this reach may be warranted as a short-term step to improving temperature and pool conditions. Approximately 1 mile of the West Fork has recently been logged and is being offered for development, which could impact temperature and other aquatic parameters as well. The remaining temperature issues are largely associated with past harvest of riparian zones in tributary streams and will recover if vegetation passively, if allowed. Changing the indicator call to FA will require decades until overhead canopy begins to re-establish in sufficient size to adequately provide cover to the stream.

Barriers: There are no known barriers on NFS lands within this HUC. All barriers on previously owned Plum Creek land that was recently sold to MTFWP have been removed.

Pools: Pool habitat in Upper Fish Creek HUC is negatively affected by extensive timber harvest and road development in the HUC. Extremely high road densities exist in some watersheds, including high densities of riparian roads and high numbers of stream crossings. Riparian harvest has been extensive in some areas. These activities have resulted in a significant reduction in large woody debris recruitment to the system, and a wide, shallow stream channel that provides less than optimal amounts of habitat for large, fluvial bull trout. The baseline call is FAR. Pool habitat is important in this portion of Fish Creek because it provides holding and resting habitat for upstream migrating spawners, and it provides rearing habitat for juvenile fish prior to moving to the larger river system. Without large, complex pools, however, bull trout use is limited, and the functionality of this HUC as a migration corridor is also suppressed. The most direct way to improve pool habitat is by adding significant amounts of large woody debris to the stream, in large complex structures that resemble logjams that were historically common throughout the system. Over the long-term, it is important to actively reduce road densities (especially those within 300 feet of streams), and allow vegetation (especially riparian zones) to recover over the next several decades so that pool creation and maintenance can naturally occur. Simply following the SMZ law for riparian harvest will not achieve the objective of improving pool habitat because it allows for continuous removal of the large trees that provide the long-term structure that forms pools. Activities to address the pool indicator (adding large woody debris) are important to address relatively soon, and will provide direct benefits to bull trout. The addition of large woody debris, if sufficient in scope, could change the indicator to FA. However, maintaining the FA call will require a long-term commitment to manage the riparian zone for benefits to the aquatic system, rather than for timber products.

Sediment: The baseline indicator for sediment is FUR. Sediment levels are influenced by high road densities in the HUC. Many watersheds have an extremely dense network of logging roads crossing the hillsides at regular intervals. These all combine to produce much higher than natural sediment loading. There are numerous opportunities to reduce roads, and therefore sediment, to lower levels that would be more conducive to maintaining a healthy and resilient aquatic ecosystem. Reducing sediment in this HUC, will improve conditions for bull trout both within the HUC and downstream, however it will not yield the same direct benefits as working on other areas, or other indicators, in the watershed.

Most important activities to improve bull trout population:

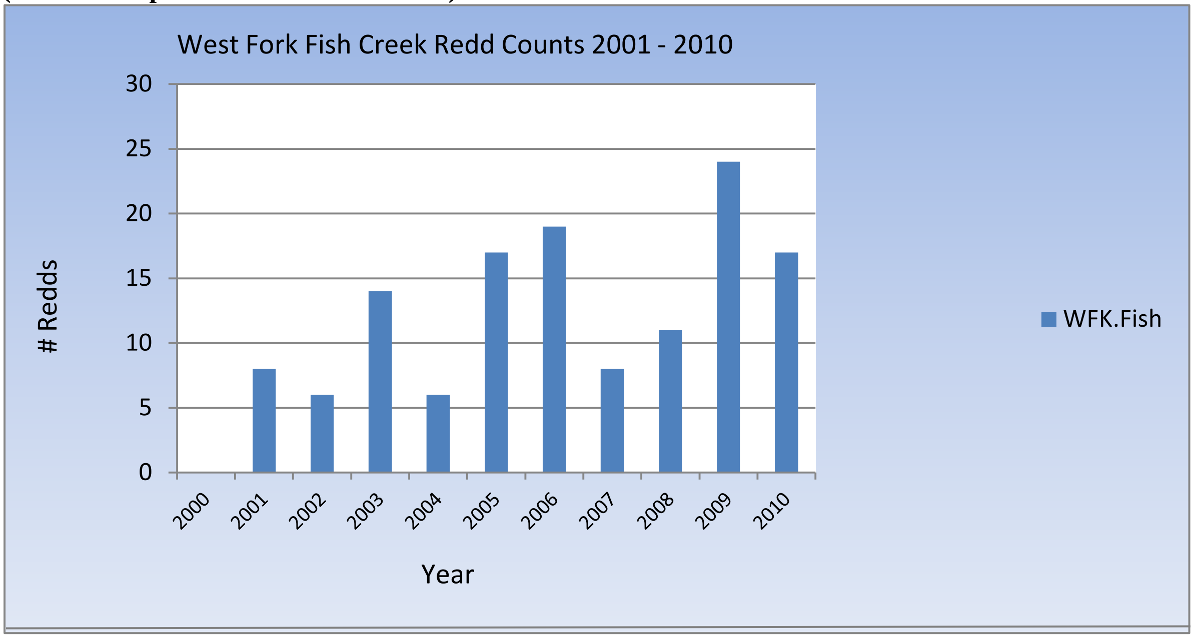
1. Add large woody debris complexes along a short reach of the mainstem West Fork to increase the amount of large, complex pool habitat and also improve temperature conditions. Collect temperature data to monitor results.
2. Improve riparian conditions by eliminating timber harvest in valley bottoms and allowing trees to naturally recruit to the stream channel at normal rates and frequencies.
3. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in Fish Creek and the middle Clark Fork River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Fork Fish Creek - 170102040504							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FA	FA	-	3	$0	-	-
Sediment	FA	FA	-	3	$0	-	-

This is the stronghold for fluvial bull trout in the Fish Creek system. Average numbers of fluvial redds range from about 5 to 25 (in index reaches), and are mostly concentrated in two reaches where highly complex habitat exists (Figure 7-20). Aquatic conditions within this HUC are pristine, and function largely the way they did historically. There are few non-native issues. The only limitation in this HUC is the overall size of the local population, which is limited by downstream habitat in the Clark Fork River and access issues associated with the three Lower Clark Fork River dams.

Figure 7-20. Fluvial bull trout redd counts in the West Fork Fish Creek index reaches, 2001 – 2010 (MTFWP unpublished redd count data).



Temperature: Temperatures in the West Fork Fish Creek HUC likely resemble those historically due to the relatively undeveloped character of the watershed. The trail is generally well away from the stream and does not affect temperatures or other indicators.

Barriers: There are no man-made barriers in the West Fork Fish Creek HUC. However, there are several 4-5 foot cascades in both the North and West Forks that may inhibit upstream brook trout expansion.

Pools: Pool habitat in the West Fork Fish Creek HUC is similar to what occurred historically. There are frequent areas where large debris jams create highly complex pool habitat and sort spawning gravels to provide optimum spawning conditions. Large pools exist that are atypical of those found on developed lands lower in the watershed.

Sediment: Sediment levels are similar to natural, and vary with flows. The trail does not impact sediment to any significant degree.

Most important activities to improve bull trout population:

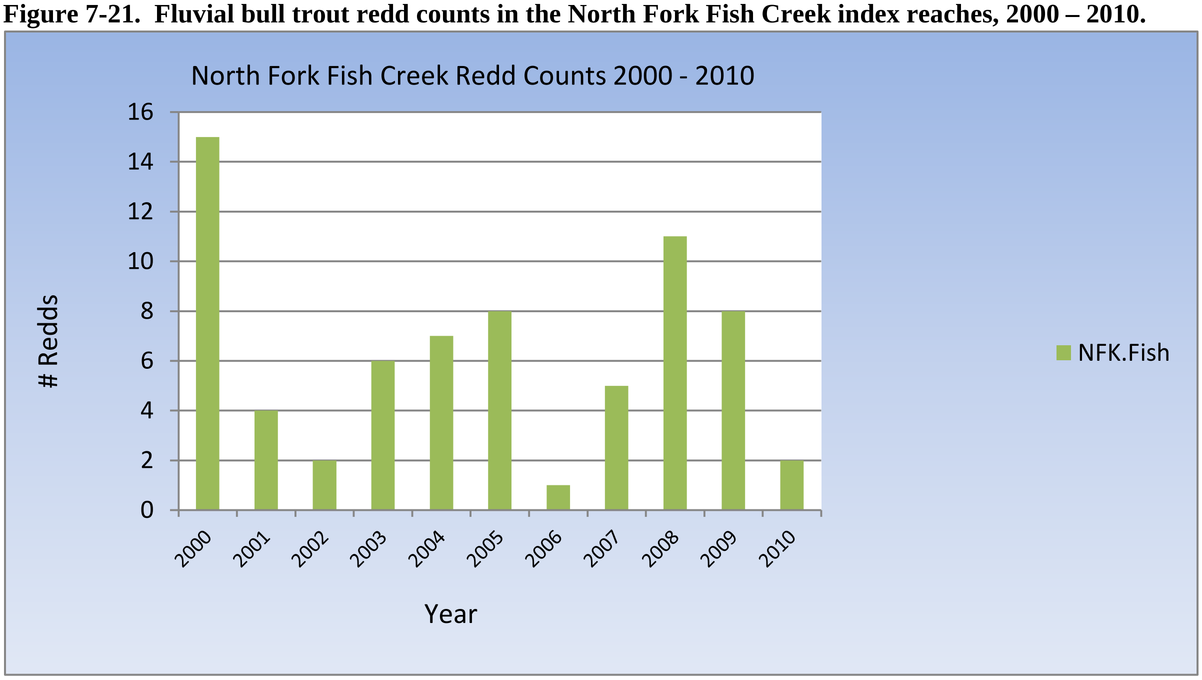
1. Improve habitat conditions throughout the remainder of the Fish Creek watershed (as identified in other HUC write-ups).
2. Protect the HUC from non-native species invasion.
3. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in Fish Creek and the middle Clark Fork River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): North Fork Fish Creek - 170102040505							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FA	FA	-	3	$0	-	-
Sediment	FA	FA	-	3	$0	-	-

This HUC contains a significant number of fluvial bull trout in some years. However, variability is high due to a short reach that naturally goes dry in some years, thereby precluding access to index reach spawning sites. The West Fork and North Fork combined support nearly all of the fluvial bull trout spawning in the entire Fish Creek local population (which consists of 8 HUCs). The average number of redds in the North Fork index site ranges from one to 15 annually (Figure 7-21). Habitat conditions in the North Fork Fish Creek are pristine. There are opportunities to remove brook trout in one Upper Trio Lake, and we are currently pursuing this with FWP. Brook trout don't seem to be significantly affecting populations at the present time, but they are a high risk due to their location in the lakes, and these are high priority projects for bull trout conservation. As with the West Fork, the primary current limitation in this HUC is the overall size of the local population, which is limited by downstream habitat and water quality issues, and possibly access issues associated with the Lower Clark Fork River dams.

Figure 7-21. Fluvial bull trout redd counts in the North Fork Fish Creek index reaches, 2000 – 2010.



Temperature: Temperatures in the North Fork Fish Creek HUC resemble those historically due to the relatively undeveloped character of the watershed. The trail is generally well away from the stream and does not affect temperatures or other indicators.

Barriers: There are no known barriers in the North Fork Fish Creek HUC.

Pools: Pool habitat in the North Fork Fish Creek HUC is similar to what occurred historically. There are frequent areas where large debris jams create highly complex pool habitat and sort spawning gravels to provide optimum spawning conditions. Large pools exist that are atypical of those found on developed lands lower in the watershed.

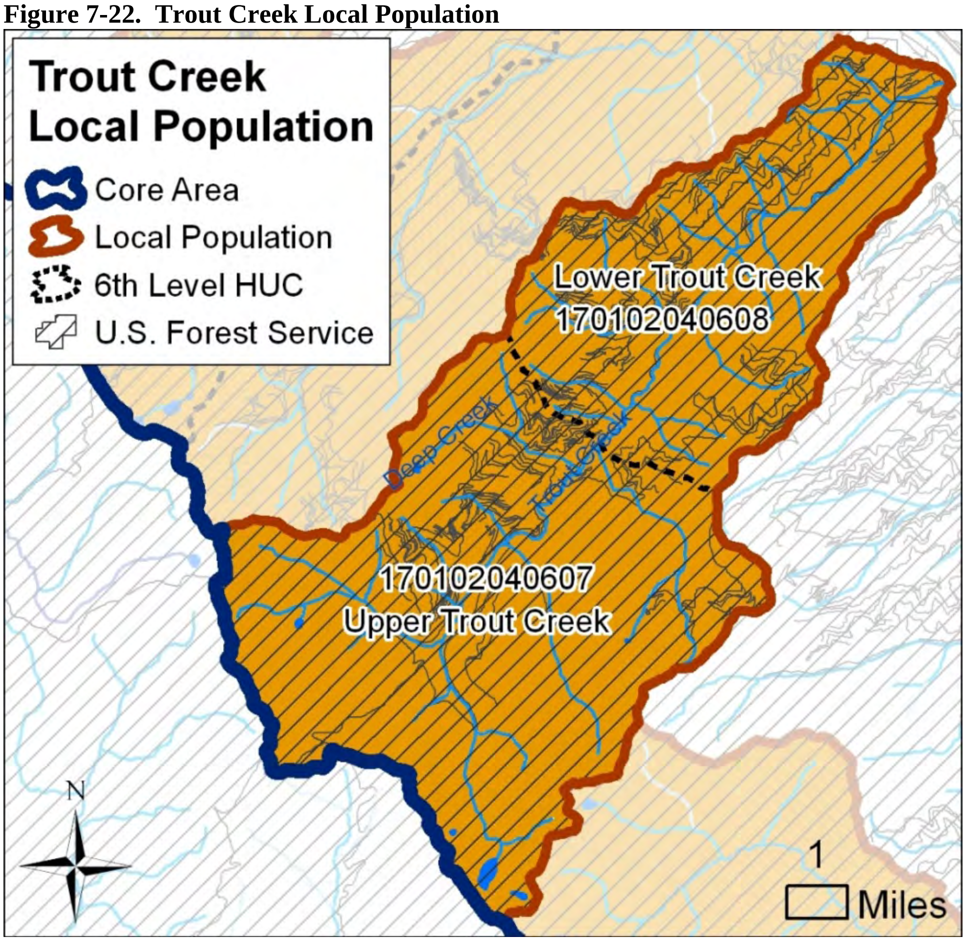
Sediment: Sediment levels are similar to natural, and vary with flows. The trail does not impact sediment to any significant degree.

Most important activities to improve bull trout population:

1. Improve habitat conditions throughout the remainder of the Fish Creek watershed (as identified in other HUC write-ups).
2. Eradicate brook trout populations in Upper Trio Lake.
3. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in Fish Creek and the middle Clark Fork River if it would benefit bull trout recovery in the watershed.

Local Population: Trout Creek

Figure 7-22. Trout Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 7-6. Trout Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50 Migratory 50-250 Res	Unknown	Fluvial, Connected	0	Brook trout and Brown trout, High
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low significance – This stream is near to Cedar Creek and the St. Regis River. It also drains the stateline, so it's similar to these two streams hydrologically.		Unknown. The high elevation and high precipitation zone would suggest vulnerability is low, but temperatures are currently high due to habitat degradation.		None

Driving Factors Determining Bull Trout Population:

Trout Creek suffers from a dramatic oversimplification of habitat due to the fact that there is very little large woody debris in the system. Historic logging of the valley bottom in the late 1800's and early 1900's resulted in most of the large trees being removed. The channel may have been used for log drives as well. Later stream channel clearing in the 1960's and 1970's by the Forest Service removed almost all residual woody debris. The result is an overly widened, riffle-dominated stream system with very little structural diversity and an overall lack of large, complex pool habitat critical for bull trout survival. More recent logging and associated road construction from the 1950's to present have also impacted habitat throughout the watershed. The road network continues to result in chronic sediment input to streams and negatively affects the input and movement of substrates and woody debris through the system. The Trout Creek Road (#250) parallels the mainstem for most of its length before crossing into the North Fork Clearwater River drainage in Idaho. This road significantly affects habitat for bull trout throughout many reaches.

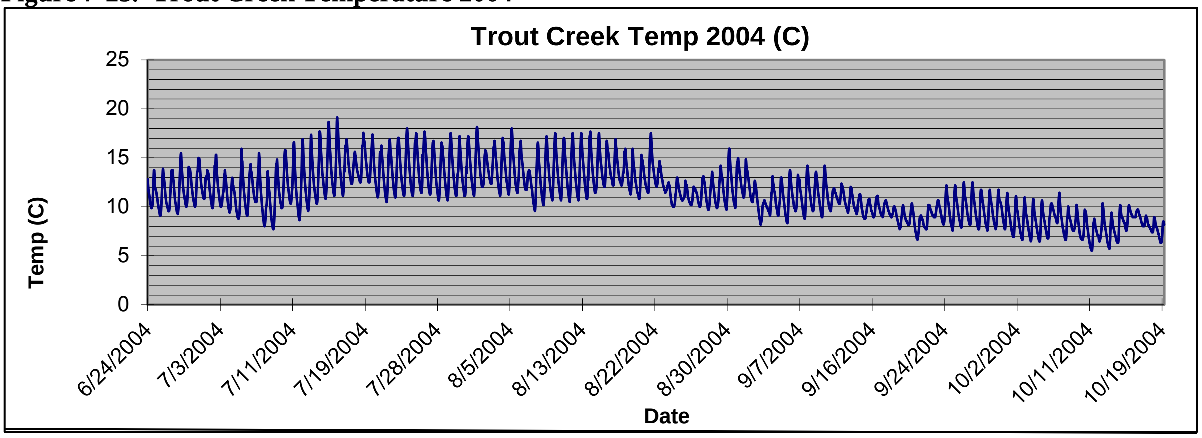
Past and present mining activities affect bull trout habitat in portions of Trout Creek as well. Many reaches have been placer mined at least once over the past 140 years, and this has also resulted in a loss of large woody debris and pool structure, unstable banks, high width:depth ratios, and poor riparian health. Current mining on both patented and claimed land maintains these poor conditions.

Spawning reaches and substrate in Trout Creek are limited in some locations due to the high gradient and confined nature of the channel. Brook trout are present in many tributary streams. Brown trout are present in the mainstem – this is likely a result of the unnaturally warm water temperatures that have resulted from riparian logging, mining, and road construction. Low fluvial bull trout numbers in the Middle Clark Fork River Core Area as a whole are another key limiting factor. These low numbers are influenced by poor habitat and water quality (sediment) in the mainstem Clark Fork River.

Only occasional redd count data has been collected in Trout Creek over the past ten years. The inconsistency in data collection is due to the fact that very few fluvial redds are found in the stream, and there doesn't appear to be a single, concentrated spawning reach that makes index redd counting efficient and reliable. A bull trout radio telemetry project conducted by FWP from 2003 to 2005 showed Fish Creek, Trout Creek, and Cedar Creek as the main spawning areas for fluvial bull trout (2 of 7 spawners tracked went into Trout Creek) in the MCFR Core Area (Knotek 2011). Bull trout migrating into Trout Creek were apparently blocked by large cascades near the mouth of the canyon reach, however, no redds were located in this reach by a follow-up survey. There are relatively high densities of bull trout (possibly resident fish) upstream of the canyon. There may be only intermittent access through the canyon cascades (based on flow patterns of any given year).

The area in the Middle Clark Fork River at the mouths of streams like Trout, Fish, and Cedar and Dry Creeks, and the St. Regis River is critical in providing mid-summer thermal refugia to bull trout. Water temperatures in the main river consistently exceed 20 degrees C from mid-July to mid-August, and bull trout require cooler areas in order to survive this period. While water temperatures in Trout Creek are elevated from past impacts (Figure 7-23), they are still lower than those in the main river, and provide cool surface and subsurface flows. During this time, bull trout concentrate in these areas, making them vulnerable to angling. For this reason, more restrictive angling regulations have been enacted to protect bull trout in these areas (Knotek 2011).

Figure 7-23. Trout Creek Temperature 2004



Trout Creek is a moderate sized watershed, containing two 6th level HUCs, and there are likely only a few fluvial bull trout that spawn in the entire drainage per year. The system has the potential to support a much larger population, although probably not to the level of other nearby streams such as Fish Creek and Cedar Creek due to the steep, confined nature of the watershed and the low amount of spawning habitat available.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Trout Creek - 170102040608							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	5 years	3	$250,000	H	H
Barriers	FUR	FA	1 year	3	$0	-	H
Pools	FUR	FAR	5 years	3	$50,000	M	H
Sediment	FUR	FAR	15 years	3	$200,000	M	M

This HUC contains the Trout Creek watershed up to the vicinity of Deep and Windfall Creeks. No juvenile bull trout have been detected in this reach in 13 sample sites since 2000 (MTFWP unpublished data). It therefore appears that spawning is not occurring within this reach at the current time. There is a barrier on VanNess Creek that is probably not significant to bull trout – the baseline call should therefore be updated to FA after field verification. The main limiting factor in this HUC is the lack of large woody debris and complex pool habitat (described above). Currently, the presence of the Trout Creek Road that parallels and encroaches on the stream, and private development, which includes a lumber milling site, limit the ability of the stream to recover naturally. There are limited opportunities to reduce roads and sediment. A stinger planting project was completed in 2010 through a partnership with Trout Unlimited. This will help to address temperature issues along the mainstem over time. In addition, large woody debris was added to approximately 5 miles of the mainstem. Large pools will benefit to some degree from this activity. The magnitude of this project, however, is small compared to the overall need to reintroduce large woody debris to the system. While not a substitute for a healthy riparian zone, these activities are mitigations that will be effective in reducing negative impacts to bull trout associated with the road and development in the valley bottom.

Temperature: Temperatures are impacted by the lack of large woody debris and the presence of the main road along many stream segments and private land development along the riparian zone in the lower reaches. Roads and development reduce woody debris, overhead riparian canopy, and pools, and increase width:depth ratios, which results in higher summer temperatures. Recent projects by Trout Unlimited, LNF fisheries, and MTFWP have added woody debris to the mainstem of Trout Creek. This will slightly improve pools and temperatures in the short-term, but the magnitude and longevity of this type of activity are both minimal, and cannot be expected to recover these baseline indicators on their own. In short, they are mitigative activities and cannot take the place of proper riparian management. The best way to improve temperature patterns in Trout Creek over the long-term would be to narrow and relocate the main Trout Creek road where possible. There are limited opportunities for this, however, and more frequent, larger scale additions of large woody debris to the stream channel may be the most practical management scenario for this HUC over time. Reducing temperatures is important in providing thermal refugia for bull trout in the main river during the summer.

Barriers: The barrier on VanNess Creek should be assessed to determine the value and priority for removal. It is likely of low importance, due to the stream size, but it may affect sediment and the downstream movement of substrate and woody debris, thereby indirectly affecting downstream habitat. If no problem exists, the baseline call should be updated to FA.

Pools: The baseline indicator for pools is FUR, largely due to the presence of the main Trout Creek road. The lack of in-channel large woody debris isn't well accounted for in the baseline database, although this probably drives pool conditions more than the road in this system. Recent restoration projects that added large woody debris to the stream channel improved pool conditions in localized areas, offsetting some of the negative impacts. Efforts to remove or relocate riparian roads and increase the scope and magnitude of the large woody debris additions to the stream channel (described under Temperature above) would simultaneously improve pool conditions in the future (hence the 5 year timeline).

Sediment: Sediment levels are elevated, due largely to the main Trout Creek road (#250). This is a major arterial road that crosses the stateline into Idaho, and is used heavily by recreationists. The road is gravel surfaced and is extremely wide. It encroaches on the stream in some places, but is more of an effect to the valley bottom and riparian zone than to direct channel morphology. Narrowing and possibly relocating this road closer to the hillside in some locations would provide direct benefits in terms of reducing sediment production and routing to the stream system.

Removing roads on hillsides will also reduce chronic sediment input. Hillside roads on the LNF are generally insloped with ditches and relief pipes – these concentrate and transport water and sediment off the road. While BMP's are partially effective in filtering sediment before it enters stream channels, not all BMP's are maintained, and not all necessary BMP's are installed to eliminate sediment input from hillside roads due to budget constraints. Therefore, there is long-term, chronic input of sediment to stream channels from these roads, and this negatively affects bull trout habitat. More options (obliteration, seasonal closures, outsloping, etc.) exist for reducing these effects from hillside roads, since sediment is the main issue (as opposed to riparian roads that affect large woody debris, cover, pools, and width:depth ratios more directly). The current baseline indicator for sediment is FUR – while it is important to at least improve this indicator to FAR to address bull trout recovery needs, the benefit of adding large woody debris to increase pool habitat and complexity would likely be much greater, at least in the short-term.

Most important activities to improve bull trout population:

1. Increase the scope and magnitude of large woody debris addition projects to significantly improve temperature and pool habitat and complexity throughout the HUC.
2. Review inactive mining claims to assess whether cooperative restoration projects with Trout Unlimited similar to those on Ninemile Creek would provide benefits to bull trout habitat. If so, aggressively pursue these opportunities, perhaps refocusing efforts from other less important watersheds.
3. Narrow and relocate the Trout Creek road closer to the hillside where practical.
4. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in Trout Creek and the middle Clark Fork River if it would benefit bull trout recovery in the watershed.
5. Take advantage of opportunities to reduce hillside road densities and sediment effects through associated projects in those areas.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Trout Creek - 170102040607							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	5 years	3	$150,000	H	H
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FUR	FAR	10 years	3	$100,000	M	M

This HUC contains the Trout Creek watershed upstream of Deep and Windfall Creeks. Bull trout spawning occurs upstream of the cascades. There are more bull trout in this HUC than in the Lower Trout Creek HUC, although many of the bull trout in this HUC are likely resident forms. Access through the cascades is limited, so fluvial bull trout may not be able to get into this HUC most years.

There are no known barriers to bull trout movement upstream of the cascades. There is some opportunity to reduce roads, and some opportunity to plant along roads and throughout the valley bottom to reduce temperatures. There may also be opportunities for mine site reclamation to improve instream conditions, but most of this is high up and would not directly improve bull trout habitat. As with the Lower Trout Creek HUC, the overall low amount of instream large woody debris and complex pool habitat is a key limiting factor. Adding large woody debris to the system similar to what was completed downstream could be effective in improving habitat conditions. The main Trout Creek Road (#250) encroaches on the stream in this HUC also, limiting the ability of the stream to recover naturally. Due to its importance for bull trout in Trout Creek, activities aimed at reducing temperatures, increasing complex pool habitat, and reducing sediment should be actively pursued.

Temperature: Temperatures are impacted by the lack of large woody debris and the presence of the main road along many stream segments. Roads and road corridors reduce woody debris, overhead riparian canopy, and pools, and increase width:depth ratios, which results in higher summer temperatures. Recent projects by Trout Unlimited, LNF fisheries, and MTFWP have added woody debris to the mainstem of Trout Creek, in the Lower Trout Creek HUC. This will slightly improve pools and temperatures in the short-term and additional work similar to this could be employed in the Upper Trout Creek HUC to positively affect conditions for bull trout here. The best way to improve temperature patterns in Trout Creek over the long-term would be to narrow and relocate the main Trout Creek road where possible. There are limited opportunities for this, however, and more frequent, larger scale additions of large woody debris to the stream channel may be the most practical management scenario for this HUC over time.

Barriers: There are no known barriers to bull trout in this HUC, and no activities are necessary.

Pools: The baseline indicator for pools is FAR, largely due to the presence of the main Trout Creek road. The lack of in-channel large woody debris isn't well accounted for in the baseline database, although this probably drives pool conditions more than the road in this system. Efforts to remove or relocate riparian roads and increase the scope and magnitude of the large woody debris additions to include this HUC would improve pool conditions in the future. It is doubtful that the baseline call will change from FAR without significant riparian road removal. However, the above mentioned activities would still result in improved conditions, even if the baseline call didn't change.

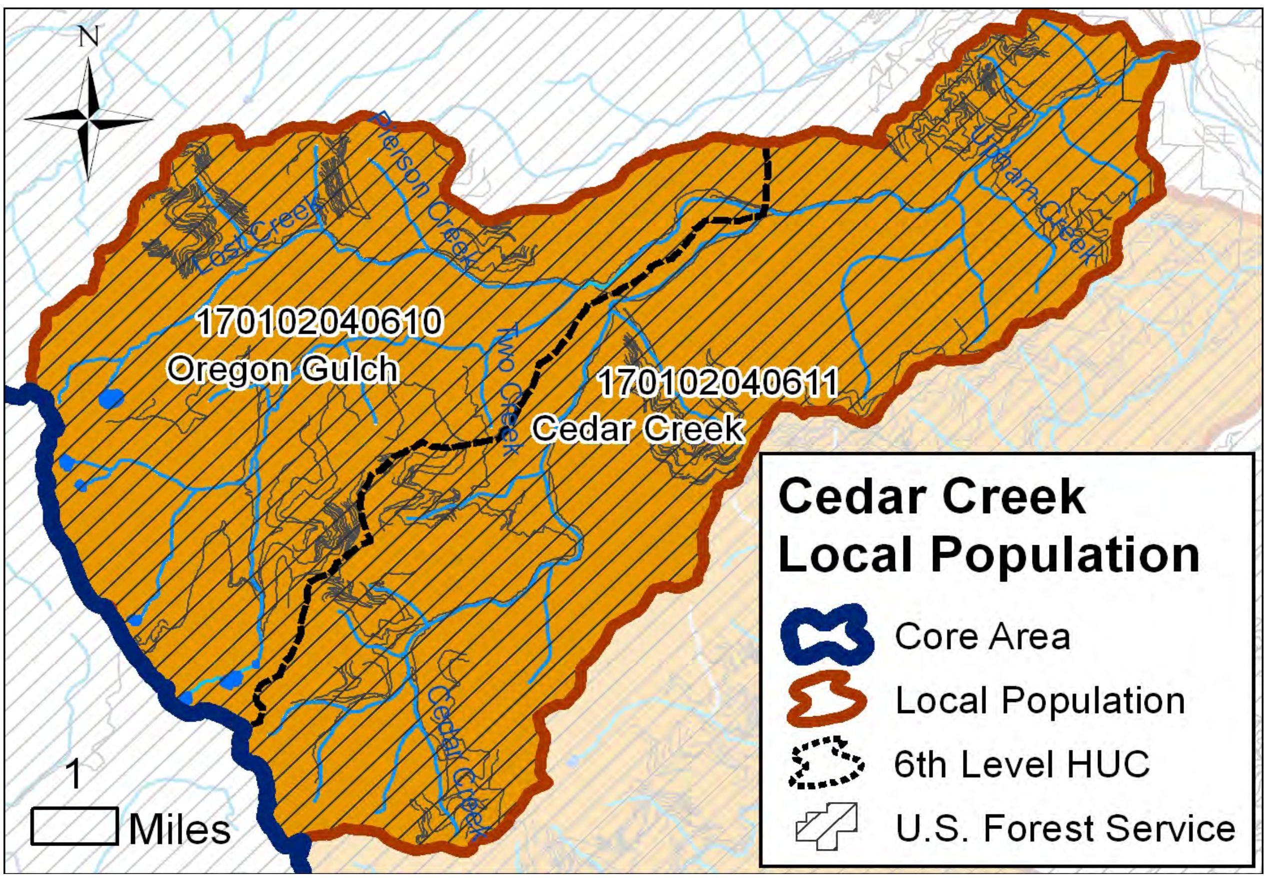
Sediment: Sediment levels are elevated, due largely to the main Trout Creek road. This is a major arterial road that crosses the stateline into Idaho, and is used heavily by recreationists. The road is gravel surfaced and is extremely wide. It encroaches on the stream in some places, but is more of an effect to the valley bottom and riparian zone than to direct channel morphology. Narrowing and possibly relocating this road closer to the hillside in some locations would provide direct benefits in terms of reducing sediment production and routing to the stream system. Removing roads on hillsides will also reduce chronic sediment input. Hillside roads on the LNF are generally insloped with ditches and relief pipes – these concentrate and transport water and sediment off the road. While BMP's are partially effective in filtering sediment before it enters stream channels, not all BMP's are maintained, and not all necessary BMP's are installed to eliminate sediment input from hillside roads due to budget constraints. Therefore, there is long-term, chronic input of sediment to stream channels from these roads, and this negatively affects bull trout habitat. More options (obliteration, seasonal closures, outsloping, etc.) exist for reducing these effects from hillside roads, since sediment is the main issue (as opposed to riparian roads that affect large woody debris, cover, pools, and width:depth ratios more directly). The current baseline indicator for sediment is FUR – while it is important to at least improve this indicator to FAR to address bull trout recovery needs, the benefit of adding large woody debris to increase pool habitat and complexity would likely be greater, at least in the short-term.

Most important activities to improve bull trout population:

1. Increase the scope and magnitude of large woody debris addition projects to significantly improve pool habitat and complexity throughout the HUC.
2. Review inactive mining claims to assess whether cooperative restoration projects with Trout Unlimited similar to those on Ninemile Creek would provide benefits to bull trout habitat. If so, aggressively pursue these opportunities, perhaps refocusing efforts from other less important watersheds.
3. Narrow and relocate the Trout Creek road closer to the hillside where practical.
4. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in Trout Creek and the middle Clark Fork River if it would benefit bull trout recovery in the watershed.
5. Take advantage of opportunities to reduce hillside road densities and sediment effects through associated projects in those areas.

Local Population: Cedar Creek

Figure 7-24. Cedar Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 7-7. Cedar Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50 Migratory 50-250 Res	Unknown	Fluvial, Connected	1	Low (brook trout in headwaters and lakes; brown trout near mouth)

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Moderate significance – This stream is near to Trout Creek and the St. Regis River. It is the dominant fluvial bull trout stream of the three. It drains the stateline, so it's similar to these two streams hydrologically.	Low vulnerability due to high elevation (cold temperature regime) and high precipitation zone from stateline.	Appears to be destination for some of Lower Clark Fork River migrants passed over T. Falls dam.

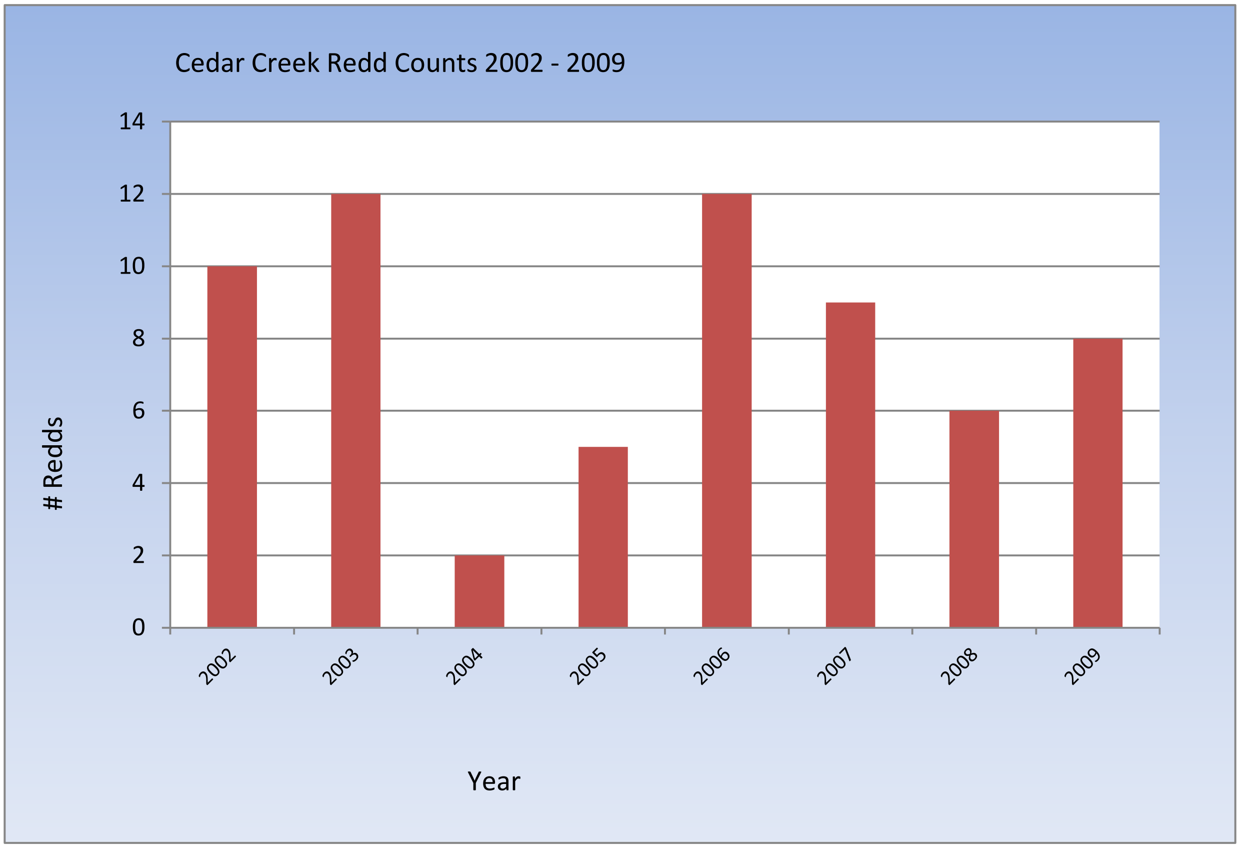
Driving Factors Determining Bull Trout Population:

Past and present mining activities significantly affect bull trout habitat in Cedar Creek. Most reaches have been placer mined at least once over the past 140 years, and this has resulted in a loss of large woody debris and pool structure, unstable banks, high width:depth ratios, and poor riparian health. Current mining on both patented and claimed land maintains these poor conditions. Historically, there was a large town in the lower reaches of Cedar Creek, and human impacts were numerous. Logging and associated road construction have also impacted habitat throughout the watershed. The road network continues to result in chronic sediment input to the stream and negatively affects the input and movement of substrates and woody debris through the system. Low fluvial bull trout numbers in the Core Area as a whole are another key limiting factor. These low numbers are influenced by mainstem Clark Fork River habitat and species interactions.

The following table shows bull trout redd counts in Cedar Creek between 2002 and 2009. Due to the short period of record, trend assessments cannot be made. There is high variability in annual redd count numbers, with results ranging from 2 to 12 redds per year. The extremely low number of redds, and the fact that most of the fluvial redds appear to be contained within one reach are a concern. Cedar Creek is a large watershed, containing two 6th level HUCs, and there are only about 15 fluvial bull trout that spawn in the entire drainage per year, based on this redd count data. Cedar Creek is a highly probable spawning destination for bull trout from the Lower Clark Fork River (below the dams), but there is no direct evidence of this to date. Two westslope cutthroat trout that were passed over Thompson Falls Dam migrated to and spawned in Cedar Creek (PPL passage report 2009).

Confidence in your assessment (H,M,L): M

Figure 7-25. Cedar Creek Redd Counts



Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

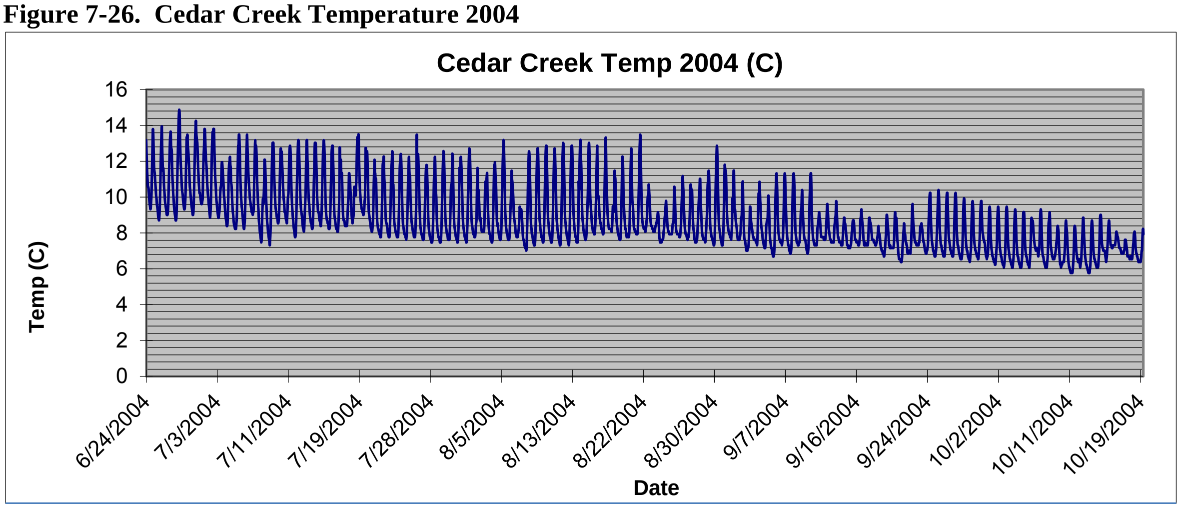
HUC6 (name and #): Cedar Creek - 170102040611							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: < 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FA	10 years	2	$50,000	H	H
Barriers	FUR	FA	25 years	2	$50,000	L	H
Pools	FAR	FA	10 years	2	$50,000	M	H
Sediment	FUR	FAR	10 years	2	$250,000	H	H

Habitat conditions in this HUC are mostly influenced by road systems. It should be a high priority through the ongoing Cedar Thom analysis and any future projects to significantly reduce roads and their effects in this HUC. The current baseline condition for sediment will only be achieved through significant reductions in roads throughout the watershed. Getting rid of roads will address both the sediment and temperature baselines. The barrier call should probably be FAR, as there are only two barriers in the database, and these are both on streams that would likely not be critically important to bull trout due to their size. There are actually three barriers on Cayuse Gulch that may provide some benefit to bull trout if removed (the baseline database should be checked to see why these aren't all included). The mainstem has been tested for WCT genetics and is not pure, (although many tributaries are likely non-hybridized) so removing barriers should not be an issue from that standpoint. In addition, the importance of this drainage for bull trout and fluvial westslope cutthroat trout has prompted MTFWP to recommend management as an open system to allow access for these species.

Temperature: Temperatures are impacted by the presence of roads along many stream segments and current mining activity in the stream channel and riparian zone. Roads and mining reduce woody debris, overhead riparian canopy, and pools, and increase width:depth ratios, which results in higher summer temperatures and lower winter temperatures (and more ice problems). Recent projects by Trout Unlimited, LNF fisheries, and MTFWP have added woody debris to the mainstem of Cedar Creek. This will slightly improve pools and temperatures (by creating direct overhead cover and complex shading) in the short-term, but the magnitude and longevity of this type of activity are both minimal, and cannot be expected to recover these baseline indicators on their own. In short, they are mitigative activities and cannot take the place of proper riparian management. The most direct way to improve temperature patterns in Cedar Creek over the long-term is to significantly reduce riparian roads and include sufficient restrictions and bonding on mining activities to assure recovery of a functional riparian zone. Some of these changes would need to occur on private patented mining lands, in addition to LNF administered lands.

Cedar Creek inherently maintains cold water due to its high elevation, north aspect, and large flow volume, despite impacts to the stream and riparian zone. While temperature patterns have been impacted by the above mentioned factors, mid-summer highs still rarely exceed 14 C, which is relatively cold and well within the tolerance limits of bull trout (Figure 7-26, Knotek 2011). The baseline indicator for this parameter should be updated based on this data to FAR. Activities listed above are still important to implement to return temperature patterns to their natural ranges, which are optimal for bull trout production and provide important thermal refugia for bull trout in the Middle Clark Fork River mainstem near the mouth of Cedar Creek.

Figure 7-26. Cedar Creek Temperature 2004



Barriers: The barriers on Cayuse Gulch should be assessed to determine the value and priority for removal. They are likely of low importance, due to the stream size, but they may affect sediment and the downstream movement of substrate and woody debris, thereby indirectly affecting downstream habitat. These are relatively small projects, with relatively low benefit.

Pools: The baseline indicator for pools is FAR due to the presence of roads along streams. Mining impacts aren't well accounted for in the baseline database, so the FAR call is likely more generous than actual conditions throughout most of the stream. Recent restoration projects that added large woody debris to the stream channel improved pool conditions in localized areas, offsetting some of the negative impacts of mining that aren't accounted for, so the overall call is probably okay. Efforts to remove riparian roads (described under Temperature above) would simultaneously improve pool conditions in the future.

Sediment: Sediment levels are elevated due to high road densities in the watershed. Removing riparian roads will provide the most direct benefit in terms of reducing sediment levels. However, removing roads on hillsides will also reduce chronic sediment input. Hillside roads on the LNF are generally insloped with ditches and relief pipes – these concentrate and transport water and sediment off the road. While BMP's are partially effective in filtering sediment before it enters stream channels, not all BMP's are maintained, and not all necessary BMP's are installed to eliminate sediment input from hillside roads due to budget constraints. Therefore, there is long-term, chronic input of sediment to stream channels from these roads, and this negatively affects bull trout habitat. More options (obliteration, seasonal closures, outsloping, etc.) exist for reducing these effects from hillside roads, since sediment is the main issue (as opposed to riparian roads that affect large woody debris, cover, pools, and width:depth ratios more directly). The current baseline indicator for sediment is FUR – it is important to at least improve this indicator to FAR within 10 years to address bull trout recovery needs.

Most important activities to improve bull trout population:

1. Significantly reduce road densities – especially riparian roads – throughout the HUC.
2. Review inactive mining claims to assess whether cooperative restoration projects with Trout Unlimited similar to those on Ninemile Creek would provide benefits to bull trout habitat. If so, aggressively pursue these opportunities, perhaps refocusing efforts from other less important watersheds.
3. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in Cedar Creek and the middle Clark Fork River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Oregon Gulch - 170102040610							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 99%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	3	$50,000	H	H
Barriers	FAR	FA	5 years	3	$250,000	H	M
Pools	FAR	FA	10 years	3	$100,000	M	M
Sediment	FUR	FAR	10 years	3	$250,000	H	H

This HUC contains the index spawning reach. It provides important spawning habitat for bull trout in Cedar Creek, which is one of only four current spawning tributaries for fluvial bull trout in the MCFR. Temperature and barrier baselines are in better condition in this HUC than the other Cedar Creek HUC. There are mining issues in this HUC that create the most impact and risk to bull trout due to direct effects and the potential for a large blowout which would add sediment to the stream. There are also numerous roads that add sediment. Some of these roads may be difficult to address because they provide access to current mineral claims. Several barriers exist in this HUC, but most are not significant to bull trout because they are on small streams. They probably affect westslope cutthroat trout to a certain degree. WCT genetics are pure – this needs to be addressed if we plan to remove these barriers. The mine site near the mouth of Oregon Gulch currently causes the stream to braid and become dewatered for a short length annually. This poses a significant access issue for migrating bull trout, and should be addressed. One other barrier on the mainstem of Oregon Gulch is important to remove from a bull trout perspective – this is moderate priority and would open up about 1/2 mile of bull trout habitat.

Temperature: Temperatures are impacted by the presence of roads along many stream segments and current mining activity in the stream channel and riparian zone. Roads and mining reduce woody debris, overhead riparian canopy, and pools, and increase width:depth ratios, which results in higher summer temperatures and lower winter temperatures (and more ice problems). The most direct way to improve temperature patterns in Cedar Creek over the long-term is to significantly reduce riparian roads and include sufficient restrictions and bonding on mining activities to assure recovery of a functional riparian zone. Some of these changes would need to occur on private patented mining lands, in addition to LNF administered lands. Improving the temperature baseline in this HUC is an important conservation measure for bull trout.

Barriers: The mine site near the mouth of Oregon Gulch currently causes the stream to braid and become dewatered for a short length annually. This poses a significant access issue for migrating bull trout, and should be addressed. The actual baseline call should be downgraded to FUR due to this barrier (the barrier wasn't captured in the baseline assessment since it was based on road/stream crossings). The barrier upstream on Oregon Gulch should be removed to provide access to ½ mile of habitat for bull trout. While this barrier is, in itself, a moderate priority, the overall population would not be expected to change dramatically as a result since the amount of habitat it influences is small relative to the overall watershed size. With implementation of both of these projects, the baseline indicator would move from FUR (the updated call) to FA. The other barriers should be assessed to determine the value and priority for removal. They are likely of low importance, due to the stream size, but they may affect sediment and the downstream movement of substrate and woody debris, thereby indirectly affecting downstream habitat. These are relatively small projects, with relatively low benefits.

Pools: The baseline indicator for pools is FAR due to the presence of roads along streams. Mining impacts aren't well accounted for in the baseline database, so the FAR call is likely more generous than actual conditions throughout most of the stream. Efforts to remove riparian roads (described under Temperature above) would simultaneously improve pool conditions in the future.

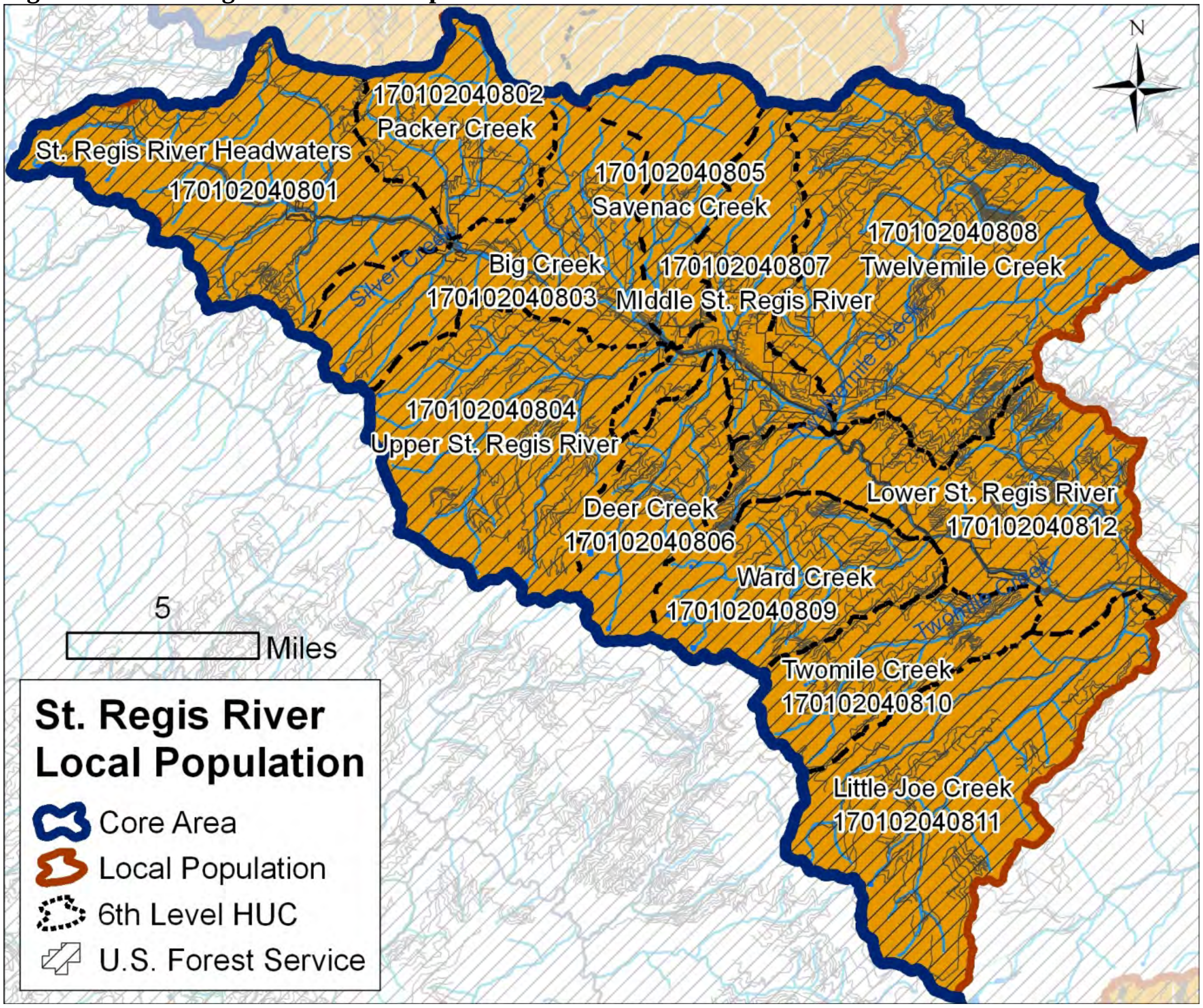
Sediment: Sediment levels are elevated due to high road densities and mining in the watershed. Removing riparian roads will provide the most direct benefit in terms of reducing sediment levels. However, removing roads on hillsides will also reduce chronic sediment input. Hillside roads on the LNF are generally insloped with ditches and relief pipes – these concentrate and transport water and sediment off the road. While BMP's are partially effective in filtering sediment before it enters stream channels, not all BMP's are maintained, and not all necessary BMP's are installed to eliminate sediment input from hillside roads due to budget constraints. Therefore, there is long-term, chronic input of sediment to stream channels from these roads, and this negatively affects bull trout habitat. More options (obliteration, seasonal closures, outsloping, etc.) exist for reducing these effects from hillside roads, since sediment is the main issue (as opposed to riparian roads that affect large woody debris, cover, pools, and width:depth ratios more directly). The current baseline indicator for sediment is FUR – it is important to at least improve this indicator to FAR within 10 years to address bull trout recovery needs.

Most important activities to improve bull trout population:

1. Develop a stream channel and mine site restoration project to re-establish perennial flow in the dewatered section near the mouth of Oregon Gulch.
2. Significantly reduce road densities – especially riparian roads – throughout the HUC.
3. Review inactive mining claims to assess whether cooperative restoration projects with Trout Unlimited similar to those on Ninemile Creek would provide benefits to bull trout habitat. If so, aggressively pursue these opportunities, perhaps refocusing efforts from other less important watersheds.
4. Continue large woody debris cooperative projects with Trout Unlimited and MTFWP to increase structural complexity and pool habitat within the stream channel where appropriate.
5. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in the middle Clark Fork River if it would benefit bull trout recovery in the watershed.

Local Population: St. Regis River

Figure 7-27. St. Regis River Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 7-8. St. Regis River Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50 Migratory 50-250 Res	Unknown	Mainly Resident at present time, Connected	2	Eastern brook trout, High
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High significance – This is a very large drainage with numerous potential spawning and rearing tributaries. It drains the stateline and CC Divide, so it's got a variety of hydrologic regimes.		Low vulnerability due to high elevation and high precipitation zone from stateline.		None

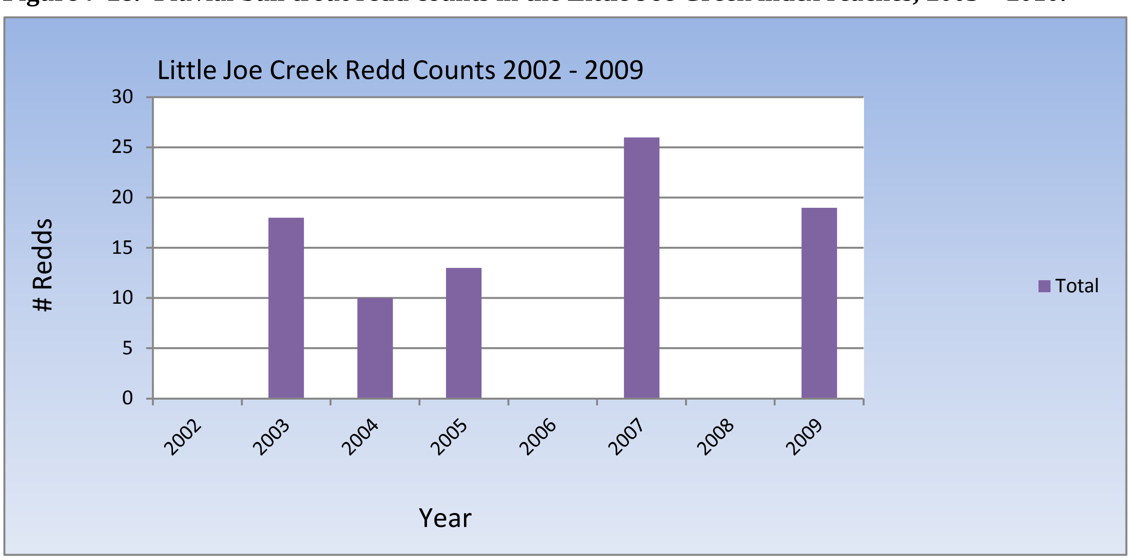
Driving Factors Determining Bull Trout Population:

The St. Regis River is the largest tributary in the Middle Clark Fork River Core Area, containing twelve 6th level HUCs. Historically, it was probably the most important bull trout producer, but its significance at the current time is much reduced. It drains high elevation, high precipitation watersheds along the Idaho/Montana state line, and therefore maintains relatively stable base flows throughout the winter and summer. This is unique in the MCFR, where many streams are disconnected due to low base flows and porous valley bottoms. The St. Regis River watershed also has the potential to be more resilient to changes from global warming due to its mean elevation, high precipitation, and orientation. Finally, its geographic location in the middle of the MCFR Core Area and as the first suitable spawning habitat upstream of the Flathead River increase its overall role in the future recovery of bull trout. These factors combined make the St. Regis River one of the highest priority areas for activities that would contribute to the long-term recovery of bull trout within the MCFR Core Area.

Historically, bull trout likely occupied nearly all of the third order and larger tributaries in the St. Regis River basin, and probably extended up the mainstem to within a mile or two of St. Regis Lakes. Many of these tributaries, such as Big Creek, Timber Creek, and Twelvemile Creek supported bull trout populations as recently as the late 1980's (MTBSG 1996). Others, such as Deer Creek, Silver Creek, Randolph Creek, Twomile Creek, and Savanac Creek probably supported bull trout until the 1960's or 1970's when widespread timber harvest and development of the transportation system caused the overall population to decline and become restricted in range. Currently, the only streams where bull trout are commonly observed are Little Joe Creek and Ward Creek (numbers in Ward Creek are too low to count accurately).

Throughout the entire St. Regis River basin, the only stream currently maintaining a population large enough to conduct annual redd counts on is Little Joe Creek. Within Little Joe Creek, annual redd counts in index reaches have ranged from 10 to 30 over the past 7 years (Figure 7-28). The majority of redds observed in Little Joe Creek appear to be from resident bull trout as they are relatively small. However, a few large redds, which are obviously constructed by fluvial fish, are observed every year. The fact that only one out of twelve watersheds in the entire basin currently support countable numbers of bull trout is particularly concerning. Even more concerning is that very few of these bull trout are fluvial. This information indicates that the fluvial component of the bull trout population in the St. Regis River basin is in urgent need of recovery actions to prevent it from disappearing altogether.

Figure 7-28. Fluvial bull trout redd counts in the Little Joe Creek index reaches, 2003 – 2010.



The mainstem of the St. Regis River has an extensive history of impacts centered on its location as a transportation corridor from Idaho to Montana. In the early 1900's, the valley bottom was used extensively for railroad transportation. Two railroad grades eventually paralleled the mainstem, cutting off meanders and destroying riparian habitat and vegetation. A major highway, which eventually gave way to Interstate 90 and another access road swallowed up the remaining valley bottom and floodplain by the end of the 1970's. Associated utility corridors (BPA and Northwest Energy power lines) completed the development to where today, the river is mostly channelized with very little riparian vegetation or functional floodplain. In places where the valley bottom widens, such as near Deborgia, the river channel is extremely unstable because the energy and associated bedload transport is all dissipated in this small area. The result is a river channel that is incapable of naturally processing sediment and bedload inputs, has little structural diversity due to the lack of functioning riparian zones, and serves primarily only as a migratory corridor for fluvial fish. This is in contrast to its historic role of providing high quality rearing habitat for both juvenile and adult bull trout and other native fluvial fish species.

The river corridor also has a long history of logging, including log drives down the stream channel which devastated aquatic habitat and fish populations. Historically, large logjams existed throughout the mainstem of the St. Regis River. These provided critical spawning and overwintering habitat for bull trout. Log drives and intensive logging of the riparian zone, along with development of the above mentioned transportation systems and small communities, all but eliminated these components of the aquatic ecosystem except in undeveloped areas near the headwaters.

Tributaries to the St. Regis River have a long history of logging as well. Every third order and larger stream in the basin (with the exception of Savanac Creek and Twin Creek) has a major road paralleling the stream for most of its length. These drainages are steep and confined, so the valley bottom roads are immediately adjacent to, and often times encroaching upon, the stream system. Extensive road networks fan out from valley bottom roads to most portions of the watersheds, creating extremely high road density and stream crossing densities in most 6th level HUCs. The road network was constructed by the Lolo National Forest, primarily from the 1960's through the 1980's for logging purposes.

Drainages that have been extensively roaded and logged have high sediment levels, limited channel complexity, and few, if any, bull trout. The widespread impacts of logging and road development throughout the watershed have systemic repercussions to habitat in the mainstem as well. High sediment and bedload levels from tributary streams, combined with riparian logging and haul routes along the main stream channels, have resulted in channel instability throughout many portions of the St. Regis River and tributary watersheds. The lack of large debris jams in the main stream channels exacerbates this problem, as there are few depositional, energy dissipation zones for complex habitat and spawning substrates to establish.

The extensive road network throughout the watershed continues to result in chronic sediment input and negatively affects the input and movement of substrates and woody debris through the system. Bull trout recovery in the local population is unlikely without significant efforts by the Forest Service to reduce road densities, especially those in riparian areas where effects to bull trout and their habitats are compounded.

Low fluvial bull trout numbers in the MCFR Core Area as a whole are another factor limiting the strength of the local population in the St. Regis River. There are currently about 60 – 70 bull trout redds on average throughout the entire MCFR Core Area index reaches per year. Of these, almost 1/3 are from Little Joe Creek (which are primarily resident). Other streams, such as Cedar Creek, which contribute significant number to the overall totals as well, also have a large proportion of resident fish. So the total number of fluvial spawners in any given year is probably somewhere between 50 and 150 (possibly as high as 200 given that not all spawning is accounted for in index reaches). With the population being this low, and given the poor habitat conditions, it is unlikely that a significant amount of spawning would occur in the St. Regis River basin.

Confidence in your assessment (H,M,L): M

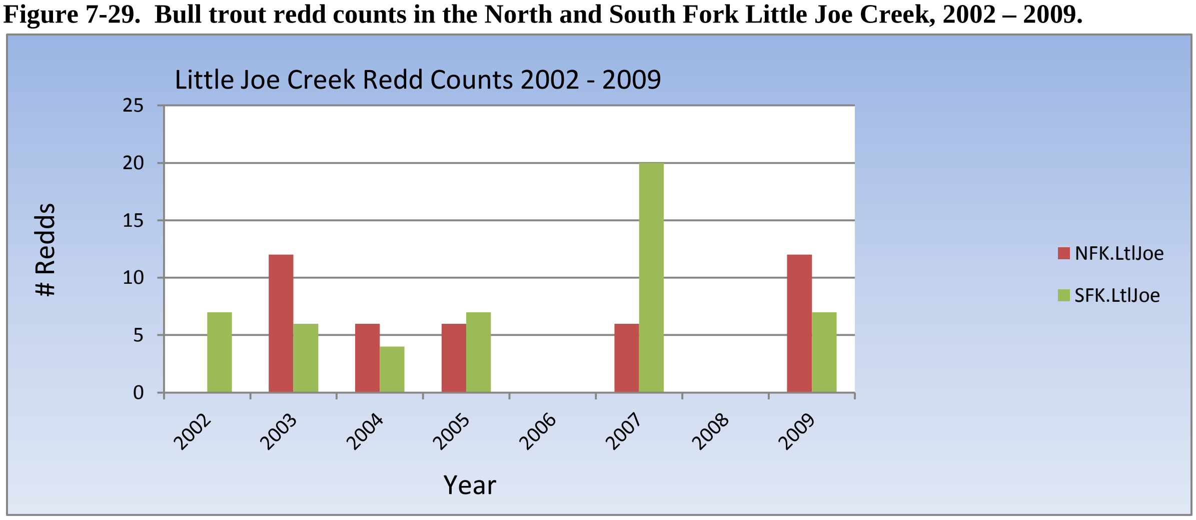
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Little Joe Creek - 170102040811							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$250,000	H	M
Barriers	FUR	FA	10 years	3	$250,000	H	H
Pools	FAR	FAR	15 years	3	$50,000	H	M
Sediment	FUR	FAR	15 years	3	$250,000	H	M

This HUC is critical for bull trout recovery in the St. Regis River Local Population. It currently supports the strongest numbers of bull trout and will serve as the cornerstone for rebuilding the St. Regis River population over the long term. The most significant limiting factors are the road systems paralleling both the North Fork and South Fork, the dense network of logging roads on the steep hillsides, and the presence of brook trout in Moore Lake and downstream reaches of Little Joe Creek.

Bull trout populations in Little Joe Creek are relatively high compared to other small tributaries that support bull trout in the MCFR Core Area. However, the majority of the fish in the population are believed to be resident, so the long-term viability of the population is a concern. Annual redd counts are conducted on both the North Fork and South Fork of Little Joe Creek. These counts show about 5 to 10 redds annually in each reach (with the exception of the South Fork in 2007, when 20 redds were counted) (Figure 7-29). There are only a few redds identified each year that appear to be from fluvial fish. If there were more bull trout in the MCFR Core Area and the St. Regis River Local Population, it is likely that a greater amount of fluvial spawning would occur in the watershed.

Figure 7-29. Bull trout redd counts in the North and South Fork Little Joe Creek, 2002 – 2009.



There are several opportunities to significantly improve conditions and contribute to bull trout recovery in the Little Joe Creek watershed. Due to the high degree of road access to most parts of the watershed, and the entire St. Regis basin, there is an opportunity to look at long-term transportation planning with the objective of returning some watersheds to a more roadless character that is more conducive to supporting strong bull trout populations. The Little Joe watershed provides a perfect opportunity to explore this, since both the North and South Forks have a road running up them. The North Fork road is a major tie-through to Idaho, and is therefore an unlikely candidate for removal. However, the South Fork road ties through to the North Fork Road, providing an ideal opportunity to remove it completely, while still maintaining recreational access to Moore Lake. Roads coming off of the South Fork road could be obliterated as well, returning the area to a less developed level, more conducive to overall watershed health and resiliency. This is just one of many opportunities in the St. Regis River basin where large-scale planning with a focus on resources other than timber would provide benefits to a multitude of other areas (such as wildlife, hydrology, undeveloped recreation, weeds, botany, etc.). In concert with this project, the USFS should coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in Moore Lake and throughout the Little Joe system if it would benefit bull trout recovery in the watershed. These efforts combined would result in real changes to the aquatic ecosystem and significantly increase the likelihood of long-term persistence of the bull trout population, securing Little Joe Creek as the building block for recovery of the St. Regis River Local Population.

Temperature: Temperatures in Little Joe Creek are impacted by roads paralleling a majority of the stream length, thereby effectively reducing overhead canopy and the input of large woody debris. The current baseline indicator call is FUR. Removing roads from the South Fork watershed (as described above) could significantly improve this indicator (moving it to FAR), but will not likely move it to FA due to the remaining high road densities in the North Fork. Nevertheless, removal of the riparian road up the South Fork would be a significant step towards improving and securing conditions for bull trout recovery in the watershed.

Barriers: There are two barriers on the North Fork that were identified as issues approximately five years ago when the road was being assessed for a Forest Highway. These are large structures that affect bull trout movement and should be replaced. In addition, the crossing to the Little Joe Pit on the mainstem should be eliminated. This crossing currently has a significant impact on channel conditions both up and downstream. During the Forest Highway project, this culvert and access road were planned to be removed following use of the pit for the road work. Although the highway project was dropped, follow-up should be conducted to remove the crossing. There are several additional barriers in the upper reaches of the North Fork that are not significant from a migration standpoint. They do pose a sediment risk to bull trout if they were to fail. Nearly all are undersized culverts. The barriers in the South Fork watershed would all be removed under the proposal to return this watershed to a primarily roadless character. In the absence of this, several hundred thousand additional dollars will be needed to remove barriers in this watershed. The current baseline call is FUR. Aggressive restoration should be undertaken to remove barriers and change this call to FA over the next decade.

Pools: The baseline indicator for pools is FAR. Pool habitat and complexity has been affected throughout the HUC by extensive amounts of roads that parallel streams and stream crossings. The most effective way to improve this condition over the long-term is to restore the South Fork to a more roadless character as described above. In the short-term, adding significant amounts of large woody debris where roads impact the stream channel will create pool habitat and complex structure that will help support bull trout populations. The baseline call will probably not change to FA due to the likelihood that the North Fork road will remain in place.

Sediment: The baseline indicator for sediment is FUR. The roads up the bottom of the mainstem and forks contribute sediment, as do numerous logging roads in the watershed. Typical current management projects that result in minor reductions in sediment over a decadal period will not achieve the desired goal of significant sediment reductions to support a more healthy bull trout population within a meaningful time period for bull trout. Large-scale transportation planning with the objective of restoring this HUC to a more remote character should be undertaken.

Most important activities to improve bull trout population:

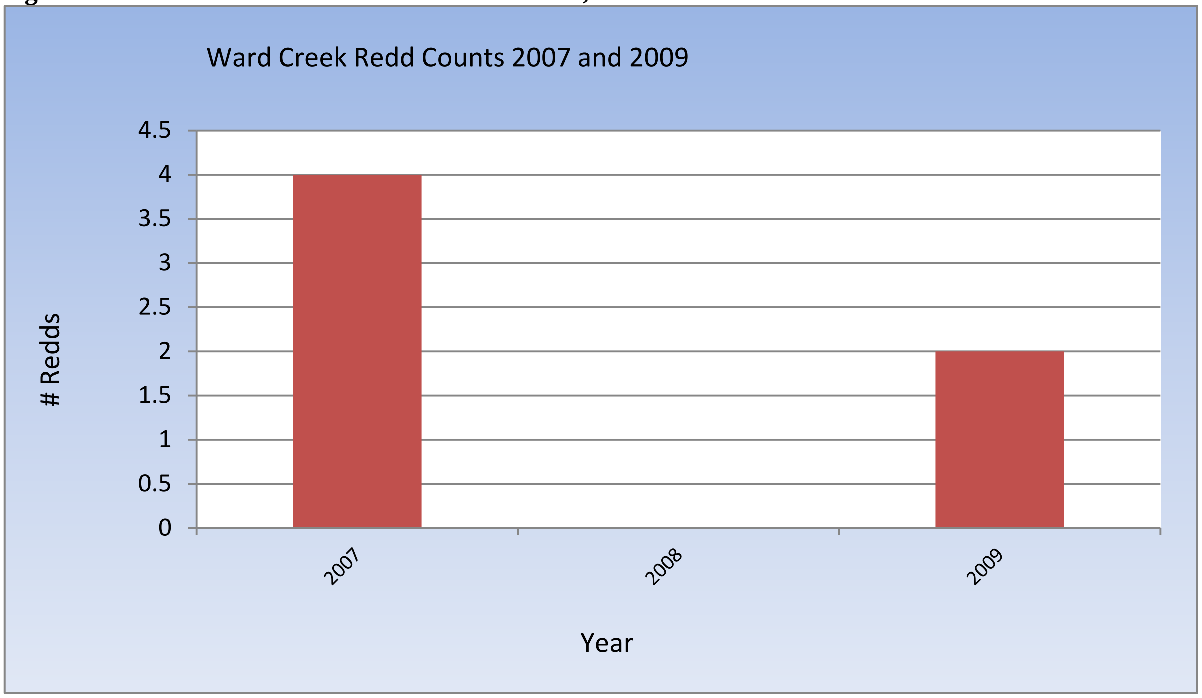
1. Remove the South Fork road and all associated access roads in the South Fork Little Joe watershed to return it to a more roadless character conducive to long-term bull trout conservation. This can be done by maintaining the tie through from the North Fork to Moore Lake.
2. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in Moore Lake, Little Joe Creek, and the St. Regis basin overall if it would benefit bull trout recovery in the watershed.
3. Relocate stored gravel in the Little Joe Pit to an area outside the floodplain. Obliterate the access road and remove the culvert across the stream.
4. Eliminate barriers throughout the watershed, primarily those identified in the Forest Highway assessment completed a few years ago.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Ward Creek - 170102040809							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FA	15 years	3	$250,000	H	M
Barriers	FAR	FA	1 year	3	$0	-	-
Pools	FAR	FA	10 years	3	$50,000	H	M
Sediment	FUR	FA	15 years	3	$250,000	H	M

This HUC is critical for bull trout recovery in the St. Regis River Local Population. Like Little Joe Creek, it currently supports both resident and fluvial bull trout. The size of the fluvial population appears to be small – it is only recently beginning to re-establish following removal of the Ward Creek Flume in the mid-1990's. This flume spanned the entire creek, and was a complete barrier to upstream migration into the upper 8 miles of the mainstem of Ward Creek. The current size and trend of the fluvial population is uncertain. Only two limited redd surveys have been conducted in the reach immediately upstream of the flume site since the flume was removed (LNF unpublished data) (Figure 7-30). If there were more bull trout in the MCFR Core Area and the St. Regis River Local Population, it is likely that a significant amount of fluvial spawning would occur in the Ward Creek watershed. A comprehensive redd survey of the basin is needed to more accurately understand this population. Brook trout are the only non-native species present in the stream -- their densities are low, and their distribution is limited to the lower reaches of the mainstem (MTFWP unpublished data).

Figure 7-30. Bull trout redd counts in Ward Creek, 2007 and 2009.



As with Little Joe Creek, Ward Creek is important for long-term recovery of bull trout in the St. Regis River Local Population -- it will serve as a stable base and source population for other watersheds. The Ward Creek watershed is relatively large, high in elevation, and has high precipitation rates. It will therefore be more resilient to climate change than most watersheds on the LNF and within the St. Regis River basin.

The most significant limiting factor in the HUC is the road systems paralleling the mainstem and the associated dense network of logging roads on the steep hillsides. Temperature, pools and sediment are negatively affected by these roads, primarily the mainstem road up the bottom. The watershed has a history of unstable roads due to its steepness and high precipitation. Removal or relocation of roads would improve stream conditions and reduce risks. Allowing vegetation patterns to recover from extensive timber harvest would also improve instream conditions. There are several culverts that should be removed or replaced to improve access for westslope cutthroat, but these generally do not impair bull trout movement patterns because they are high in the watershed on small streams. They do pose a risk of adding sediment to streams if they fail. Non-native brook trout are present in Ward Creek, but their current influence on the population is unknown. USFS biologists should coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in Ward Creek if it would benefit bull trout recovery in the watershed. The timeliness of these efforts would be good since the non-native population is currently small and distribution is limited.

There are several opportunities to significantly improve conditions and contribute to bull trout recovery in the Ward Creek watershed. Due to the high degree of road access in the St. Regis basin, there is an opportunity to look at long-term transportation planning with the objective of returning Ward Creek to a more roadless character that is more conducive to supporting strong bull trout populations. The Ward Creek/Twomile Creek road systems provide an ideal opportunity to reduce roads by eliminating the Ward Creek road (#889) and maintaining the Twomile Road (#431). The Twomile road provides access to the Stateline Road (#391), which provides trail access to all of the high mountain lakes in the Ward Creek headwaters. Eliminating the mainstem Ward Creek road, along with all associated logging roads would significantly improve aquatic habitat and resiliency in the watershed, and would increase the security of the bull trout population over the long-term. This is just one of many opportunities in the St. Regis River basin where large-scale planning with a focus on resources other than timber would provide benefits to a multitude of other areas (such as wildlife, hydrology, undeveloped recreation, weeds, botany, etc.).

Temperature: Temperatures in Ward Creek are impacted by road #889 paralleling a majority of the stream length, thereby effectively reducing overhead canopy and the input of large woody debris. The current baseline indicator call is FUR. Removing roads from the Ward Creek watershed (as described above) could significantly improve this indicator, moving it to FA. Removal of the riparian road up the Ward Creek valley bottom would be a significant step towards improving and securing conditions for bull trout recovery in the watershed. Adding large woody debris throughout the mainstem and would also improve temperature conditions, while at the same time improving pool habitat and complexity.

Barriers: There are several culverts that should be removed or replaced to improve access for westslope cutthroat, but these generally do not impair bull trout movement patterns because they are high in the watershed on small streams. They do pose a risk of adding sediment to streams if they fail, hence the baseline call of FAR. The flume that blocked passage to the entire upper watershed and limited the fluvial component of the population was removed and passage is good at this site. The culverts in the Ward Creek watershed would all be removed under the proposal to return this watershed to a primarily roadless character. In the absence of this, several hundred thousand additional dollars will be needed to remove westslope cutthroat barriers and reduce sediment risks in this watershed. The current baseline call is FAR. This call should be changed to FA due to the fact that no known barriers exist that would impact bull trout movement.

Pools: The baseline indicator for pools is FAR. Pool habitat and complexity has been affected throughout the HUC by extensive amounts of roads that parallel streams and stream crossings. The most effective way to improve this condition over the long-term is to restore Ward Creek to a more roadless character as described above. In the short-term, adding significant amounts of large woody debris to the mainstem will create pool habitat and complex structure that will help support bull trout populations. The baseline call could be changed to FA following implementation of either of these activities, however adding large woody debris to the stream without removing the riparian road would require long-term maintenance.

Sediment: The baseline indicator for sediment is FUR. The road up the bottom of the mainstem contributes sediment, as do numerous logging roads in the watershed. Typical current management projects that result in minor reductions in sediment over a decadal period will not achieve the desired goal of significant sediment reductions to support a more healthy bull trout population within a meaningful time period for bull trout. Large-scale transportation planning with the objective of restoring this HUC to a more remote character should be undertaken.

Most important activities to improve bull trout population:

1. Remove the Ward Creek (#889) road and all associated access roads in the Ward Creek watershed to return it to a more roadless character conducive to long-term bull trout conservation. Maintaining the Twomile road (#431) would retain recreational access to lakes in the headwaters of Ward Creek.
2. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in Ward Creek, the St. Regis basin, and the middle Clark Fork River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper St. Regis River - 170102040804							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100% (Note – spreadsheet % on this is incorrect – there is both private and PC land in Big Creek – need to check with Erin)							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$150,000	H	M
Barriers	FAR	FA	15 years	3	$100,000	H	M
Pools	FAR	FA	15 years	3	$50,000	H	M
Sediment	FUR	FAR	15 years	3	$150,000	H	M

This HUC is called the Upper St. Regis River, but it is really Big Creek. Bull trout were commonly found in electrofishing efforts in Big Creek as recently as the early 1990's. However, they have not been detected in numerous efforts since then. Since 2002, 13 sites have been electrofished by MTFWP, and bull trout have not been detected. Remnant bull trout populations may still exist; however, sampling is not extensive enough to identify fish at very low densities with regularity. There may be occasional fluvial spawning in Big Creek, but no redd surveys are conducted to support or refute this.

Because of its large size and abundance of low gradient, relatively unconfined stream reaches, Big Creek has a high potential for supporting significant runs of bull trout in the future. It is a key component of bull trout recovery in the St. Regis River Local Population because it would likely be more resilient than many stream systems to climate and other environmental changes that may impact populations, and because it would likely support larger numbers of fluvial fish than any other watershed in the system.

The most significant limiting factors in the HUC are the road systems paralleling streams and the associated dense network of logging roads on the hillsides. Every major tributary in this watershed has a road alongside it. This, combined with extensive timber harvest throughout much of the watershed, has resulted in high channel instability and overall poor conditions for native aquatic species. Temperature, pools and sediment are negatively affected by roads in the watershed, primarily the riparian roads along stream channels. Removal or relocation of roads would improve stream conditions and reduce risks. Allowing vegetation patterns to recover from extensive timber harvest would also improve instream conditions. There are several culverts that should be removed or replaced to improve access for westslope cutthroat, but these generally do not impair bull trout movement patterns because they are high in the watershed on small streams. The main culverts that were barriers to bull trout movement were removed several years ago through a LNF fisheries and watershed project. The remaining culverts do pose a risk of adding sediment to streams if they fail. Non-native brook trout are present in relatively high densities throughout Big Creek, further impacting the bull trout population (MTFWP unpublished data). If there were more bull trout in the MCFR Core Area and the St. Regis River Local Population, it is likely that a significant amount of fluvial spawning would occur in the Big Creek watershed.

There are several opportunities to significantly improve conditions and contribute to bull trout recovery in the Big Creek watershed. Due to the high degree of road access in the St. Regis basin, there is an opportunity to look at long-term transportation planning with the objective of returning a portion of Big Creek to a more roadless character that is more conducive to supporting strong bull trout populations. The Big Creek road system doesn't tie through to any other systems, so eliminating the main road in the East Fork may be more difficult than in the Ward Creek or Little Joe Creek watersheds because access to Heart Lake would be eliminated (unless the Rivers Creek road were retained for access instead). However, there are numerous opportunities to eliminate road systems in the Middle Fork, upper West Fork, Rivers (or East Fork), and Gilt Edge Creek watersheds, and these should be thoroughly pursued. Eliminating these valley bottom roads (along with associated logging roads) and allowing vegetation to recover from past timber harvest would significantly improve aquatic habitat and resiliency in the watershed and would increase the security of the bull trout population in the St. Regis basin over the long-term. This is just one of many opportunities in the St. Regis River watershed where large-scale planning with a focus on resources other than timber would provide benefits to a multitude of other areas (such as wildlife, hydrology, undeveloped recreation, weeds, botany, etc.).

Temperature: Temperatures in Big Creek are impacted by the excessive amount of roads paralleling most streams. These roads reduce overhead canopy and the input of large woody debris, and cause increased channel instability that results in high width:depth ratios. These impacts combine to result in greater temperature extremes during both the summer and winter. The current baseline indicator for temperature is FUR. Removing roads from the Big Creek watershed (as described above) could significantly improve this indicator, moving it to FAR or possibly FA (depending on the extent and location of roads removed). Removal of the riparian roads would be a significant step towards improving and securing conditions for bull trout recovery in the watershed. Adding large woody debris throughout the stream network would also improve temperature conditions, while at the same time improving pool habitat and complexity.

Barriers: There are numerous culverts in the watershed, however none of the crossings on large, bull trout streams are known barriers. Several culverts exist that should be removed or replaced to improve access for westslope cutthroat, but these generally do not impair bull trout movement patterns because they are high in the watershed on small streams. They do pose a risk of adding sediment to streams if they fail, hence the baseline call of FAR. Several culverts in the Big Creek watershed would be removed under the proposal to return portions of this watershed to a primarily roadless character. In the absence of this, several hundred thousand additional dollars will be needed to remove westslope cutthroat barriers and reduce sediment risks in this watershed.

Pools: The baseline indicator for pools is FAR. Pool habitat and complexity has been affected throughout the HUC by extensive amounts of roads that parallel streams and by excessive numbers of stream crossings. The most effective way to improve this condition over the long-term is to restore portions of Big Creek to a more roadless character as described above. In the short-term, adding significant amounts of large woody debris to the stream network will create pool habitat and complex structure that will help support bull trout populations. The baseline call could be changed to FA following implementation of either of these activities, however adding large woody debris to the stream without removing the riparian roads would require long-term maintenance.

Sediment: The baseline indicator for sediment is FUR. Excessive amounts of valley bottom and hillslope roads throughout the watershed contribute sediment to stream channels. Typical current management projects that result in minor reductions in sediment over a decadal period will not achieve the desired goal of significant sediment reductions to support a more healthy bull trout population within a meaningful time period for bull trout. Large-scale transportation planning with the objective of restoring this HUC to a more remote character should be undertaken.

Most important activities to improve bull trout population:

1. Significantly reduce existing road densities by obliterating riparian roads along the Middle Fork, upper West Fork, Rivers Creek (or East Fork) and Gilt Edge Creek drainages. Remove corresponding logging road systems associated with these valley bottom roads.
2. Coordinate with FWP and consider management that reduces numbers and distributions of non-native trout in Big Creek, the St. Regis basin, and the middle Clark Fork River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): St. Regis River Headwaters - 170102040801							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	25 years	3	$100,000	L	L
Barriers	FUR	FAR	20 years	3	$500,000	M	L
Pools	FUR	FAR	25 years	3	$100,000	L	L
Sediment	FUR	FAR	25 years	3	$250,000	L	L

This HUC contains the headwaters of the St. Regis River above Silver Creek. The only streams with significant potential for contributing to bull trout recovery are the mainstem of the St. Regis River, Randolph, Rainy, and Dominion Creeks. Access to the mainstem is blocked by at least one major barrier under I-90. Access to Randolph Creek is marginal through a baffled culvert at the mouth. All of these systems have the potential to support modest numbers of fluvial and resident bull trout under a more robust population scenario. However, at the present time there appears to be no bull trout remaining in the HUC.

The main limiting factors at the current time are barriers in the mainstem, I-90 and associated access roads, access to Randolph Creek, and the stream bottom roads in Rainy, Dominion, and Randolph Creeks. There are numerous opportunities to improve conditions for bull trout in these watersheds (remove barriers and stream bottom roads, passive vegetative recovery); however, efforts should be focused on Ward, Little Joe, and Big Creeks first because benefits to bull trout are likely to be greater in these systems. Costs in the above table should be viewed cautiously due to the indefinite nature of the projects and the fact that most of them would be accomplished on an opportunistic basis in conjunction with other projects in the watersheds.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Packer Creek - 170102040802							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	25 years	3	$50,000	L	L
Barriers	FUR	FAR	20 years	3	$100,000	M	L
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FUR	FAR	25 years	3	$50,000	L	L

This HUC contains Packer Creek. This stream probably supported moderate numbers of both fluvial and resident bull trout in the past, but appears to have none at the present time. It has potential for contributing to bull trout recovery in the future given its relatively large size and abundance of low gradient habitats. It is impacted by private land in the bottom, the BPA power line, and timber harvest and road development in the watershed. Packer Creek has the potential to support modest numbers of fluvial and resident bull trout under a more robust population scenario.

The main limiting factors at the current time are the extensive timber harvest, roading, and home development on private land in the lower half of the watershed, and to a lesser degree, forest roads and BPA access roads and right of way impacts in the upper half of the watershed. There are numerous opportunities to improve conditions for bull trout in Packer Creek, however, much of the needed effort is on private land. In addition St. Regis recovery efforts should first be focused on Ward, Little Joe, and Big Creeks because benefits to bull trout are likely to be greater in these systems. Costs in the above table should be viewed cautiously due to the indefinite nature of the projects and the fact that most of them would be accomplished on an opportunistic basis in conjunction with other projects in the watersheds

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Big Creek - 170102040803							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	25 years	3	$100,000	L	L
Barriers	FUR	FAR	15 years	3	$150,000	M	L
Pools	FAR	FA	25 years	3	$100,000	M	L
Sediment	FUR	FAR	25 years	3	$50,000	L	L

This HUC, although named Big Creek, does not actually contain Big Creek. It contains the St. Regis mainstem, Silver Creek, and Timber Creek. The St. Regis mainstem is a migratory corridor and has potential to provide spawning habitat for bull trout in this reach. Timber Creek supported bull trout as recently as the late 1980's, but doesn't appear to at the present time. There are no records of bull trout occurring in Silver Creek. Access through the St. Regis mainstem in this HUC is good. There are likely **barriers** on Timber Creek, given the high amount of roading and development on private land in the bottom, but no data is available to confirm this. Silver Creek has a drop culvert at the mouth that is a total barrier to upstream movement of all fish species. There is a genetically pure population of resident westslope cutthroat trout upstream of this barrier. Timber and Silver Creeks have the potential to support modest numbers of fluvial and resident bull trout under a more robust population scenario. However, at the present time there appears to be no bull trout remaining in the HUC.

The main limiting factors at the current time are the barrier on Silver Creek (Timber Creek should be checked), channel straightening caused by Interstate 90 and two railroad grades/access roads, and timber harvest and development in Timber Creek. There are numerous opportunities to improve conditions for bull trout in these watersheds (remove the railroad grades and reconnect meanders and floodplain of the St. Regis River, remove the barrier in Silver Creek, road removal in Timber Creek, passive vegetative recovery), however, efforts should be focused on Ward, Little Joe, and Big Creeks first because benefits to bull trout are likely to be greater in these systems. Costs in the above table should be viewed cautiously due to the indefinite nature of the projects and the fact that most of them would be accomplished on an opportunistic basis in conjunction with other projects in the watersheds. The only exception to this opportunistic strategy would be in Silver Creek, where active removal of the barrier at the mouth may benefit fluvial bull trout. However, this project needs extensive discussion with MTFWP, since the barrier currently protects a pure westslope cutthroat population from potential introgression from rainbow trout and the immediate benefits to bull trout may be limited by the current low numbers of fluvial fish in the system. Timeliness of this project is not currently great, but could change if non-native species were detected above the barrier. Considerations should be made in future transportation planning decisions to assure that opportunities to improve channel and riparian conditions along the St. Regis River are not foregone by expansion of recreation activities on railroad beds and access roads

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Savanac Creek - 170102040805							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	25 years	3	$0	L	L
Barriers	FAR	FAR	20 years	3	$0	L	L
Pools	FAR	FAR	25 years	3	$0	L	L
Sediment	FUR	FAR	15 years	3	$25,000	L	M

This HUC contains Savanac Creek. Savanac Creek has potential for contributing to bull trout recovery due to its relatively large size and undeveloped status (in the middle and upper reaches).

Access to Savanac Creek was blocked by a dam up until the mid-1990's, when the LNF removed the dam and restored the stream channel. The stream has the potential to support modest numbers of fluvial and resident bull trout under a more robust population scenario. However, at the present time there appears to be no bull trout in the HUC.

The main limiting factor at the current time is the small size of the St. Regis bull trout population – there simply isn't a strong founder source for the HUC. There are minimal opportunities to improve conditions for bull trout in the watershed (BPA power line maintenance roads, impacts from motorized use of the trail system, brook trout suppression), however, efforts should be focused on Ward, Little Joe, and Big Creeks first because benefits to bull trout are likely to be greater in these systems. Costs in the above table should be viewed cautiously due to the indefinite nature of the projects and the fact that most of them would be accomplished on an opportunistic basis in conjunction with other projects in the watersheds.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Deer Creek - 170102040806							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	20 years	3	$100,000	M	M
Barriers	FAR	FA	1 year	3	$0	-	-
Pools	FAR	FA	20 years	3	$100,000	H	M
Sediment	FUR	FAR	20 years	3	$200,000	M	M

This HUC contains Deer Creek. Deer Creek has significant potential for contributing to bull trout recovery in the future due to its large size, large flow volume, and cold water. These factors will also make it more resilient to climate change than many streams, heightening its importance. There are no known barriers on Deer Creek – the baseline call should be changed. Deer Creek has the potential to support modest numbers of fluvial and resident bull trout under a more robust population scenario. However, at the present time there appears to be no bull trout remaining in the HUC.

The main limiting factors at the current time are the valley bottom road that parallels Deer Creek for most of its length, along with associated timber access roads in the watershed. Opportunities to improve conditions for bull trout in Deer Creek revolve around transportation planning and reducing road densities. There are opportunities to remove the valley bottom and timber access roads, as recreation access to high mountain lakes would still be available from the Stateline Road. However, this type of large-scale watershed restoration effort should be focused on Ward, Little Joe, and Big Creeks first because benefits to bull trout are likely to be greater in these systems. Deer Creek could serve as a substitute to any of these streams and accomplish similar, although possibly slightly less encompassing, benefits. Costs in the above table should be viewed cautiously due to the indefinite nature of the projects and the fact that most of them would be accomplished on an opportunistic basis in conjunction with other projects in the watersheds (unless Deer Creek were substituted for Ward, Little Joe, or Big Creeks as an active restoration watershed).

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle St. Regis River - 170102040807

Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration

% Forest Service Ownership in HUC: 100%

Relative Contribution of Habitat in Limiting Local Population: High

Functional Significance to Local Pop: Moderate

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FUR	FAR	20 years	3	$50,000	M	L
Barriers	FUR	FAR	20 years	3	$0	-	-
Pools	FUR	FAR	20 years	3	$0	-	-
Sediment	FUR	FAR	20 years	3	$0	-	-

This HUC contains middle reaches of the St. Regis River and Twin Creek. The St. Regis River is primarily a migration corridor through this HUC. Twin Creek has moderate to low potential to support fluvial bull trout, but would likely support a resident population under a more robust population scenario. At the present time there appears to be no bull trout remaining in the HUC.

The main limiting factors at the current time are channel straightening caused by Interstate 90 and two railroad grades/access roads upstream of this HUC, combined with excessive road development in tributary watersheds upstream. These impacts have resulted in significant bedload accumulation and instability in the mainstem of the St. Regis River. Development, including timber management and homes and access roads, on private lands in Twin Creek is also a factor, but probably doesn't limit bull trout to a large degree. There are some opportunities to improve conditions for bull trout in the HUC (improve riparian conditions along the St. Regis River), however many opportunities lie in improving conditions upstream (reducing roads and riparian impacts to reduce channel instability in this HUC). Efforts should be focused on Ward, Little Joe, and Big Creeks first because benefits to bull trout are likely to be greater in these systems. Costs in the above table are low because most of the opportunities are already addressed in upstream HUCs. Costs should be viewed cautiously due to the indefinite nature of the projects and the fact that most of them would be accomplished on an opportunistic basis in conjunction with other projects in the watersheds. Considerations should be made in future transportation planning decisions to assure that opportunities to improve channel and riparian conditions along the St. Regis River are not foregone by expansion of recreation activities on railroad beds and access roads, as these would affect conditions in this HUC.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Twelvemile Creek - 170102040808							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	20 years	3	$200,000	H	M
Barriers	FUR	FAR	1 year	3	$0	-	-
Pools	FAR	FA	20 years	3	$100,000	H	M
Sediment	FUR	FAR	20 years	3	$100,000	M	M

This HUC contains Twelvemile Creek. Twelvemile Creek is the largest single watershed in the St. Regis River system. It is similar to Big Creek, in that it has an abundance of relatively wide valley bottoms that support low gradient stream reaches. Due to these characteristics, it has the potential to be a highly productive bull trout spawning and rearing stream. All of the tributaries to Twelvemile Creek have potential for contributing to bull trout recovery; however, the mainstem contains the most habitat and the highest amount of potential spawning habitat. Access to the watershed is generally good. There are some barriers on smaller streams, but no known barriers on large systems likely to support bull trout. There is a relatively high amount of beaver activity in the lower reaches of the mainstem that creates rearing habitat for young of the year salmonids. The Twelvemile Creek watershed has the potential to support a relatively high number of fluvial and resident bull trout under a more robust population scenario. Bull trout were commonly found in Twelvemile Creek as recently as the late 1980's. However, at the present time there appears to be no bull trout remaining in the HUC.

The main limiting factors in Twelvemile Creek are the Twelvemile/Thompson Falls road (#352) that parallels the mainstem for most of its length and associated timber access roads. There is a small amount of development on private land in the lower reaches of the mainstem that affects habitat conditions to a lesser degree. There are numerous opportunities to improve conditions for bull trout in Twelvemile Creek – nearly all of these revolve around significantly reducing road densities, especially valley bottom roads. Due to the lower mean elevation of Twelvemile Creek, and its general southerly orientation, it may be more susceptible to warmer summer temperatures if climate change continues, and this could make it less productive for bull trout than streams like Ward, Little Joe, and Big Creeks in some years. However, it has the potential to be the most productive watershed on the north side of the St. Regis River, and therefore efforts should be put into active restoration projects that would benefit bull trout. Costs in the above table should be viewed cautiously due to the indefinite nature of the projects and the fact that most of them would be accomplished on an opportunistic basis in conjunction with other projects in the watersheds, at least until higher priority areas like Ward, Little Joe, and Big Creek are restored. Active efforts to improve pool habitat by adding large woody, however, could be undertaken soon, as they are relatively inexpensive and provide direct benefits to pools.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Twomile Creek - 170102040810							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	25 years	3	$50,000	M	L
Barriers	FUR	FAR	10 years	3	$50,000	M	M
Pools	FAR	FA	15 years	3	$50,000	M	M
Sediment	FUR	FAR	25 years	3	$100,000	M	L

This HUC contains Twomile Creek. Twomile Creek has moderate potential for contributing to bull trout recovery. It is relatively small and doesn't contain a high amount of tributary basins. Access limitations in the watershed are not well known. Twomile Creek likely supported limited numbers of fluvial bull trout and modest numbers of resident bull trout historically. At the present time there appears to be no bull trout remaining in the HUC.

The main limiting factor is the valley bottom road (#431) that parallels Twomile Creek for most of its length. There are numerous opportunities to improve conditions by removing roads in the watershed. However, efforts should be focused on Ward, Little Joe, and Big Creeks first because benefits to bull trout are likely to be greater in these systems. Costs in the above table should be viewed cautiously due to the indefinite nature of the projects and the fact that most of them would be accomplished on an opportunistic basis in conjunction with other projects in the watersheds. Access issues should be looked at, and if barriers exist they should be removed. Pool conditions could also be improved relatively inexpensively through adding large woody debris to the mainstem.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower St. Regis River - 170102040812							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FUR	25 years	3	$0	-	-
Barriers	FA	FA	25 years	3	$0	-	-
Pools	FUR	FAR	25 years	3	$50,000	M	L
Sediment	FUR	FUR	25 years	3	$0	-	-

This HUC contains the lower reaches of the St. Regis River and Mullan Gulch. The only stream with significant potential for contributing to bull trout recovery is the mainstem of the St. Regis River.

Mullan Gulch is too small to provide significant habitat for bull trout. Access is not an issue. The mainstem of the St. Regis River is primarily a migration corridor through this HUC. Historically, the mainstem in this reach was probably very important in providing rearing habitat for juvenile bull trout, and also as overwinter and refugia habitat when conditions for bull trout in tributaries was less than optimal. In its current state, the river provides little rearing habitat or refugia because it has been straightened and channelized by I-90 and paralleling access roads. There is probably some rearing that occurs during low-stress periods when conditions are adequate.

The main limiting factors at the current time are the channelization and loss of functional riparian zone caused by I-90 and access roads. While these are huge impacts to the river system, the benefits of addressing them are likely not as great as benefits associated with tributary restoration or mainstem restoration upstream. Efforts should be focused on Ward, Little Joe, and Big Creeks prior to working on the mainstem in this HUC because benefits to bull trout are likely to be greater in these systems. There are likely very few projects that would be undertaken in the short-term to benefit bull trout recovery in this HUC. The exception to this may be the active addition of large woody debris to increase pool habitat. This would need to be in very large conglomerates that would have the potential to stay in the system under high flows. Most benefits to this HUC will likely be achieved through cumulative changes in habitat conditions in the upstream watersheds over time.

Middle Clark Fork River Core Area Summary:

Table 7-9 summarizes relevant information from each of the 6th level HUC local populations. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire Middle Clark Fork River Core Area within the borders of the Lolo National Forest. It does not include necessary restoration activities in watersheds where the LNF has no ownership that may be critical for overall restoration of the bull trout population in the Core Area.

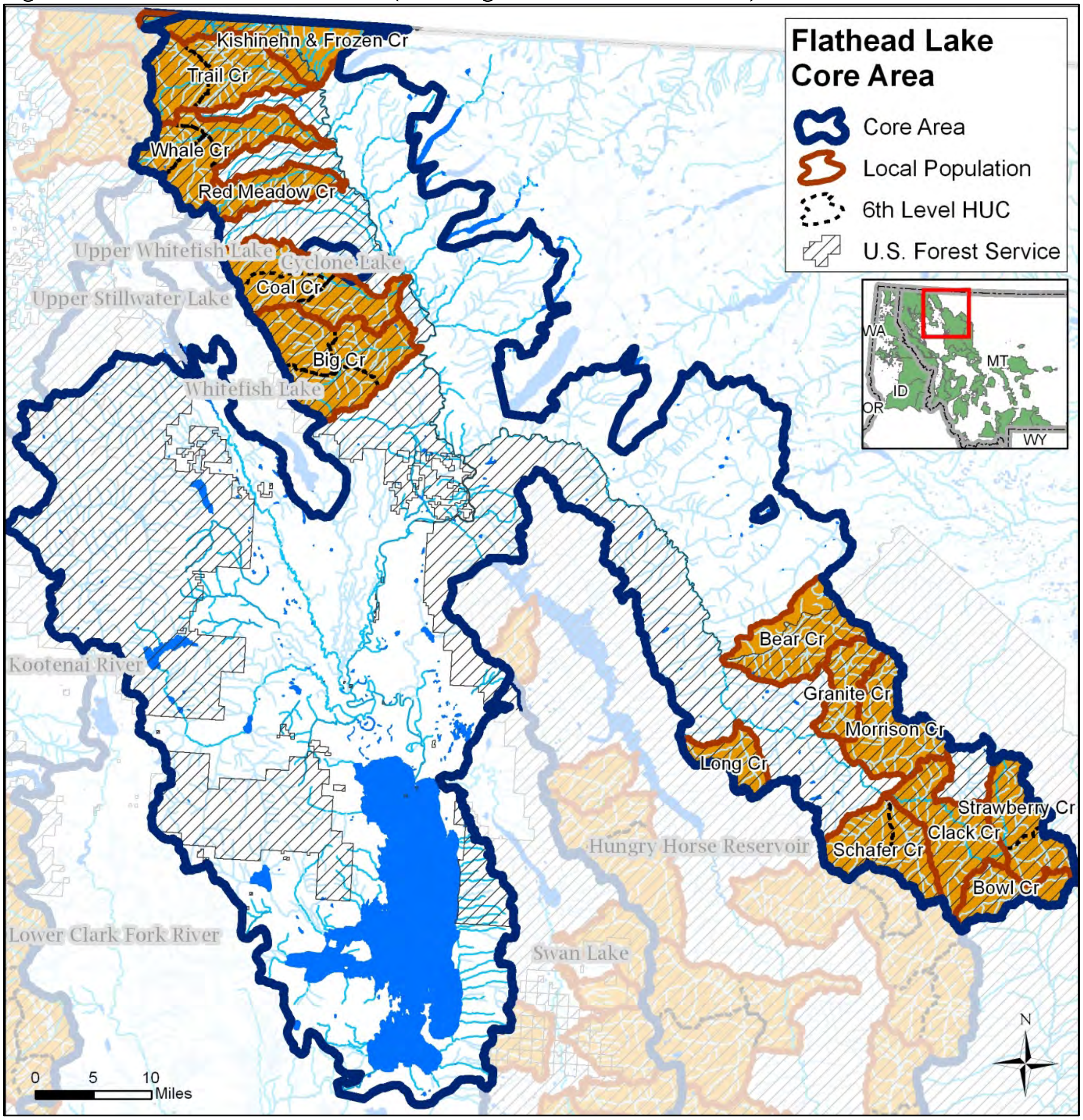
Table 7-9. Summary of important Local Population attributes and conservation recommendations for the Middle Clark Fork River Core Area.

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
Rattlesnake Creek	Upper Rattlesnake Cr	Moderate	Low	Conserve	-	-	-
	Lower Rattlesnake Cr	High	Moderate	Conserve	-	-	-
Grant Creek	Grant Cr	High	High	Passive	-	-	-
Albert Creek	Albert Cr	High	High	Passive	Barriers	10 years	$200,000
Petty Creek	Upper Petty Cr	Low	Low	Passive	-	-	-
	Eds Cr	Low	Low	Passive	-	-	-
	Middle Petty Cr	Low	Low	Passive	-	-	-
	West Fork Petty Cr	Low	Low	Passive	-	-	-
	Lower Petty Cr	Low	Low	Passive	-	-	-
Fish Creek	Burdette Cr	Low	Low	Conserve	-	-	-
	Cache Cr	High	Low	Active	Barriers	5 years	$50,000
	Upper South Fork Fish Cr	Moderate	High	Active	Temperature & Pools	5-10 years	$150,000

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
	Lower South Fork Fish Cr	Moderate	High	Active	Temperature, Barriers & Pools	5-10 years	$450,000
	Lower Fish Cr	Moderate	Moderate	Active	Pools	5 years	$50,000
	Upper Fish Cr	Moderate	Moderate	Active	-	-	-
	West Fork Fish Cr	High	Low	Conserve	-	-	-
	North Fork Fish Cr	High	Low	Conserve	-	-	-
Trout Creek	Lower Trout Cr	Moderate	Moderate	Active	Temperature	5 years	$250,000
	Trout Cr	High	Moderate	Active	Temperature	5 years	$150,000
Cedar Creek	Cedar Cr	High	High	Active	Temperature & Sediment	10 years	$300,000
	Oregon Gulch	High	High	Active	Temperature, Barriers & Sediment	5-10 years	$550,000
St. Regis River	Little Joe Cr	High	High	Active	Temperature, Barriers, Pools & Sediment	10-15 years	$800,000
	Ward Cr	High	High	Active	Temperature, Pools & Sediment	10-15 years	$550,000
	Upper St. Regis River	High	High	Active	Temperature, Barriers, Pools & Sediment	15 years	$450,000
	St. Regis River Headwaters	Low	High	Passive	-	-	-
	Packer Cr	Moderate	High	Passive	-	-	-
	Big Cr	Moderate	High	Passive	-	-	-
	Savenac Cr	Low	Low	Passive	-	-	-
	Deer Cr	Moderate	High	Active	Pools	20 years	$100,000
	Middle St. Regis River	Moderate	High	Passive	-	-	-
	Twelvemile Cr	Moderate	High	Active	Temperature & Pools	20 years	$300,000
	Twomile Cr	Moderate	High	Passive	-	-	-
	Lower St. Regis River	Moderate	High	Passive	-	-	-

Chapter 8: Flathead Lake

Figure 8-1. Flathead Lake Core Area (including North and Middle Forks)



Core Area Discussion:

The Flathead Lake watershed is one of the largest, most complex, and best-documented bull trout core areas in the upper Columbia River watershed, encompassing 125,000-acre Flathead Lake (the largest freshwater lake in the U.S. west of the Mississippi River) and a large portion of northwest Montana extending into British Columbia, Canada. The Flathead Lake Core Area (FLCA) includes all of Flathead Lake and the North Fork Flathead River, Middle Fork Flathead River, and South Fork Flathead River (up to Hungry Horse Dam) and all tributaries within these described areas. The South Fork above Hungry Horse Dam forms the separate Hungry Horse Core Area. The Whitefish and

Stillwater River systems are separate core areas and are currently insignificant contributors of bull trout to the Flathead Lake Core Area, due in part to low current population densities of fish that are restricted primarily to their headwaters, although they may have been more important historically. The Swan River is a separate Core Area from the outlet of Swan Lake upstream (Swan Lake Core Area) and also was apparently historically isolated due to the warm thermal regime of the lower Swan River. The Conservation Strategy only addresses bull trout populations on the Flathead National Forest and does not include populations within Canada and Glacier National Park.

The South Fork Flathead (upstream of Hungry Horse Dam) was a naturally important contributor to Flathead Lake. Zubik and Fraley (1987) estimated that potential habitat for about 2,100 spawning adult bull trout (and 65,287 migratory juvenile cutthroat trout) was lost annually to Flathead Lake in the South Fork Flathead (38% of the drainage basin) with the closure of Hungry Horse Dam in 1953. Based on comparative population levels of spawning bull trout in the North Fork and Middle Fork, the loss statement (Zubik and Fraley 1987) estimated that between 4,844 and 6,966 adult bull trout would have spawned in the Flathead River forks in the early 1980's without the dam.

Some biologists believe current bull trout densities in the Flathead Lake Core Area are approximately ten percent of what they were historically and other biologists believe current populations may be as much as fifty percent of what they were historically. The distribution of populations throughout the core area is likely similar to historic patterns. Local populations are still relatively widespread in about 22 tributaries and occur in all historically occupied systems (occurrence is based largely on presence of cold water). Life history expression is probably also similar to historic, as most populations are currently and were historically primarily adfluvial.

Bull trout populations in the Flathead Lake Core Area were likely first exposed to significant human-caused impacts in the late 1800's. Prior to this time, bull trout were fished for by native Salish and Pend Orielle peoples and maintained relatively robust and widespread populations throughout the FLCA. Beginning in the late 1800's, however, European settlement in the area increased, which brought more fishing pressure and intensive land uses that directly affected bull trout and their habitats. Bull trout were commonly viewed as "trash fish" for decades and indiscriminately killed (until the 1950's, when tributaries were closed to fishing for bull trout – we are unsure whether these closures were due to observed population declines or a proactive measure to protect vulnerable spawners). Logging by the Kalispell and Flathead Company and other private landowners soon to be followed by the US Forest Service in the early 1900's was directly and indirectly responsible for extensive changes in habitat. These practices resulted in both direct mortality to bull trout inhabiting the river and also long-term simplification of habitat that negatively affected the productivity and carrying capacity of the system for decades. Construction of the transcontinental railroad caused significant impacts along the Middle Fork Flathead River and road construction practices of the time paid little concern to important riparian habitat and access to spawning grounds. The mainstem Flathead River upstream of Flathead Lake was subjected to intensive snag removal and channel clearing to clear the way for steamboat traffic upstream from Flathead Lake.

Beginning around 1905, another long-term impact to the system arrived with the stocking of Lake Trout in Flathead Lake (Lake Whitefish were also planted around this time, but their impact on bull trout has been minimal, so far as is known). In 1910, other non-native fish were planted in the lake and throughout many tributaries. Yellow perch, brook trout, Yellowstone cutthroat trout, rainbow trout, and kokanee were all stocked in the system between 1910 and 1916. The effects of these species have not all been the same. As mentioned, Lake Trout have likely had the biggest long-term negative effect on bull trout, through direct predation and competition for similar food resources in Flathead Lake. Brook trout have colonized much of the valley habitat (though less common in the Middle fork and North Fork tributaries) and in so doing may have had effects on formerly productive bull trout populations. Kokanee, on the other hand, likely had a neutral or positive effect on bull trout populations by providing an abundant high-calorie food source in the lake and rivers, where the larger fish migrated and spawned when they matured. While it is thought that kokanee, an obligate planktivore, largely replaced formerly abundant native westslope cutthroat trout, they may have bolstered bull trout populations by creating an unnaturally elevated prey base.

In the 1950's-1960's another era of extensive logging in the three forks of the Flathead River headwaters of the core area began. This time, extensive road networks were constructed to access timber, which resulted in increased erosion and a proliferation of small-scale fish barriers at road/stream crossings throughout the watershed. These roads not only affected habitat, but also facilitated increased fishing and harvest or poaching of spawning bull trout in many tributaries. These impacts occurred on both Flathead National Forest and State Forest as well as Plum Creek Timber Company and other private lands throughout most of the FLCA.

The 1964 flood was a record event that took out large portions of Highway 2 and the railroad along the Middle Fork Flathead River. Many streams were scoured to bedrock and large wood was flushed from the system which simplified habitat. Streams may still be recovering from the effects of the flood.

On the fisheries front, the mid-1960's saw the introduction of *Mysis* shrimp into several Flathead Valley lakes (1967), which ultimately spread to Flathead Lake (1981) and disrupted the food web interactions in the system. The establishment of *Mysis* was determined to be responsible for the collapse of a formerly strong population of kokanee salmon and fueled major increases in lake trout and lake whitefish populations that followed (Spencer et al. 1991). Predation, competition, or other forms of negative interaction with lake trout is widely believed to be the single factor most responsible for the currently depressed condition of bull trout in this core area (MFWP and CSKT 2000, USFWS 2002). However, these complex interactions and the specific role of each in the Flathead Lake core area remain unsettled and are a source of major disagreement and ongoing concern.

Ongoing summary and discussion of recent (MFWP and CSKT) fish management program direction indicates that Flathead Lake anglers have harvested between 45,000 and 70,000 lake trout annually from 2008 through 2011 (roughly equal to the management goal of 60,000). Catch per unit effort and species composition of lake-wide gill net catch were similar in recent years, and indicators suggest the lake trout population remains stable (Hansen and Evarts 2008) and bull trout and cutthroat trout populations remain stable but lower than pre-Mysis levels. Pike numbers, inhabiting primarily the mainstem Flathead River also appear relatively stable. Recent bioenergetics modeling (Muhlfeld et al. 2008) indicated that northern pike consume nearly 3,500 bull trout annually in the core area and are likely contributing to the predator trap. Monitoring programs indicate that bull trout redd numbers were at or below secure levels prescribed my managers in the mid-1990's but exceeded secure levels since the late 1990's (Deleray and Hansen 2002).

In the mid-1990's, with the threat of ESA listing impending, greater angling restrictions were instituted on bull trout harvest. There is currently no harvest of bull trout allowed in the FLCA, but some incidental mortality is associated with the heavy angling pressure for lake trout in Flathead Lake and heavy angler use on the Flathead River system, and there is also some limited mortality associated with gillnetting in the lake.

At the current time, many of the past direct habitat impacts associated with logging and road construction have been reduced or eliminated, and therefore some potential stressors on the population no longer play as large a role as they did historically. In addition, much of the habitat where bull trout spawn and rear is protected by Wilderness, National Park, or National Wild and Scenic River corridors. Private land ownership in the three forks of the Flathead is limited. Considerable new information has been developed in recent years that indicate a generally improving recent trend in overall bull trout habitat in this core area (see e.g., Weaver 2005, Muhlfeld et al. 2005, 2007, Steed et al. 2008, and Sylvester et al. 2008). On National Forest lands where bull trout exist, there has been minimal development of new roads or timber sales and a strong emphasis on road decommissioning and application of BMPs, in large part due to grizzly bear security concerns. Potential for significant negative impacts due to sediment production and other wide-scale effects of recent large fires has been largely mediated by favorable precipitation and runoff patterns in the vulnerable post-fire periods. The full implementation of the selective withdrawal system at Hungry Horse Dam has restored more normative flow and temperature regimes to the mainstem Flathead River (Sylvester et al. 2008).

Though Hungry Horse Dam on the South Fork Flathead River removed a substantial portion (estimated 38%) of the spawning and rearing habitat, the integrity and connectivity of the remaining habitat in the North and Middle Fork drainages of this core area is high. The FLCA is a large core area with some natural barriers in headwaters and occasional temporary barriers resulting from beaver dams or other natural activities. However, there are no known man-caused barriers on bull trout spawning and rearing streams and bull trout from Flathead Lake have been documented to travel as far as 150 miles upstream to spawn in headwaters of the North Fork and Middle Fork.

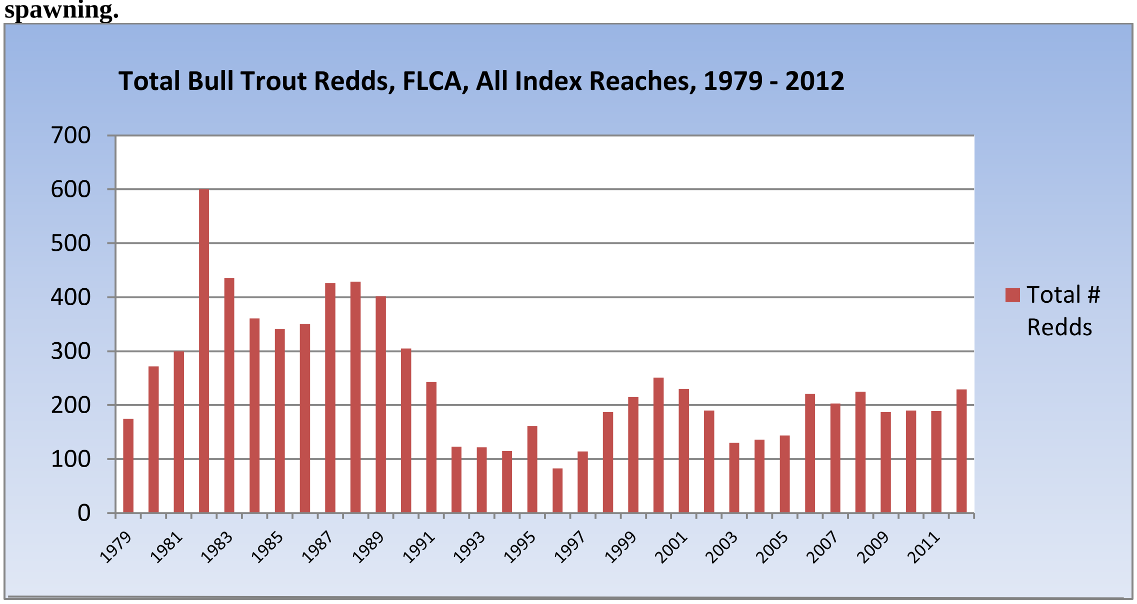
Despite the recent improving trend in bull trout habitat, some concerns remain due to potential for long term increases in water temperatures, future effects of rain-on-snow precipitation patterns, and potential future land management in the headwaters. Recently, additional emphasis has been placed on identifying and evaluating important bull trout habitat in the B.C. headwaters of the Flathead, given threats of expanded coal, oil, and gas exploration and development and timber extraction.

An extensive redd count monitoring program was developed and implemented by Montana Fish, Wildlife, and Parks beginning in 1980 (MFWP 2004a). These redd counts accurately reflect the population trend (Figure 8-3) (FWP and USFS unpublished data). Based on data collected from eight index tributary streams in the North Fork and Middle Fork Flathead River (collectively representing about 45 percent of the known spawning in the basin), bull trout index redd counts ranged from about 300-600 in the 1980's (averaging 392), then dropped drastically in the early 1990's, to a range of 83-243 in the seven years prior to listing (averaging 137 between 1991 and 1997). From 1998 through 2012, index redd counts ranged from 130 to 251 redds, averaging 195. Some counts were considered minimum counts due to poor conditions during portions of the survey. Based on these counts, the recent trend appears relatively stable at a level roughly half of that in the 1980's.

Basin-wide counts were made sporadically in 11 of the 30 survey years, representing "all 31 stream sections known to be used by Flathead Lake spawners" (T. Weaver, 2008, MFWP, pers. comm.). The basin-wide total has ranged from lows of 236 (1997) and 291 (1992) to highs of 1,156 (1982) and 850 (1986). The basin-wide count in 2012 was 500, approaching the average count of 578 for the 11 basin-wide counts conducted since 1980.

Given all that, there is considerable uncertainty regarding bull trout status and trends in the Flathead Lake core area, but recent basin-wide counts would seem to indicate an adult bull trout population of at least 1,600 fish in this core area (3.2 adults per redd conversion factor) and perhaps as high as nearly twice that (adding in non-spawning adults that remained behind in the lake or river).

Figure 8-2. Bull trout redd numbers in the eight index reaches of the North and Middle Forks of the Flathead River combined, from 1979 through 2010. Index counts represent about 45 percent of spawning.



Currently, the main threats to bull trout in the FLCA are: 1) Introduced species/fisheries management, 2) Forest management practices and forest roads, and 3) angling or harvest (legal or illegal). The FWS convened a Bull Trout Scientific Review Team in 2008 that agreed with 100% consensus that these three threats, in this order, currently represent the greatest threats to bull trout in the Flathead lake core area. Given that threat #2 is currently being mitigated by BMPs and other actions and active forest management activities are much reduced in scope; and also that the overall habitat trend is improving, they concluded that the nonnative species threat (especially lake trout and *Mysis*, but also northern pike and other warm-water fish) poses the greatest ongoing risk to bull trout in the FLCA. The FS will continue to play a leading role to facilitate appropriate habitat improvements for bull trout on FS lands. Similarly, the FS will continue to engage with partners including the MT FWP, USFWS, and The Salish Kootenai Tribes on native and non-native fish management issues in the core area, needs, and recovery planning.

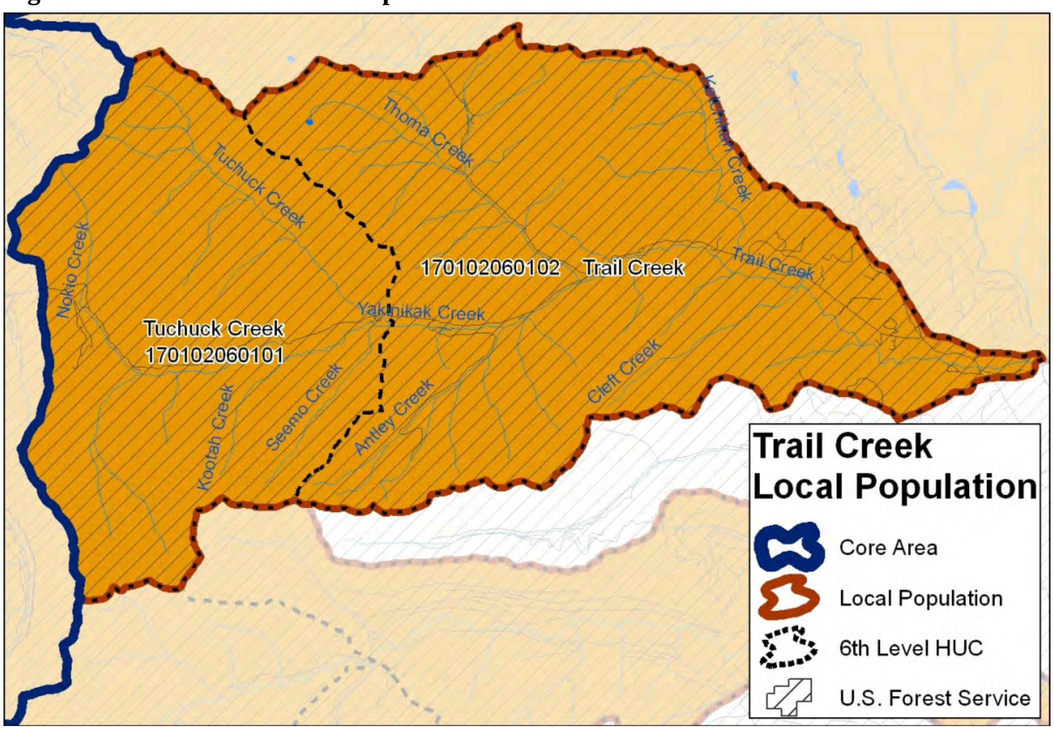
Flathead Lake Core Area - Flathead National Forest

There are thirteen local populations within the core area on the Flathead National Forest – eight of which are index reaches. Ole, Park & Nyack Creek are not included in this conservation strategy because over 95% of the land base is in Glacier National Park. There is one simple core area discussed in this chapter: Frozen Lake. Cyclone Lake, Upper Stillwater Lake, Upper Whitefish Lake & Whitefish Lake (also simple core areas) are not discussed in this conservation strategy because 90+% of the land base is under state ownership. The index reaches include Trail Creek, Whale Creek, Coal Creek, Big Creek, Morrison Creek, Lodgepole Creek (tributary to Morrison Creek), Granite Creek, and Ole Creek. While adfluvial bull trout do spawn in other tributaries, these eight streams support the larger adfluvial spawning runs, and redd numbers within them appear to represent about 45 percent of the total adfluvial spawning that occurs in the basin.

Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Local Population: Trail Creek

Figure 8-3. Trail Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 8-1. Trail Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
30-50	Stable	Adfluvial	1	Lake Trout in Flathead

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Low	Low-Heavy ground water influence	Low

Driving Factors Determining Bull Trout Population:

There is a long-term declining trend due to lake trout in Flathead Lake. Large groundwater influence keeps spawning gravels cleansed. Trail Creek subs naturally at Caves near Thoma Creek. This prevents upstream spawning passage in the fall. Juvenile bull trout are primarily non-existent above this point. There is very little impact seen from 2003 Wedge Canyon Fire. Slump on Rd. 114 was repaired in 2007. Very little habitat restoration needs to occur in this drainage. No improvements proposed at this time as habitat conditions appear to be optimum.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

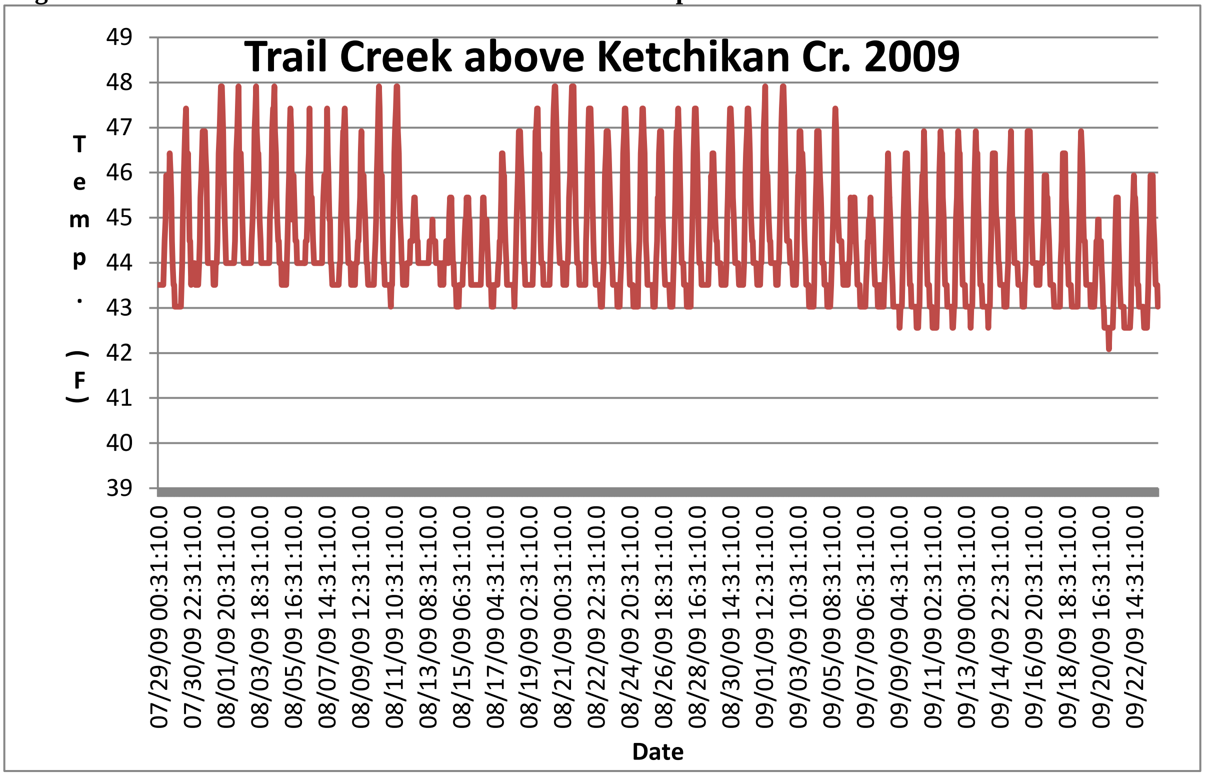
HUC6 (name and #): Tuchuck Cr – 170102060101							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low, primarily provides clean water, spawning is in HUC below							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FAR	FAR	-	-	$0	-	-

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Trail Creek - 170102060102							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High, Primary spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FAR	FAR	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FAR	FAR	-		$0	-	-

Temperature: GIS rating= FAR, data and professional judgment= FA. Temperature in Trail Creek is largely regulated by the underground springs that surface near Thomas Creek. The majority of bull trout spawning occurs just downstream of this reach.

Figure 8-4. Trail Creek above Ketchikan Creek 2009 Temperatures

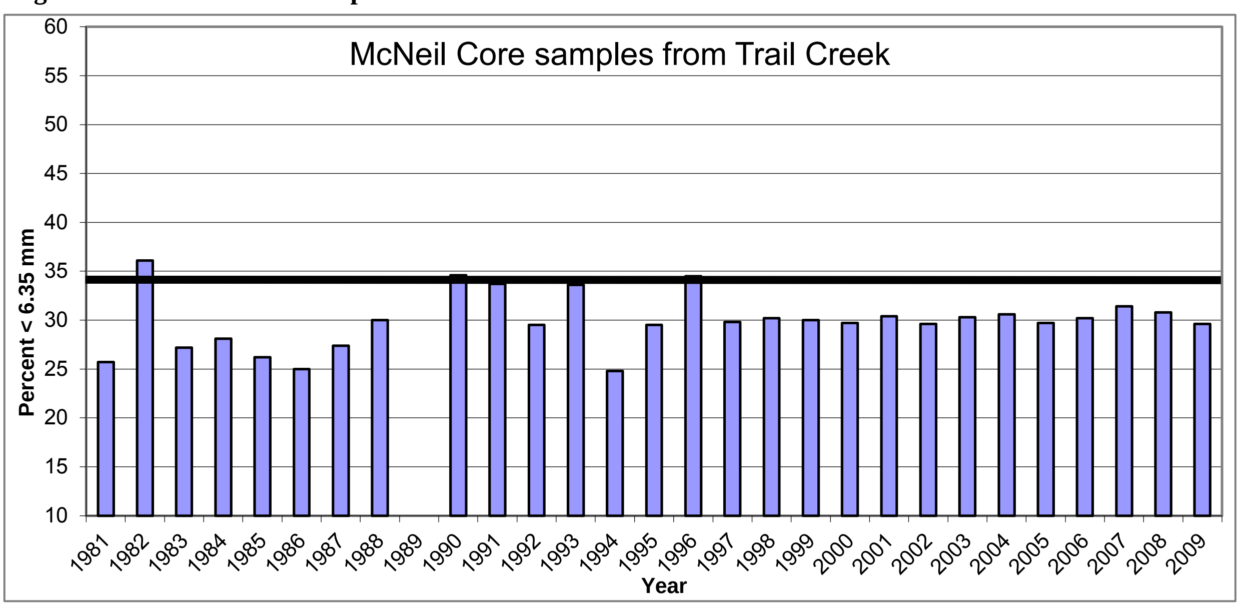


Barriers: GIS rating = FAR and FA, data and professional judgment= FA. There are no man-made barriers to bull trout waters in Trail Creek.

Pools: GIS rating = FAR, professional judgment = FA. There has been no riparian harvest along Trail Creek and surveys conducted during annual redd counts reveal high pool numbers in high quality.

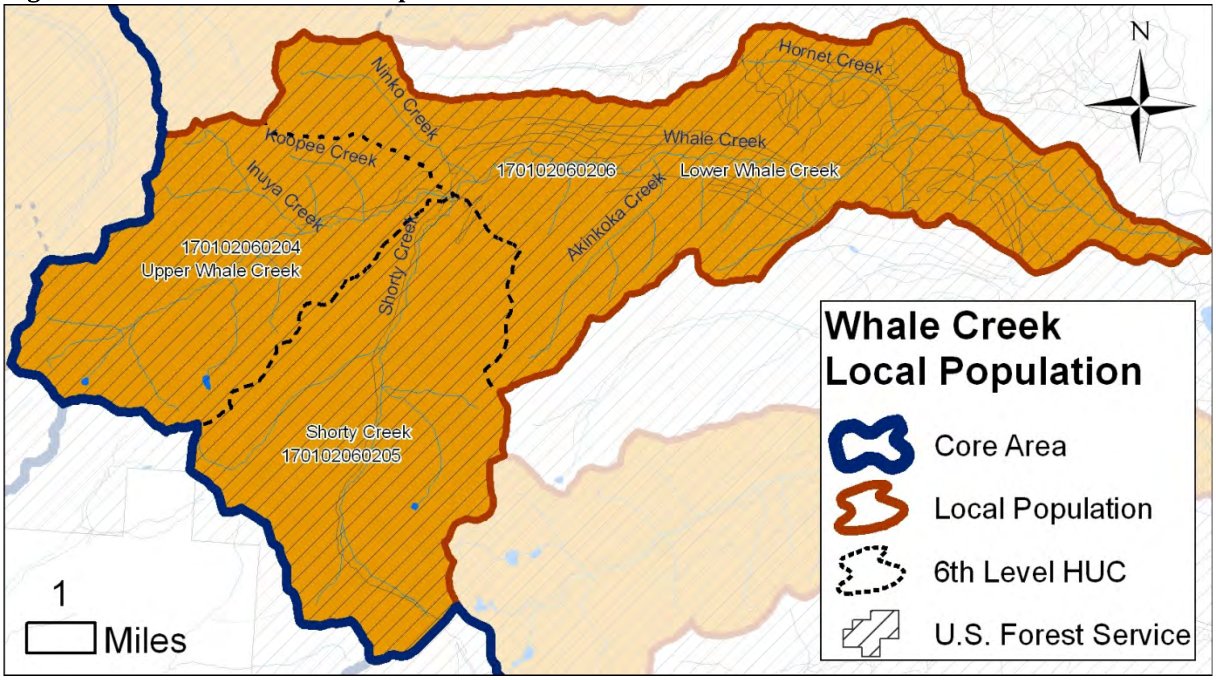
Sediment: GIS rating = FAR, professional judgment = FA. Percent fines as measured by McNeil core samples have fluctuated little over the last decade despite a major fire in 2003.

Figure 8-5. McNeil Core Samples From Trail Creek



Local Population: Whale Creek

Figure 8-6. Whale Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 8-2. Whale Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
95-105	Stable	Adfluvial	2	Lake Trout in Flathead
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

There is a long-term declining trend due to lake trout in Flathead Lake. There are no bull trout above Whale Falls in the Upper Whale HUC. Large groundwater influence keeps spawning gravels cleansed. Very little impact was seen from 2003 Wedge Canyon Fire. Shorty Creek Rd. was decommissioned in 2010. No barrier removals or other improvements are needed except for some decommissioning low in the drainage.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Whale Creek - 170102060404							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low, primarily provides clean water, spawning is in HUC below. Natural barrier at Whale Falls.							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	5 years	1	$0	-	-
Barriers	FA	FA	5 years	1	$0	-	-
Pools	FA	FA	5 years	1	$0	-	-
Sediment	FA	FA	5 years	1	$0	-	-

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Shorty Creek – 170102060405							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High, Primary spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FAR	FAR	-	-	$0	-	-

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Whale Creek - 170102060406							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High, Primary spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FUR	FAR	5 years	1	$10,000	L	H

Temperature: GIS rating = FAR, data and professional judgment = FA. In 2009, a relatively warm summer, stream temperature varied little over 9 miles from upstream to downstream. Downstream temperatures remained cool due to the tremendous ground water effect.

Figure 8-7. Upper Whale Creek Rd. 318 Bridge 2009 Temperatures

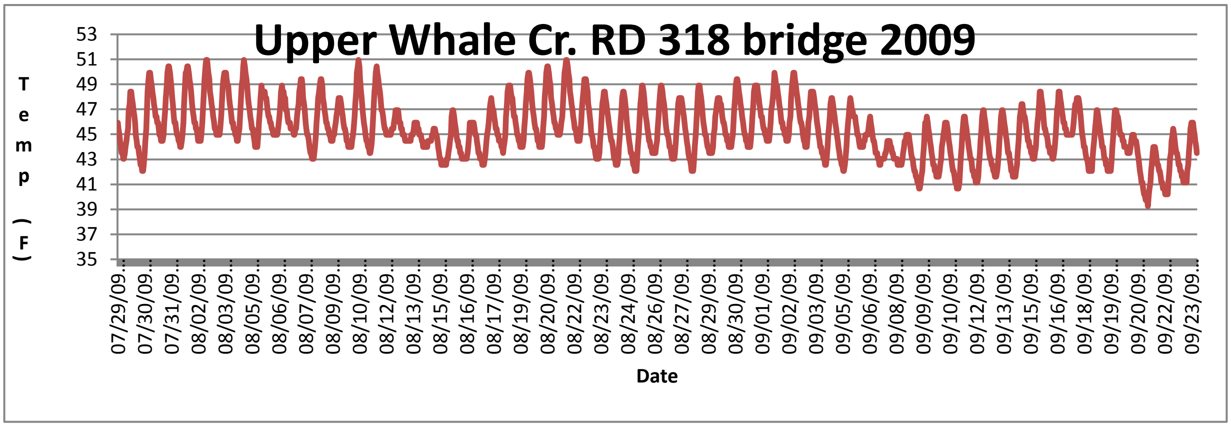
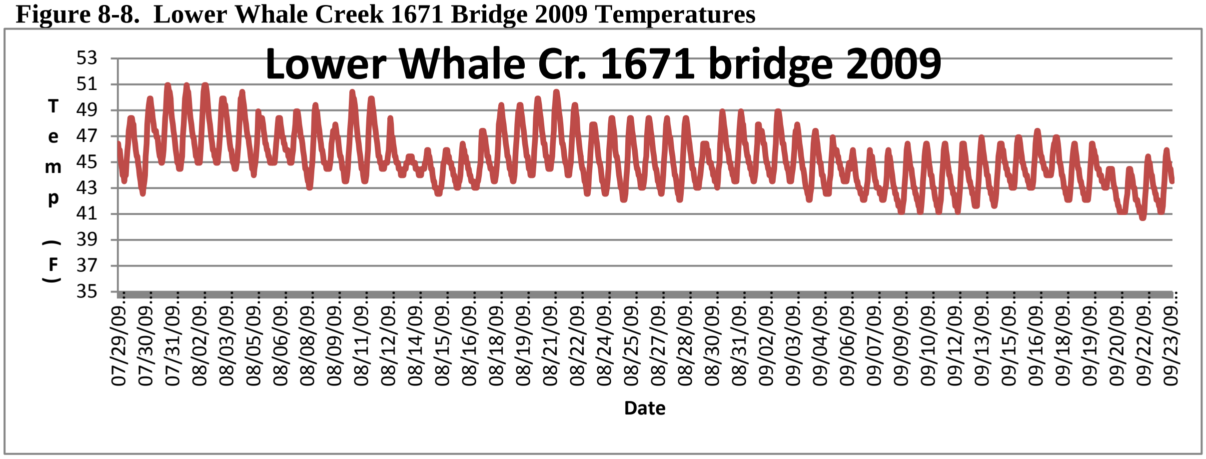


Figure 8-8. Lower Whale Creek 1671 Bridge 2009 Temperatures

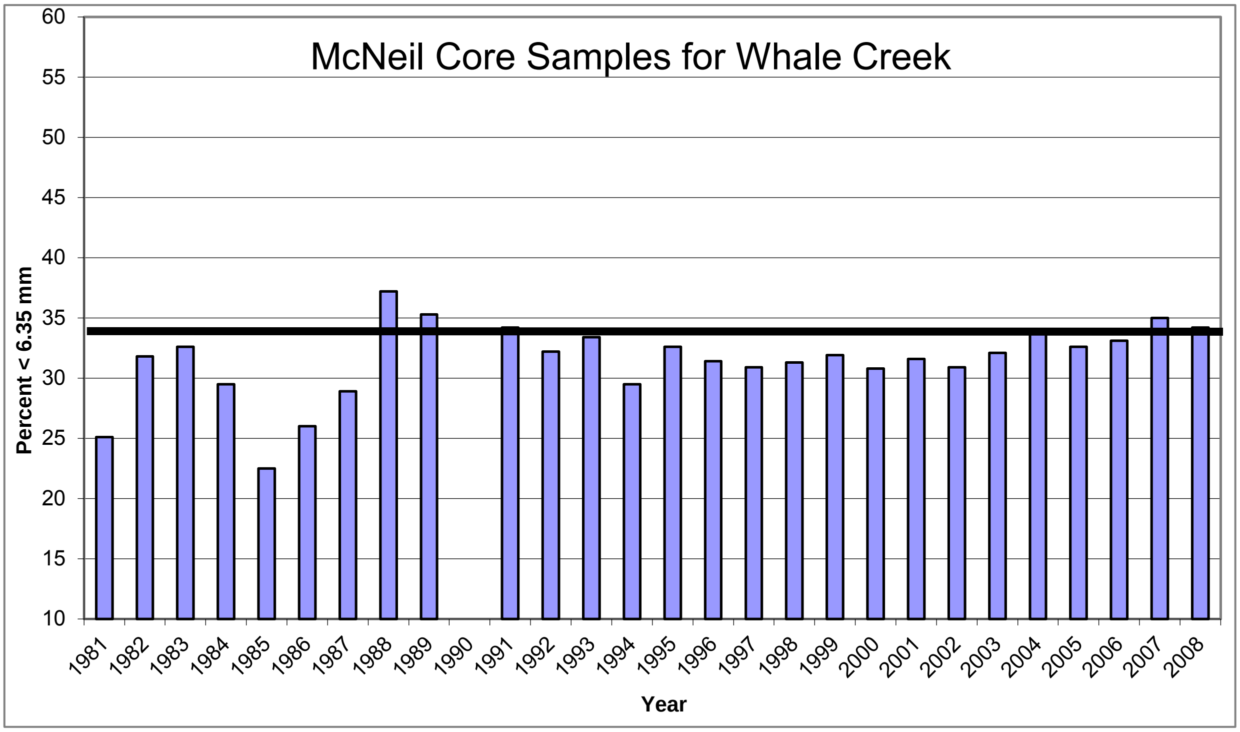


Barriers: GIS rating = FA, data and professional judgment = FA. There are no manmade barriersin Whale Creek affecting bull trout.

Pools: GIS rating FA-FAR, data and professionl judgment = FA. Riparian harvest has occurred in Whale Creek over the past. However, recruitment of wood has been substantial over the last decade primarily from the 2003 Wedge Canyon Fire. Based upon surveys when conducting redd counts on an annual basis, pools are abundant and of high quality, i.e. depth and size.

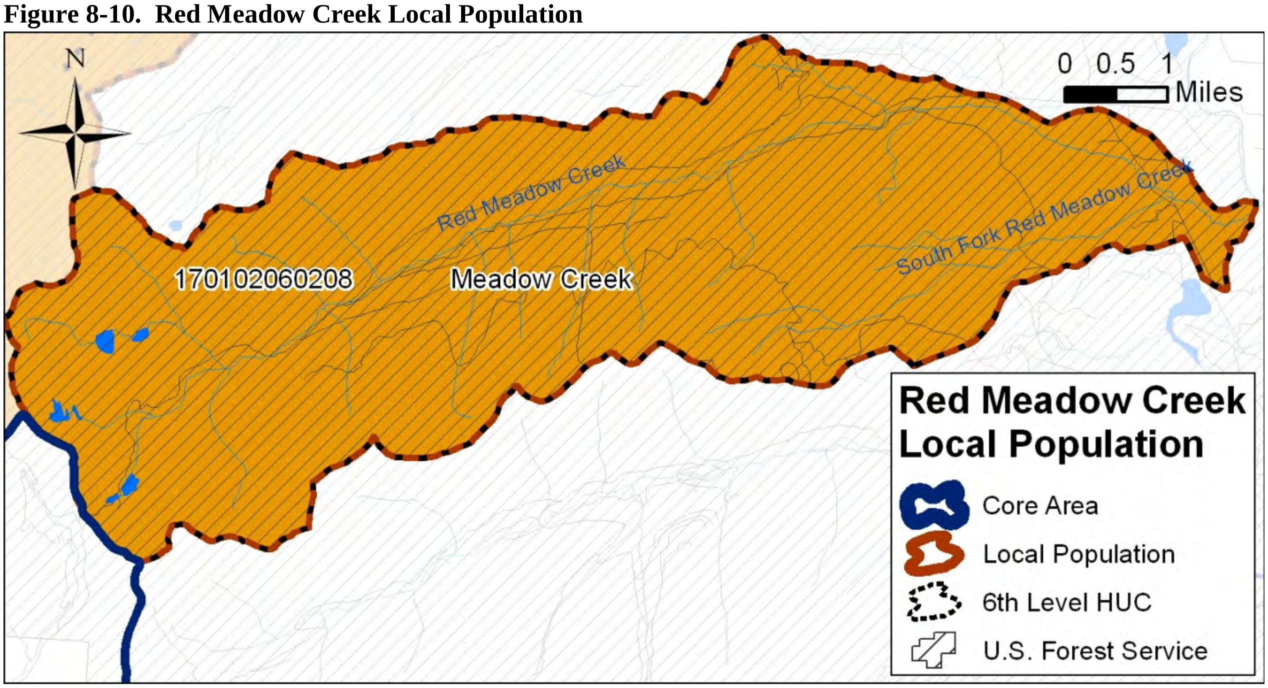
Sediment: GIS rating = FA to FUR, data and professional judgment = FAR. Percent fines have varied little over the last 2 decades, increasing slightly following the 2003 fire.

Figure 8-9. McNeil Core Samples for Whale Creek



Local Population: Red Meadow Creek

Figure 8-10. Red Meadow Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 8-3. Red Meadow Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
10	Depressed	Adfluvial	1	Lake Trout in Flathead

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Low	Low-Heavy ground water influence	Low

Driving Factors Determining Bull Trout Population:

There is a long-term declining trend due to lake trout in Flathead Lake. Redd counts only during basin wide years. There is uncertainty as to why counts are down. Rd. 1684 will be decommissioned under Red Whale Decision (2009). BMPS have been updated on most other roads. There are no bull trout culvert barriers. Habitat restoration is generally not needed in this local population. Road #115 will not be decommissioned to provide fire escape route over Whitefish Divide.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Red Meadow Creek - 170102060208

Strategy (Active Restoration, Passive Restoration, Conserve): Conserve

% Forest Service Ownership in HUC: 100%

Relative Contribution of Habitat in Limiting Local Population: Low

Functional Significance to Local Pop: Low, Red Meadow population is small.

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FA	15 years	-	$0	-	-
Barriers	FA	FA	15 years	-	$0	-	-
Pools	FA	FA	15 years	-	$0	-	
Sediment	FUR	FAR	15 years	3	$10,000	L	M

Temperature: GIS rating FAR, data and professional judgment rating = FA. The turnover in the lake is reflected by the cooling temperatures at the beginning of September. Groundwater affects appear to be less than in other drainages.

Figure 8-11. Red Meadow Creek Temperatures (Two Miles Below Lake)

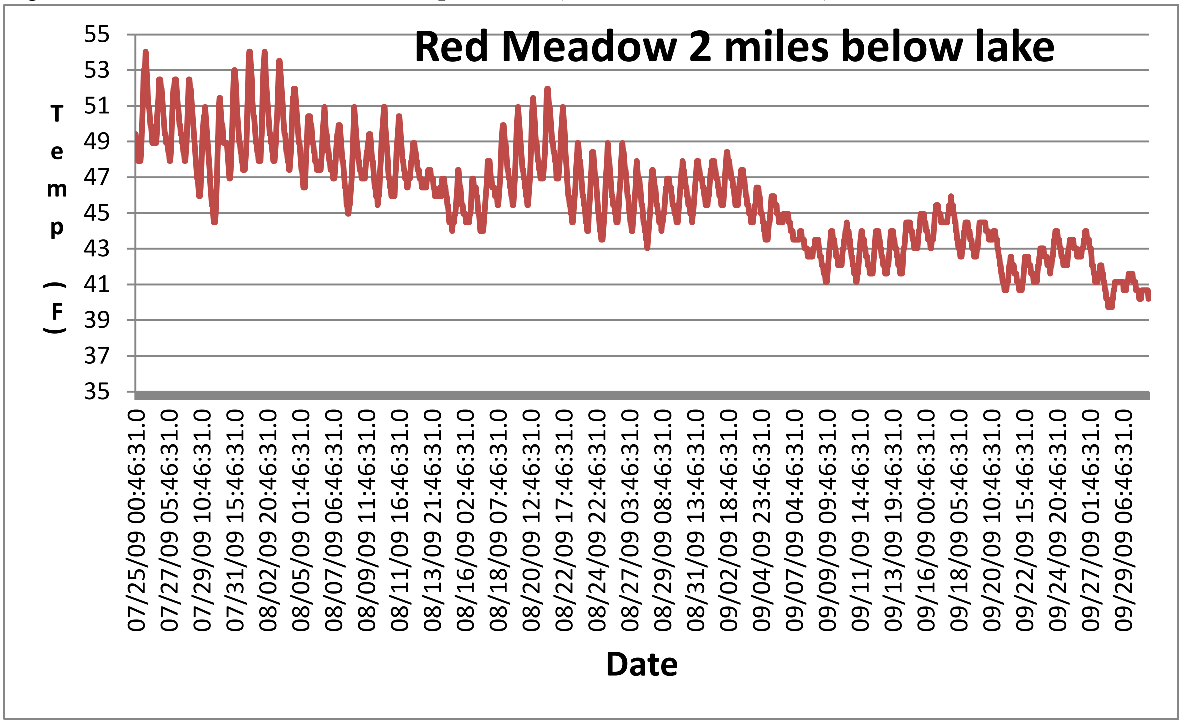


Figure 8-12. Lower Red Meadow Near Road #115 Bridge Temperatures

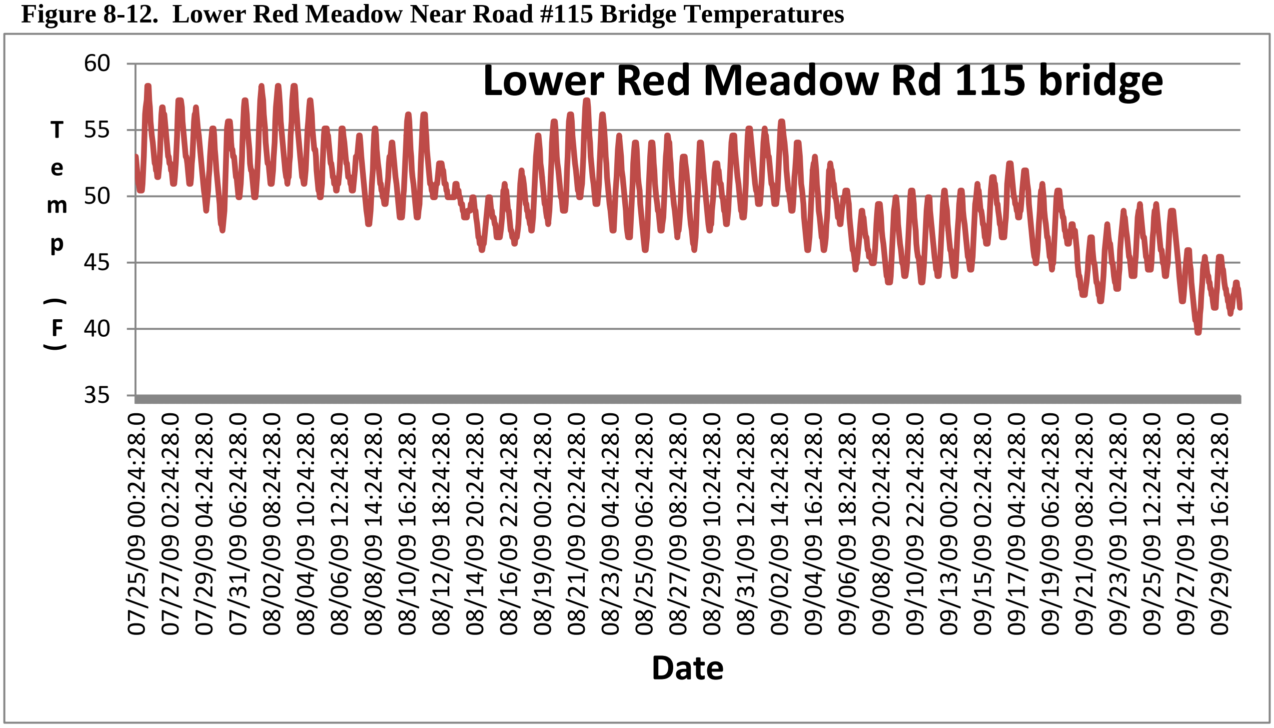
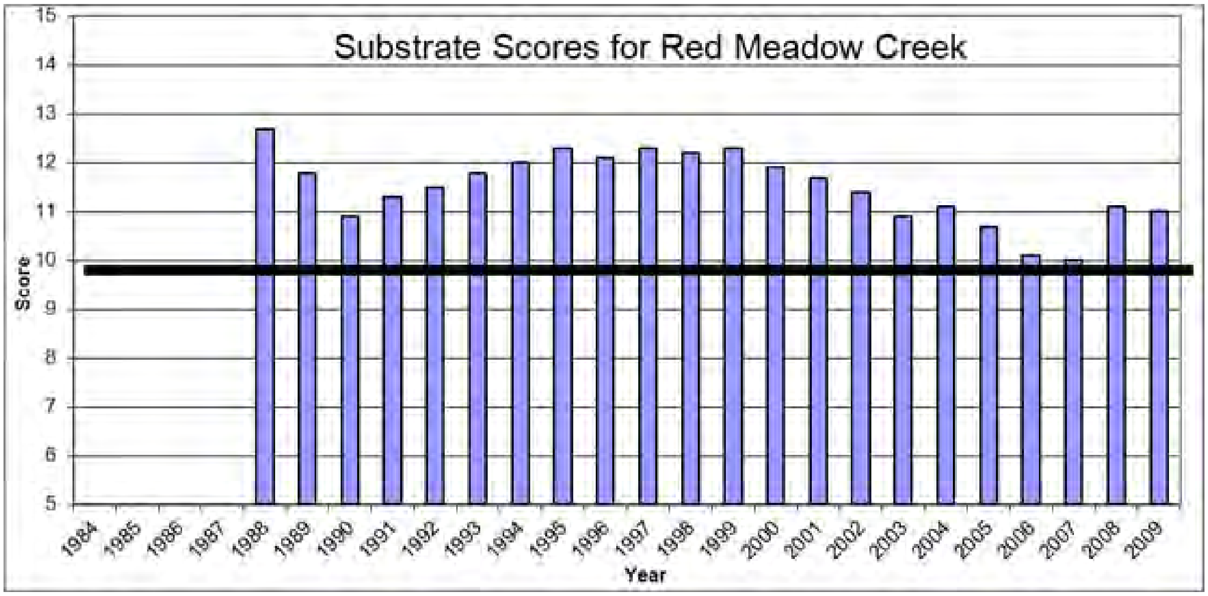


Figure 8-13. Substrate Scores for Red Meadow Creek



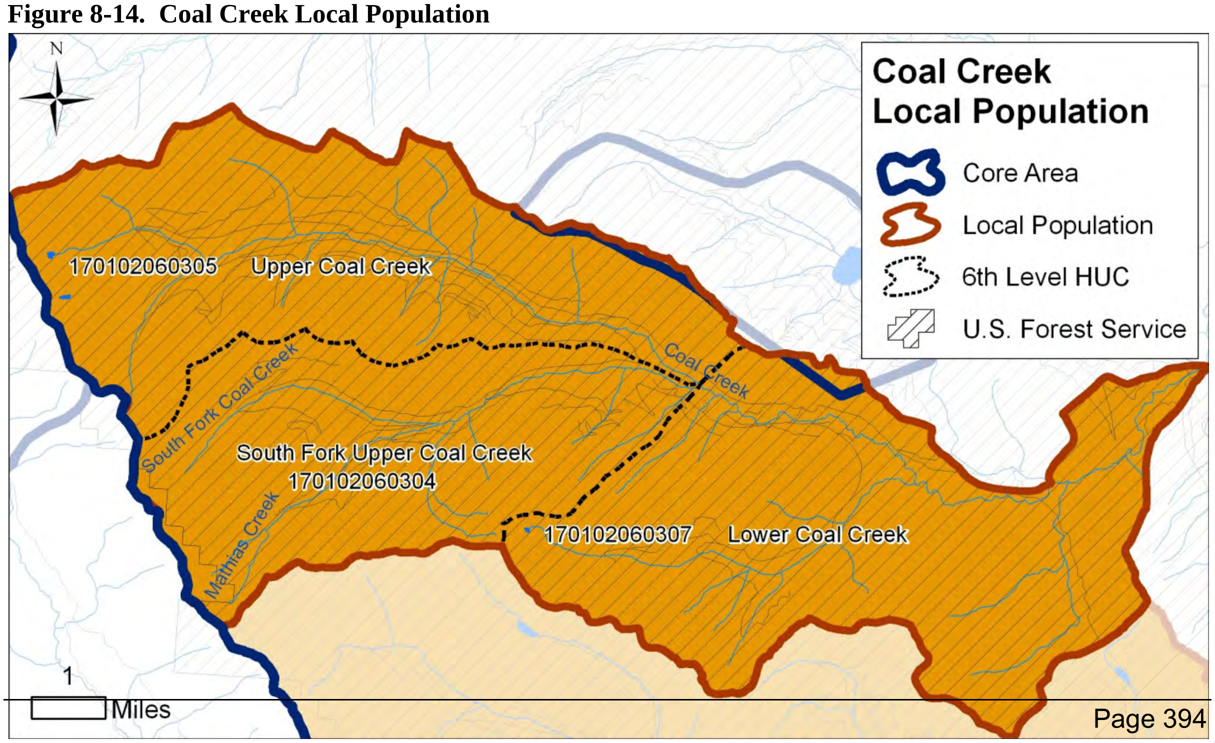
Barriers: GIS rating = FA, data and professional judgment = FA. There are no known manmade barriers in Red Meadow that affect bull trout distribution.

Pools: GIS rating = FA, data and professional judgment = FA. Pools are abuundant and in high quality based upon basin wide redd surveys.

Sediment: GIS rating = FUR, data and professional judgment = FA. There are no McNeil Core samples for Red Meadow Creek; however substrate scores have been taken by Tom Weaver, MFWP since 1988. A score over 10 exhibits good rearing conditions for juvenile salmonids as interstitial spaces between gravels are not filled. The higher the score the better the rearing conditions.

Local Population: Coal Creek

Figure 8-14. Coal Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 8-4. Coal Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
0-5	Stable	Adfluvial	1	Lake Trout in Flathead
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

There is a long-term declining trend due to lake trout in Flathead Lake and past habitat degradation associated with past land management activities. Habitat was heavily impacted from 1950's era logging and road building. Numerous channel avulsions and aggradation have occurred. Large groundwater influence keeps spawning gravels cleansed and temperatures regulated. Population has reached a bottleneck due to low redd counts over an extended period of years. The forest looked at restoration opportunities due to low redd counts but none were found other than some road decommissioning options.

Cyclone Lake in HUC #170102060306 contains a disjunct population of bull trout that spawn in the outlet of the lake. Most of this HUC falls within the Coal Creek State Forest.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Coal Creek - 170102060305							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low, primarily provides clean water, spawning is in HUC below							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	5 years	1	$0	-	-
Barriers	FA	FA	5 years	1	$0	-	-
Pools	FUR	FAR	5 years	1	$0	-	-
Sediment	FUR	FAR	5 years	1	$0	-	-

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): South Fork Upper Coal Creek – 170102060304							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High, Primary spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	5 years	1	$0	-	-
Barriers	FA	FA	5 years	1	$0	-	-
Pools	FAR	FAR	5 years	1	$0	-	-
Sediment	FUR	FAR	5 years	1	$0	-	-

Temperature: GIS rating = FAR, data and professional judgment rating = FA. Temperatures are cooler downstream once again due to the groundwater influence. Very few days were over 55 degrees despite a warm summer in 2009.

Figure 8-15. Upper Coal Creek Near Road #317 Bridge 2009 Temperatures

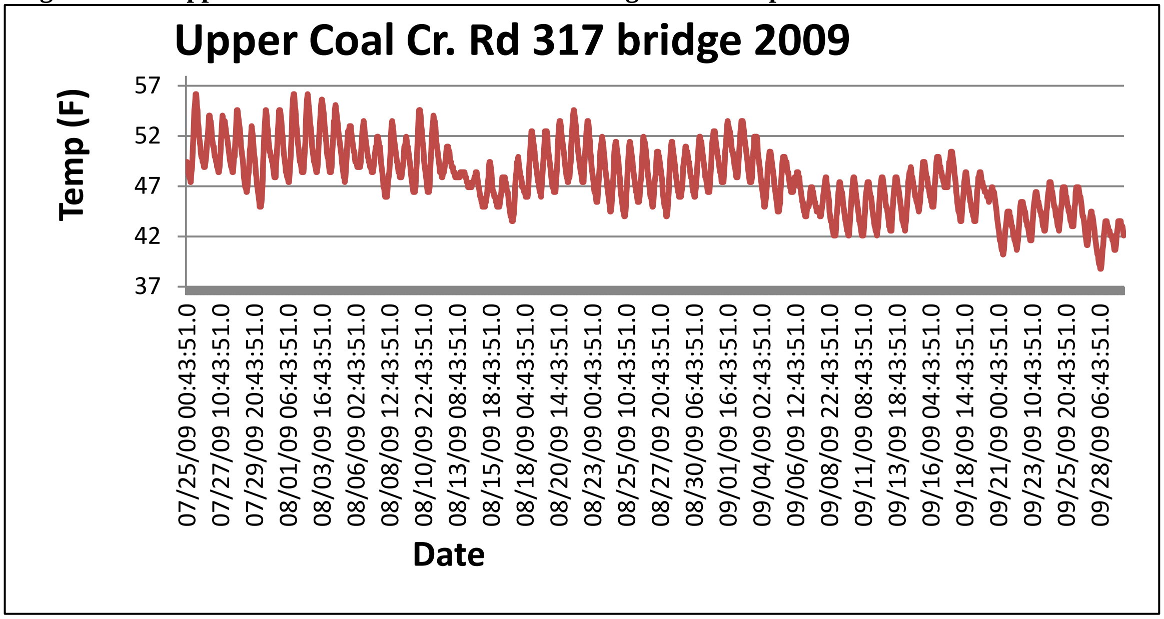
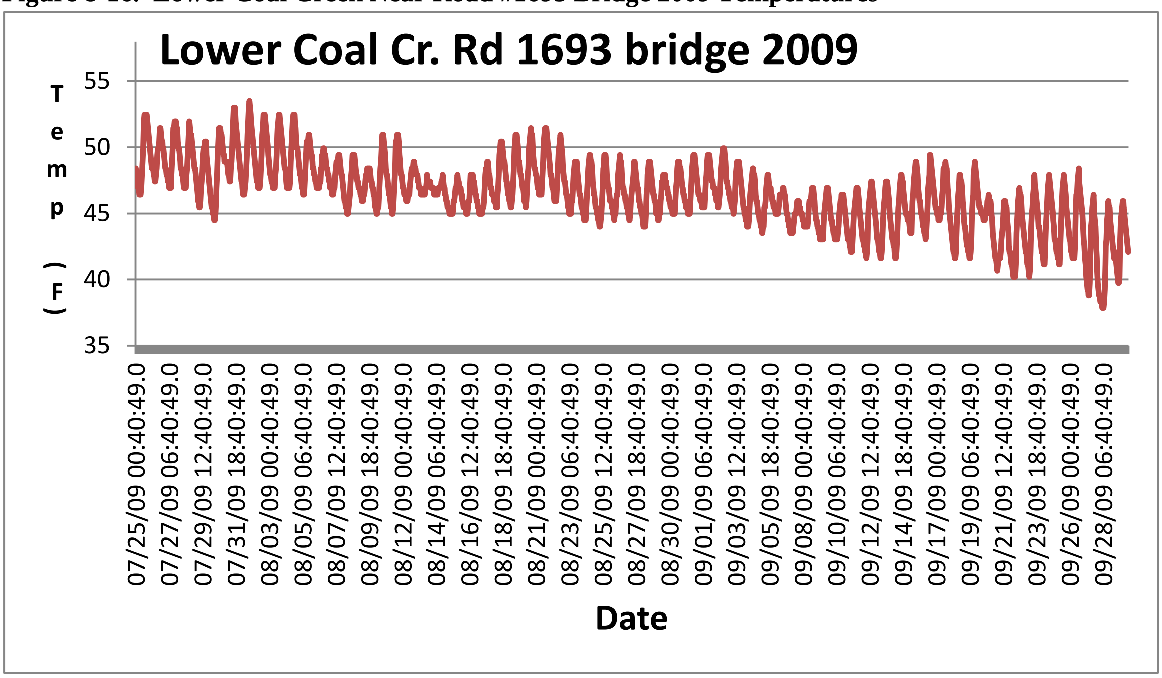


Figure 8-16. Lower Coal Creek Near Road #1693 Bridge 2009 Temperatures



Barriers: GIS rating = FA, data and profesional rating = FA. There are no man made barriers in Coal Creek that affect bull trout distribution. A culvert on Road #10801 in the very headwaters of Coal Creek was removed in 2009.

Pools: GIS rating = FAR & FUR, data and professional judgment rating = FAR. There is a large amount of bedload in Coal Creek that has caused stream braiding and channel avulsions. Many pools have been filled due to aggradation. Large wood is abundant despite a fair amount of past riparian harvest.

Sediment: GIS rating FUR, data and professional judgment rating = FA. Core samples have been consistently belwo 35% over the last 20 years.

Figure 8-17. McNeil Core Samples for South Coal Creek

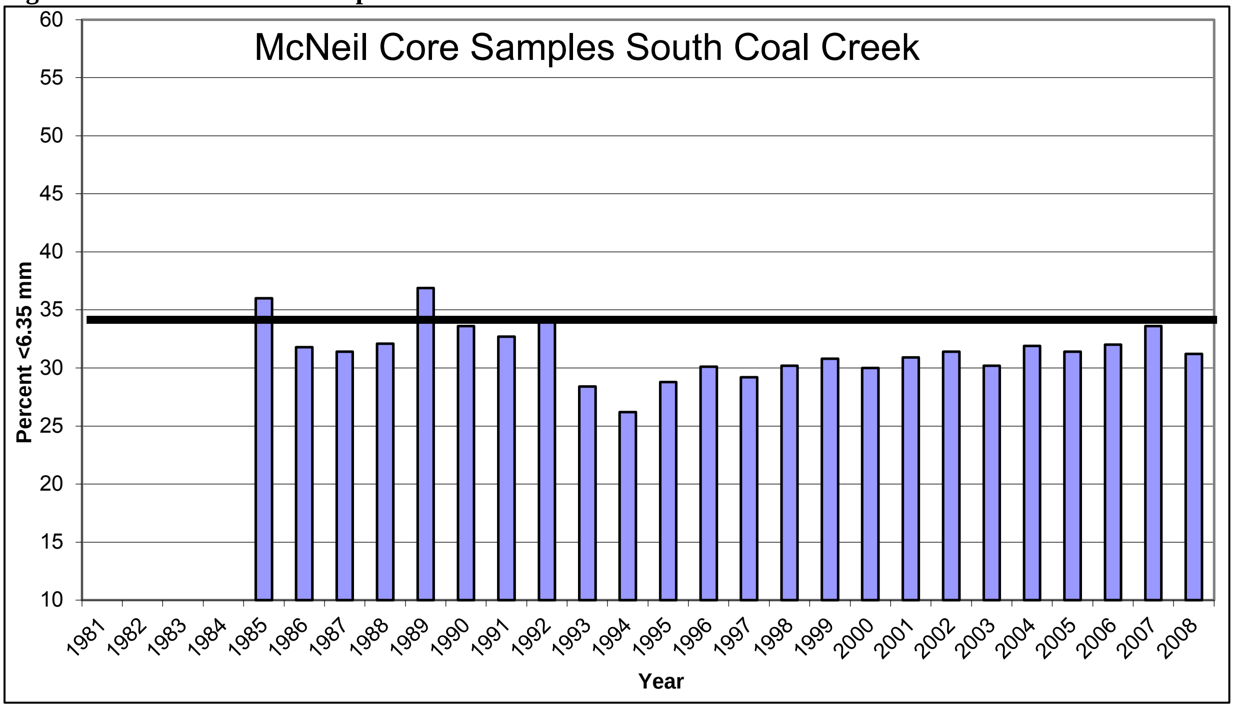
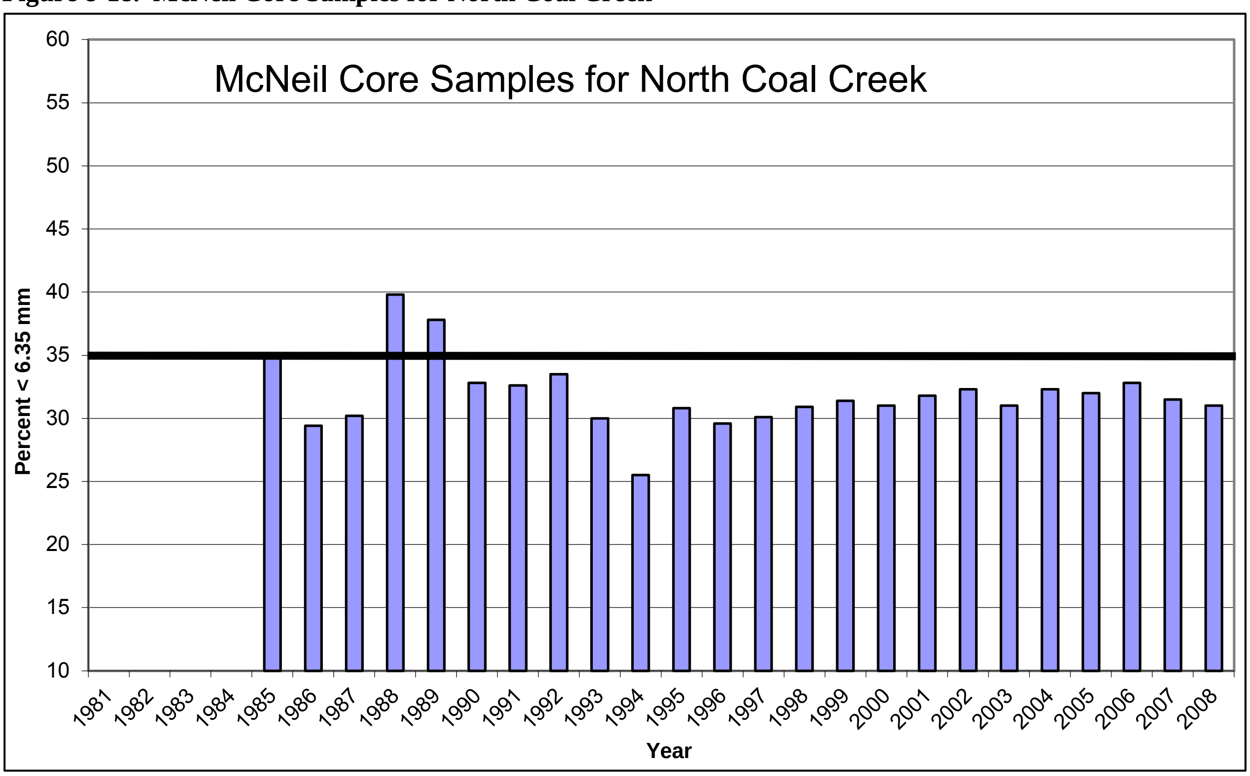
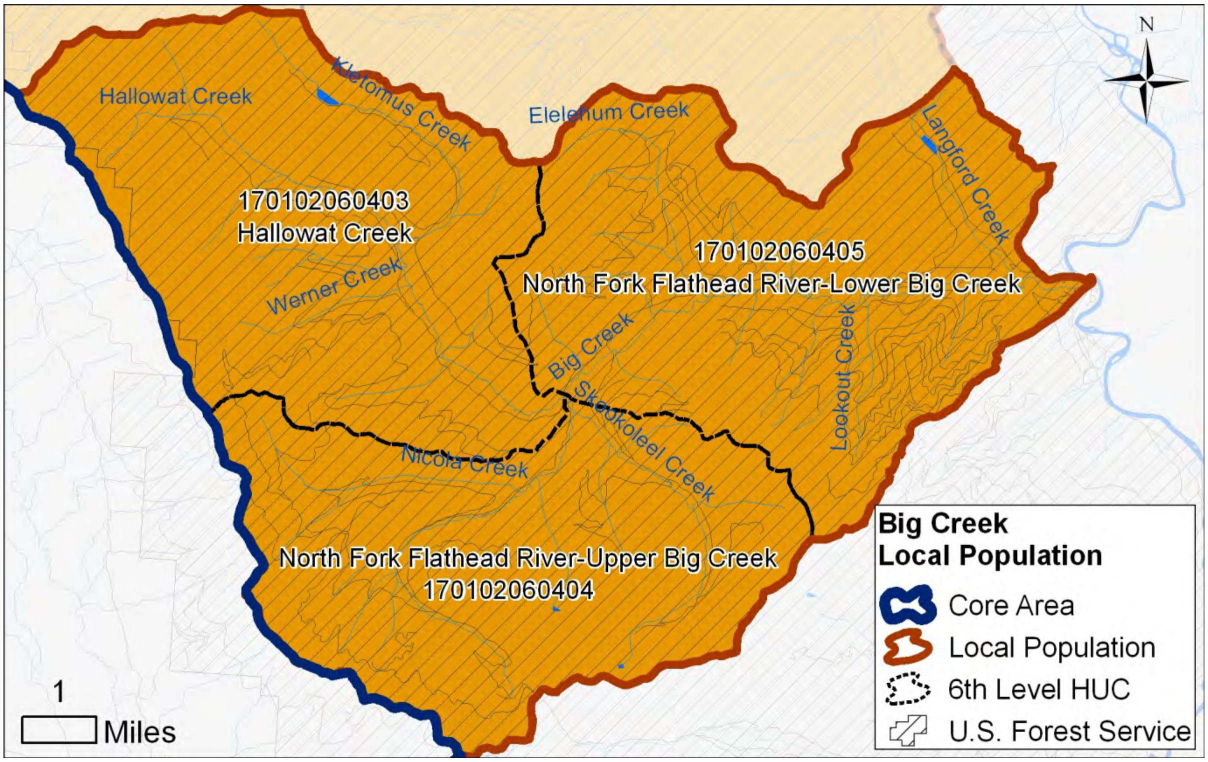


Figure 8-18. McNeil Core Samples for North Coal Creek



Local Population: Big Creek

Figure 8-19. Big Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 8-5. Big Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
55-65	Depressed	Adfluvial	2	Lake Trout in Flathead
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

There is a long-term declining trend due to lake trout in Flathead Lake. Habitat was heavily impacted from 1950's era logging and road building. Numerous channel avulsions and aggradation have occurred. Moose Fire (2001) impacted the Hallowat Creek spawning reach; however, a LWD addition project in 2008 has increased the number of juvenile bull trout within the reach. Big Creek was removed from the State listed 303(d) Report in 2012 after a TMDL plan was developed and implemented.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Hallowat Creek - 170102060403							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High - spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	15 years	1	$0	-	-
Barriers	FA	FA	15 years	1	$0	-	-
Pools	FAR	FAR	15 years	1	$0	-	-
Sediment	FUR	FA	15 years	1	$0	-	-

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Big Creek - 170102060404							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High, spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	15 years	1	$0	-	-
Barriers	FA	FA	15 years	1	$0	-	-
Pools	FUR	FAR	15 years	1	$0	-	-
Sediment	FUR	FAR	15 years	1	$0	-	-

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Big Creek - 170102060405							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 50%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate below spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FA	15 years	1	$0	-	-
Barriers	FA	FA	15 years	1	$0	-	-
Pools	FUR	FA	15 years	1	$0	-	-
Sediment	FUR	FAR	15 years	1	$0	-	-

Temperature: GIS rating = FAR-FUR, data and professional rating = FA. Temperatures were about 8 degrees warmer on average at the lower site.

Figure 8-20. Big Creek Near Road #803 Bridge 2009 Temperatures

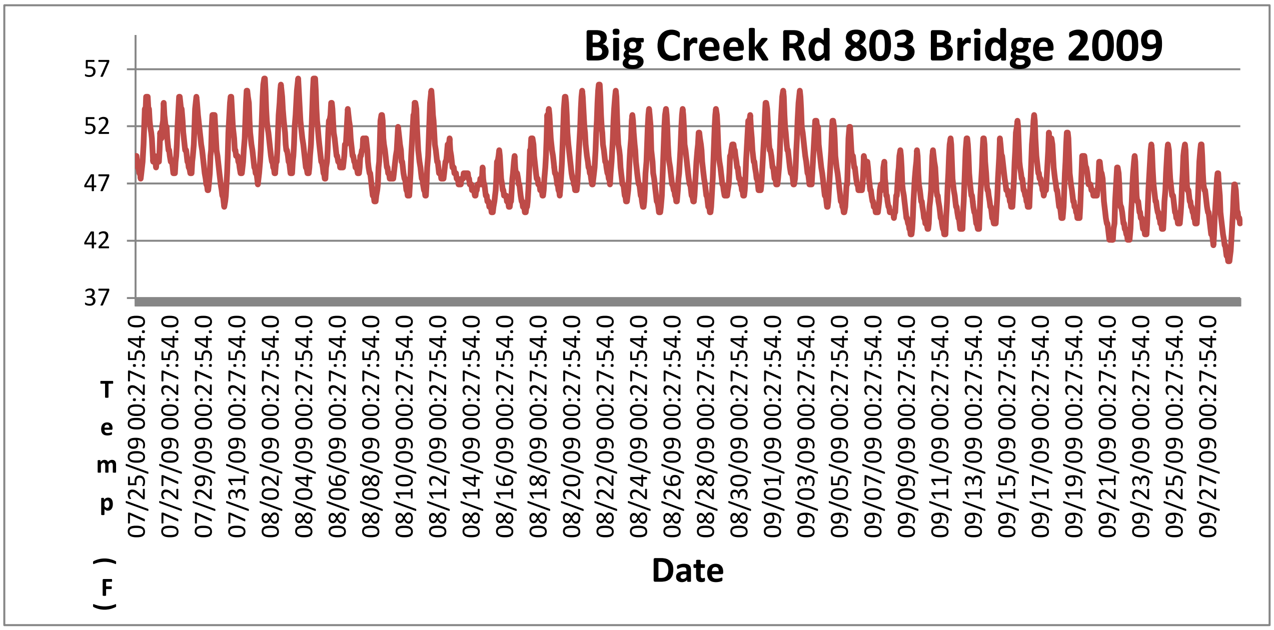
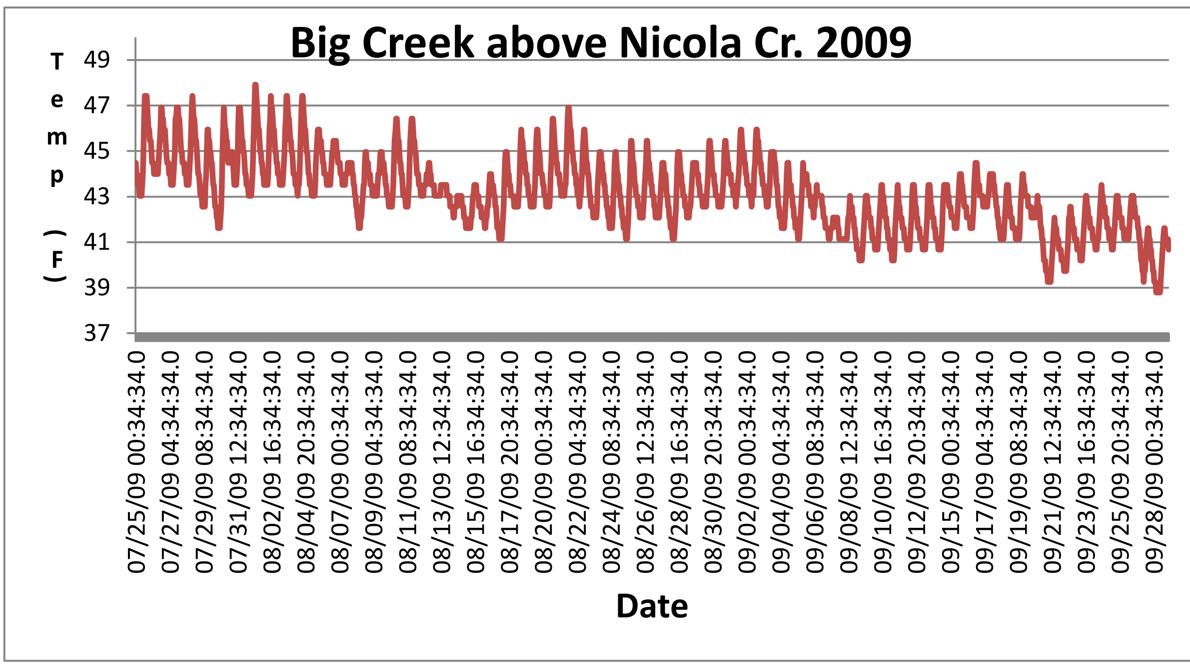


Figure 8-21. Big Creek Above Nicola Creek 2009 Temperatures



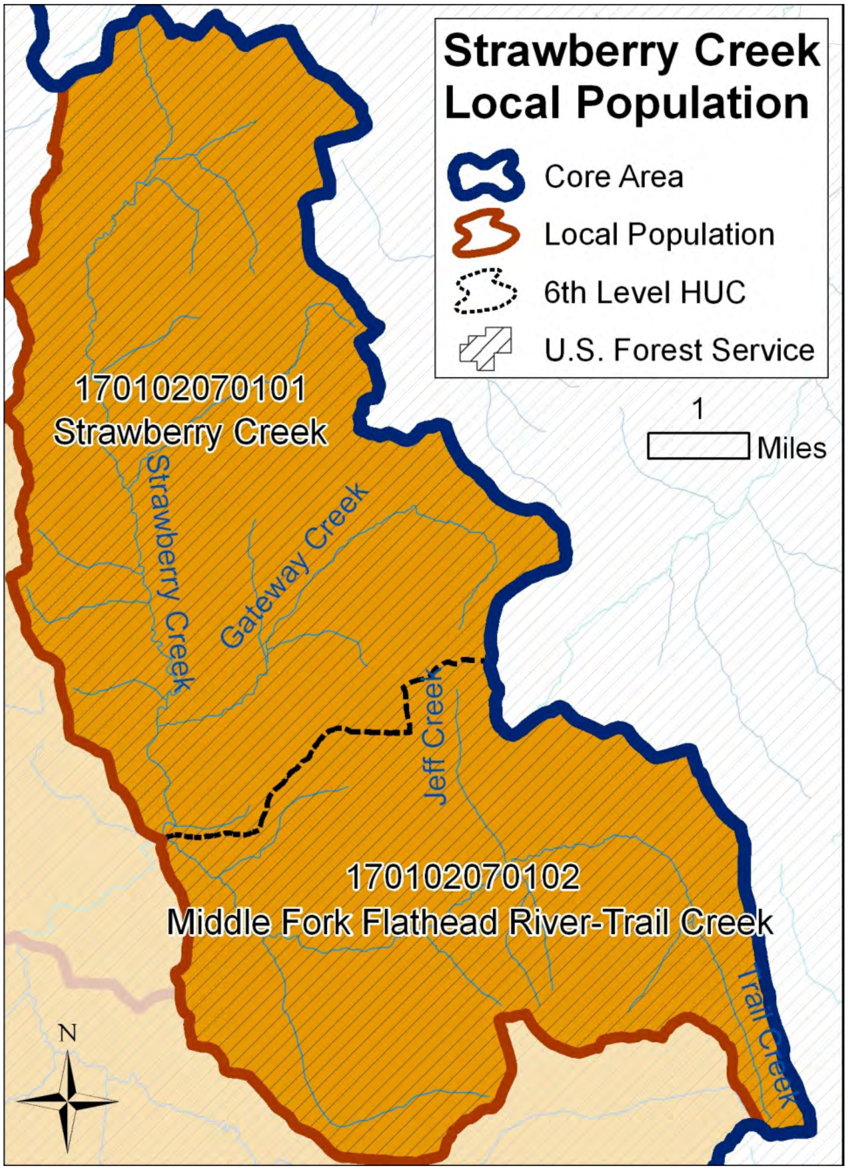
Barriers: GIS rating = FA, data and professional judgment rating = FA. There are no manmade barriers that affect bull trout distribution in Big Creek.

Pools: GIS rating = FAR –FUR, data and professional judgment rating = FAR. Big Creek functions similar to Coal Creek in terms of aggraded reaches and multiple channels. LWD is abundant in most reaches and was added to Hallowat Creek in 2008. The quality of pools is impacted.

Sediment: GIS rating = FUR, data and professional judgment rating = FA. Percent fines have been below 35% since 1994.

Local Population: Strawberry Creek

Figure 8-22. Strawberry Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 8-6. Strawberry Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
10-15	stable	Adfluvial	1	Lake Trout in Flathead
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

Wilderness. There is a long-term declining trend due to lake trout in Flathead Lake.

Confidence in your assessment (H,M,L): H

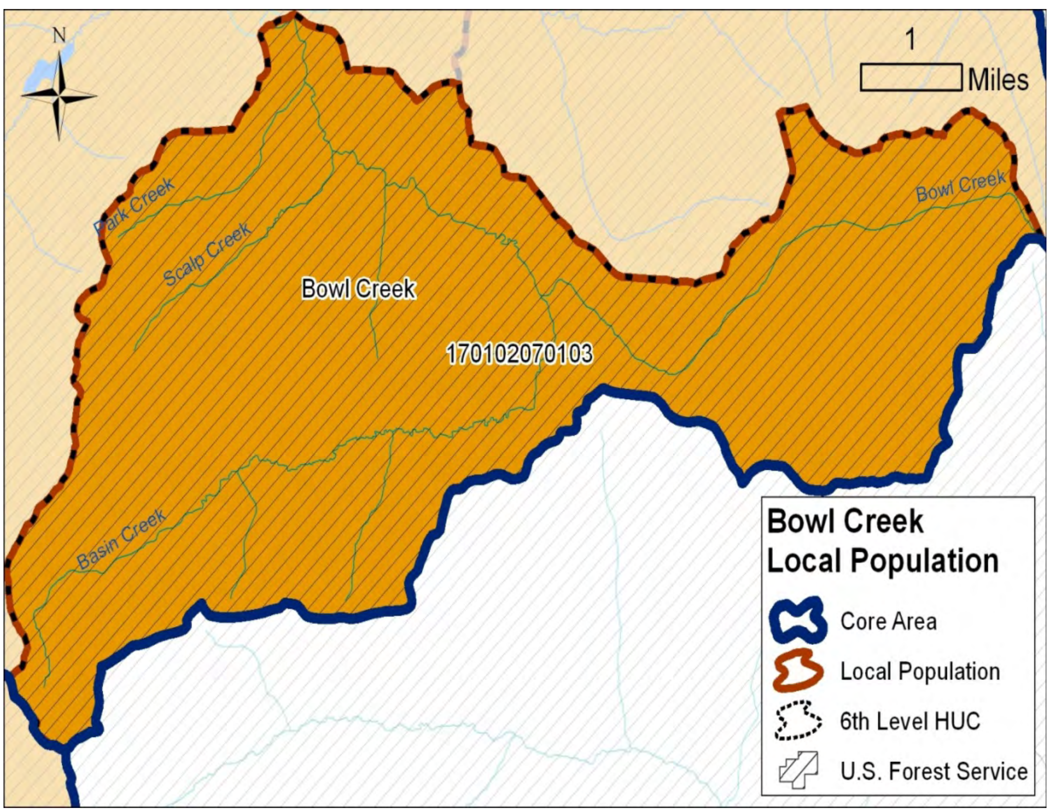
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Strawberry Creek – 170102070101							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

There are no improvements to be made in this local population because it is in wilderness.

Local Population: Bowl Creek

Figure 8-23. Bowl Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 8-7. Bowl Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
5-10	stable	Adfluvial	1	Lake Trout in Flathead
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

Wilderness. There is a long-term declining trend due to lake trout in Flathead Lake.

Confidence in your assessment (H,M,L): H

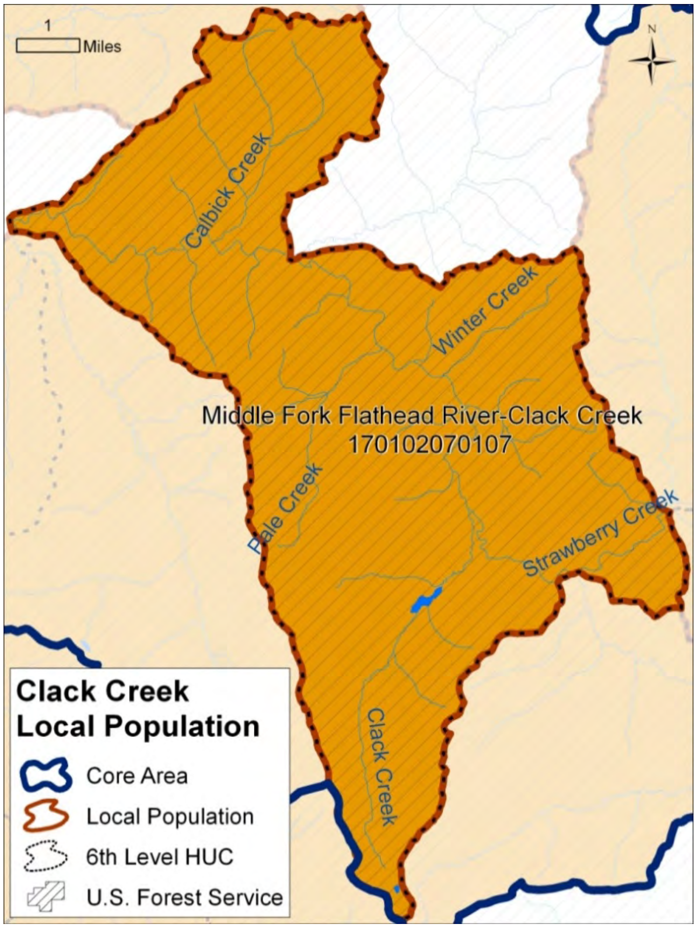
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Bowl Creek – 170102070103							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

There are no improvements to be made in this local population because it is in wilderness.

Local Population: Clack Creek

Figure 8-24. Clack Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 8-8. Clack Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
5-10	stable	Adfluvial	1	Lake Trout in Flathead
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

Wilderness. There is a long-term declining trend due to lake trout in Flathead Lake.

Confidence in your assessment (H,M,L): H

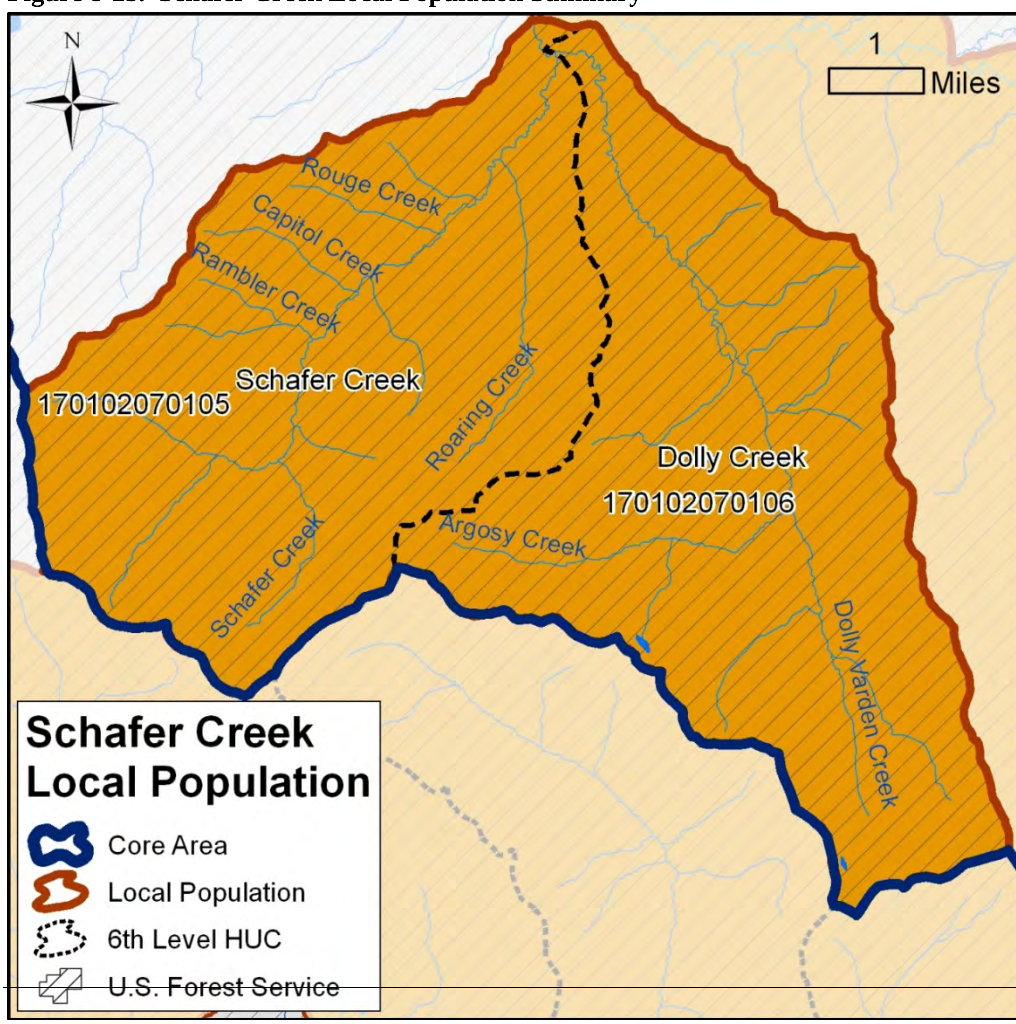
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Clack Creek – 170102070107							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

There are no improvements to be made in this local population because it is in wilderness.

Local Population: Schafer Creek

Figure 8-25. Schafer Creek Local Population Summary



Relative Importance of Population to Core Area (H,M,L): H

Table 8-9. Schafer Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
5-10	stable	Adfluvial	1	Lake Trout in Flathead
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

Wilderness. There is a long-term declining trend due to lake trout in Flathead Lake.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Schafer Creek – 170102070105

Strategy (Active Restoration, Passive Restoration, Conserve): Conserve

% Forest Service Ownership in HUC: 100%

Relative Contribution of Habitat in Limiting Local Population: Low

Functional Significance to Local Pop: High- spawning reach

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

There are no improvements to be made in this local population because it is in wilderness.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Dolly Varden Creek – 170102070106

Strategy (Active Restoration, Passive Restoration, Conserve): Conserve

% Forest Service Ownership in HUC: 100%

Relative Contribution of Habitat in Limiting Local Population: Low

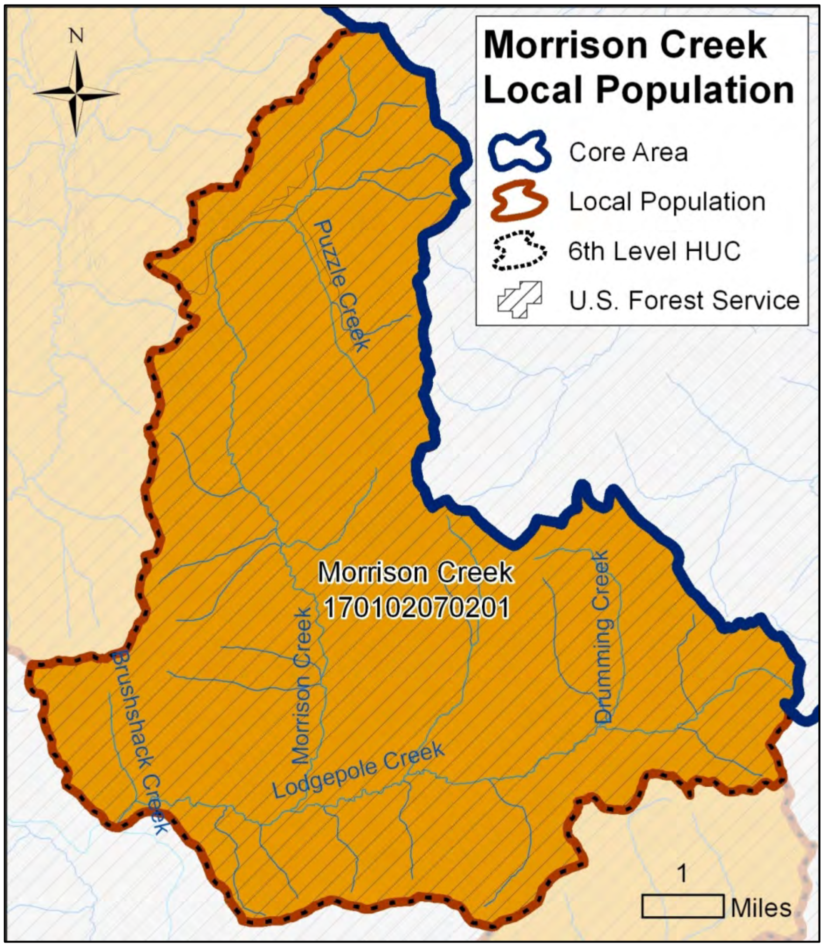
Functional Significance to Local Pop: High- spawning reach

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

There are no improvements to be made in this local population because it is in wilderness.

Local Population: Morrison Creek

Figure 8-26. Morrison Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 8-10. Morrison Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
30-40	stable	Adfluvial	2	Lake Trout in Flathead
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

Headwaters are not in wilderness. There is a long-term declining trend due to lake trout in Flathead Lake. Juvenile populations have been low the last 5 years due to a beaver dam barrier. A beaver dam that prevented upstream passage of adult spawners just above Lodgepole Creek was removed in 2010 along with 8 beavers. This site will need to be monitored to assure the dam will not be re-established.

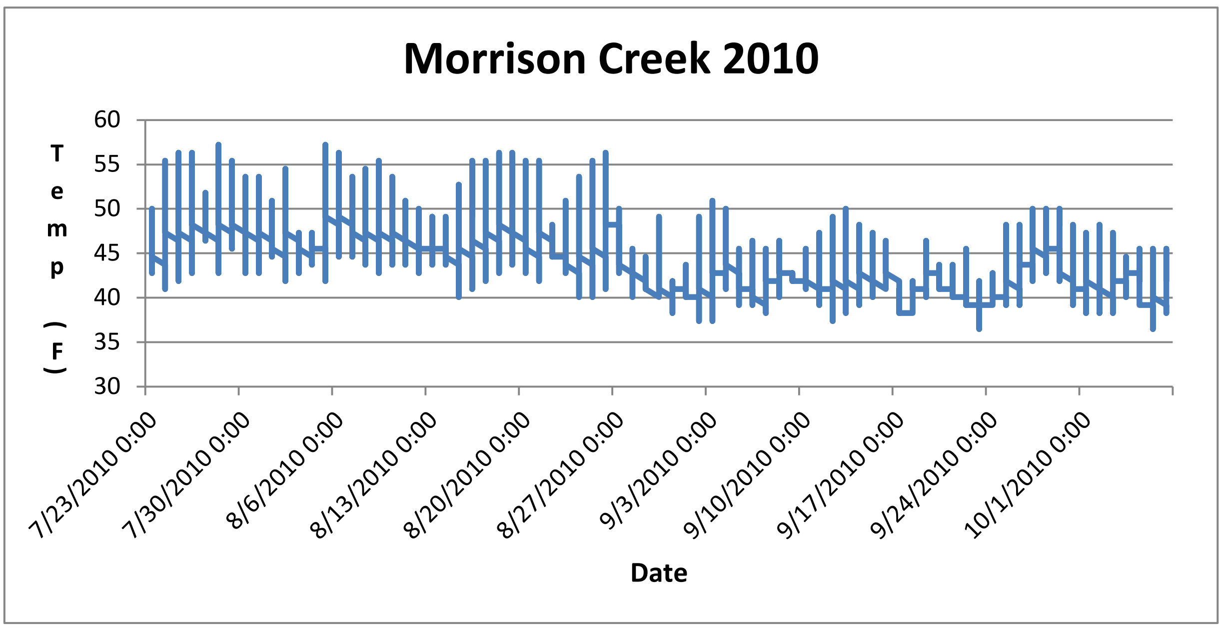
Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Morrison Creek - 170102070201							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: GIS rating = FA, data and professional judgment rating = FA

Figure 8-27. Morrison Creek 2010 Temperatures



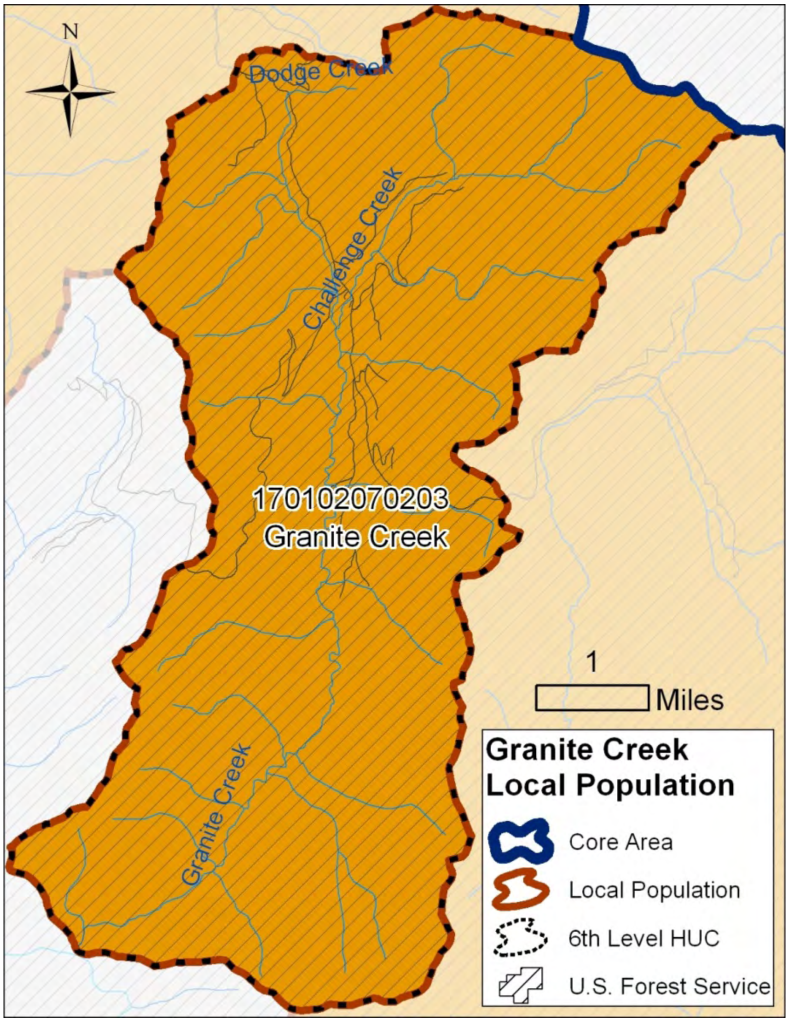
Barriers: GIS rating= FA, data and professional judgment rating = FA. A beaver dam barrier was removed in 2010 and will need to be monitored. There are no man made barriers in Morrison Creek.

Pools: GIs rating = FA, data and professional judgment rating = FA. This HUC is primarily wilderness and pools are abundant.

Sediment: GIS rating = FA, data and professional judgment rating = FA. There is no core data for Morrison Creek; however, conditions should be better than those in Granite and Challenge as the road density is less.

Local Population: Granite Creek

Figure 8-28. Granite Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 8-11. Granite Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
15-25	stable	Adfluvial	1	Lake Trout in Flathead
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

Headwaters are not in wilderness. Downstream reaches are in wilderness. There is a long-term declining trend due to lake trout in Flathead Lake. The reach between Dodge Creek downstream to the Outfitters Trailhead goes subsurface annually. Bull trout spawn below this reach.

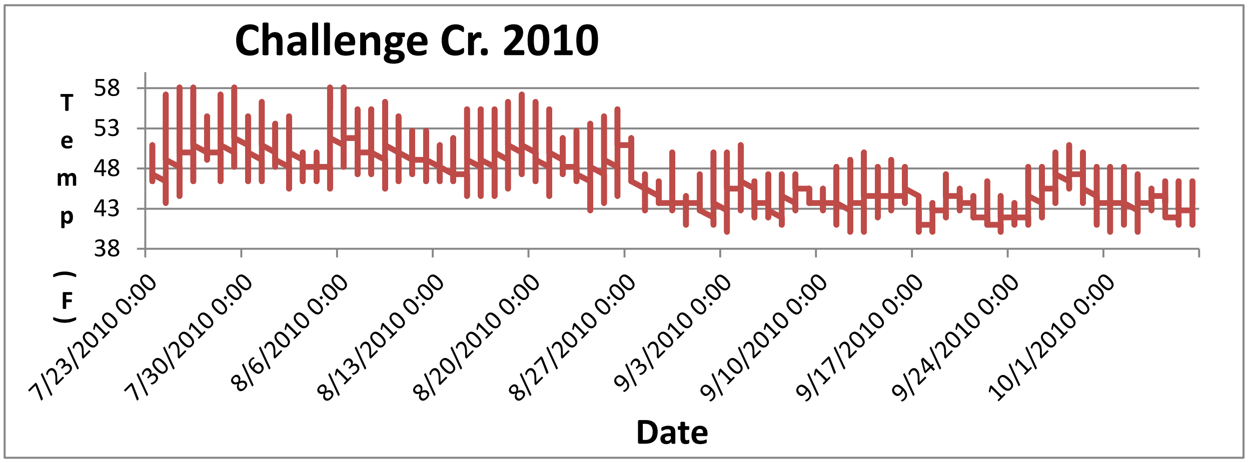
Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Granite Creek - 170102070203							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: GIS rating = FAR, data and professional judgment rating = FAR. Challenge Creek is about a mile upstream of the spawning reach. A thermograph just upstream of the spawning reach in 2010 was out of water.

Figure 8-29. Challenge Creek 2010 Temperatures



Barriers: GIS rating = FA, data and professional judgment rating = FA. There are no known manmade barriers that affect bull trout distribution in Granite Creek.

Pools: GIS rating = FA, data and professional judgment rating = FA. Pools are abundant and of high quality throughout Granite Creek as observed during annual bull trout redd surveys.

Sediment: GIS rating = FA, data and professional rating = FA. The soils in the Granite Creek area are highly erosive and it can be expected that the sediment levels are near base level.

Figure 8-30. McNeil Core Samples in Granite Creek

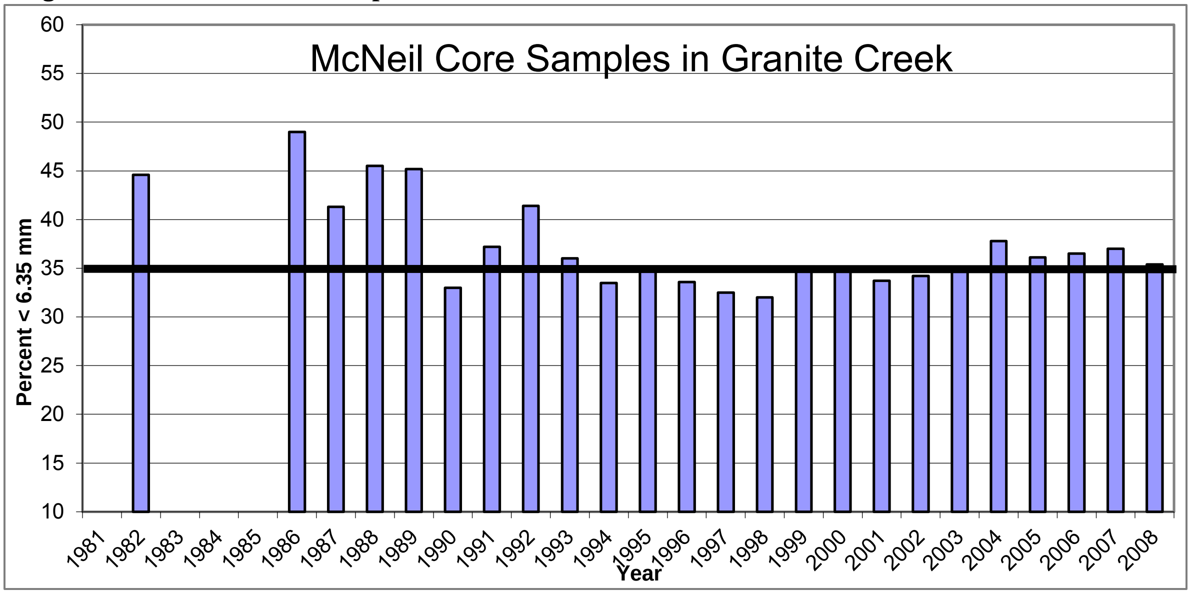
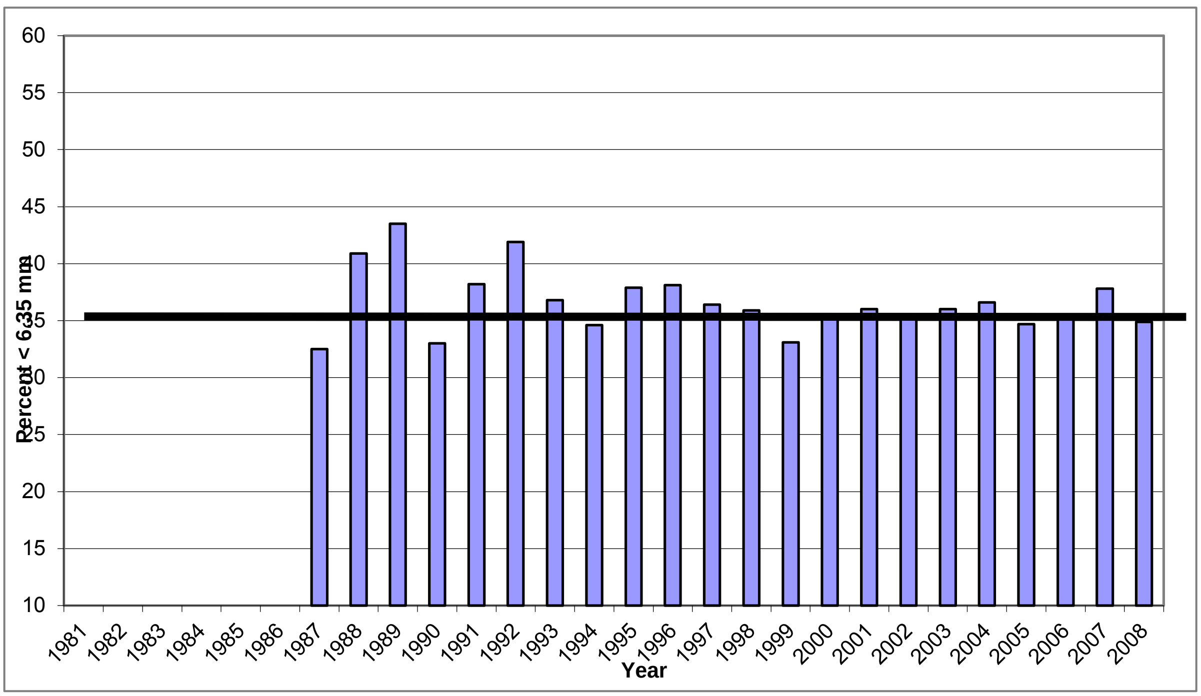
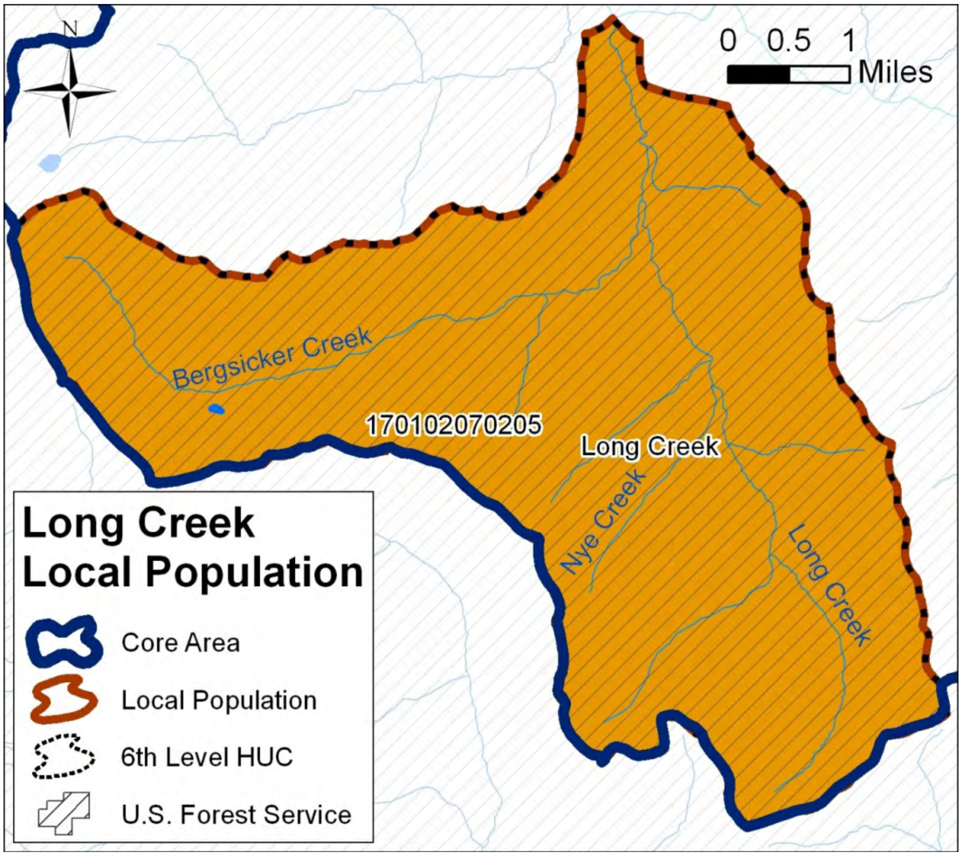


Figure 8-31. McNeil Core Samples Challenge Creek 2009



Local Population: Long Creek

Figure 8-32. Long Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 8-12. Long Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
10-15	stable	Adfluvial	1	Lake Trout in Flathead
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

Wilderness. There is a long-term declining trend due to lake trout in Flathead Lake.

Confidence in your assessment (H,M,L): H

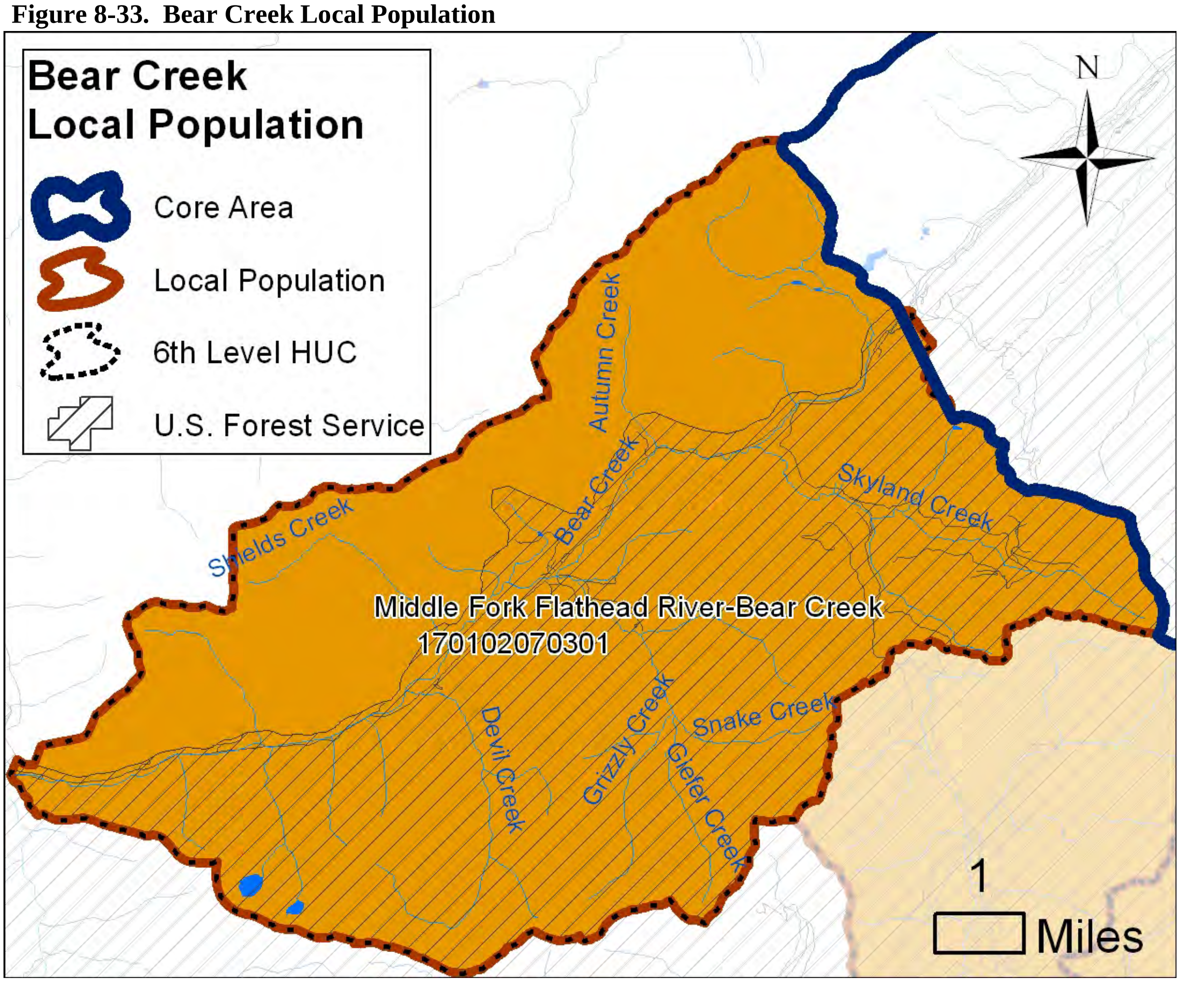
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

UC6 (name and #): Long Creek - 170102070205							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

There are no improvements to be made in this local population because it is in wilderness.

Local Population: Bear Creek

Figure 8-33. Bear Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 8-13. Bear Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
20-30	Stable but long term depressed	Adfluvial, Connected	1	LT in Flathead Lake, Threat is high
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low significance – Due to numerous pops. in MF		Low vulnerability due to high elevation and high ground water influence		None

Driving Factors Determining Bull Trout Population:

Bear Creek is the only HUC within the Middle Fork Flathead that is not wholly contained or does not have wilderness within the watershed. Highway 2 and the railroad influence Bear Creek in numerous locations, especially above bull trout spawning. The 1964 flood washed out portions of Highway 2 and debris slumps are common throughout reaches that are affected by the highway. Not much information such as core samples, substrate scores, etc. exists on Bear Creek with regards to habitat conditions.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Bear Creek - 170102070301							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: %100							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FAR	FA	-	-	$0	-	-
Pools	FUR	FAR	-	-	$0	-	-
Sediment	FUR	FAR	-	-	$0	-	-

Temperature: GIS rating= FAR, No over-ride for this call.

Barriers: GIS rating = FA, data and professional judgment rating = FA. There are no manmade barriers that affect bull trout distribution in Bear Creek. Barriers along Highway 2 affect WCT distribution.

Pools: GIS rating =FUR, data and professional judgment rating = FAR. LWD is abundant in most reaches. Quality of pools is not impacted.

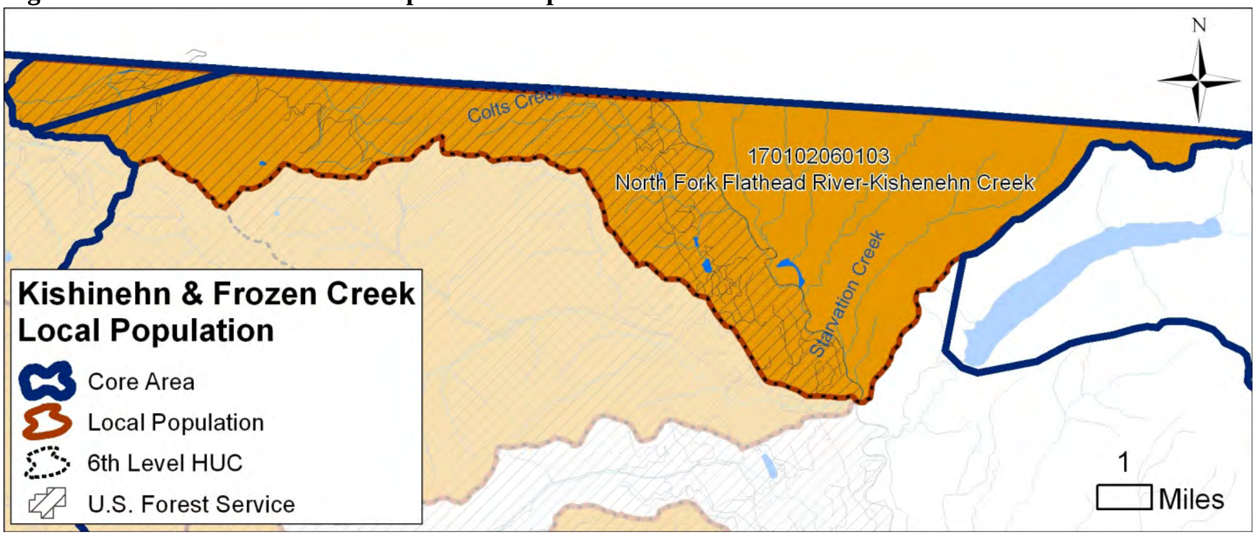
Sediment: GIS rating = FUR, No over-ride for this call.

Simple Core Areas

There is one simple core area discussed in this chapter – Frozen Lake.

Simple Core Area: Frozen Lake

Figure 8-34. Frozen Lake Local Population Map



Relative Importance of Population to Core Area (H,M,L): L

Table 8-14. Frozen Lake Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
10-20	Stable	Adfluvial, disjunct	1	Lake Trout in Flathead could colonize
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		High

Driving Factors Determining Bull Trout Population:

Frozen Lake supports a disjunct population of bull trout that spawn in the outlet. Limited redd counts have been done. The lake is bisected by the international U.S.-Canada Border. It is most likely that habitat conditions have not changed within this lake over the last 20 years as no management activities have occurred within the watershed. There are limited restoration activities within this watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Frozen Lake - 170102060103							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 50%, north half is in Canada							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach in outlet							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Confidence in your assessment (H,M,L): H

Flathead Lake Core Area Summary:

Table 8-15 summarizes relevant information from each of the 6th field HUC local populations. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire Flathead Lake Core Area within the borders of the Flathead National Forest. It does not include necessary restoration activities in watersheds where the FNF has no ownership that may be critical for overall restoration of the bull trout population in the Core Area.

Table 8-15. Summary of important Local Population attributes and conservation recommendations for the Flathead Lake Core Area.

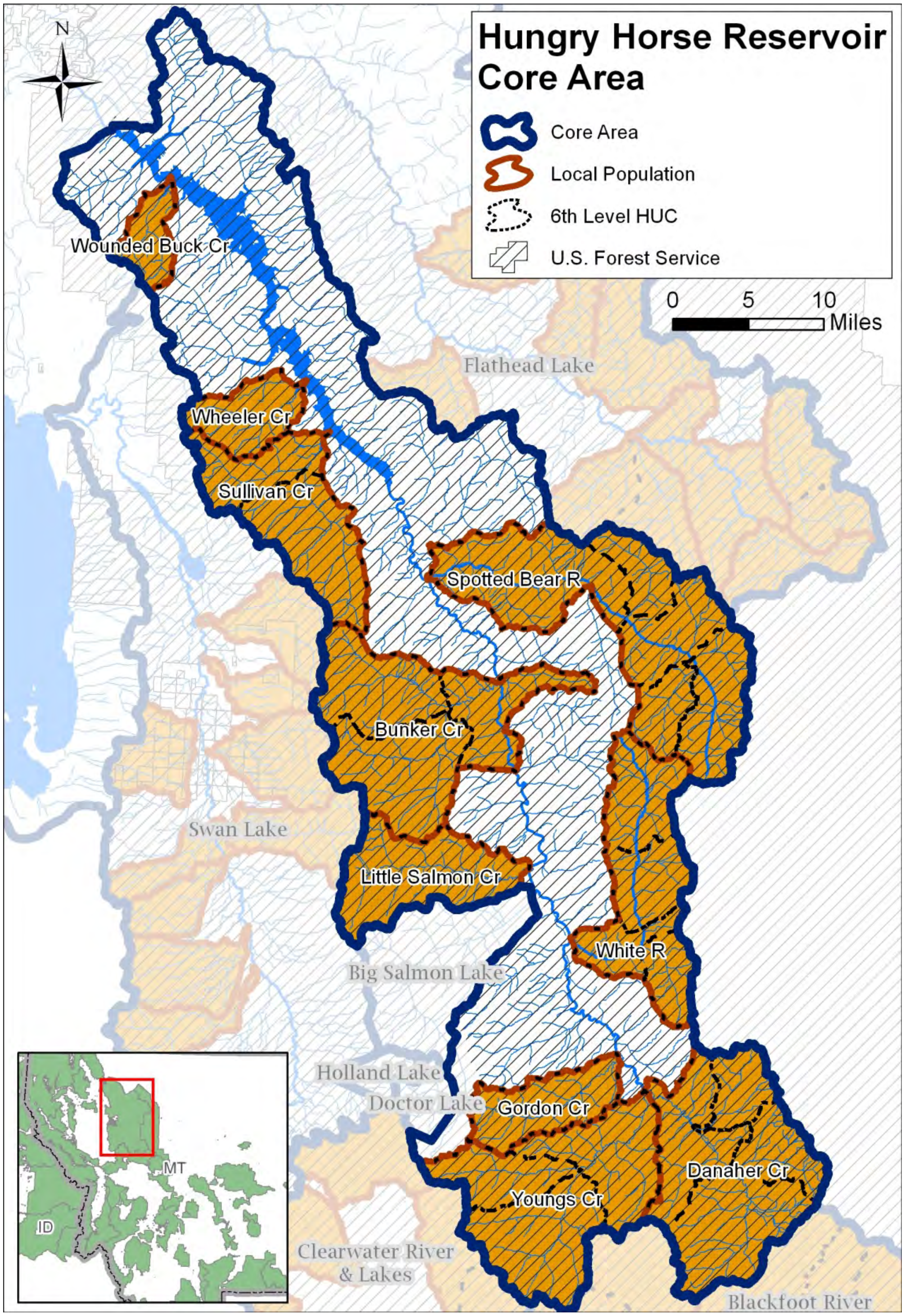
Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
Trail Creek	Upper Trail Cr	Low	Low	Conserve	-	-	-
	Lower Trail Cr	High	Low	Conserve	-	-	-
Whale Creek	Upper Whale Cr	Low	Low	Conserve	-	-	-
	Shorty Cr	High	Low	Conserve	-	-	-
	Lower Whale Cr	High	Low	Conserve	-	-	-
Red Meadow Creek	Red Meadow Cr	Low	Low	Conserve	-	-	-
Coal Creek	Upper Coal Cr	Low	Low	Conserve	-	-	-
	South Fork Upper Coal Cr	High	Low	Conserve	-	-	-
Big Creek	Hallowat Cr	High	Moderate	Active	-	-	-
	Upper Big Cr	High	Moderate	Active	-	-	-
	Lower Big Cr	Moderate	Low	Active	-	-	-
Strawberry Creek	Strawberry Cr	High	Low	Conserve	-	-	-

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
Bowl Creek	Bowl Cr	High	Low	Conserve	-	-	-
Clack Creek	Clack Cr	High	Low	Conserve	-	-	-
Schafer Creek	Schafer Cr	High	Low	Conserve	-	-	-
	Dolly Varden Cr	High	Low	Conserve	-	-	-
Morrison Creek	Morrison Cr	High	Low	Conserve	-	-	-
Granite Creek	Granite Cr	High	Low	Conserve	-	-	-
Long Creek	Long Cr	High	Low	Conserve	-	-	-
Bear Creek	Bear Cr	High	Low	Conserve	-	-	-
Frozen Lake*	Frozen Creek	High	Low	Passive	-	-	-

*Simple Core Area

Chapter 9: Hungry Horse

Figure 9-1. Hungry Horse and Surrounding Core Areas



Core Area Discussion:

The Hungry Horse Core Area (HHCA) includes all of Hungry Horse Reservoir and the South Fork Flathead River and all tributaries upstream of the dam. Hungry Horse Dam, completed in 1954, isolates the South Fork Flathead River drainage from its former connectivity with Flathead Lake, cutting off about 38% of the spawning and rearing habitat for the Flathead Lake core area (Zubik and Fraley 1987). The HHCA bull trout population originated from adfluvial Flathead Lake stocks that were trapped upstream of Hungry Horse Dam. There is no evidence of resident fish occurrence in this core area.

In 1998, the status and trend of bull trout in the HHCA was considered “strong” and “stable” based on information available at the time of listing (USFWS 1998). This was the only Montana core area accorded that combination of attributes, and is in sharp contrast to most Core Areas in western Montana where current bull trout densities are typically well below historic levels. Since then, the population has continued to remain stable and even increase, suggesting that the status and trend calls were accurate. The distribution of bull trout populations throughout the core area is probably similar to historic patterns, as is life form expression (dominated by adfluvial adults). This is a large core area with some natural barriers in headwaters and occasional temporary barriers resulting from beaver dams or other natural activities. There are no known man-caused barriers on bull trout spawning and rearing streams. In recent years, the reservoir has been held at more stable levels (as opposed to drawdowns of up to 200 feet in the early 1990’s) further improving connectivity with reservoir tributaries and the upstream watershed. Hungry Horse Dam (564 feet high) is a complete barrier to all upstream and most downstream movement of bull trout. Entrainment of bull trout through the dam probably occurs at low levels, but has not been an issue, likely due to the depth and configuration of penstock withdrawal. The South Fork upstream of Hungry Horse Dam is a defacto native fish refugium and the barrier the dam presents to upstream movement of nonnative species (e.g., rainbow trout and lake trout) is currently considered an asset to bull trout recovery.

Hungry Horse Reservoir and the South Fork Flathead is the largest bull trout habitat in the northwest with a predominantly native fish species assemblage. MFWP has recognized the importance of that and is implementing measures to systematically remove nonnative salmonids in the limited headwater lake basins where they occur (as a result of historical stocking programs with rainbow trout and Yellowstone cutthroat trout). The entire upper watershed is within the Bob Marshall Wilderness.

Historic bull trout redd counts are not available. It is unknown what numbers, size, and age composition of bull trout were trapped upstream of the dam at closure in 1954. It is likely that numbers were lowest immediately following construction of the dam and filling of the reservoir and then quickly rebounded with the new habitat and food resources afforded by the reservoir. The population likely expanded for a period of several years through the 1960’s. However, heavy angling, logging on non-wilderness lands surrounding the reservoir, and extreme reservoir drawdowns are surmised to have caused the bull trout population to decline during the 1970’s and 1980’s. In 1993, due to pending ESA action, angling for bull trout was restricted. This facilitated a long-term increase in the population that has sustained itself despite limited angling opportunity and harvest that was reinitiated beginning in 2004.

Current bull trout densities in the Hungry Horse Core Area appear to be relatively stable or increasing at about 2,500 to 3,000 adults, based on MFWP redd count data from 1993 to present (MFWP). Because the HHCA was formed by a reservoir that inundated a portion of the previous migratory corridor for fish from Flathead Lake, there was no established previous record of natural carrying capacity for this portion of the system in isolation. Rather, this core area incorporated about 38% of the spawning and rearing habitat for the Flathead Lake core area (Zubik and Fraley 1987). The loss statement for the Hungry Horse Mitigation program concluded that the dam construction eliminated between 1,840 and 2,089 adult bull trout from the Flathead Lake population (Zubik and Fraley 1987). Based on that analysis, we can conclude that the adult bull trout population occupying this core area (estimated 2,500-3,000 fish) is similar in size to natural carrying capacity of the area when it was still attached to Flathead Lake. However, it must be noted that while Hungry Horse Reservoir is a large, deep, cold body of water that provides generally excellent foraging, migrating and overwintering (FMO) habitat for subadult and adult bull trout, it is not nearly as productive as the natural habitat of Flathead Lake. As a consequence, adult adfluvial bull trout in Hungry Horse Reservoir are typically not as large as the Flathead Lake fish and their condition factors are not as high.

In contrast to many Core Areas in western Montana, habitat in the HHCA is large, connected, and secure. In addition, the population has the added benefit of having a large reservoir rearing area, providing habitat that is relatively buffered from environmental extremes and supports adequate natural food resources for a large bull trout population. A 1985 analysis of 125 bull trout stomachs from Hungry Horse reservoir found that native fish made up 99.7% of the diet, by weight (May and Weaver 1987), dominated numerically by northern pikeminnow (39%), mountain whitefish (28%), suckers (26%), and westslope cutthroat trout (7%). There are few current threats to bull trout in the core area. Currently, the greatest threats are angling (legal or illegal) and reservoir operations, in that order (USFWS status assessment 2008).

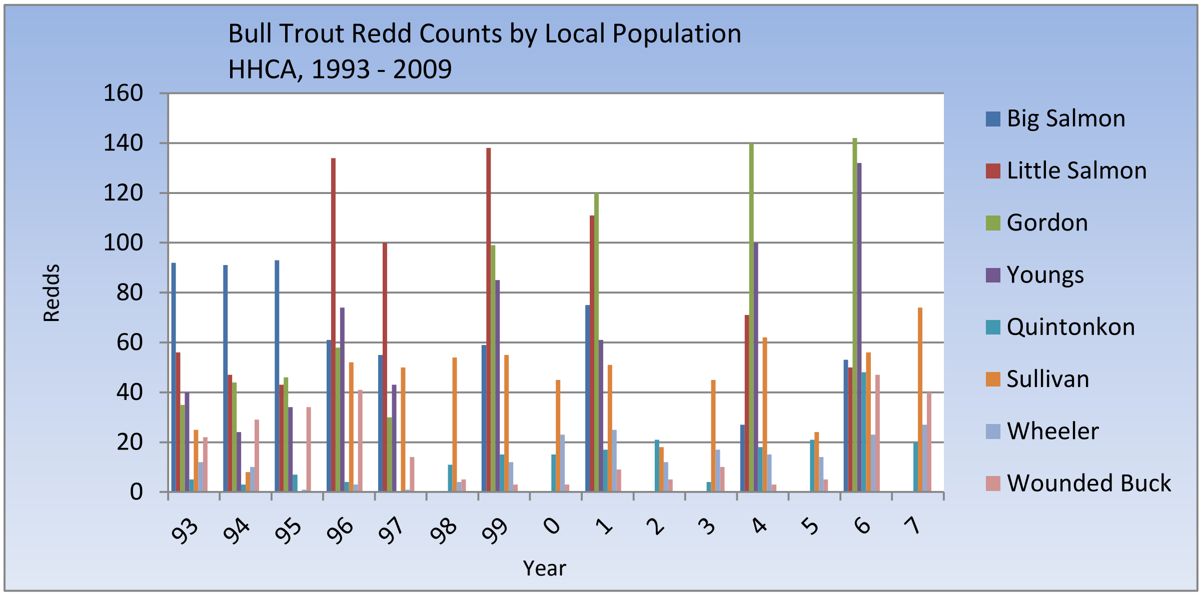
The recreational bull trout fishery on Hungry Horse Reservoir has continued since 2004 and is being closely monitored (Hensler and Benson 2007, Rosenthal and Hensler 2008, Rosenthal 2009, 2010). Angler catch and harvest (in parentheses) of bull trout from Hungry Horse Reservoir has been estimated as follows: 2004-05 catch = 355 (48); 2005-06 catch = 2,154 (58); 2006-07 catch = 623 (56); 2007-08 catch = 533 (57); 2008-09 catch = 621 (74); 2009-10 catch = 832 (97). In addition, anglers participating in the catch and release fishery authorized in the upper end of the Reservoir and in the South Fork Flathead River into the Bob Marshall Wilderness were estimated to have caught 173 bull trout in 2004, 531 bull trout in 2005, 380 bull trout in 2006, and roughly 320 bull trout in 2007, 405 bull trout in 2008 and 370 bull trout in 2009. In total, nearly 13,000 angler days of recreation in the combined Reservoir and River fisheries has occurred over the six-year period and nearly 7,300 bull trout have been caught, of which 390 (roughly 5%) were harvested. The fishery is closely monitored and is not assumed to be a high threat because of the ability to adjust regulations quickly if needed.

Operations of the Federal Columbia River Power system in the past have led to extreme variability in the pool of Hungry Horse Reservoir, at times being drawn down over 200 feet from full. While drawdowns of that magnitude have been eliminated in recent years, the State of Montana continues to express concern over the effect of water level fluctuation on native fish and recreation. Despite these variable pools, bull trout populations have not shown any measurable negative response.

In 2003 a series of major fires burned large portions of the bull trout habitat in the South Fork Flathead River drainage. In recent years, logging activities have been minimal with the exception of some post-fire salvage. Rain-on-snow events heavily impacted Westside reservoir tributaries in 2003 and again in 2006, with large debris flows and several culvert and bridge blowouts. Despite this, or perhaps related to these flushing flows, bull trout spawning numbers in several of these streams (e.g. Wounded Buck and Wheeler Creeks) increased through the period 2006-2008 (MFWP 2009, unpublished). Reservoir operations have also been stabilized through the period (Sylvester et al. 2008).

There are eight bull trout spawning index reaches in the HHCA. Collectively, these eight reaches represent up to 85% of the total basin-wide spawning of bull trout. Figure 9-2 shows bull trout redd numbers in the eight index reaches throughout the HHCA from 1993 through 2009 (FWP and USFS unpublished data). The data show that the four index streams in the Wilderness support approximately 70 percent of the bull trout spawning in the HHCA.

Figure 9-2. Bull trout redd numbers in the HHCA from 1993 through 2009. Note that wilderness streams (Big Salmon, Little Salmon. Gordon, Youngs) are not counted every year.



Currently, there appear to be few factors limiting bull trout populations in the HHCA. There might be slightly more bull trout in the population without fishing or harvest; however, monitoring has shown the population to continue to maintain or increase under the current regulations and fishing pressure. Therefore, there appears to be little need to change current regulations, and the ability to fish for bull trout likely provides some positive benefit in terms of building support for their recovery. This population likely represents the most secure bull trout population covered by the National Forest Conservation Strategy.

Hungry Horse Core Area - Flathead National Forest

There are ten local populations within the core area on the Flathead National Forest. They include:

1. Danaher Creek,
2. Youngs Creek,
3. Gordon Creek,
4. White River,
5. Little Salmon Creek,
6. Bunker Creek,
7. Spotted Bear River,

8. Sullivan Creek.
9. Wheeler Creek,
10. Wounded Buck,

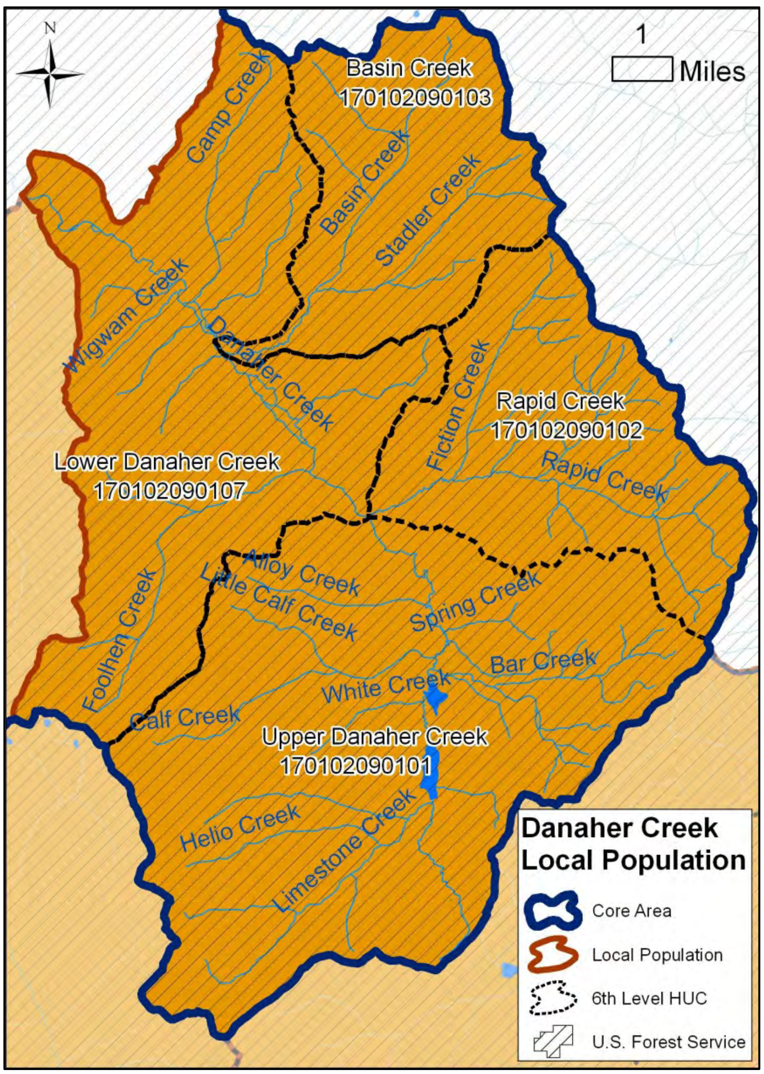
Two simple core areas are also included in this chapter: Big Salmon and Doctor Lake.

All ten local populations in the core area support adfluvial bull trout spawning; there are no known resident populations. A similar pattern, in terms of importance, may have existed historically between these streams as they provide the largest amount of high quality groundwater-influenced spawning and rearing habitat due to their relative size and quality.

Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Local Population: Danaher Creek

Figure 9-3. Danaher Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 9-1. Danaher Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
25	stable	Adfluvial	1	None
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

Bull trout spawn in Rapid and Danaher Creeks but to a lesser extent than other wilderness local populations. There are no driving factors to mention because this stream is in wilderness.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Danaher Creek - 170102090107							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Danaher Creek – 170102090101							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Basin Creek - 170102090103							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC.

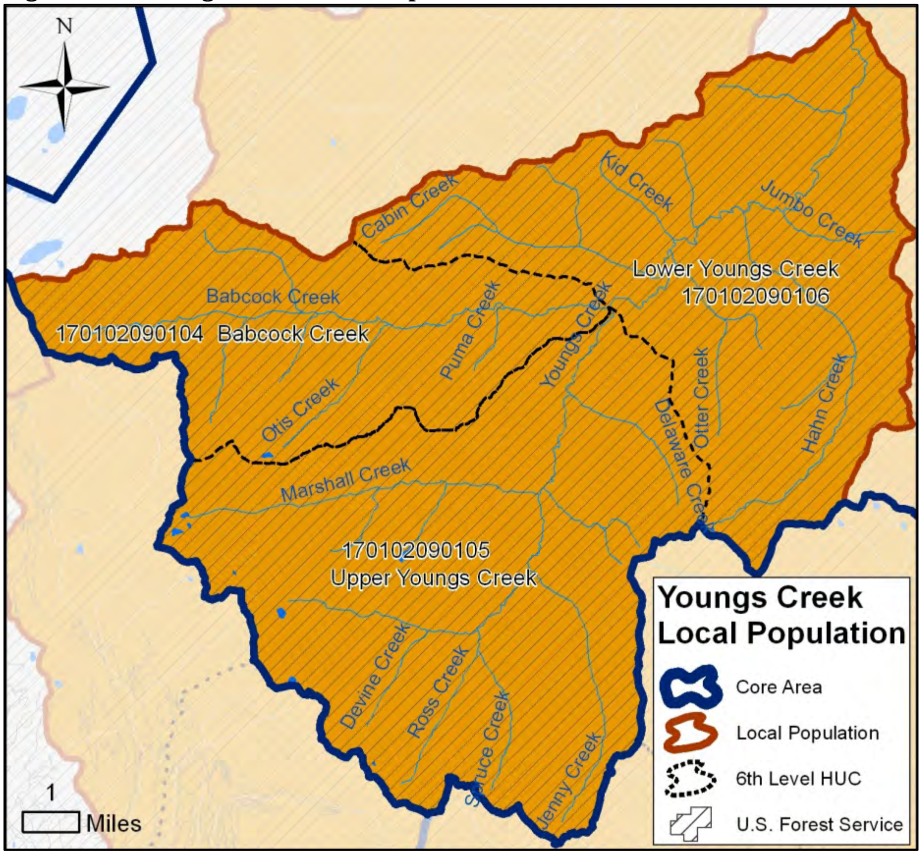
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Rapid Creek - 170102090102							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC.

Local Population: Youngs Creek

Figure 9-4. Youngs Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 9-2. Youngs Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
100	stable	Adfluvial	1	None
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

There are no driving factors to mention because this stream is in wilderness.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Youngs Creek - 170102090106							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Youngs Creek - 170102090105							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC.

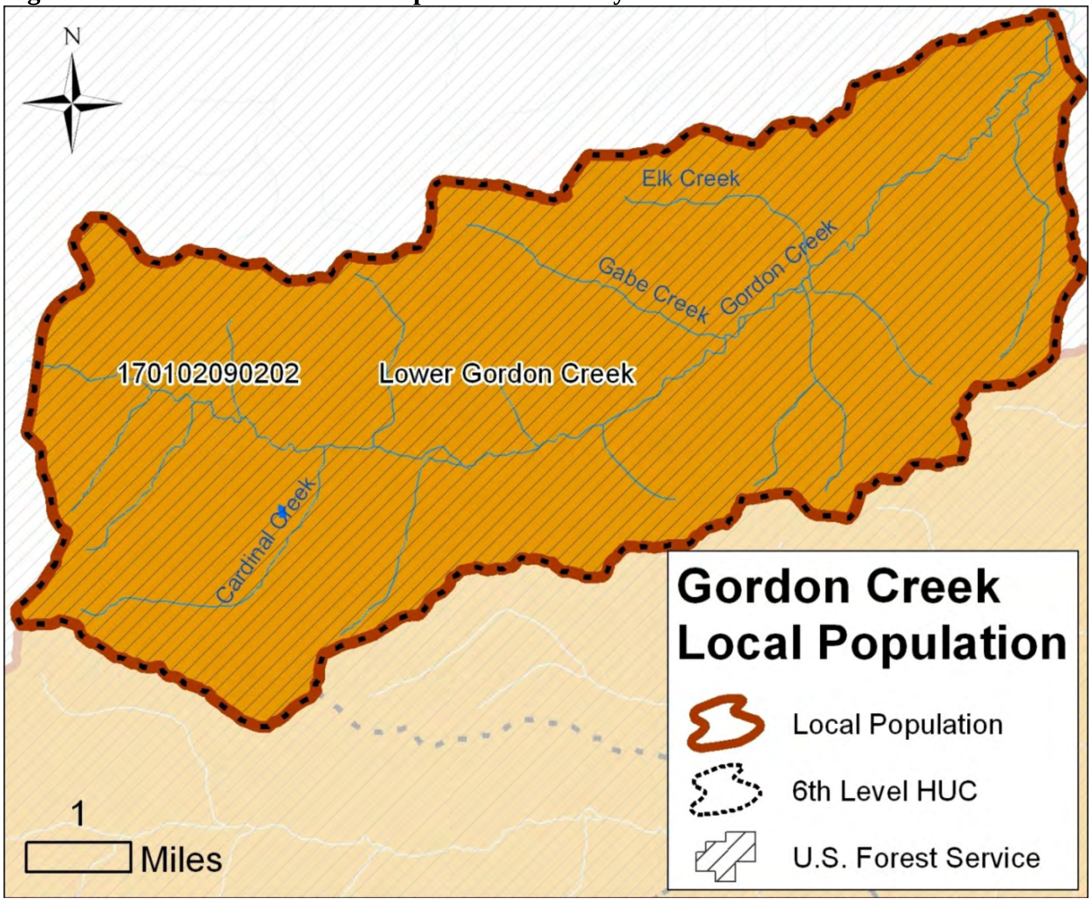
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Babcock Creek - 170102090104							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC.

Local Population: Gordon Creek

Figure 9-5. Gordon Creek Local Population Summary



Relative Importance of Population to Core Area (H,M,L): H

Table 9-3. Gordon Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
100-140	stable	Adfluvial	1	None
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

There are no driving factors to mention because this stream is in wilderness.

Confidence in your assessment (H,M,L): H

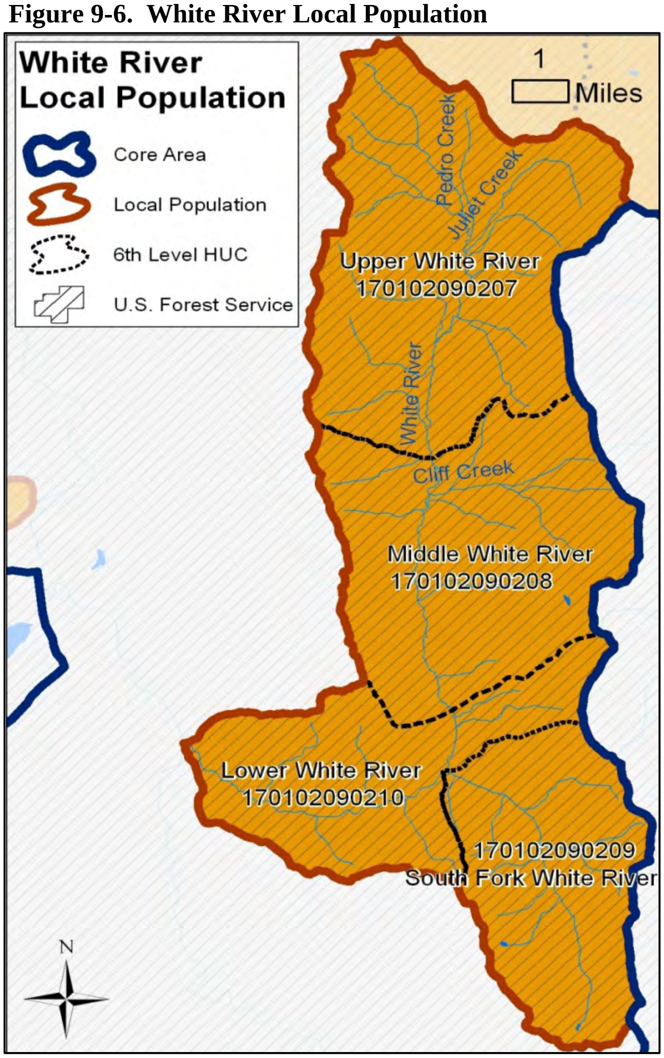
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Gordon Creek - 170102090202							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC.

Local Population: White River

Figure 9-6. White River Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 9-4. White River Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
70-90	stable	Adfluvial	1	None
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

There are no driving factors to mention because this stream is in wilderness.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper White River - 170102090207							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC. The White River was affected by the 1964 flood and has a high bedload which likely affects temperature and pools.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle White River - 170102090208							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC. The White River was affected by the 1964 flood and has a high bedload which likely affects temperature and pools.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): South Fork White River - 170102090209							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC. The White River was affected by the 1964 flood and has a high bedload which likely affects temperature and pools.

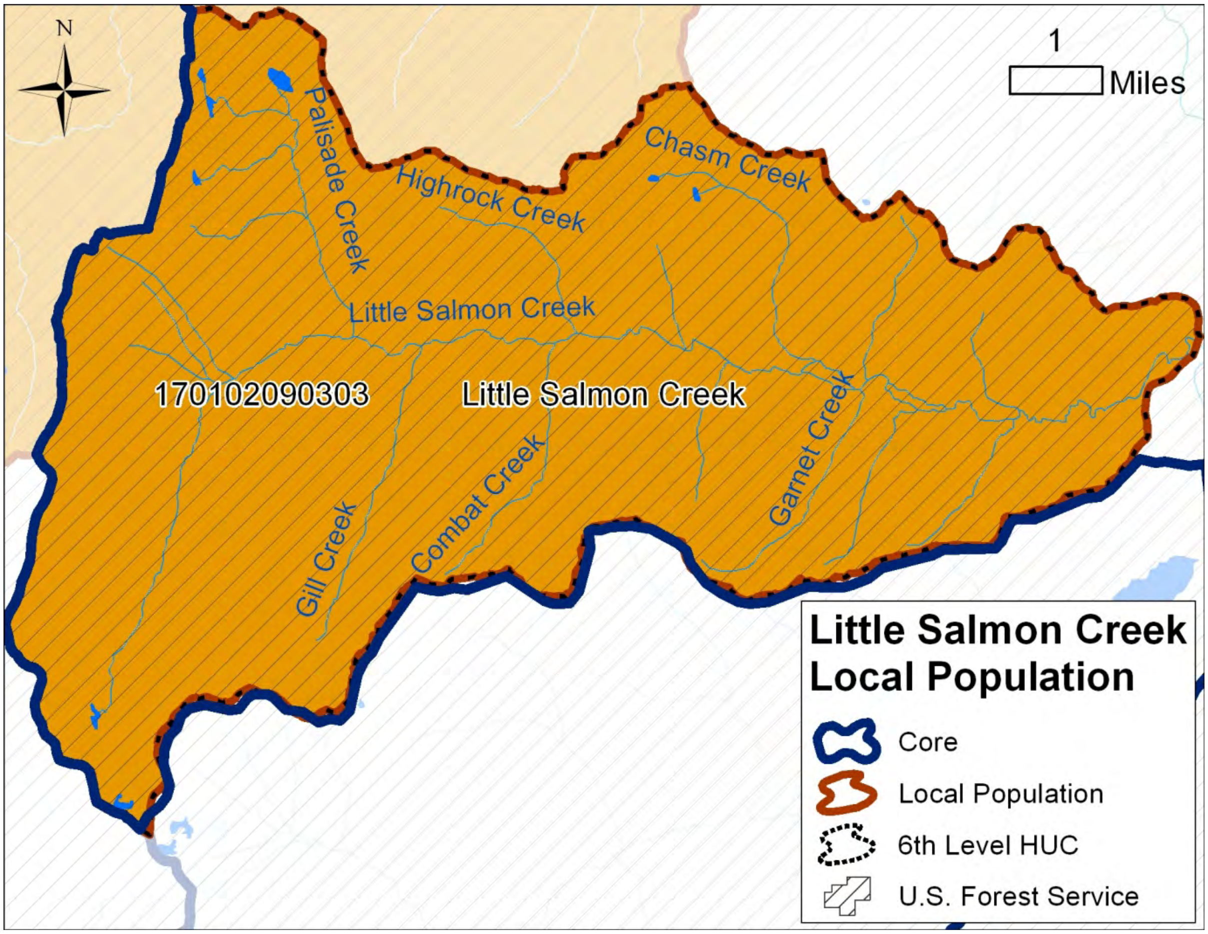
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower White River - 170102090210							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC. The White River was affected by the 1964 flood and has a high bedload which likely affects temperature and pools.

Local Population: Little Salmon Creek

Figure 9-7. Little Salmon Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 9-5. Little Salmon Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
30-60	stable	Adfluvial	1	None
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

There are no driving factors to mention because this stream is in wilderness.

Confidence in your assessment (H,M,L): H

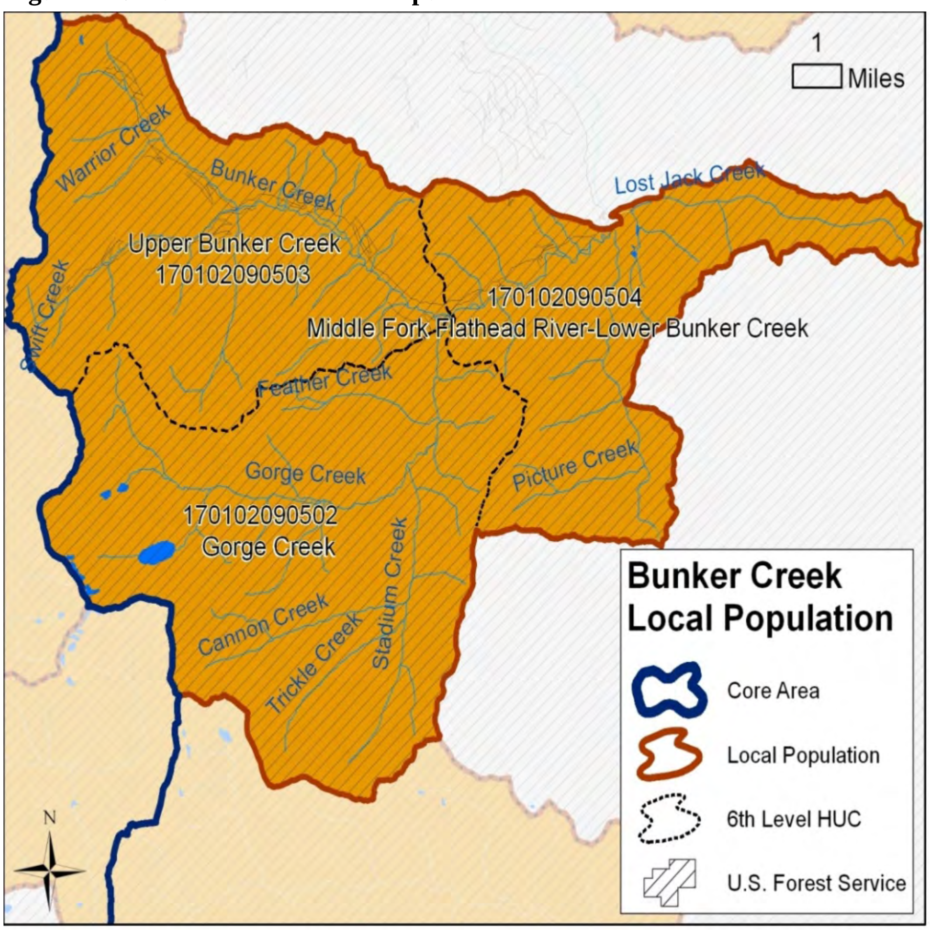
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Little Salmon Creek - 170102090303							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC.

Local Population: Bunker Creek

Figure 9-8. Bunker Creek Local Population



Relative Importance of Population to Core Area (H,M,L): L

Table 9-6. Bunker Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
10	stable	Adfluvial	1	None
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

Great habitat. Barrier falls just above (1/4 mile) Gorge Cr. Trailhead. Not much is needed for habitat improvement. Roads in upper Bunker except for main road have been decommissioned.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle Fork Flathead – Lower Bunker Creek – 170102090504							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	-	3	$0	-	-
Sediment	FA	FA	-	3	$0	-	-

No over-ride calls in this HUC.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Bunker Creek – 170102090503							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	-	3	$0	-	-
Sediment	FA	FA	-	3	$0	-	-

No over-ride calls in this HUC.

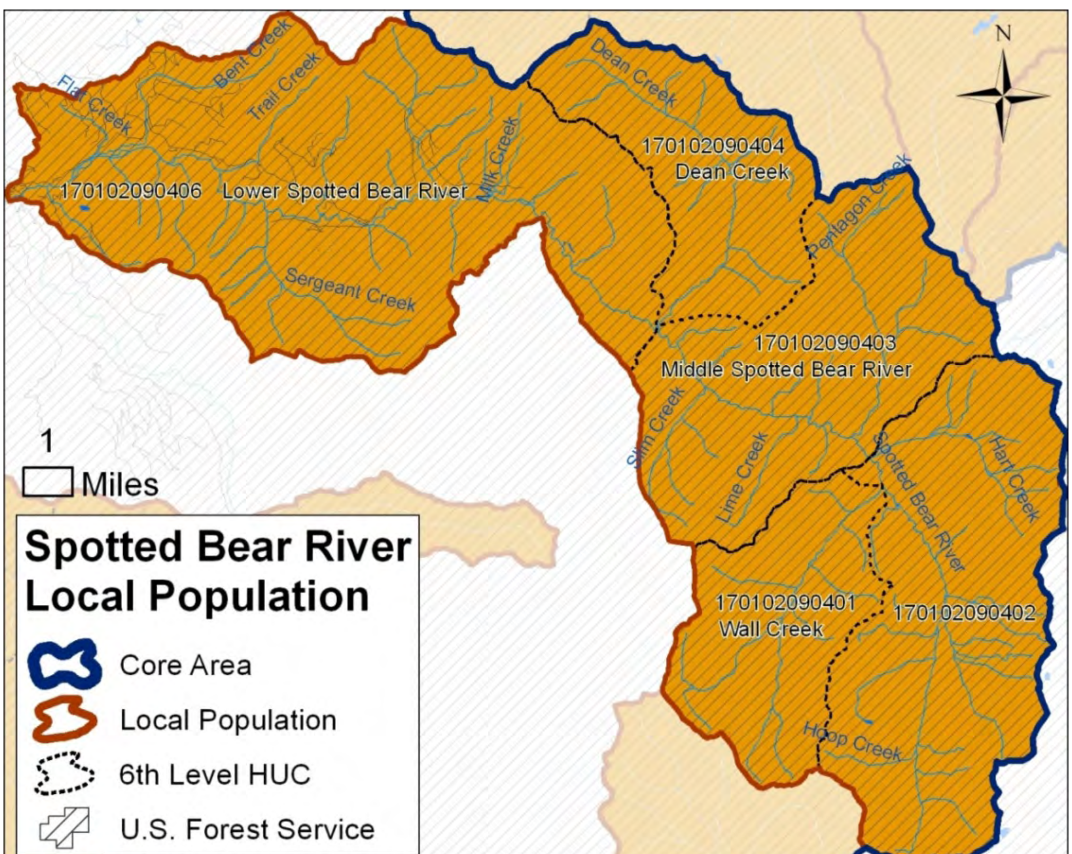
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Gorge Creek – 170102090502							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FA	-	3	$0	-	-
Sediment	FA	FA	-	3	$0	-	-

No over-ride calls in this HUC.

Local Population: Spotted Bear River

Figure 9-9. Spotted Bear River Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 9-7. Spotted Bear River Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat

<table>
<tr><td>20-40</td><td>stable</td><td>Adfluvial</td><td>1</td><td>None</td></tr>
<tr><th colspan="2">Significance of geographical location</th><th colspan="2">Vulnerability to Climate Change</th><th>Unique Population Attributes</th></tr>
<tr><td colspan="2">Low</td><td colspan="2">Low-Heavy ground water influence</td><td>Low</td></tr>
</table>

Driving Factors Determining Bull Trout Population:

There are no driving factors to mention – this watershed is a wilderness stream in the headwaters. Bull trout spawn below Dean Falls and above any potential affects from roads downstream. 1964 flood had greatest impact and river is still recovering from that due to braided channels.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Spotted Bear River- 170102090406

Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration

% Forest Service Ownership in HUC: 100%

Relative Contribution of Habitat in Limiting Local Population: Low

Functional Significance to Local Pop: High- spawning reach

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FAR	FAR	-	3	$0	-	-

No over-ride calls in this HUC.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Dean Creek – 170102090404

Strategy (Active Restoration, Passive Restoration, Conserve): Conserve

% Forest Service Ownership in HUC: 100%

Relative Contribution of Habitat in Limiting Local Population: Low

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FAR	FAR	-	3	$0	-	-

No over-ride calls in this HUC.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle Spotted Bear River - 170102090403							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FAR	FAR	-	3	$0	-	-

No over-ride calls in this HUC.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Wall Creek - 170102090401							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FAR	FAR	-	3	$0	-	-

No over-ride calls in this HUC.

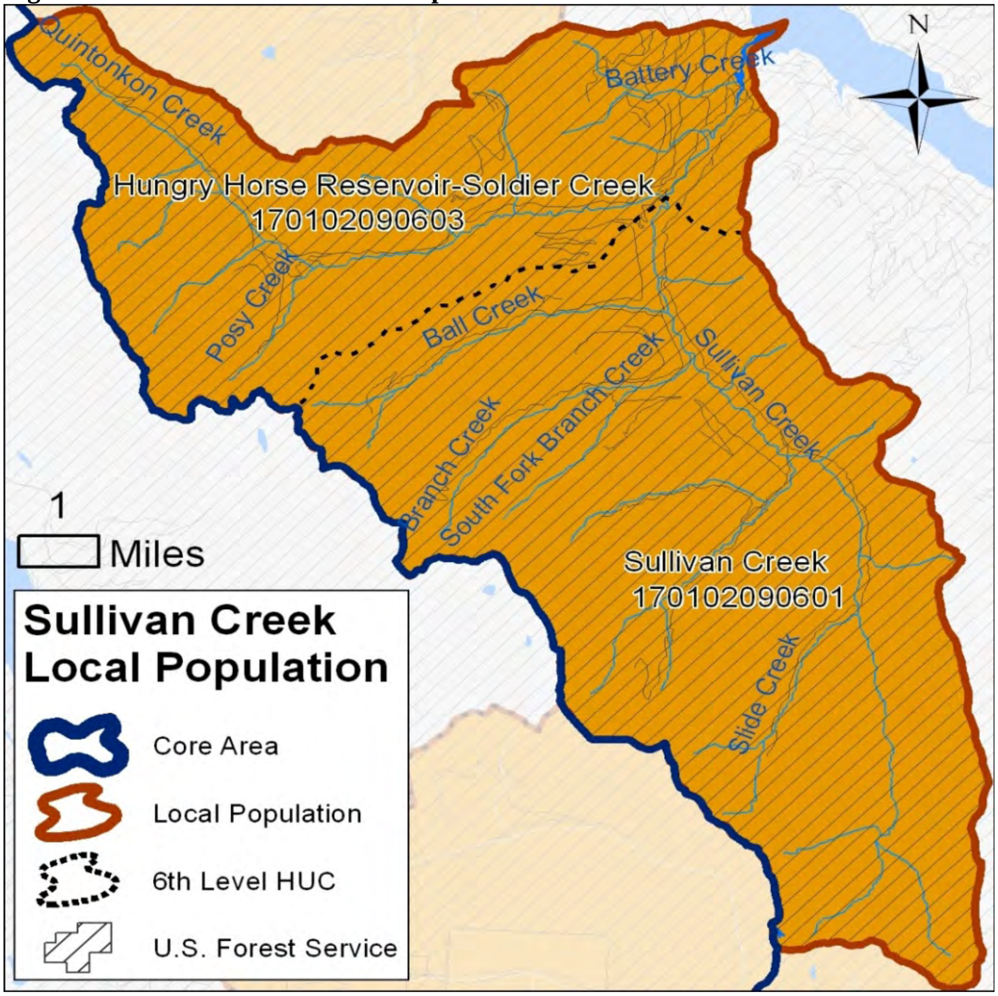
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Spotted Bear River Headwaters - 170102090402							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FAR	FAR	-	3	$0	-	-

No over-ride calls in this HUC.

Local Population: Sullivan Creek

Figure 9-10. Sullivan Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 9-8. Sullivan Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-75	stable	Adfluvial	1	None
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

The bull trout population in Sullivan Creek is stable. Ball, Branch, Conner roads are no longer used and could be decommissioned. They have been surveyed in the past and there are no deep fill culverts. Risks of failure are moderate while consequences of the failures are low due to the amount of fill and low number of culverts.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Sullivan Creek - 170102090601							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	1	$0	-	-
Barriers	FA	FA	10 years	1	$0	-	-
Pools	FAR	FA	10 years	1	$0	-	-
Sediment	FAR	FA	10 years	1	$0	-	-

Temperature: GIS rating= FAR, data and professional judgment rating = FA. There are PIBO sites on Conner and Sullivan Creek from 2003 and repeated in 2008. 2003 was an extreme fire year with elevated air temperatures. This can be seen by the water temperatures between years at both sites.

Barriers: GIS rating = FA, data and professional judgment rating = FA. There are no man made barriers that restrict bull trout passage in Sullivan Creek.

Pools: GIS rating = FAR, data and professional judgment rating= FAR.

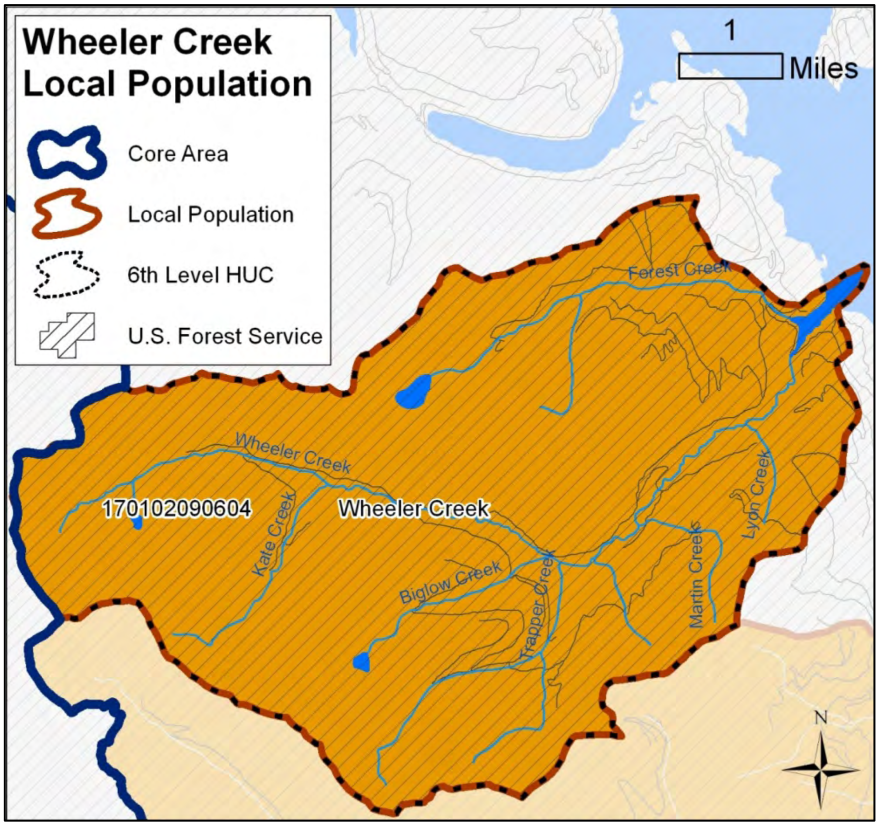
Sediment: GIS rating = FAR, data and professional judgment rating = FAR.

Table 9-9. Stream Temperatures in the Sullivan Creek Watershed

Stream	HUC6	Latitude	Longitude	Temp Days	WMT Days	Start Date	End Date	Avg Temp	MDMT	MWMT	WMT 12
Conner	170102090603	47.9733807	-113.669343	48	42	7/15/03	8/31/03	11.92	15.80	15.49	42
Conner	170102090603	47.9733807	-113.669343	48	42	7/15/08	8/31/08	9.38	12.60	11.71	0
Sullivan	170102090602	47.9415238	-113.648109	48	42	7/15/03	8/31/03	8.81	11.80	11.54	0
Sullivan	170102090602	47.9415238	-113.648109	48	42	7/15/08	8/31/08	6.96	9.80	9.34	0

Local Population: Wheeler Creek

Figure 9-11. Wheeler Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 9-10. Wheeler Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
15-25	stable	Adfluvial	1	None

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Low	Low-Heavy ground water influence	Low

Driving Factors Determining Bull Trout Population:

There is limited spawning habitat below waterfall and high road densities in the watershed. The Forest surveyed Rd #1611 in 2009 which has since been decommissioned. Need to survey Mink/Martin drainages.

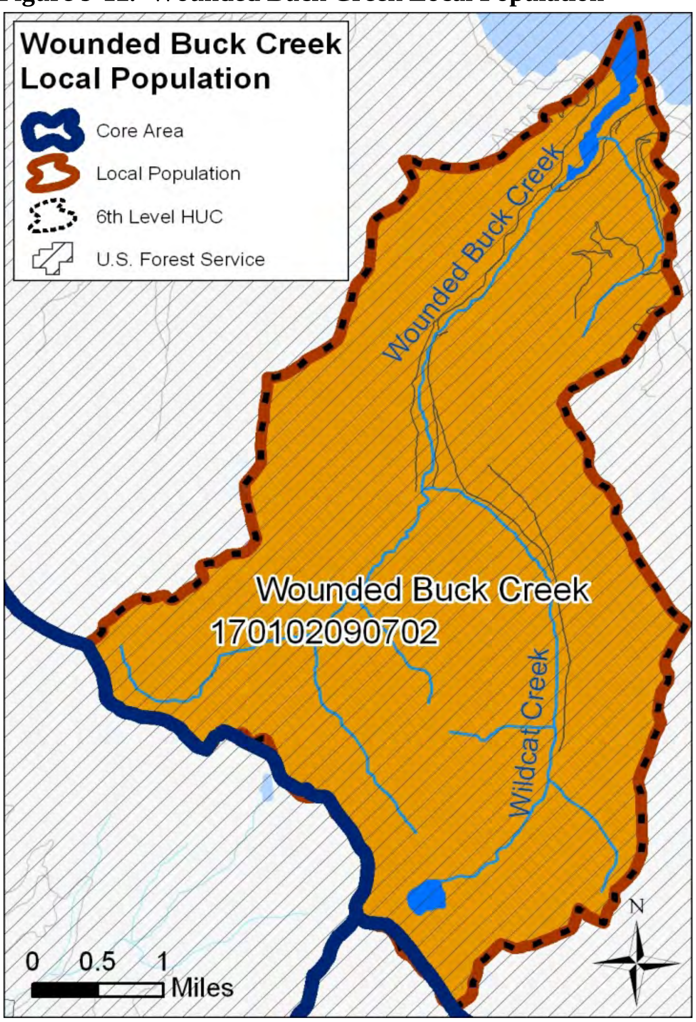
Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Wheeler Creek – 170102090604							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps(H,M,L)**
Temperature	FAR	FA	10 years	1	$0	-	-
Barriers	FA	FA	10 years	1	$0	-	-
Pools	FAR	FA	10 years	1	$0	-	-
Sediment	FUR	FA	10 years	1	$0	-	-
Integrated	FUR	FAR	10 years	1	$10,000	L	H

Local Population: Wounded Buck Creek

Figure 9-12. Wounded Buck Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 9-11. Wounded Buck Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
10-40	stable	Adfluvial	1	None
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low		Low-Heavy ground water influence		Low

Driving Factors Determining Bull Trout Population:

Large rain event in 2007 scoured channel and took out bridge on Rd #5339. Temperature monitors put in 2009. Culverts above have been pulled. There are really no habitat improvements needed. Substrate is rather large and spawning is somewhat limited relative to other South Fork tributaries.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Wounded Buck Creek - 170102090702							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High- spawning reach							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FAR	FAR	-	3	$0	-	-

Temperature: GIS rating = FAR, data and professional judgment rating = FA. There is a PIBO site in Lower Wounded Buck from 2005. Air Temperatures in 2005 were about average for the region.

Table 9-12. Wounded Buck Temperatures

Stream	HUC6	Latitude	Long	Temp Days	WMT Days	Start Date	End Date	Avg Temp	MD MT	MW MT	WMT 12
Wounded Buck	1701020 90104	48.265684	-113.948995	47	41	7/16/05	8/31/05	8.86	13.2	13.01	18

Barriers; GIS rating = FA, there are no man-made barriers for bull trout.

Pools: GIS rating =FAR**,** judgment call = FAR

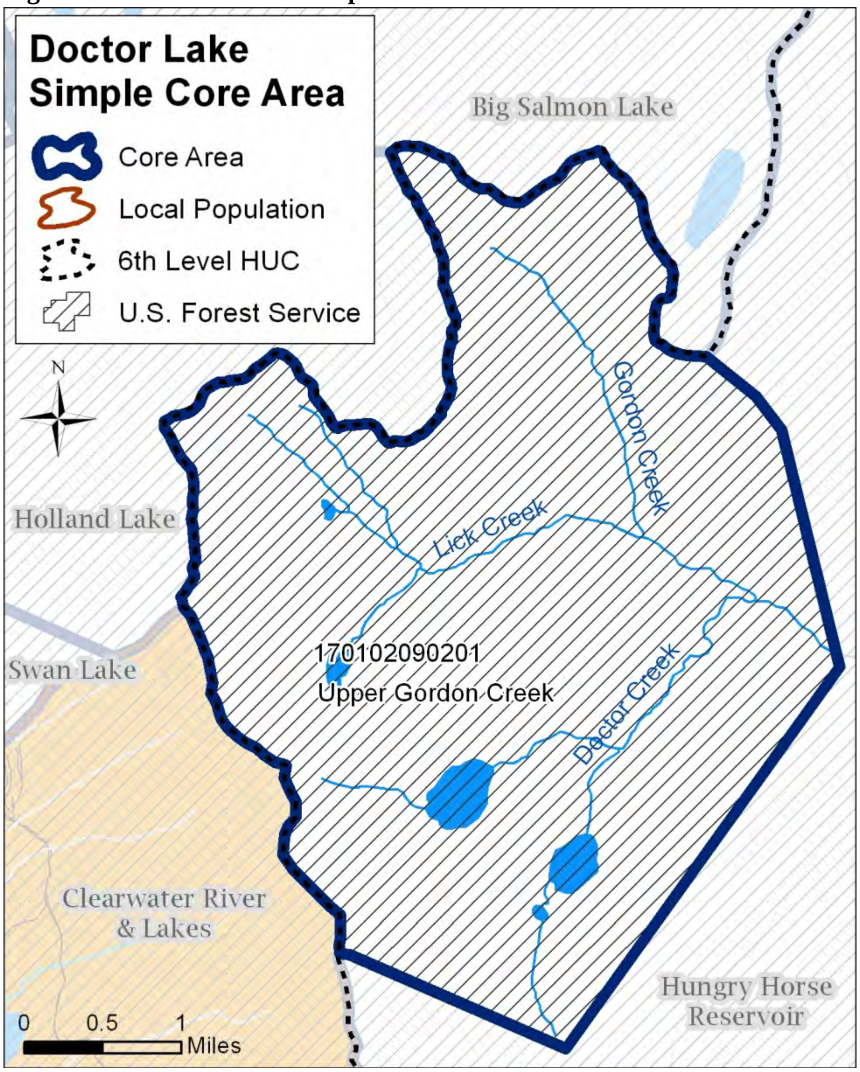
Sediment: GIS rating =FAR, judgment call =FAR

Simple Core Areas

There are two simple core areas discussed in this chapter – Doctor Lake & Big Salmon Lake.

Simple Core Area: Doctor Lake

Figure 9-13. Doctor Lake Simple Core Area



Relative Importance of Population to Core Area (H,M,L): H

Table 9-13. Doctor Lake Simple Core Area Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
20-30	stable	Adfluvial	1 at lake outlet	None
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High		Low – High elevation lake		High, disjunct population

Driving Factors Determining Bull Trout Population:

There are no driving factors to mention because this lake is in wilderness.

Confidence in your assessment (H,M,L): H

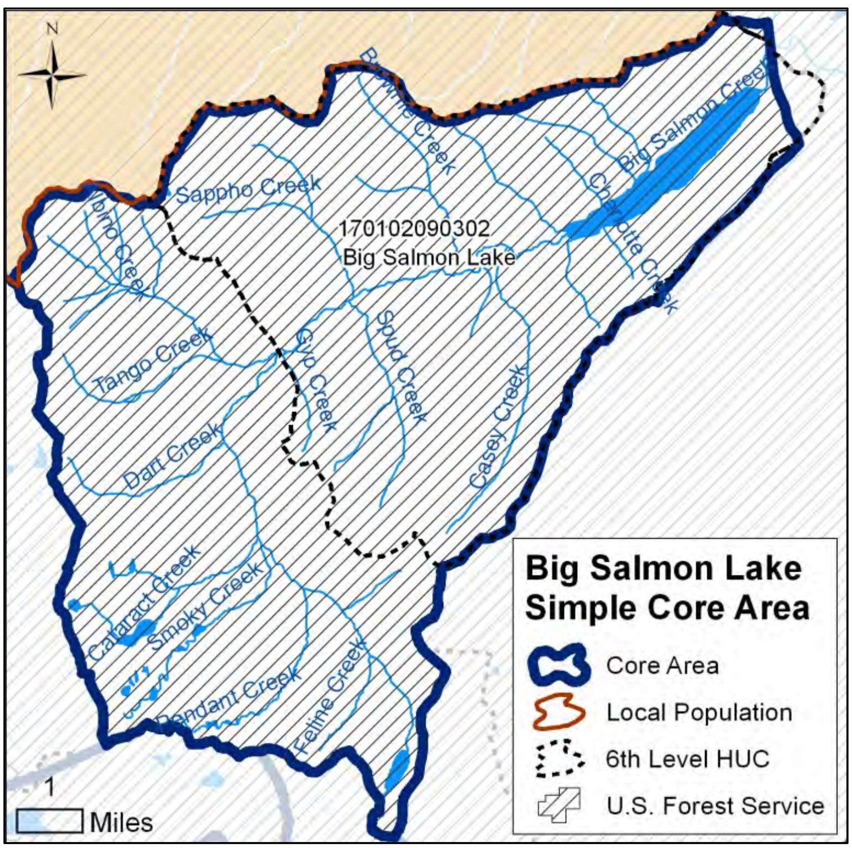
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Gordon Creek – Doctor Lake - 170102090201							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC.

Simple Core Area : Big Salmon Lake

Figure 9-14. Big Salmon Lake Simple Core Area



Relative Importance of Population to Core Area (H,M,L): H

Table 9-14. Big Salmon Lake Simple Core Area Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
100-150	stable	Adfluvial	1 (upstream to barrier falls)	None
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High		Low – Heavy ground water influence in spawning reach		High, disjunct population

<u>Driving Factors Determining Bull Trout Population:</u>

There are no driving factors to mention because this lake is in wilderness.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Big Salmon Lake - 170102090302							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No over-ride calls in this HUC.

Hungry Horse Core Area Summary:

Table 9-15 summarizes relevant information from each of the 6th field HUC local populations. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire Hungry Horse Core Area within the borders of the Flathead National Forest. It does not include necessary restoration activities in watersheds where the FNF has no ownership that may be critical for overall restoration of the bull trout population in the Core Area.

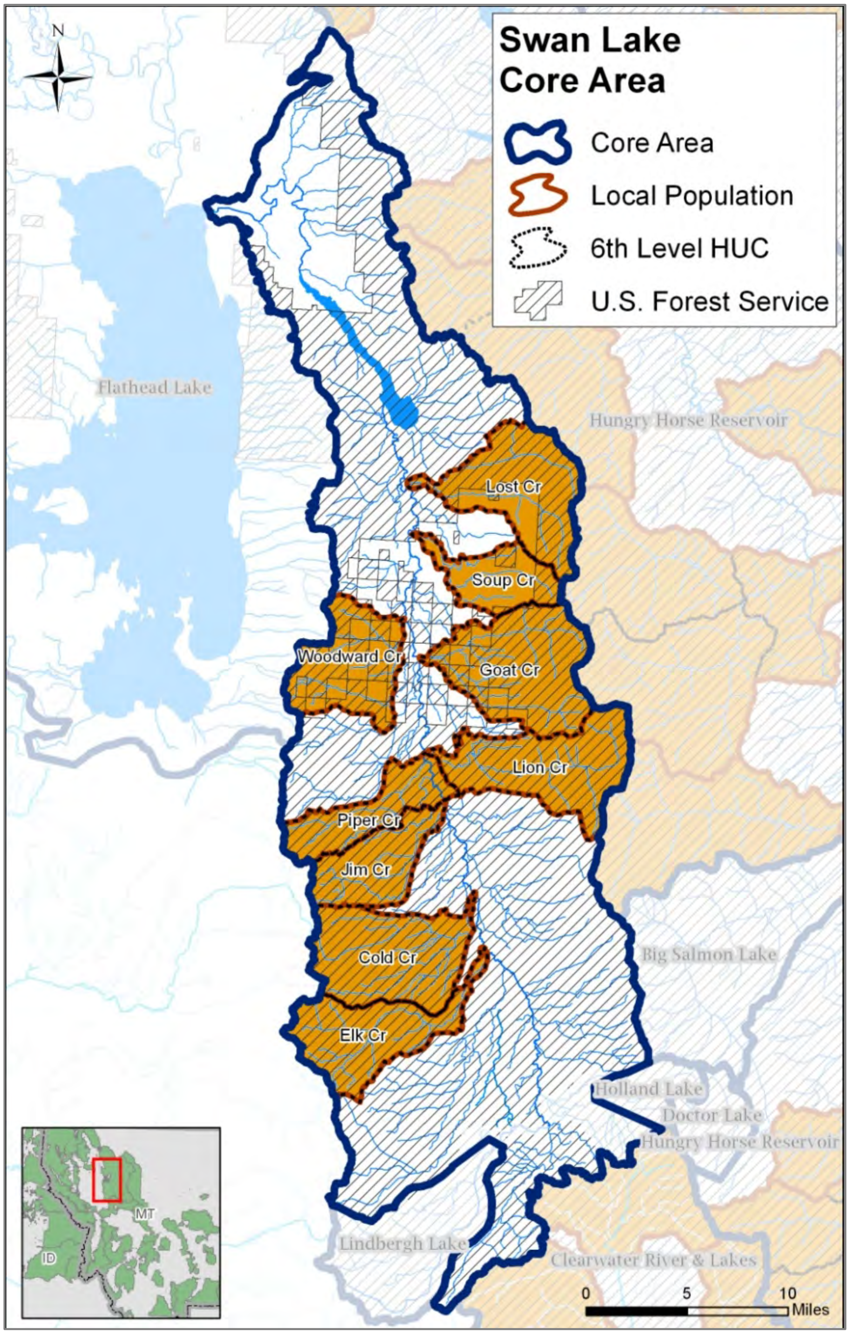
Table 9-15. Summary of important Local Population attributes and conservation recommendations for the Hungry Horse Core Area.

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
Danaher Creek	Lower Danaher Cr	High	Low	Conserve	-	-	-
	Upper Danaher Cr	High	Low	Conserve	-	-	-
	Basin Cr	High	Low	Conserve	-	-	-
	Rapid Cr	High	Low	Conserve	-	-	
Youngs Creek	Lower Youngs Cr	High	Low	Conserve	-	-	-
	Upper Youngs Cr	High	Low	Conserve	-	-	
	Babcock Cr	High	Low	Conserve	-	-	-
Gordon Creek	Lower Gordon Cr	High	Low	Conserve	-	-	-
Little Salmon Creek	Little Salmon Cr	High	Low	Conserve	-	-	-
Bunker Creek	Lower Bunker Cr	High	Low	Passive	-	-	-
	Upper Bunker Cr	High	Low	Passive	-	-	-
	Gorge Cr	High	Low	Conserve	-	-	-
Spotted Bear River	Lower Spotted Bear River	High	Low	Passive	-	-	-
	Dean Cr	High	Low	Conserve	-	-	
	Middle Spotted Bear River	High	Low	Conserve	-	-	-
	Wall Cr	High	Low	Conserve	-	-	-
	Spotted Bear River Headwaters	High	Low	Conserve	-	-	-
Sullivan Creek	Sullivan Cr	High	Moderate	Active	-	-	-
Wheeler Creek	Wheeler Cr	High	Moderate	Active	-	-	-
Wounded Buck Cr	Wounded Buck Cr	High	Low	Passive	-	-	-
Doctor Lake*	Upper Gordon Cr – Doctor Lake*	High	Low	Conserve	-	-	-
Big Salmon Lake*	Big Salmon Lake*	High	Low	Conserve	-	-	-

*Simple Core Area

Chapter 10: Swan Lake

Figure 10-1. Swan Lake and Surrounding Core Areas



Core Area Discussion:

The Swan Lake Core Area includes all of Swan Lake and the Swan River and all tributaries upstream. The Swan system is an important component of the overall Flathead River aquatic ecosystem. However, warm water temperatures in the lower Swan River (below Swan Lake) have most likely always limited the degree of bull trout movement between Flathead Lake and the Swan system.

This observation is supported by genetic evidence. The Swan Lake Core Area has therefore likely always functioned primarily as a separate core area from the Flathead.

Swan Lake is recognized as a bull trout stronghold. USFS and USFWS Biologists believe that current bull trout densities in the Swan Lake Core Area are roughly half of they were historically. This is in contrast to most Core Areas in western Montana, where densities are much less than their historic level. The distribution of populations throughout the core area is likely similar to historic patterns as well, with populations still relatively widespread where suitably sized streams exist. Life form expression (dominated by adfluvial adults) is probably also similar, as no major barriers exist. Bigfork Dam is the only large barrier, and its impact on bull trout movement is probably minimal due to natural water temperature issues described above. There is a barrier near the mouth of Cooney Creek, however we are uncertain of the degree of impact this may have on bull trout.

Bull trout populations in the Swan Lake Core Area (SLCA) were likely first exposed to significant human-caused impacts in the late 1800's. Prior to this time, bull trout were harvested by native Salish and Pend'Orielle peoples for thousands of years and maintained relatively robust and widespread populations throughout the SLCA. Beginning in the late 1800's, however, European settlement in the area increased, which brought more fishing pressure and intensive land uses that directly affected bull trout and their habitats. Logging by the Kalispell and Flathead Company and the US Forest Service in the early 1900's was directly and indirectly responsible for much of the change in habitat as large drainages important for adfluvial bull trout were roaded and harvested.

Beginning in 1910, another major change to the watershed began to take place as non-native fish were planted in the lake and throughout many tributaries. Yellow perch, brook trout, Yellowstone cutthroat trout, rainbow trout, and kokanee were all stocked in the system between 1910 and 1936. The effects of these species have not all been the same. Brook trout had perhaps the biggest long-term negative effect on bull trout, bringing threats of both competition and hybridization that continue to this day. In several major bull trout spawning tributaries over half the *Salvelinus* biomass is composed of brook trout and bull trout X brook trout hybrids. Kokanee, on the other hand, likely had a positive effect on bull trout populations by providing an abundant high-quality food source in the lake where the larger fish matured. While perhaps kokanee largely replaced the native westslope cutthroat trout, this effect may have bolstered the bull trout population by creating an unnaturally elevated prey base. In the period from approximately 1930 to 1960 bull trout populations were more carefully managed with increased angling protection and were observed to have increased in the SLCA.

In the 1950's-1960's, however, another era of extensive logging in the core area began. This time, roads were constructed to access the timber, which resulted in increased erosion and a proliferation of small-scale fish barriers at road/stream crossings throughout the watershed. These roads not only affected habitat, but also facilitated increased fishing and excessive harvest or poaching of spawning bull trout in many tributaries. These impacts occurred on both Forest Service and Plum Creek Timber Company lands throughout most of the SLCA.

On the fisheries front, the same time period saw the introduction of *Mysis* shrimp (1967) and the introduction of northern pike (approximately 1970) into Swan Lake. *Mysis* actually had a beneficial effect on bull trout populations by supplementing the food chain, but pike had the opposite effect by becoming not only a predator to juvenile bull trout but also a potential competitor for available food resources. Bull trout and northern pike have been somewhat more compatible in Swan Lake than some other systems through the past four decades, likely due in large part to the partitioning of available habitat and limited pike recruitment combined with robust productivity of bull trout in the system. The combined impacts of nonnative species, angling/poaching, and land management activities appear to have caused a marked decline in the bull trout population from about 1950 to the mid 1990’s.

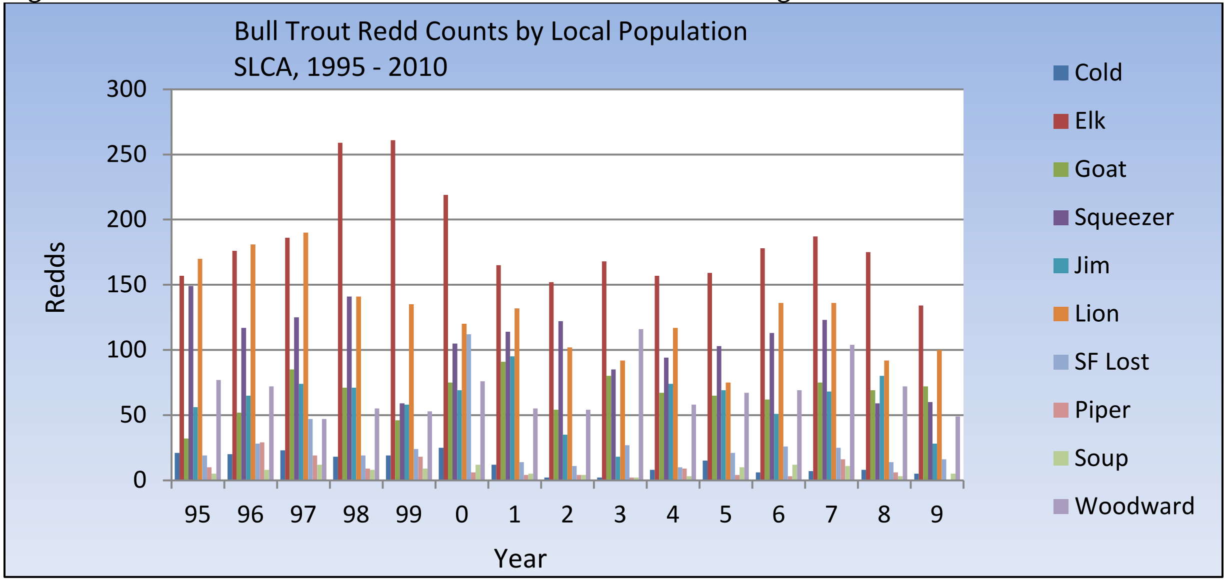
In the mid-1990’s, with the threat of ESA listing impending, greater angling restrictions were instituted on bull trout harvest. Angler harvest was gradually restricted over time and now no harvest of bull trout is permitted upstream of Swan Lake. Perhaps most significantly, the four most important spawning streams (Lion, Goat, Squeezer, and Elk) allow no recreational fishing at all, thus eliminating any incidental mortality. This action, along with cumulative effects of improved habitat practices, helped generate a noticeable increase in the SLCA bull trout population for the next decade or more. Until very recently, the Swan Lake population was considered strong enough to permit a limited recreational fishery on the lake itself. It is now a catch and release fishery.

The last several years, however, have seen a reversal in redd counts, suggesting that the population is again declining, and we speculate several reasons for this decline. The recent increase in lake trout in Swan Lake are most likely partially responsible for the decrease in bull trout as they are both top-level predators competing for the same resources, and predation on bull trout by lake trout does occur to some degree. In addition, the intense effort at lake trout removal in 2007-2012 (over 30,000 lake trout gillnetted and removed) has also resulted in bycatch of approximately 1,500 bull trout and projected mortality of nearly half these fish. The inherently high variability in bull trout populations may also be expressing itself. In any case, bull trout in the SLCA, while not currently represented at the levels they were historically, are still stronger than most Core Areas and likely represent a population that will remain strong if the lake trout threat can be successfully mitigated.

Many of the past direct habitat impacts associated with logging and road construction have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. Most spawning streams have relatively good habitat conditions. Recent inventory and monitoring work has found that many streams are within a standard deviation of unmanaged, reference streams. Beginning in the 1990’s and continuing into the early 2000’s many historic, undersized culverts were replaced and BMP’s on road surfaces greatly reduced the legacy impact of roads. Streamside buffers appear to adequately protect fish habitat during on-going timber harvest. Recent Federal acquisition of Plum Creek lands through the Montana Legacy Project and other improvements through programs such as the Montana DNRC HCP should continue to contribute to this positive habitat trend.

Figure 10-2 shows bull trout redd numbers in index reaches throughout the SLCA from 1995 through 2010 (FWP and USFS unpublished data). The data show that bull trout populations in many of the index reaches throughout the SLCA are relatively stable over the 16 year time period, however overall redd numbers are down recently due to the significant declines in Elk and Lion Creek. These two streams produce a large portion of the overall redds in the basin, and therefore influence cumulative counts.

Figure 10-2. Bull trout redd numbers in the SLCA from 1995 through 2010.



Currently, the main factors limiting bull trout populations in the SLCA are probably the lake trout and other non-native fish communities throughout the system (mainly northern pike in the lake and brook trout in tributaries), combined with the legacy of past land management actions that resulted in impacts to stream habitat. Other impacts, such as fishing mortality and poaching also remain a concern.

While none of these impacts is easy to address, it is important that we begin to address them while there are still relatively healthy bull trout populations to work with in the SLCA. It is likely that the impacts from any one of these sources cannot be eliminated entirely, but persistent improvement in each will contribute synergistically to a stronger population over the long-term, which will move us closer to delisting and ultimately recovery of the species.

For example, it is unlikely that we would be able to completely eliminate non-native fish from the watershed. However, the USFS should continue to coordinate with FWP on management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the watershed. Similarly, with the recent large-scale change in land ownership associated with the Montana Legacy Project, there will be opportunities to manage tributary watersheds more for the long-term productivity and resilience of aquatic ecosystems rather than strictly for timber production. The transportation system could also be addressed more completely due to these changes.

Swan Lake Core Area: Flathead National Forest

There are nine local populations within the core area on the Flathead National Forest. They are:

1. Elk Creek,
2. Cold Creek,
3. Jim Creek,
4. Piper Creek,
5. Lion Creek,

6. Goat Creek,
7. Woodward Creek,
8. Soup Creek, and
9. Lost Creek.

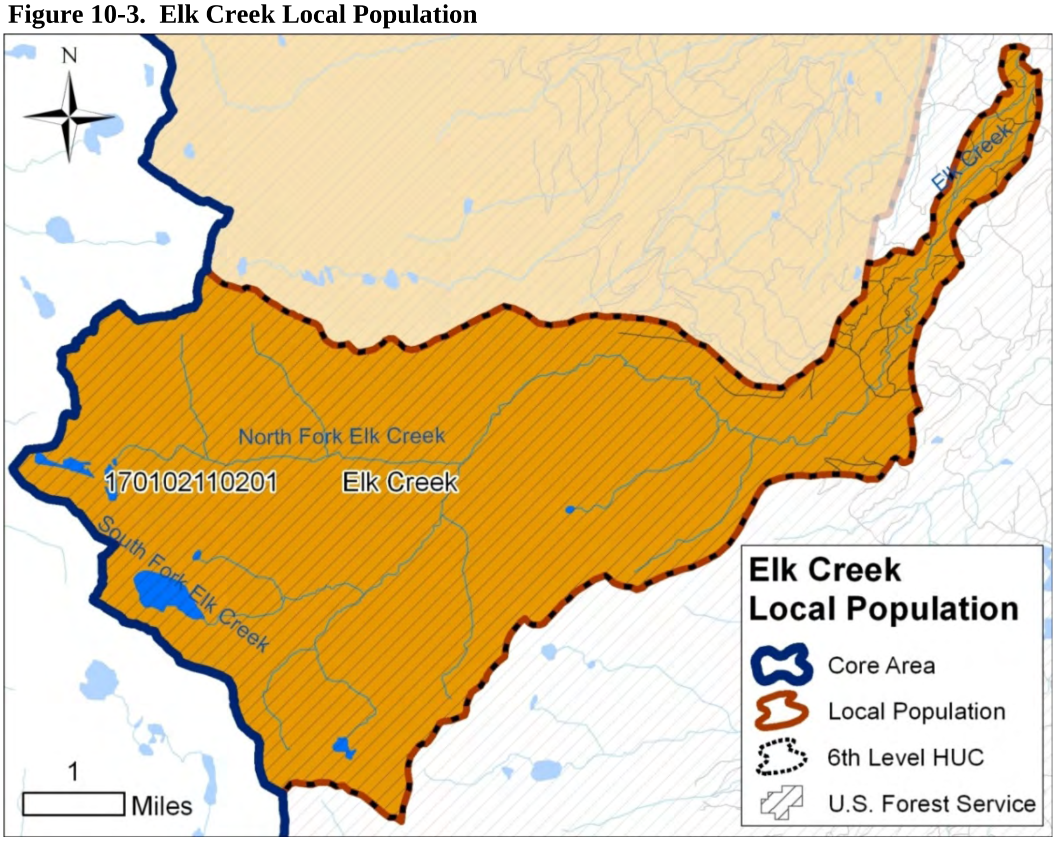
While adfluvial bull trout do spawn in other tributaries, these tributary streams support the majority of fluvial spawning, and redd numbers within them likely represent over 90 percent of the total adfluvial spawning that occurs in the basin. There are two disjunct populations (Holland and Lindbergh Lakes) that are considered separate core areas and are also monitored on an annual basis. Unfortunately, both Holland and Lindbergh Lake have been recently invaded by lake trout. So far as is known, limited interchange of bull trout occurs amongst the three Swan core areas. Discussions for these two simple core areas are also included in this chapter.

Of the nine local populations in the core area, Lion Creek, Goat/Squeezer Creeks, and Elk Creek currently support the majority of adfluvial bull trout spawning. A similar pattern, in terms of importance, may have existed historically between these streams as they provide the largest amount of high quality groundwater-influenced spawning and rearing habitat due to their relative size and quality.

Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Local Population: Elk Creek

Figure 10-3. Elk Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 10-1. Elk Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
3 year average is 168 redds x 3.2= 537 adults	Stable	Migratory Connected	1	EB, low LT in lake, currently low NP in lake, low
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
All Swan local populations are fairly close to each other. Elk is the southernmost & largest pop		Low. Groundwater system with natural flow regimes		Only local population with almost no EBT.

Driving Factors Determining Bull Trout Population:

This is a large, secure local population. Watershed is largely unroaded and has good habitat. This is only local population with minimal brook trout invasion. The only threat is the lake trout invasion in Swan Lake. Recent genetic assignment found that Elk Creek contributes less-than-expected adults in Swan Lake when compared to its large number of redds. This watershed happens to be the furthest upstream from Swan Lake. It is possible that some progeny from Elk Creek rear in the Swan River or possibly Lindbergh Lake and further evaluation is warranted.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Elk Creek - 170102110201							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 85%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: 2008 data found MWMT in rearing at 10C.

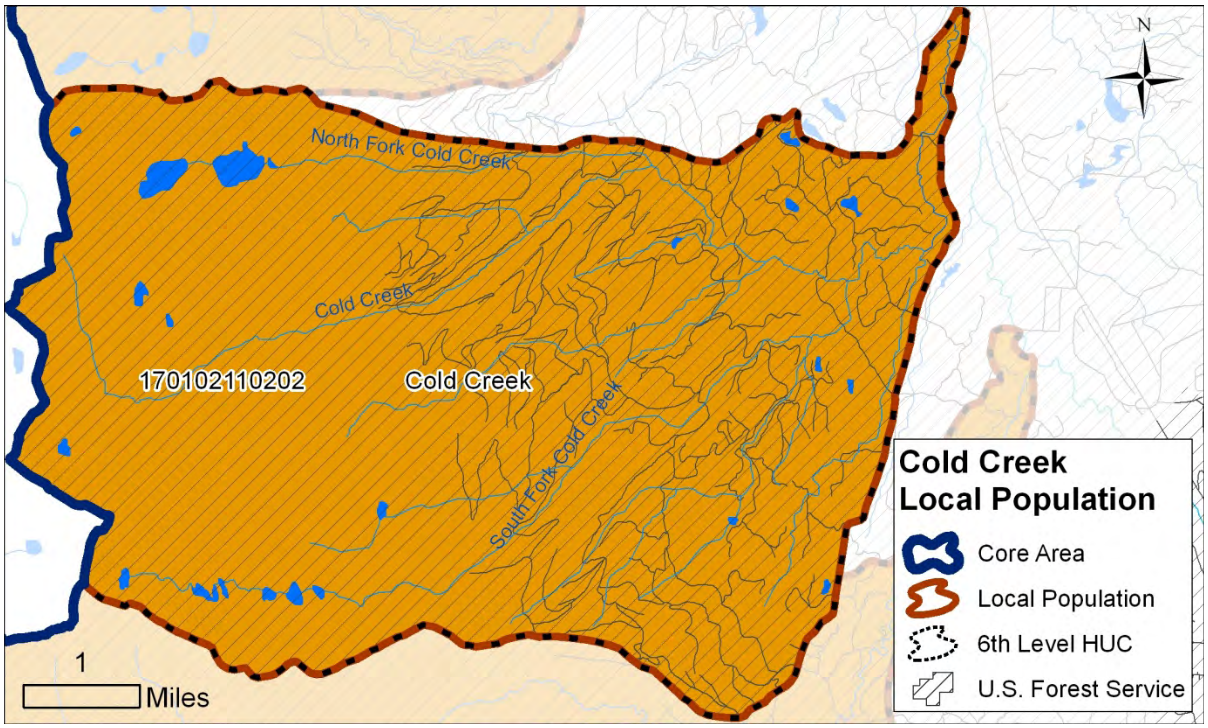
Barriers: 2002 inventory found no barriers.

Pools: 1997 R1/R4 surveys found 24.9 pools per mile with INFISH Riparian Management Objective for this stream size at >18 per mile. Many deep pools observed as well.

Sediment: Based on local research (Weaver and Fraley 1991), the Flathead Basin Commission recommends key bull trout spawning streams have a maximum of 35% fine sediment based on coring data. Streams with more than 35% are considered 'threatened' and streams with more than 40% are 'impaired'. Coring samples have been collected in Elk Creek since 1987 and range from 27 to 40% fines. Given that Elk Creek is largely unroaded, the coring sample range seems to demonstrate natural variability. Fine sediment has been less than 35% since 2000. The five year average of 2001-2010 is 31.1% fine sediment. Since this is within recommended level, sediment appears to be functioning appropriately.

Local Population: Cold Creek

Figure 10-4. Cold Creek Local Population



Relative Importance of Population to Core Area (H,M,L): L

Table 10-2. Cold Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
3 year average is 6.5 redds x 3.2=21 adults	Decreasing	Migratory, mostly connected. Several isolated tributaries may harbor fish?	1 long reach with scattered redds. May also support small resident pop in Middle Fork?	EB, High LT in lake, currently low NP in lake, low

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
All Swan populations are fairly close together	Medium. Some groundwater input but unnatural flow regimes	If residents exist, that would be unique

Driving Factors Determining Bull Trout Population:

This population declined substantially since 1995 (unlike others) and never recovered. Bull trout/brook trout hybrids are likely present in the watershed in unknown abundance. Hybrids have been observed in other portions of the Swan River, Swan Lake and Swan tributaries (Rosenthal, pers. Com. 2013). Older data suggests possibility of resident fish, but relatively little investigations or monitoring has taken place. Watershed is heavily roaded and logged. Habitat restoration may help but main threat is non-native fish. More investigation on status and a restoration plan is needed.

Confidence in your assessment (H,M,L): L

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Cold Creek - 170102110202

Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration

% Forest Service Ownership in HUC: 90%

Relative Contribution of Habitat in Limiting Local Population: Moderate

Functional Significance to Local Pop: Low

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FA	30 years	3	$0	L	L
Barriers	FUR	FA	5 years	2	$150,000	L	H
Pools	FA	FA	-	-	$0	-	-
Sediment	FAR	FA	10 years	2	$150,000	M	H

Temperature: 2008 mean weekly mean temperature (MWMT) just above spawning is 8.8C. However 2005-2007 monitoring at mouth (rearing habitat) found increasing MWMT from 15 to 17C. Suspected impacts from old harvests and numerous roads which altered channel shape, but may also be natural. Riparian area should passively heal over time. Decommissioning roads may also slightly help channel shape but should not be done solely for temp restoration.

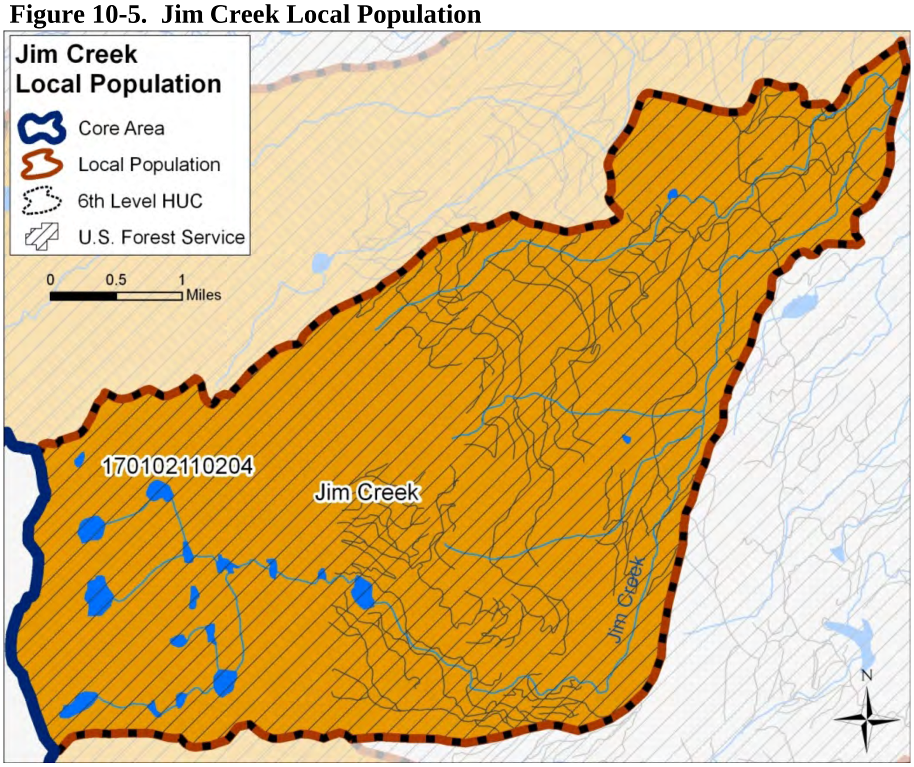
Barriers: 2002 inventory found 7 barriers on tributaries and one marginal one within spawning habitat. Since migratory fish currently pass this marginal pipe, it may not be a high priority to fix solely for passage. Several barriers have already remedied; however, more investigation is needed before fixing others. There is some funding potential to fix since this area is acquired by Legacy Land Act. However, even if all barriers are fixed, the magnitude of direct benefit to bull trout is not suspected to be great as the barriers are all on tributary streams.

Pools: 2007 and 2008 PIBO surveys (in different locations) found 36-60 pools per mile. Optimal range is >18. Fairly good depths of pools noted too.

Sediment: No coring data available. 2007 and 2008 PIBO surveys have 22-40% fine sediments based on pebble counts. 1994 Plum Creek visual surveys estimated 17.9% fine sediments. These values are on the high side but just barely within 1 standard deviation of similar wilderness streams. Substrate looks very embedded in lower three miles of stream spawning reach. Local citizens comment that stream has more fines than earlier. Culprit is likely legacy of old road construction. Several chronic erosion sites are known, a restoration plan is needed. Opportunities to reduce road surface sediment and remove constricting culverts especially due to new land acquisition. However, it is unclear if this would have a significant benefit to bull trout since data does not suggest serious habitat limitation. It is concluded reducing sediment would have a modest benefit and bull trout may respond. The fact remains that with this Core Area being as important as it is, all opportunities such as cumulative watershed benefits need to be more fully investigated. This watershed may hold potential for modest benefits to habitats that could provide added persistence security into the future. Also, a primary biological threat to the local population is expansion of, and interaction with, brook trout.

Local Population: Jim Creek

Figure 10-5. Jim Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 10-3. Jim Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
3 year average is 54 redds x 3.2= 173 adults	Was stable until 2009. Currently sharp decline	Migratory, connected	1 reach	EB, medium LT in lake, currently low NP in lake, low

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
All Swan populations are fairly close together	Medium. Has groundwater but also beaver ponds	

Driving Factors Determining Bull Trout Population:

Redd counts are highly variable and bounce around from 30's to 90's, but in recent years down to less than 20. Several large beaver dams may occasionally block migratory fish and increase water temperature. TMDL listed stream. MT DEQ cites sedimentation from past logging. Plum Creek has been critical of this determination and submitted reports stating habitat is unimpaired. As with other previously owned Plum Creek lands, this watershed provides an opportunity for more thorough evaluation of the road network and identification of potential chronic or acute watershed or stream impairments.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Jim Creek - 170102110204

Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration

% Forest Service Ownership in HUC: Roughly 50%, soon to be about 90% via Montana Legacy Project

Relative Contribution of Habitat in Limiting Local Population: Low

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FAR	FA	10 years	3	$100,000	L	M
Pools	FA	FA	-	-	$0	-	-
Sediment	FAR	FA	10 years	3	$25,000	L	L

Temperature: 2008 inventory in spawning found MWMT at 10C. Although dataset is small, this seems fairly accurate. Uncertain if any restoration is possible - this may be natural.

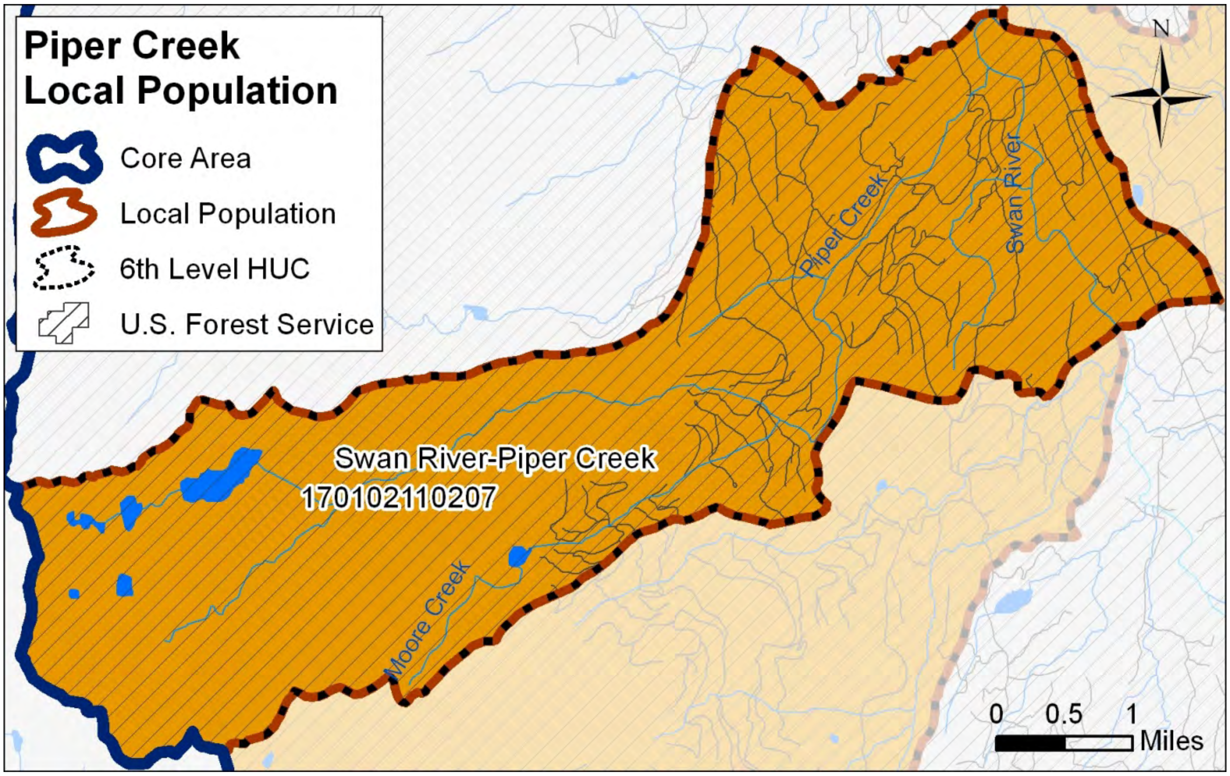
Barriers: 2002 inventory found 2 barriers on a tributary to Jim Creek. It is unlikely they are blocking bull trout but investigation is needed. There is potential to fix since it is newly acquired land.

Pools: 1994 Plum Creek survey found 45 pools per mile, 2003 PIBO found 89 per mile and 2008 PIBO (different location found 85 per mile). INFISH RMO is > 18-23 per mile.

Sediment: Coring data indicates declining fine sediments since the 1990s (when DEQ listed the stream). Fine sediments gradually declined from 50% to 35%. 2004 was the first year that Jim Creek dipped below 35% fine sediment and met recommendations from the Flathead Basin Commission. 2008-2010 (the most recent data available) were also below 35%. The five year average is 35.2% fines suggesting that Jim Creek is approaching its target. Pebble counts in PIBO surveys also found sediments on edge of 1 SD of wilderness streams. Sediment source was likely controversial PCTC riparian logging in late 1980's. Effects have likely abated over time. A partial road inventory in 2002 suggested very little sediment coming from roads. A more thorough inventory might uncover some spot opportunities but overall potential benefits to bull trout are anticipated to be modest at this time.

Local Population: Piper Creek

Figure 10-6. Piper Creek Local Population Summary



Relative Importance of Population to Core Area (H,M,L): M

Table 10-4. Piper Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
3 year average is 6.2 redds x 3.2= 20 adults	Declining. No redds in 2009	Migratory, connected	1 reach	EB, high LT in lake, currently low NP in lake, low

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
All Swan populations are fairly close together	Medium, relatively little groundwater, medium elevation	

Driving Factors Determining Bull Trout Population:

This local population appears to have never been very large and has declined in recent years. No redds were found in 2009. Brook trout are suspected as a primary limiting factor. Bull trout/brook trout hybrids are likely present in the watershed in unknown abundance. Hybrids have been observed in other portions of the Swan River, Swan Lake and Swan tributaries (Rosenthal, pers. Com. 2013).

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Piper Creek - 170102110207							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 90%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: 2002 MWMT in spawning reaches was 13C. 2008 MWMT just above spawning is 10.5C. There is one beaver dam on stream that may have some impact. Temperature situation is assumed natural.

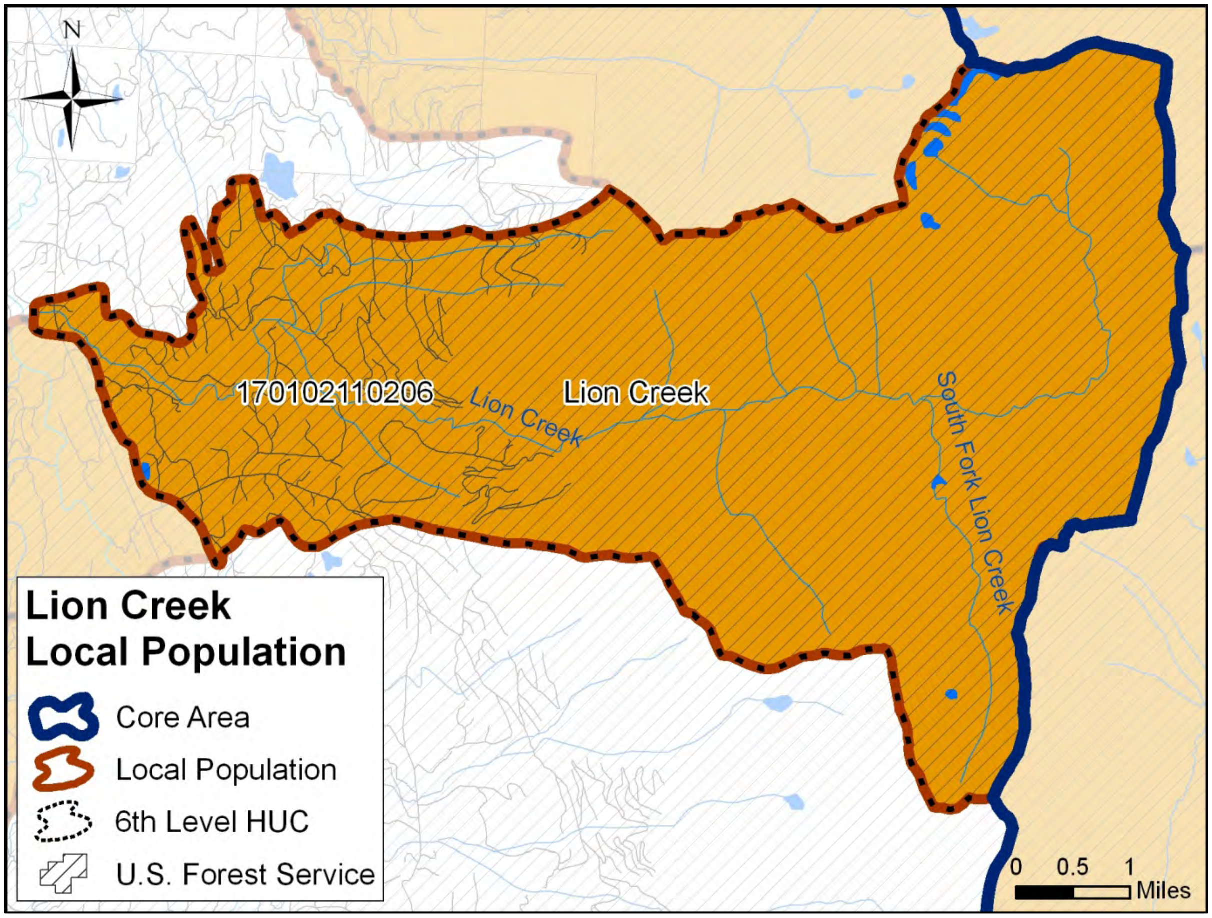
Barriers: 2002 inventory found no barriers.

Pools: 1994 Plum Creek watershed assessment found and average of 79 pools per mile in spawning reaches, goal is 48. 2008 PIBO subsample found 67 pools per mile, goal is 23.

Sediment: No coring data. 2008 PIBO found 15.3% fines, well within range of reference streams. Road sediment survey by Plum Creek in 1994 found very few erosion point sources. Forest watershed roads analysis may provide additional detail on road network impairment and improvement opportunities.

Local Population: Lion Creek

Figure 10-7. Lion Creek Local Population Summary



Relative Importance of Population to Core Area (H,M,L): H

Table 10-5. Lion Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
3 year average is 116 redds x 3.2=371	Stable	Migratory, Connected	1 big reach	EB, high LT in lake, currently low NP in lake, low
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
All Swan populations are fairly close together		Low. Groundwater system with natural flow regimes		Tolerates higher than average sedimentation

Driving Factors Determining Bull Trout Population:

This is large, stable population that also is a large contributor to adult bull trout production in the overall Swan Lake system. Only threats are from brook trout (and lake trout in Swan Lake). Habitat is in natural condition.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lion Creek - 170102110206							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 95%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FAR	FAR	-	-	$0	-	-

Temperature: MWMT is 8.8C.

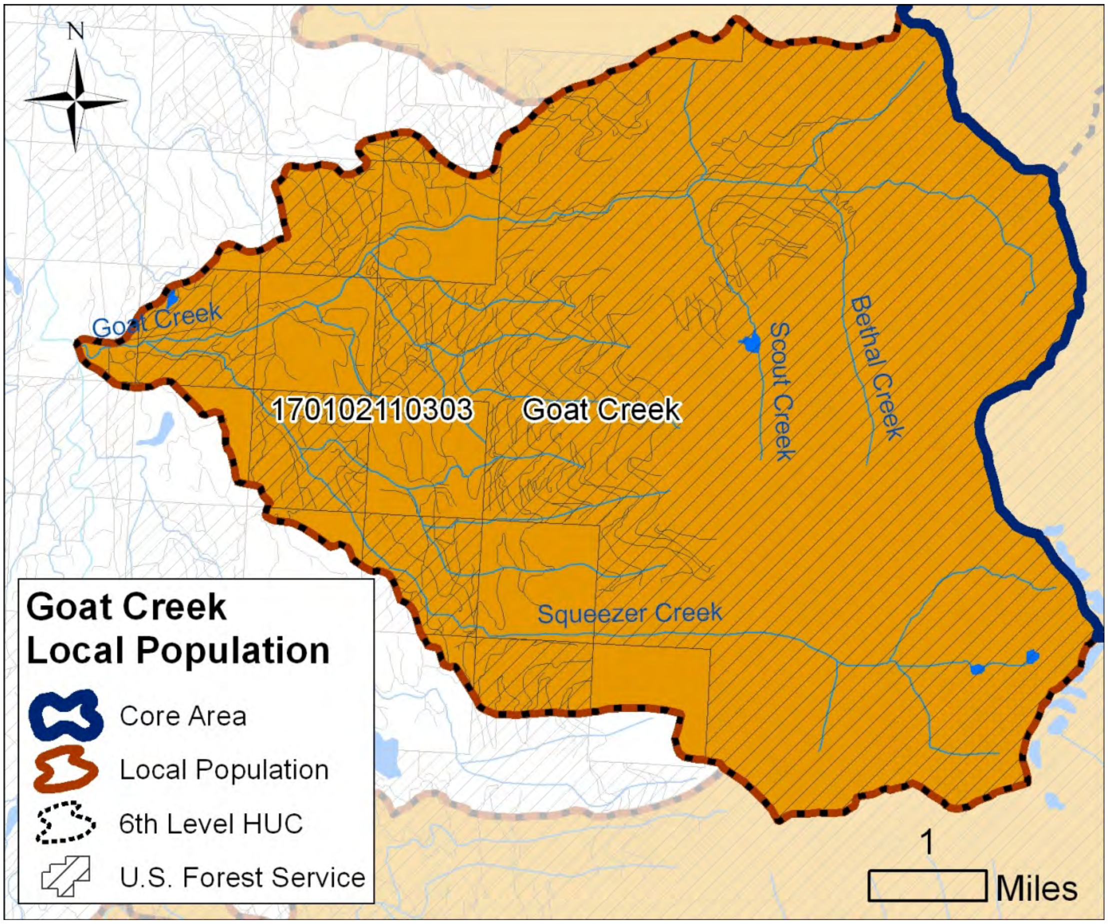
Barriers: 2002 inventory found no barriers.

Pools: 2009 PIBO found 23.3 per mile, goal is 18.

Sediment: Coring data has been collected since 1987. Peaked at 45% in 1991 and has since stabilized between 35-40%. These sediment levels are believed to be natural. DEQ seems to agree and removed stream from 303(d) list.

Local Population: Goat Creek

Figure 10-8. Goat Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 10-6. Goat Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
3 year average is 158 redds x 3.2=506	Stable? Squeezer has declined since 2007	Migratory, Connected	2 big reaches, one in Goat and one in Squeezer	EB, medium LT in lake, currently low NP in lake, low
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
All Swan populations are fairly close together		Low. Groundwater system with natural flow regimes		

Driving Factors Determining Bull Trout Population:

This is a large population that seems stable other than Squeezer in recent years. Genetic assignment work done by USFWS indicates that this system is a disproportionate contributor to adult bull trout production in Swan Lake. Genetic assignment also verified that Goat and Squeezer function as a single population. The redd decline in Squeezer may be due to difficult surveying conditions in recent years. It is a TMDL listed stream due to prior logging but habitat conditions seem much improved. This land was purchased as part of the Montana Legacy Lands project from Plum Creek Timber and transferred to the DNRC with a conservation easement held by FWP. . Though the Plum Creek hydrologist reports past road erosion has stabilized, there should be an effort to investigate the road network and look for strategic investments to remove watershed risks and additional potential chronic sources of habitat impairment.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Goat Creek - 170102110303							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: Roughly 45%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: Only data collected is at stream mouth. 15C MWMT from 2005-2007. There are no known temperature problems.

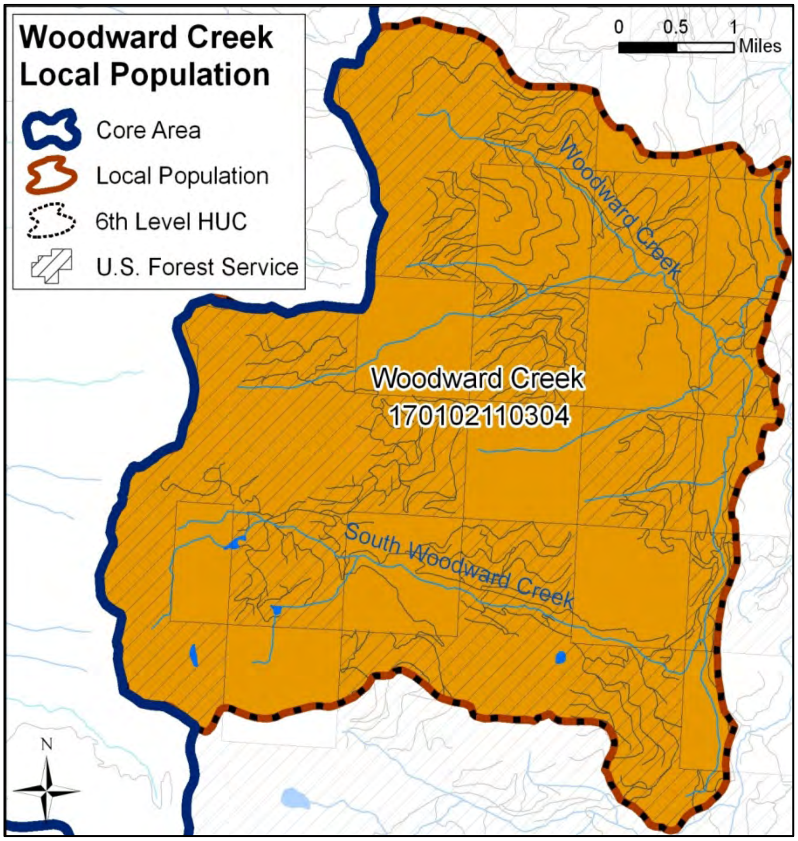
Barriers: 2002 inventory found no barriers.

Pools: Plum Creek watershed assessment found 79 pools per mile average, while the INFISH riparian management objective (RMO) is identified as 23.

Sediment: Coring data has been collected in both Goat and Squeezer since 1987, although the location moved in 1994. Five-year averages from 2005 to 2010 found Goat has 32.3% fine sediment and Squeezer has 32.8% fine sediment. Both streams are within recommendations of the Flathead Basin Commission and sediment appears to be functioning appropriately.

Local Population: Woodward Creek

Figure 10-9. Woodward Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 10-7. Woodward Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
3 year average is 86 redds x 3.2 = 275	Declining	Migratory, Connected	2 reaches. South Woodward and mainstem	EB, high LT in lake, currently low NP in lake, low

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
All Swan populations are fairly close together	Medium. Groundwater system but low elevation	Seems to tolerate high percentage of fines in rearing habitat (not spawning)

Driving Factors Determining Bull Trout Population:

This is a large population but redd count numbers were significantly down in 2009. Overall the population appears to be persisting in spite of the high density of brook trout, but future trends need to be closely monitored. Bull trout/brook trout hybrids are likely present in the watershed in unknown abundance. Hybrids have been observed in other portions of the Swan River, Swan Lake and Swan tributaries (Rosenthal, pers. Com. 2013). .

Confidence in your assessment (H,M,L): L

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Woodward Creek - 170102110304							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: Roughly 15%							
Relative Contribution of Habitat in Limiting Local Population: Low-Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA?	FA	-	-	$0	-	-
Barriers	FAR	FA	1 year	3	$150,000	L	L
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FAR	FAR	-	-	$0	-	-

Temperature: There is no known data. Just have to assume it is adequate in spawning areas.

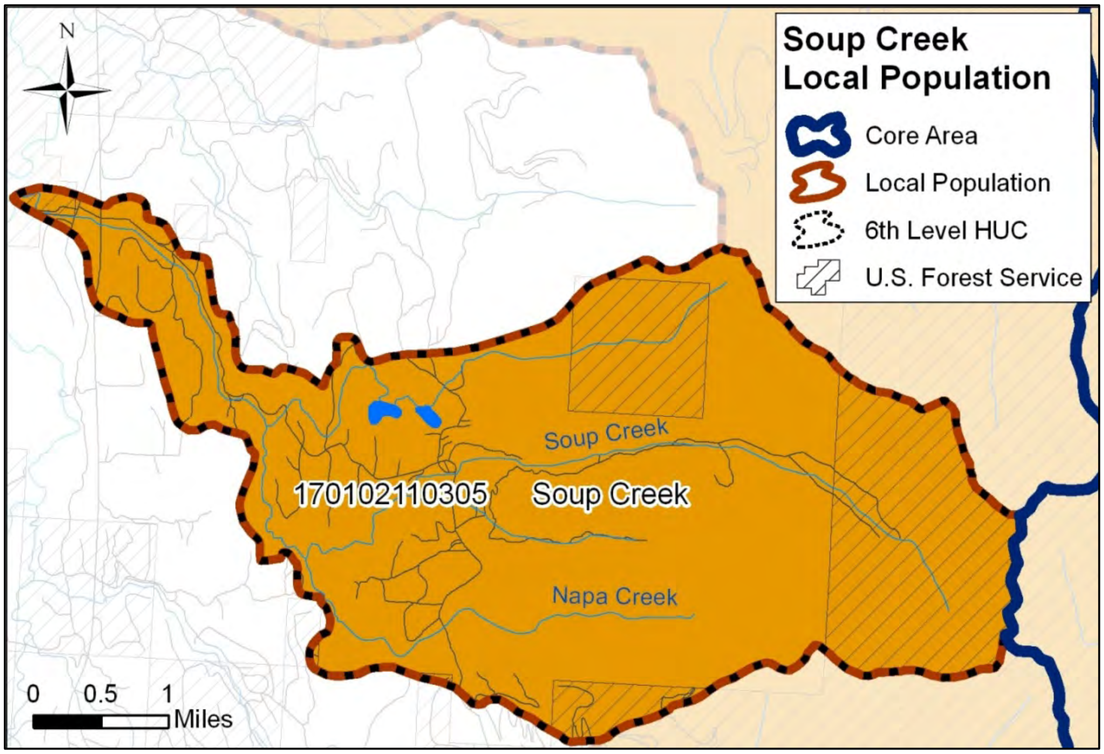
Barriers: 2002 inventory found 4 barriers but all seem to be upstream of known bull trout spawning. Replacing lowest barrier may have a very slight benefit to juvenile rearing. This is a complicated culvert and will be expensive. Cost estimate is only for lowest barrier.

Pools: 2001 DNRC R1/R4 survey of mainstem found 4.5 pools per mile, well below goal of 18. However 50% of these pools are high quality.

Sediment – Recent work by electrofishing crews noted deep silt and sand beds in rearing areas (lots of storage). 2001 DNRC R1/R4 survey found 24.6% fines in pebble counts, which is within reference range. 5-year average of coring data in spawning habitat on mainstem is 36%, but South Fork is 26%. No upward or downward trend.

Local Population: Soup Creek

Figure 10-10. Soup Creek Local Population



Relative Importance of Population to Core Area (H,M,L): L

Table 10-8. Soup Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
3 year average is 7.7 redds x 3.2=25 adults	Declining	Migratory, Connected	1 reach	EB, high LT in lake, currently low NP in lake, low
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
All Swan populations are fairly close together		High. Stream seems to have little or no groundwater & a small population to begin with.		

Driving Factors Determining Bull Trout Population:

This is a small population with recent downward trend. There are very high densities of brook trout. 2008 effort to collect juvenile bull trout could not capture a single bull trout. This conflicts with redd count information and indicates further investigation in Soup Creek is urgently needed. Note: Soup Creek is not designated as critical habitat.

Confidence in your assessment (H,M,L): L

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Soup Creek - 170102110305							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 20%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FAR	FA	5 years	3	$30,000	L	H

Temperature: 2001-2004 measurements found 16-19C MWMT. The cause of elevated temperatures is unknown. DNRC EIS in 2006 suggests some potential impact from past road construction but no restoration identified.

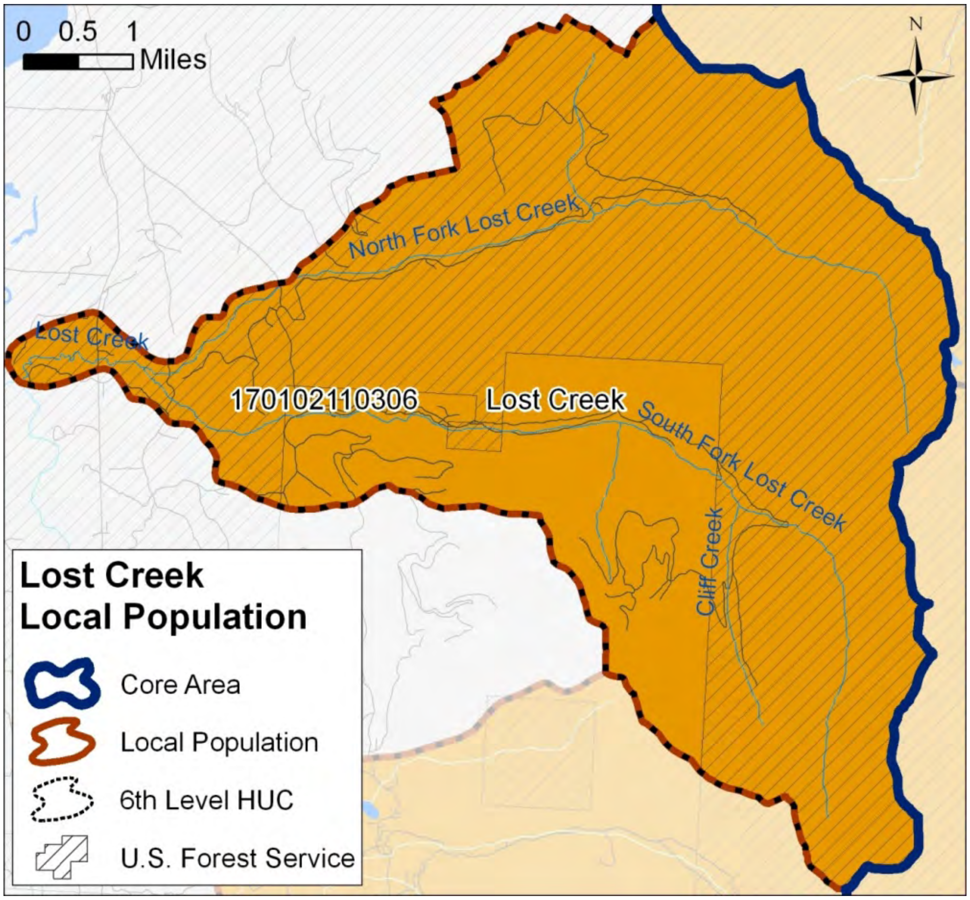
Barriers: 2006 DNRC EIS reports no barriers.

Pools: 2002 R1/R4 inventory by DNRC found 27.8 pools per mile, goal is 48. There is plenty of wood present. Unknown if this is a natural state or reflection of past land management impacts.

Sediment: 5-year average of coring is 38% and appears to be increasing. 2006 EIS identified about 30 tons per year coming from road network. DNRC may plan to correct in the future via integrated vegetation management project.

Local Population: Lost Creek

Figure 10-11. Lost Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 10-9. Lost Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
3 year average is 23.2 redds x 3.2= 74 adults.	Declining. Last 2 years are down	Migratory, Connected	2 reaches. South Fork monitored annually. North Fork sparsely monitored.	EB, high LT in lake, currently low NP in lake, low

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
All Swan populations are fairly close together	High. Limited groundwater input. Naturally dewaters at mouth and vulnerable to further loss	Migratory fish somehow negotiate past dewatered area.

Driving Factors Determining Bull Trout Population:

Bull trout apparently negotiate past chronic de-watered area near the mouth, potentially via earlier upstream migration. South Fork appears to contribute about 2/3 of local population. North Fork is monitored infrequently and recent redd counts with large numbers of redds suggest this stream should be monitored more closely. Brook trout hybrids observed in South Fork. Watershed was subject to severe degradation from 1910 logging but past impairments have likely been reduced over time. Recent genetic assignment found Lost Creek contributes more than expected to number of adults in Swan Lake as compared to the number of redds. Lost Creek happens to be the closest spawning tributary to Swan Lake and it may be more important than previously thought.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lost Creek - 170102110306

Strategy (Active Restoration, Passive Restoration, Conserve): Conserve

% Forest Service Ownership in HUC: Roughly 70%

Relative Contribution of Habitat in Limiting Local Population: Low

Functional Significance to Local Pop: Moderate

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FAR	FAR	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FAR	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

Temperature: 1999, 2002, 2003 readings in North Fork spawning areas found MWMT 10-11C. Groundwater is fairly sparse, believed natural condition. 2001-2004 readings in South Fork spawning found MWMT 11-13C. Some groundwater here but daily fluctuations noted. 2006 DNRC EIS characterizes it as a natural condition.

Barriers: 2002 inventory found a single barrier in North Fork headwaters. This was fixed in 2003.

Pools: 2002 R1/R4 inventory of South Fork spawning reaches found 11-24 pools per mile, goal is 39. The cause of low pool numbers unknown because the stream has abundant wood. 1998 R1/R4 survey on North Fork spawning reach found 33-41 pools per mile, goal is 39. No pools were of high quality. There are possible lingering impacts from past harvest. No identified restoration.

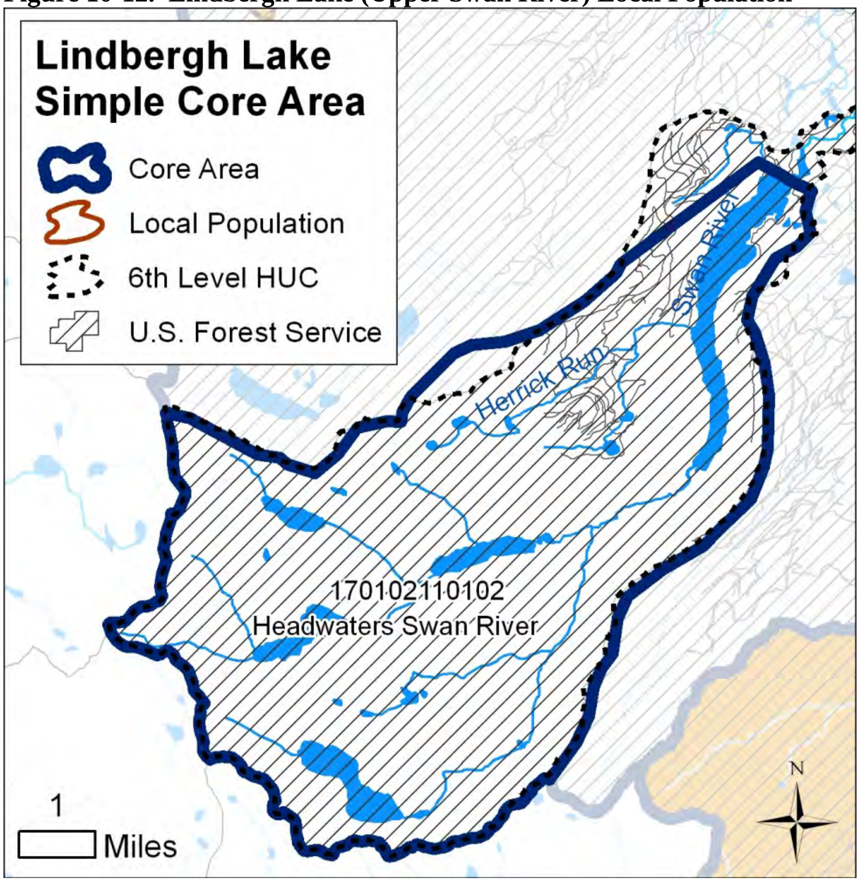
Sediment: South Fork Road previously contributed 19 tons per year but DNRC moved the road in 2008. Five-year average of coring data on South Fork is 31% fines, no upward or downward trend.

Simple Core Areas

There are two simple core areas discussed in this chapter: Lindbergh and Holland Lakes.

Simple Core Area: Lindbergh Lake

Figure 10-12. Lindbergh Lake (Upper Swan River) Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 10-10. Lindbergh Lake (Upper Swan River) Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
5 redds in 2008 x 3.2=16	Unknown	Migratory Connected	1 very short reach. Just 200m	EB, low LT in lake, currently low impact
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Quasi-disjunct core population in headwaters of Swan River valley. Thought to be thermally isolated		Medium. Warm and stable flows but local patch of groundwater.		Juvenile fish rear in lake

Driving Factors Determining Bull Trout Population:

This is a small, somewhat disjunct population with very limited spawning habitat. Only four intermittent redd counts have been completed in the past 14 years, making it difficult to determine status. The population is traditionally assumed to only spawn in limited areas upstream of the lake but recent genetics study hints at possibility they are spawning in Elk Creek. Lake trout are becoming increasingly common in Lindbergh Lake. There is currently no plan to suppress them.

Confidence in your assessment (H, M, L): L

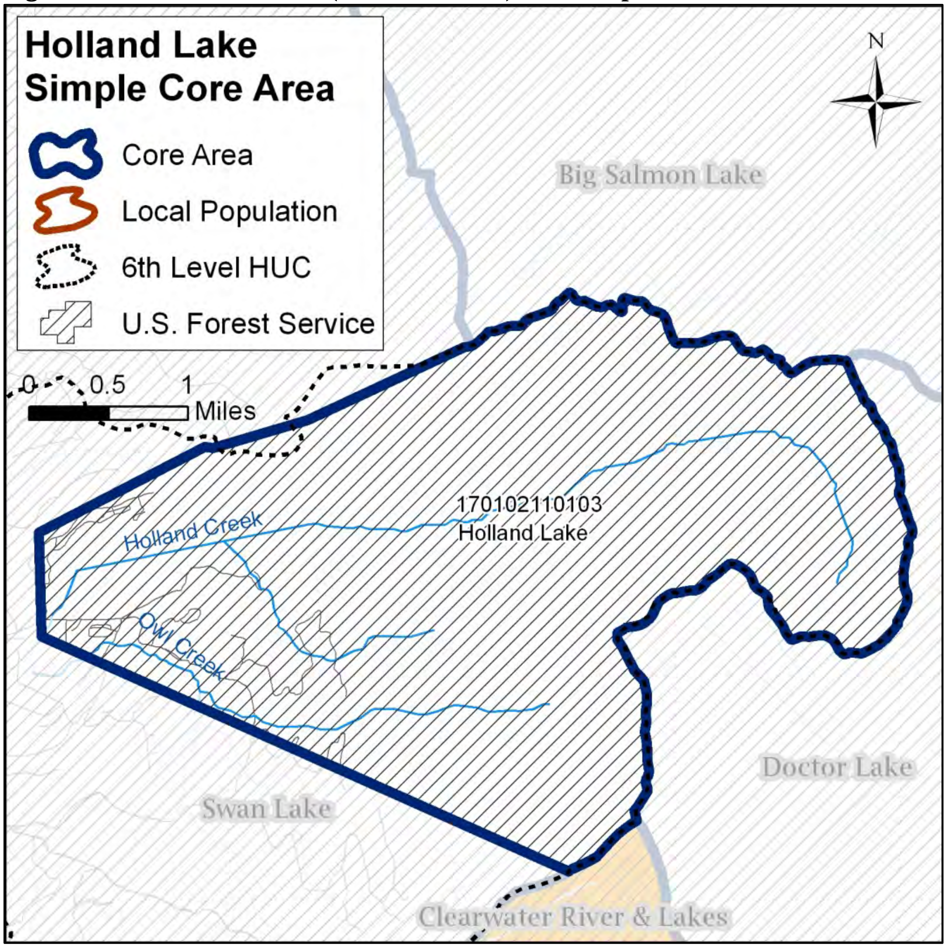
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Headwaters Swan River – Lindbergh Lake - 170102110102							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: Roughly 95%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FA	FA	-	-	$0	-	-
Sediment	FA	FA	-	-	$0	-	-

No habitat data available. Spawning stream is in wilderness and assumed to be in natural state.

Simple Core Area: Holland Lake

Figure 10-13. Holland Lake (Holland Creek) Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 10-11. Holland Lake (Holland Creek) Local Population

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
3 year average is 8.6 redds x 3.2=27 adults	Stable	Migratory Connected	1 very short reach. Just 280m	EB, low LT suspected in lake, currently low threat

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Quasi-disjunct core population in headwaters of Swan River valley. Thought to be thermally isolated	High. Very little groundwater. Invasive species (EBT) may get more established.	Juvenile fish rear in lake.

<u>Driving Factors Determining Bull Trout Population:</u>

This is a small, somewhat disjunct population. Very limited spawning habitat is available. Appears to have a long, gradual decline in numbers and stabilized at lower number. Spawning reach is well-known and vulnerable to poaching. 1980 riparian logging caused some degradation but since then watershed is undisturbed. Lake Trout were found in Holland Lake in 2012.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Holland Lake - 170102110103							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR?	-	-	$0	-	-
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR?	FA	20 years	-	$0	M	L
Sediment	FA	FA	-	-	$0	-	-

Temperature: 2005 measurement found MWMT at 11.6C. Since then, a new beaver dam may have elevated it further. Stream appears to have little groundwater to begin with. 1980 logging damaged stream bank cover & shade. This habitat will continue to slowly heal under existing management and regulatory constraints and protections.

Barriers: None. This is a roadless watershed.

Pools: No data available, though there may be still lingering impacts from 1980 logging. As riparian vegetation matures, stream banks should stabilize and new pools develop. Seedlings already growing, so no active restoration needed.

Sediment: 2005 pebble counts found 9.6% fines, well within reference condition.

Swan Lake Core Area Summary:

Table 10-12 summarizes relevant information from each of the 6th field HUC local populations. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire Swan Lake Core Area within the borders of the Flathead National Forest. It does not include necessary restoration activities in watersheds where the FNF has no ownership that may be critical for overall restoration of the bull trout population in the Core Area.

Table 10-12. Summary of important Local Population attributes and conservation recommendations for the Swan Lake Core Area.

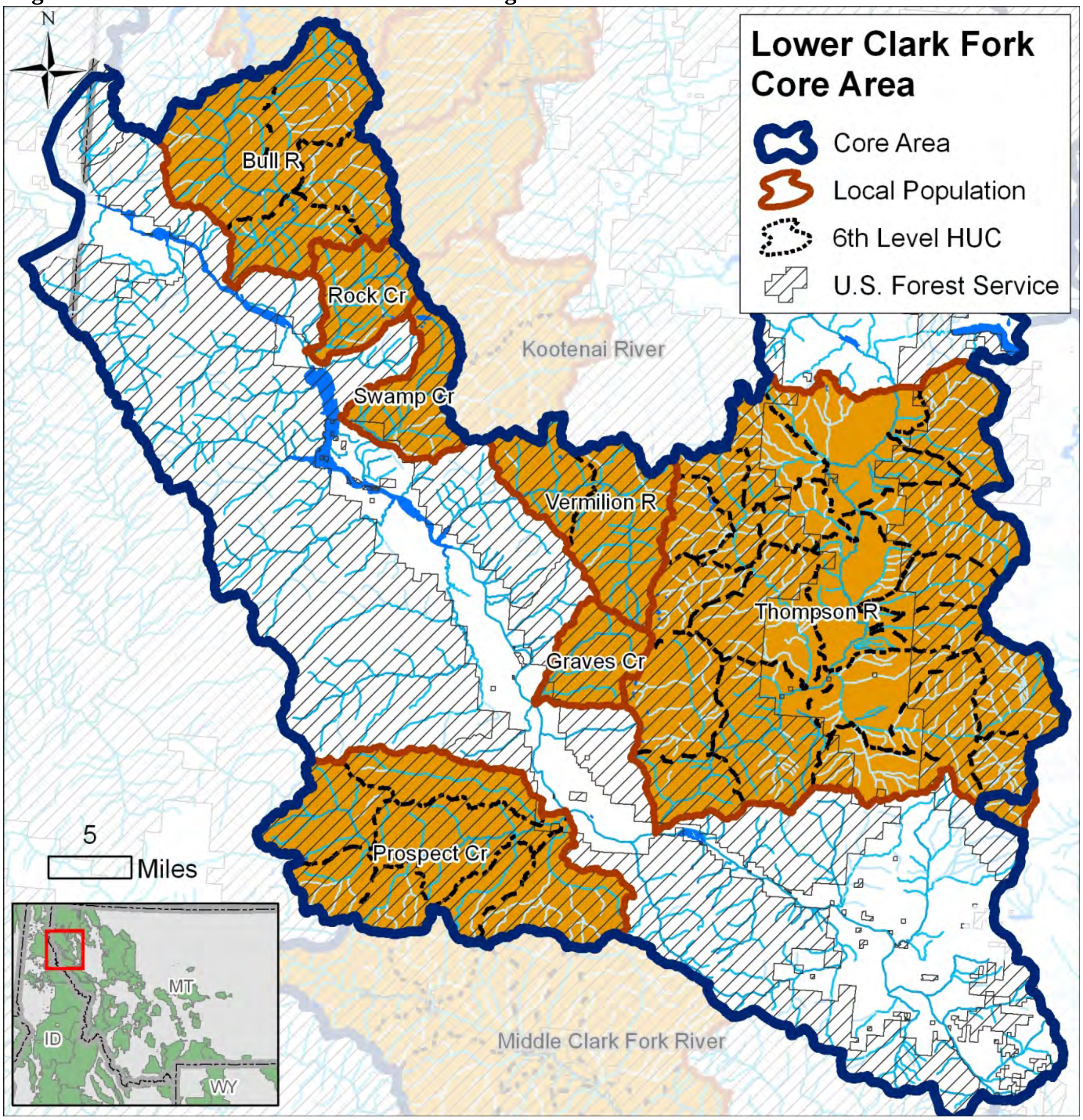
Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
Elk Creek	Elk Cr	High	Low	Conserve	-	-	-
Cold Creek	Cold Cr	Low	Moderate	Active	-	-	-
Jim Creek	Jim Cr	High	Low	Active	-	-	-
Piper Creek	Piper Cr	Moderate	Low	Conserve	-	-	-
Lion Creek	Lion Cr	High	Low	Conserve	-	-	-
Goat Creek	Goat Cr	High	Low	Conserve	-	-	-
Woodward Creek	Woodward Cr	High	Low-Moderate	Passive	-	-	-
Soup Creek	Soup Cr	Low	Moderate	Conserve	-	-	-
Lost Creek	Lost Cr	Moderate	Low	Conserve	-	-	-
Lindbergh Lake*	Headwaters Swan River*	High	Low	Active	-	-	-
Holland Lake*	Holland Creek*	Moderate	Moderate	Passive	-	-	-

*Simple Core Area

Chapter 11: Lake Pend Oreille/Lower Clark Fork

Core Area Discussion:

Figure 11-1. Lower Clark Fork and Surrounding Core Areas



Bull trout densities in the Lower Clark Fork River (LCFR) Core Area were historically much higher than they are today. Impacts to bull trout populations in the LCFR began in the early part of the 20th century, and have continued through the present time. Distributions of bull trout populations are significantly restricted from historical patterns. At least two large streams (Pilgrim Creek and Elk Creek) that once likely supported strong fluvial populations now contain few, if any bull trout. Remaining fluvial populations, however, are geographically distributed throughout the core area, which increases the potential for recovery. The proportion of fluvial to resident forms is likely much different than historical, due to the extremely low numbers of fluvial fish in the population. Resident populations are generally isolated by natural conditions.

Bull trout populations in the LCFR Core Area were first exposed to significant human-caused impacts approximately 100 years ago with the construction of Thompson Falls Dam (1916). This dam blocked upstream migration of bull trout from Lake Pend'Orielle, and effectively cut off all upstream spawning habitat, affecting hundreds of miles of bull trout populations in Core Areas upstream of the Lower Clark Fork River. Within the Lake Pend Orielle Core Area, Thompson Falls Dam cut off the Thompson River from the rest of the Core Area. This was a significant impact to bull trout in the core area.

Numerous smaller scale impacts to bull trout gradually occurred throughout the Lower Clark Fork River valley in the early part of the 20th century as well. These included grazing and agricultural development along many of the important low gradient spawning streams, road and energy corridor development in riparian areas, and logging and road development in tributary streams. These all had impacts to bull trout and their habitats, however they were not of the same magnitude as Thompson Falls Dam.

In 1952 and 1958, respectively, Cabinet Gorge and Noxon Dams were constructed. These dams also blocked upstream access, resulting in only a few smaller tributaries remaining to support the entire Lake Pend Oreille population. With the completion of these two dams, combined with Thompson Falls Dam, the fate of bull trout in the LCFR was cast. The once robust population was now effectively isolated into four distinct units (Lake Pend Orielle, Cabinet Gorge and tributaries, Noxon and tributaries, and above Thompson Falls Dam) with only downstream connectivity. As a result, the upper-most populations, isolated above Thompson Falls Dam, were affected the most in the short-term.

Over the next several decades, changes in fish species composition within the LCFR, brought about by Montana Fish, Wildlife and Parks stocking programs and some illegal introductions, brought an additional impact to the system. Brown trout, northern pike, smallmouth and largemouth bass, and a host of other non-native species became established in the reservoirs, creating predation and competition pressures that most likely impacted bull trout populations.

From the 1930's through the 1960's, bull trout populations in the LCFR continued to decline due to a host of developments and increasing land utilization that impacted stream habitats. The Thompson River was heavily impacted by two logging roads that paralleled the stream. Many of the wide riparian valleys in key spawning tributaries like Prospect Creek, Vermillion River, and Thompson River, were impacted by grazing, logging, or often a combination of these.

The 1970's and 1980's saw a rapid expansion of road construction and logging in areas that were, up to this time, refugia for bull trout populations. Steep slopes in the middle and upper portions of many drainages were logged, resulting in high sediment loads that exceeded the transport capacity of streams. The sediment eventually settled out in lower gradient spawning reaches and larger streams and rivers, causing systemic changes in the stream systems and aquatic communities they supported. Chronic erosion and sediment addition from the extensive road network constructed during this period still occurs today. This period of heavy road construction also resulted in extensive fragmentation of bull trout populations at undersized culvert crossings.

By the 1990's, bull trout populations had been eliminated or severely reduced throughout much of the LCFR. Small fluvial populations still existed in many of the larger, less developed watersheds. However, chronic impacts from existing developments, combined with climate change and a drought that caused low flows and warm water, further impacted populations.

Some of the past impacts have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. Logging and road construction have decreased considerably, but the effects of the existing road networks throughout many watersheds are still prevalent. The drought seems to have subsided. Fishing regulation changes do not allow people to keep, or intentionally fish for, bull trout.

Overall, current bull trout numbers in the LCFR Core Area are very low. Within the last decade, the AVISTA relicensing process has resulted in programs to trap and move bull trout around the three dams in an effort to more fully understand spawning movements and future recovery priorities. The overall objective is to eventually restore upstream passage. A fish ladder has been installed by PPL in Thompson Falls Dam, and future work on the other two dams to allow for unmitigated fish passage is occurring. If these efforts are successful, they may significantly affect bull trout populations in the Core Area over the coming decades. Passage at Thompson Falls, however, still appears to be limited. Movement efforts to date have resulted in higher numbers of bull trout in the Thompson River over the past 10 years simply due to the individual fish being moved above the dam. There has been no indication of a population level response suggesting long-term success as of yet.

There are seven local populations on lands administered by the Forest Service in the Lake Pend Oreille/Lower Clark Fork Core Area. They are:

1. Thompson River,
2. Prospect Creek,
3. Graves Creek,
4. Vermillion River,
5. Swamp Creek,
6. Rock Creek, and
7. Bull River.

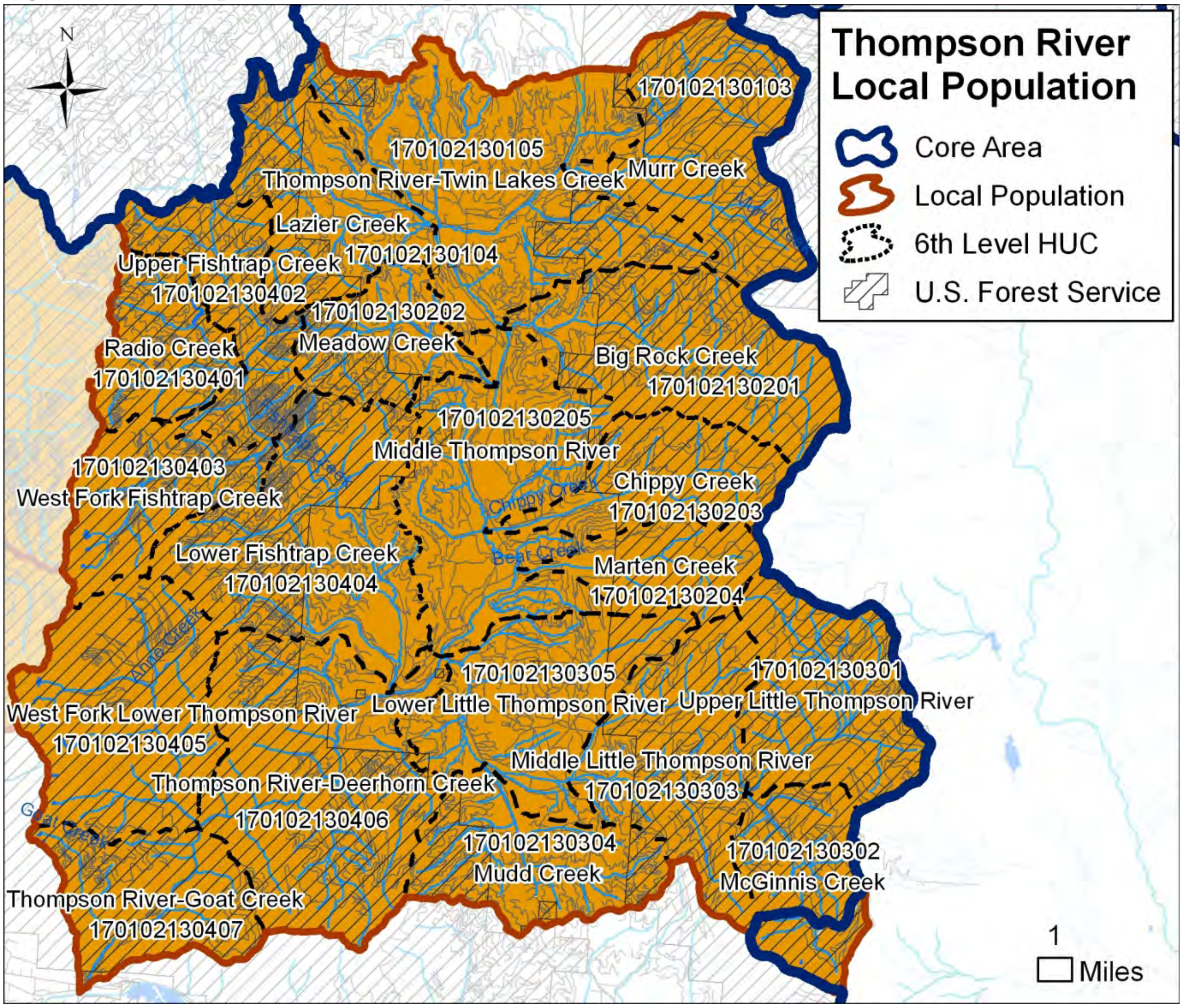
This core area lies within two forest boundaries: Lolo National Forest and Kootenai National Forest. The Thompson River, Prospect Creek and Graves Creek are on lands administered by the Lolo National Forest and the Vermillion River, Swamp Creek, Rock Creek and the Bull River are on lands administered by the Kootenai National Forest. There are also six local populations in Montana that are not discussed further in this document because they are administered by the Salish and Kootenai Tribe (Post, Mission, Dry, South Fork Jocko, Middle Fork Jocko and North Fork Jocko).

Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Lake Pend Oreille Core Area – Lolo National Forest

Local Population: Thompson River

Figure 11-2. Thompson River Local Population



Relative Importance of Population to Core Area (H, M, L): H

Table 11-1. Thompson River Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250 Migratory 250-500 Res	Stable or increasing	Migratory, Fragmented	2	Browns, rainbows and brooks throughout system. Also pike, bass, etc. in Thompson Falls reservoir downstream of mouth and numerous non-natives in Thompson Lakes at the headwaters. Threat is very high.

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High – Stream mouth is just upstream of Thompson Falls dam – it's the first major tributary to CFR above the three dam system and the only bull trout tributary for the next 40-50 miles upstream (to St. Regis. It's a huge system – probably has the most opportunity and most potential in MFCR1 Core Area.	Moderate. Fragmentation of main river system (T. Falls, Noxon, Cabinet Gorge Dams) is an issue, but the Thompson River is a large, mostly connected system within itself. There is very little high elevation/precipitation zone in the watershed, though – the headwaters are relatively large, mid-elevation lakes that get warm and support non-natives. There are some large groundwater sources that keep the West Fork and Fishtrap (main bull trout areas) cold, but the system overall is pretty warm and subject to negative effects of climate change.	None known.

Driving Factors Determining Bull Trout Populations:

Key limiting factors are fragmentation of the Lower Clark Fork River system and poor habitat conditions in the majority of the Thompson River. Temperature is the main issue, although sediment and habitat simplification associated with parallel roads along much of the river and extensive roading and timber harvest in the watershed overall are big issues. Non-native species associated with the downstream reservoirs, headwater lakes, and the main river system are an issues. Extensive work is underway through AVISTA relicensing to address fish passage and connectivity to Lake Pend Oreille, and there are specific PPL dollars set aside for restoration in the Thompson River system itself.

Thompson River Local Population Discussion:

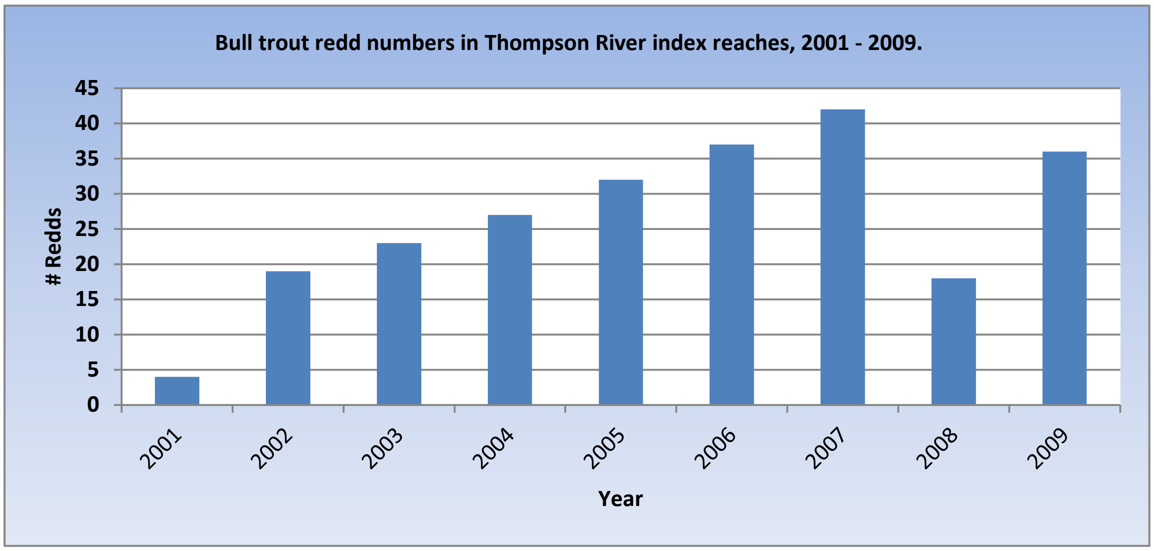
The Thompson River local population includes all of the Thompson River, from the headwaters at the Thompson Lakes to its confluence with the Clark Fork River. USFS Biologists believe that bull trout densities were historically much higher than they are today and that distributions were also likely different in that many of the larger streams, such as the Little Thompson River, Chippy Creek, Big Rock Creek, and Murr Creek may have supported significant numbers of bull trout in the past but have few, if any, today. Both fluvial and resident forms are currently well below what they were in the past.

We believe that the Thompson River local population may have supported 200 to 400 redds historically. As with most bull trout populations, overall numbers were likely highly variable from year to year, based on natural climatic and disturbance patterns.

Bull trout populations in the Thompson River were likely first exposed to human-caused impacts in the late 1800's to early 1900's with limited timber harvest, some fishing and ranching in the upper headwaters of the Thompson River. The first significant impact occurred in 1913, when the construction of the Thompson Falls Dam limited migration and spawning access into the Thompson River. The next significant impacts to the population culminated in the 1930's to the 1950's when several major changes came to the watershed. In the 1930's, the Thompson River Road #56 was constructed up the valley, connecting Highway 200 and Highway 2. This road parallels the Thompson River, sometimes closely enough to cut off meanders along the river. In the 1950's the second road, the ACM road, was constructed along the Thompson River, also paralleling the river, usually on the opposite site. The road was first intended to be a railroad grade, but never was established as one and eventually turned into a road. These roads resulted in higher sediment levels, less stream cover along the Thompson River, and higher water temperatures.

Due to the increased access from two major roads paralleling the Thompson River, the next significant era came from the 1960's to the 1980s when extensive road building and timber harvest in the tributaries resulted in high sediment levels, less stream cover, and higher water temperatures in many drainages. Finally, a decade of successive drought years in the late 1990's caused warm water temperatures that facilitated the upstream expansion of brown trout into areas occupied by rainbow trout, further impacting bull trout populations.

Figure 11-3. Bull trout redd numbers in Thompson River, 2001-2009. This graph also shows linear trends.



As seen in Figure 11-3, the population trend for bull trout in the Thompson River is increasing. During the 9 years of record, the trend has been increasing at the rate of approximately 2 fluvial redds/year. But when put in the context of historical numbers, these data are concerning. The average number of redds over the past six years has been about 30, while those a century ago were probably more than 10-20 times this number. However, it is encouraging that the trend in the Thompson River is a slow increase in the last 10 years.

Currently, the main factor limiting recovery of bull trout in the Thompson River is probably fragmentation of the main river system (Thompson Falls, Noxon, and Cabinet Gorge Dams) that is limiting migration of fluvial bull trout into the Thompson River. There is an active program at Cabinet Gorge Dam to transport fluvial fish over the dams in order for them to complete migration. A fish ladder was installed on Thompson Falls dam in 2010 and has been operational since the spring of 2011, which should help fluvial populations reach the Thompson River. However, it is not expected that these operations will fully resolve the problem of fragmentation in the Clark Fork River system.

It is unlikely that this impact is entirely responsible for the overall decline. Numerous other significant impacts, such as the main Thompson River Road system (which parallels a large portion of the river) extensive land management and road construction in many of the tributaries, ranching/land development in the upper watershed, natural lakes in the upper river system that increase summer water temperatures, extensive non-native fish species through the system (mainly brown and rainbow trout, but also brook trout in some tributaries), and inadvertent fishing mortality probably also contribute significantly to the current population trend.

As referred to above, the dual road system along the Thompson River was constructed in the 1950's. County Road 56 and Forest Road 9991 run the entire length of the Thompson River from Highway 200 to US Highway 2 near the Thompson Chain of Lakes. These two roads closely parallel the river on each side for the first 18 miles, then alternate to the other side by crossing the Thompson River and periodically paralleling or crossing the stream in the upper 20 miles. The most significant effects are seen for the first 18 miles. The dual road system has caused the river to be confined, which, in turn, has led to habitat that is oversimplified. There is a general lack of large woody debris and subsequently large, high quality pools. The dual road system also contributes large amounts of sediment to the river. The loss of overhead cover from the dual road system also leads to increased stream temperatures. The dual road system has also indirectly caused an increase in fishing because both side of the river are easily accessible by vehicle.

Temperature is also a main limiting factor to the Thompson River. Likely one of the largest contributors to high stream temperatures is the Thompson Chain of Lakes at the headwaters of the Thompson River. The upper half of the Thompson River drainage is characterized by a broad valley, keeping lake temperatures warm. However, stream temperatures are also elevated from ranchland conversion along the Thompson River in the upper watershed. The loss of overstory cover, along with the broad valley bottom, warms water temperatures significantly. On the lower Thompson River there is a loss of overstory cover from the parallel road system and riparian harvest.

While none of the previously mentioned impacts is easy to address, it will be necessary to change them in order to maintain a long-term population of bull trout in the Thompson River Core Area. It is likely that the impacts from any one of these sources can be eliminated entirely, but rapid and successive improvements in each will contribute synergistically to a stronger population, and this will allow us time to work further towards reducing additional impacts.

One very real possibility is eliminating one of the two major roads that parallel the Thompson River. By removing one of the roads, habitat could be significantly improved through channel meander reactivation, large woody debris additions, which in turn would create high quality fish habitat, and an overall decrease in fine sediment. Over time, large overstory trees could also be recruited, which would decrease stream temperatures and provide potential large woody debris to the river. One road system would still exist and would still have impacts, but the impacts would be considerably less than two parallel road systems.

Temperatures in the Thompson River mainstem could be reduced over time with revegetation efforts along the mainstem in the upper portion of the watershed, especially in areas heavily impacted from ranching activities. This would require coordination with private landowners and state and federal agencies. Some revegetation efforts have already taken place along the mainstem on Plum Creek lands with good success thus far. Temperature impacts from the Thompson Chain of Lakes would still be present.

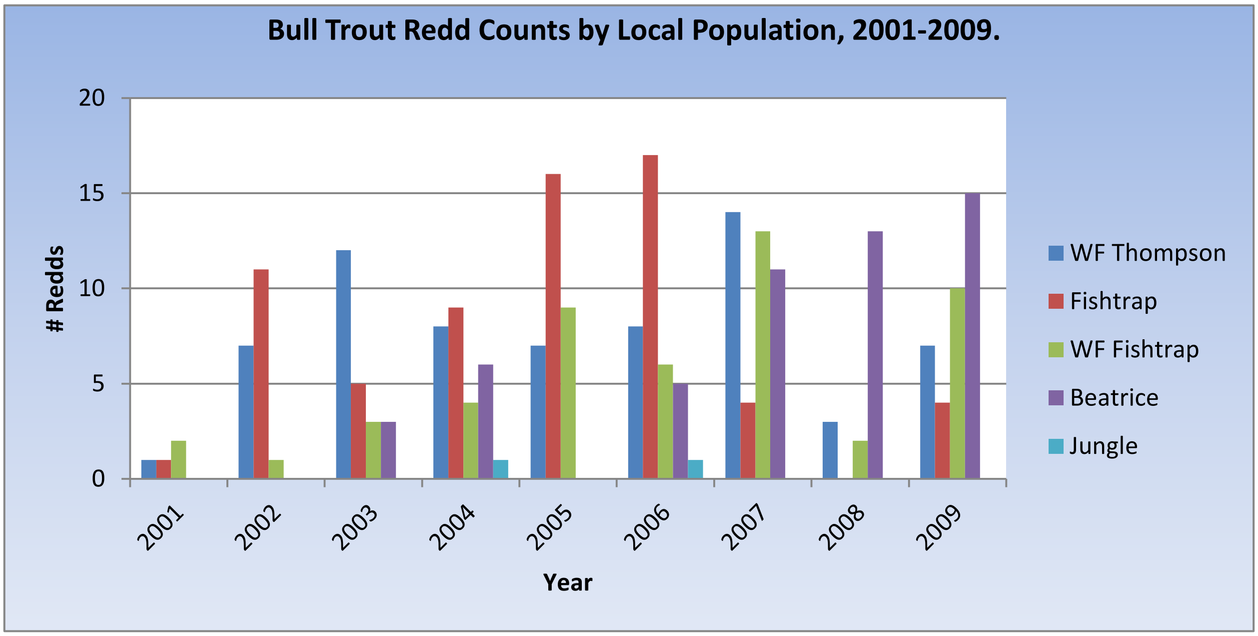
It is unlikely that we would be able to completely eliminate non-native fish from the watershed. However, changes in fishing regulations, as well as direct management efforts (i.e., electrofishing, trapping, etc.) could be used to reduce populations of non-natives. With less competition, westslope cutthroat trout and bull trout populations may respond favorably, benefiting both native fish populations and the entire aquatic community in the Thompson River. This outcome is uncertain at the present time due to limited long-term studies and uncertainty regarding the magnitude and interaction of other limiting factors. The USFS will coordinate with FWP and consider management that reduces numbers and distributions of non-native trout towards this end where it is expected to benefit bull trout recovery in the watershed.

There are currently 6 6th level HUCs that support measurable populations within lands administered by the Lolo National Forest – West Fork Thompson River, Lower Fishtrap Creek, West Fork Fishtrap

Creek, Radio Creek, Upper Fishtrap Creek, and Big Rock Creek. While fluvial bull trout may spawn in other tributaries, these six populations support the majority of fluvial spawning, and redd numbers within them likely represent over 90% of the total fluvial spawning that occurs on the LNF.

Figure 11-4 shows redd count data from the five index streams over the 2001-2009 time-period. As can be seen, redd numbers in any given stream are highly variable from year to year. This is partly a result of the extremely low numbers within index reaches. Most streams usually support less than ten bull trout redds, and often support only a few.

Figure 11-4. Bull trout redd counts within the five Thompson River index streams, 2001-2009.



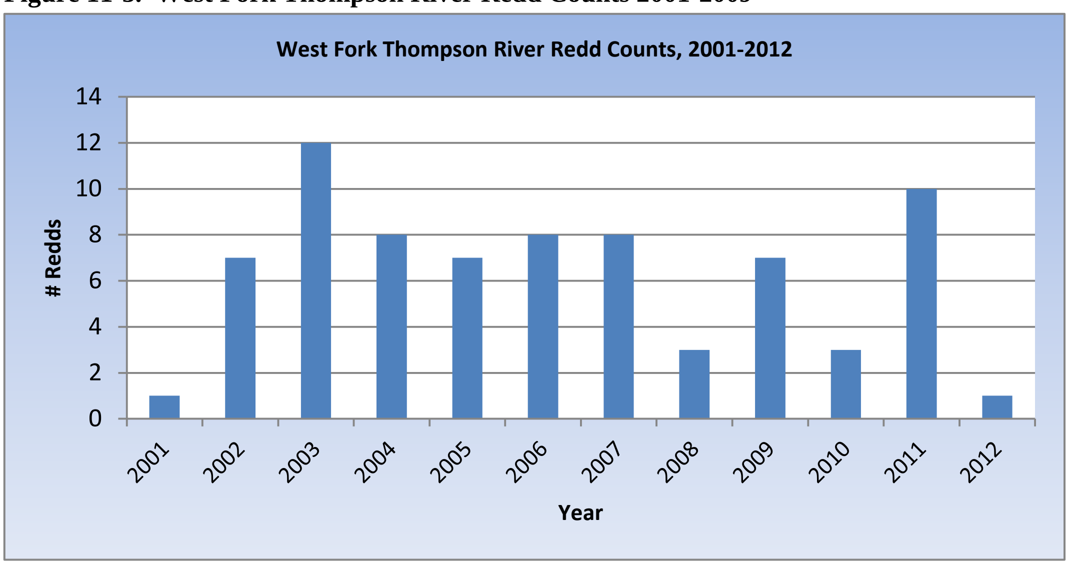
Of the five index reaches in the Thompson River local population, West Fork Thompson and Fishtrap Creek are currently the strongest (note there is no information for the Big Rock Creek subpopulation because redds surveys have not been conducted in that watershed). It appears that Beatrice Creek and West Fork Fishtrap Creek have been increasing since sampling has occurred, but in general, there is a lot of variability in streams over the years. Fishtrap Creek appears to have the largest number of bull trout redds over the 9 years of record. A similar pattern, in terms of importance, probably existed historically between these five streams. Fishtrap Creek has probably always been the most significant bull trout spawning tributary in the Thompson River due to its size and abundance of suitable habitat.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Fork Thompson River - 170102130405							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	3	$50,000	M	H
Barriers	FUR	FA	5 years	3	$100,000	H	H
Pools	FAR	FA	5 years	3	$50,000	H	H
Sediment	FUR	FA	10 years	3	$500,000	M	H

The West Fork Thompson River is important for long-term viability of bull trout in the Lower Clark Fork River. Within the Thompson River, the West Fork and Fishtrap watersheds support the bulk of the fluvial population. The West Fork Thompson River has a fairly extensive road system that should be reduced to substantially reduce sediment delivery, improve stream temperatures as well as improve other channel, riparian and watershed conditions. There is also a barrier on Honeymoon Creek a barrier near the mouth of Four Lakes Creek that should be looked at to assess their significance to bull trout. The remaining barriers are not important to bull trout.

Figure 11-5. West Fork Thompson River Redd Counts 2001-2009



Temperature: Temperatures in the West Fork Thompson River are affected by the riparian road that runs along approximately 5 miles of the stream. This has reduced riparian canopy cover along the stream. The road should be assessed for opportunities to reduce impacts, including the potential for removal or relocation. Riparian planting in riparian areas should also be assessed. These activities will improve the condition of the temperature indicator.

Barriers: The barriers on Honeymoon Creek and Four Lakes Creek should be replaced with structures that meet Q100 and aquatic organism passage. Replacement of these structures would bring the baseline from FUR to FA.

Pools: Pools have been somewhat limited in the Thompson River due to the main riparian road. Construction of this road reduced potential large woody debris. An assessment of the feasibility to place large woody debris jams in the West Fork Thompson River should be completed, especially along the lower 5 miles of the river.

Sediment: Sediment levels in the West Fork Thompson River are likely elevated from the main riparian road and the road system in the upper portion of the watershed. Future analyses in the area should consider a range of road management opportunities to reduce sediment delivery. The range of opportunities should include feasibility of potential removal or relocation of the main West Fork Thompson River road.

Most important activities to improve bull trout population:

1. Plan for, and manage the road system in the Four Lakes Creek, Anne Creek & upper headwaters of the West Fork Thompson River (especially in riparian areas) to reduce sediment delivery, and to improve water temperatures and stream channel habitat and riparian conditions. Management actions could include such items as road decommissioning, storage, and relocation.
2. Assess the main West Fork Thompson River Road (which parallels the West Fork Thompson River for approximately 6 miles) for opportunities to reduce sediment, improve water temperatures and other channel habitat and riparian conditions and the feasibility to remove or relocate the road.
3. Replace culvert barriers on Honeymoon Creek, Big Spruce and Four Lakes Creek.
4. Assess the potential to construct large woody debris jams to create quality pools in the mainstem of West Fork Thompson River.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Fishtrap Creek - 170102130404							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 63%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timelines s of opps (H,M,L)**
Temperature	FUR	FA	10 years	3	$50,000	H	H
Barriers	FUR	FA	1 year	3	$0	-	-
Pools	FAR	FA	5 years	3	$100,000	H	M
Sediment	FUR	FA	20 years	3	$500,000	H	H

This HUC consists of the mainstem of Fishtrap Creek and two tributaries – Jungle and Beatrice Creek. These are both very important tributaries for bull trout, but are largely owned by Plum Creek. Fishtrap Creek is the stronghold for bull trout in the Thompson River. Bull trout probably spawn in the mainstem in some places in this HUC; however, there is little information available. Large woody debris was added to this HUC within the last three years, so that should improve habitat slightly in the mainstem Fishtrap Creek. Temperatures should also improve. The road system is still responsible for many impacts, including high sediment levels and warm temperatures.

Figure 11-6. Beatrice & Jungle Creek Redd Counts

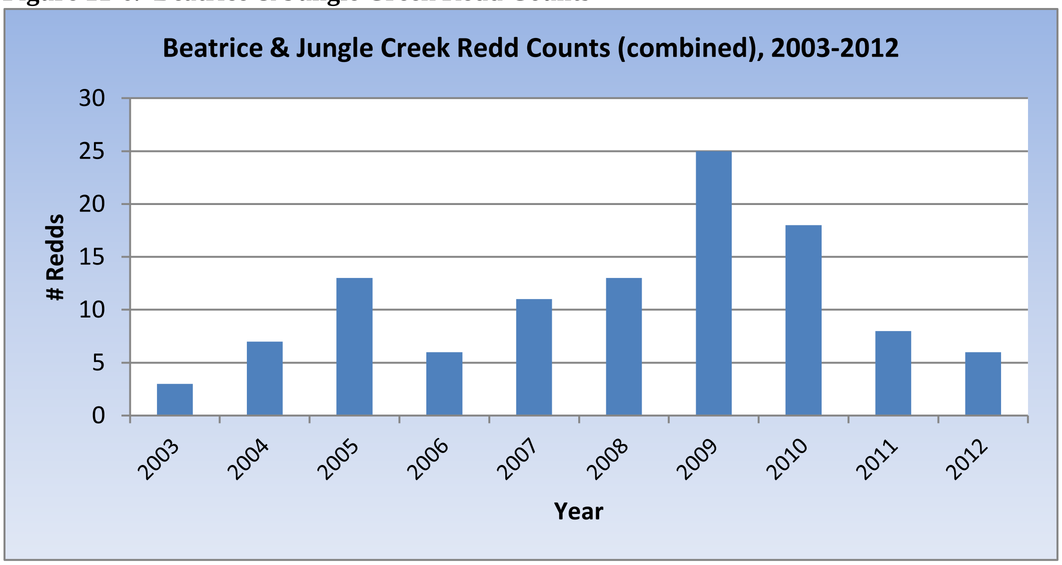
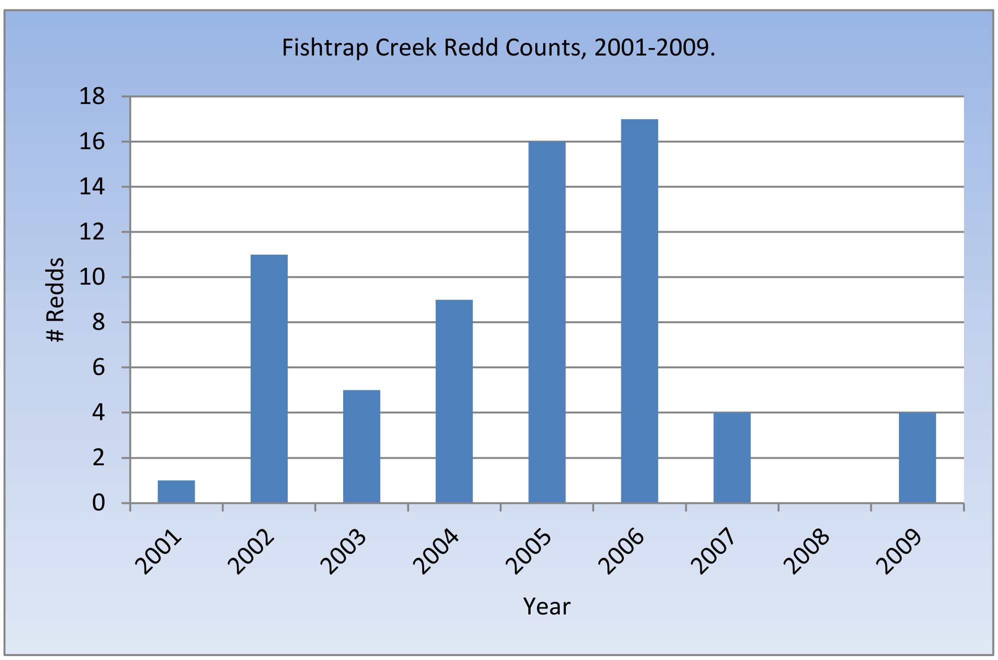


Figure 11-7. Fishtrap Creek Redd Counts, 2001-2009



Temperature: Temperatures in lower Fishtrap Creek and Beatrice Creek are affected by a loss of riparian vegetation from historical riparian harvest and, to a lesser extent, the main riparian roads that run up the valley bottom. Discussions with Plum Creek Timber Company should be initiated to develop a riparian re-vegetation plan, especially along lower Fishtrap Creek. The road in Beatrice Creek should also be assessed to determine if there are areas that could be relocated to reduce impacts. These activities will all improve the condition of the temperature indicator.

Barriers: There are no barriers and there are no future actions needed to address this indicator. The FUR baseline should be reassessed.

Pools: Pools conditions are impaired in lower Fishtrap Creek and Beatrice Creek from historical riparian harvest and riparian roads that have limited the amount of potential large woody debris in the streams. Plum Creek Timber Company and the Lolo National Forest have already placed large woody debris jams in two sections of Fishtrap Creek. Discussions with Plum Creek Timber Company should be initiated to continue the placement of large woody debris in lower Fishtrap Creek and possibly Beatrice Creek.

Sediment: Sediment is elevated in lower Fishtrap Creek and Beatrice Creek from riparian roads and an extensive road system in Beatrice Creek with numerous crossings. Discussions with Plum Creek Timber Company should be initiated to identify opportunities to reduce road densities and other actions to reduce sediment delivery from roads within the Beatrice and Jungle Creek watersheds, as well as along lower Fishtrap Creek.

Most important activities to improve bull trout population:

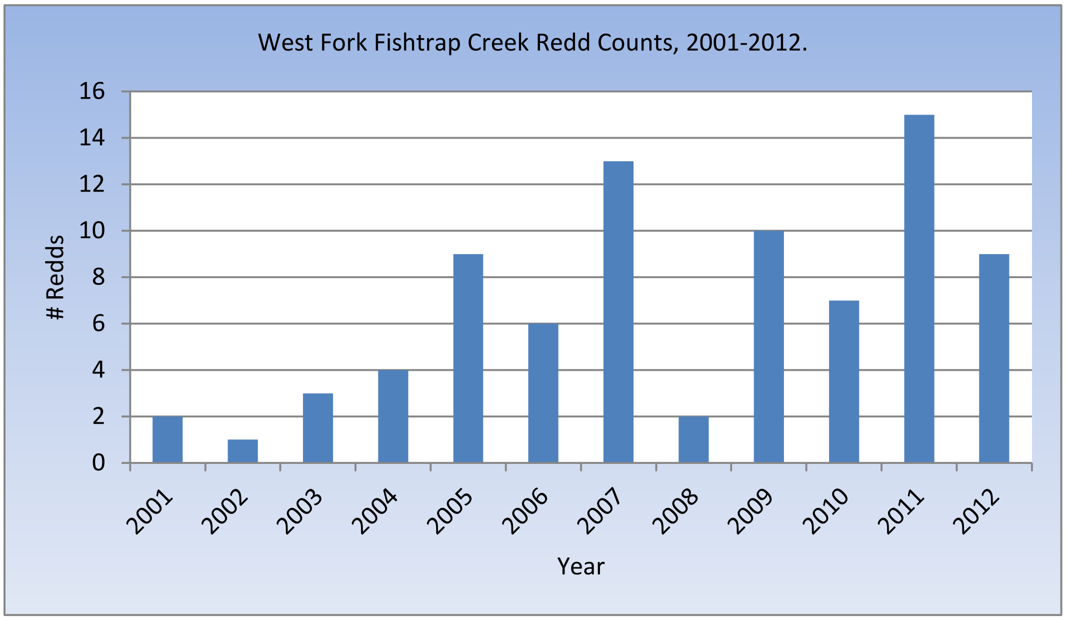
1. Work cooperatively with Plum Creek Timber Company on a travel management plan of the road system in the Beatrice and Jungle Creeks watersheds to reduce sedimentation into Fishtrap Creek.
2. Continue large woody debris placement efforts on the mainstem of Fishtrap Creek to create quality pools and reduce stream temperatures.
3. Identify areas along the mainstem Fishtrap Creek for riparian planting (hardwoods and conifers) where vegetation has been removed, to improve stream temperatures. Implement riparian planting.
4. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in Fishtrap Creek and the Thompson River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Fork Fishtrap Creek - 170102130403							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FA	10 years	3	$50,000	M	H
Barriers	FUR	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	$50,000	H	H
Sediment	FUR	FA	10 years	3	$500,000	M	H

The West Fork of Fishtrap Creek supports the bulk of fluvial bull trout spawning in the Fishtrap watershed. The 2008 Fishtrap EIS and Record of Decision authorized road decommissioning, storage, and maintenance activities to improve aquatic conditions. These actions are ongoing and will likely be completed within the next three years. As part of this effort, the large culvert crossing on West Fork Fishtrap Creek was replaced in 2010 with a bridge. There are currently no other fish passage barriers to fluvial bull trout in this HUC.

Figure 11-8. West Fork Fishtrap Creek Redd Counts, 2001-2009



Temperature: Temperatures in West Fork Fishtrap Creek are slightly elevated from riparian roads and, to a lesser extent, beaver activity in the middle portion of the stream. There may be opportunities to re-establish riparian vegetation in certain areas to promote shade along the West Fork Fishtrap Creek. Discussions to restore riparian vegetation and increase woody debris in the stream through the affected riparian zone should be pursued.

Barriers: There are no barriers remaining in West Fork Fishtrap Creek and no future actions are needed to address this indicator. This indicator should now be FA.

Pools: Pool conditions are slightly impaired in West Fork Fishtrap Creek from historical riparian harvest and riparian roads that have limited the amount of potential large woody debris. In 2012, large woody debris jams were installed in approximately 2 miles near the confluence with Fishtrap Creek. There may be more opportunities to install large woody debris jams to promote pool formation. Monitoring of these large woody debris placements in West Fork Fishtrap Creek should help determine the need for additional debris jam installations.

Sediment: Sediment has partially been addressed through the implementation of BMPs, gravel surfacing and culvert removals/replacements as part of the Fishtrap project. Further road decommissioning and storage is authorized as part of that project. Implementation of road decommissioning and storage as authorized under the Fishtrap Project will reduce sediment levels and will improve the FUR baseline call for sediment in West Fork Fishtrap Creek.

Most important activities to improve bull trout population:

1. Implement road decommissioning and storage activities, authorized under the Fishtrap Project, to reduce sediment levels in the West Fork Fishtrap Creek.
2. Identify additional areas for large woody debris placement on West Fork Fishtrap Creek to create quality pools and reduce stream temperatures.

3. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in Fishtrap Creek and the Thompson River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Radio Creek - 170102130401							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$50,000	M	H
Barriers	FUR	FA	5 years	3	$200,000	M	H
Pools	FAR	FA	5 years	3	$50,000	H	H
Sediment	FUR	FAR	10 years	3	$500,000	H	H

This HUC contains upper and lower Fishtrap Lakes and Radio and Beartrap Creeks. There is probably some fluvial spawning in these tributaries; however, there is limited data. The lakes contribute to elevated temperatures in the Radio Fork. Elevated temperatures in Radio Fork and mainstem Fishtrap Creek are also partially due to the large amount of beaver activity and naturally open meadows in these areas. The 2008 Fishtrap EIS and Record of Decision authorized actions to reduce road densities and remedy fish passage barriers. In 2010 the culvert that was identified as a barrier in Radio Creek was replaced with a larger structure. The culvert on Beartrap Creek that acts as a partial barrier will be removed when the Beartrap road system is placed in storage within the next 5-10 years. Some road decommissioning and storage work was completed in Beartrap Creek in 2010. Much of the work authorized in the Fishtrap EIS and Record of Decision has already been funded and is simply waiting implementation. These improvements should lead to some changes in indicator conditions.

Temperature: Temperatures in Fishtrap, Beartrap and Radio Creek are affected by historical timber harvest that removed canopy cover, large amounts of beaver activity and Upper and Lower Fishtrap Lakes. There are opportunities to plant large conifers along Fishtrap Creek to improve overstory cover and shading. However, it is unlikely that temperatures will be fully recovered because of natural impacts from the lakes and beavers. The storage of the riparian road in Beartrap Creek will help improve temperatures in Beartrap Creek.

Barriers: The fish barrier on Radio Creek was replaced in 2010. The fish barrier in Beartrap Creek is proposed to be removed in the next 5-10 years. Once the barrier in Beartrap Creek is removed there will be no remaining barriers in this local population.

Pools: Pools are lacking in Fishtrap, Beartrap and Radio Creek from historical riparian harvest and riparian roads. An assessment should be conducted to identify areas for large woody debris placement where feasible in Fishtrap, Radio and Beartrap Creek to create quality pools. Storage of the Beartrap Creek road, as authorized in the Fishtrap EIS, may provide some potential future recruitment of wood to the stream depending on canopy recovery over time.

Sediment: Sediment has already been somewhat improved in this area from implementation of road BMPs, gravel surfacing, culvert removals and replacements and road decommissioning and storage. Implementation of additional authorized road decommissioning, storage and barrier removals should help improve this indicator further. The storage of the valley bottom road in Beartrap Creek should greatly improve the sediment indicator in this HUC.

Most important activities to improve bull trout population:

1. Implement road decommissioning, storage and barrier removal activities, as authorized under the Fishtrap Project, to reduce sediment levels in the Beartrap and Radio Creek. The storage of the valley bottom road in Beartrap Creek is of high importance to bull trout.
2. Identify areas for large woody debris placement where feasible on Fishtrap Creek to create quality pools and reduce stream temperatures.
3. Assess feasibility to plant large conifers along mainstem Fishtrap Creek in certain areas to provide additional shading to the stream.
4. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in Fishtrap Creek and the Thompson River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Fishtrap Creek - 170102130402							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FUR	FA	10 years	3	$50,000	H	H
Barriers	FUR	FA	-	3	$0	-	-
Pools	FUR	FA	5 years	3	$50,000	H	H
Sediment	FUR	FAR	10 years	3	$500,000	H	H

This HUC contains the Mantrap Fork of Fishtrap Creek and a portion of mainstem Fishtrap Creek. It is very low gradient in general, and there is an abundance of meadows and beaver activity. There is probably some fluvial spawning in this HUC; however, there is limited data. The potential for fluvial spawning is high. The 2008 Fishtrap EIS and Record of Decision authorized activities to reduce road densities and remedy fish passage barriers in Mantrap Creek. The culvert in Mantrap Creek was replaced in 2010, along with some road decommissioning. There are still opportunities to reduce road densities in the Daisy and Shale Creek watersheds, east of Fishtrap Creek to reduce sediment levels in the HUC. There are no barriers remaining that are significant to fluvial bull trout in this local population.

Temperature: Temperatures are elevated in this HUC from natural influences (low gradient, meadows and beaver activity) but also human influences including riparian roads and historical riparian harvest. An assessment of riparian re-vegetation opportunities should be completed along Mantrap & Fishtrap Creek to improve temperature conditions, where possible, in this HUC.

Barriers: There are no barriers remaining that are significant to fluvial bull trout in this local population due to the remedy of a fish barrier on Mantrap Creek in 2010. The baseline call should be changed from FUR to FA.

Pools: Pools conditions are impaired in this HUC from the loss of riparian vegetation from past riparian harvest and roads. Although beaver activity in some areas has created pools, an assessment of large woody debris placement in sections of Mantrap and Fishtrap Creek should be completed to improve pool conditions, where possible. Riparian re-vegetation would also improve long-term large woody debris recruitment and thus, pool conditions.

Sediment: Sediment levels are elevated in this HUC from the extensive road system. Improvements have been made in the last two years due to BMP implementation, road decommissioning and culvert replacements. Further road decommissioning authorized in Mantrap Creek should help improve the sediment indicator. Extensive travel planning and road reductions in the Daisy and Shale Creek drainages should occur to reduce sedimentation into Fishtrap Creek.

Most important activities to improve bull trout population:

1. Implement road decommissioning and storage, as authorized under the Fishtrap Project, to reduce sediment levels in Mantrap Creek.
2. Assess the road system in the Shale and Daisy Creek areas east of Fishtrap Creek to identify opportunities to reduce sediment delivery and improve stream function, especially through road reductions.
3. Identify areas for large woody debris placement where feasible on Fishtrap Creek to create quality pools and reduce stream temperatures.
4. Assess feasibility to plant large conifers along mainstem Fishtrap Creek in certain areas to provide additional shading to the stream.
5. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in Fishtrap Creek and the Thompson River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Big Rock Creek - 170102130201							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 87%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$50,000	M	H
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	$50,000	M	H
Sediment	FUR	FAR	15 years	3	$200,000	H	H

The 2007 Chippy Creek fire burned through the Big Rock Creek drainage. Through sampling efforts after the fire, bull trout were discovered in Big Rock Creek in 2008. There is probably a small fluvial run into the stream, but data is limited. It has high potential to support bull trout, and is relatively high up in the Thompson River system, so its importance from a geographical location standpoint is accentuated. The culvert at the mouth washed out a couple of years ago, and was replaced in 2009 with a bridge, so access is not an issue. Extensive sampling occurred during the 2010 field season, but it was unclear from sampling efforts whether there is a fluvial component in this drainage. Bull trout were PIT tagged to determine in future years if there is a fluvial component in this drainage. As of 2012, salvage sale activities were nearing completion. Brown trout and brook trout were present in the lower reaches of Big Rock Creek.

Temperature: Temperatures are impaired in the lower reaches of Big Rock Creek from riparian harvest, roads and land development on Plum Creek lands. Discussions with private landowners, including Plum Creek Timber Company, should occur to look at possibilities to improve riparian vegetation in this area. In the upper reaches, temperatures are likely to be impaired for several years due to the fire that burned in 2007, but there are no measures proposed to improve temperatures in the upper portions of Big Rock Creek.

Barriers: There are no barriers and no future actions needed to address this indicator.

Pools: Pools may be slightly limited on private lands in the lower portion of Big Rock Creek. Discussions with private landowners, including Plum Creek Timber Company, should occur to look at possibilities to improve large woody debris through direct placement and riparian revegetation. There will be an improvement in pools in Big Rock Creek from an influx of large woody debris from the fire that occurred in 2007 in the upper portion of Big Rock Creek.

Sediment: Sediment is likely elevated in this HUC from the 2007 fire and an extensive road system on National Forest and Plum Creek Timber lands. However, after the fire, work was conducted on the road system on National Forest System lands through BAER (Burned Area Emergency Recovery) and post salvage activities to reduce sediment delivery. Extensive road maintenance was conducted which upgraded Best Management Practices through installation of additional drainage, straw wattle placement and/or slash filter windrows on culverts and other areas identified as potential sediment sources, culvert upgrades where necessary, and seeding. Some road decommissioning was also completed. Pursue additional opportunities for added travel management and treatments to further reduce the greatest sources of potential sediment.

Most important activities to improve bull trout population:

1. Assess the road system on all ownerships in Big Rock Creek to identify additional priority opportunities to reduce sediment delivery and improve stream temperatures, channel habitat and riparian conditions, especially through road reductions.
2. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in Big Rock Creek and the Thompson River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Murr Creek - 170102130103							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 87%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$50,000	M	H
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	$50,000	M	H
Sediment	FUR	FAR	15 years	3	$200,000	M	H

Bull trout have not been detected in Murr Creek. However, there has been very little sampling due to the fact that much of the drainage is in private (Plum Creek) ownership. There may be some bull trout in the system, given its large size. It has relatively high potential to support bull trout, and is relatively high up in the Thompson River system, so its importance from a geographical location standpoint is accentuated. The Lolo National Forest traded a large amount of land in Murr Creek to PCTC about 10 years ago, so the ability of federal agencies to make substantive changes in the watershed is limited.

Temperature: Temperatures are likely impaired in the lower reaches from harvest and road development in the upper watershed. Discussions with private landowners, including Plum Creek Timber Company, should occur to look at possibilities to improve riparian vegetation in this area.

Barriers: There are no human caused barriers. However, there are numerous cascades in the middle and upper reaches that likely limit bull trout access.

Pools: Pools may be slightly limited due to roads and past riparian harvest. Discussions with Plum Creek Timber Company should occur to look at possibilities to improve large woody debris through direct placement and riparian revegetation.

Sediment: Sediment is elevated in this HUC from an extensive road system. Travel planning, in coordination with Plum Creek, should be looked at to develop a less extensive road system with fewer sediment sources.

Most important activities to improve bull trout population:

1. Initiate discussions with Plum Creek to identify opportunities to address the above habitat conditions. However, higher priority watershed that currently support bull trout in the Thompson River system should be addressed first.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lazier Creek - 170102130104							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 50%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$0	L	L
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	$0	L	L
Sediment	FUR	FAR	15 years	3	$0	L	L

Bull trout have not been detected in Lazier Creek. This is a relatively small, low elevation watershed with poor habitat and it is unlikely that bull trout are currently present. It has moderate potential to support bull trout

Temperature: Temperatures are likely impaired in the lower reaches from harvest and road development throughout the watershed. Discussions with Plum Creek Timber Company should occur to look at possibilities to improve riparian vegetation and reduce road impacts.

Barriers: There are no known human caused barriers.

Pools: Pools are likely limited due to roads and past riparian harvest. Discussions with Plum Creek Timber Company should occur to look at possibilities to improve large woody debris through direct placement and riparian revegetation.

Sediment: Sediment is likely elevated in this HUC from an extensive road system. Discussions with Plum Creek should be initiated to develop a less extensive road system with fewer sediment sources.

Most important activities to improve bull trout population:

1. State agencies and NGO's should initiate discussions with Plum Creek to address the above habitat conditions. However, higher priority watershed that currently support bull trout in the Thompson River system should be addressed first.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Thompson River – Twin Lakes Creek - 170102130105							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 22%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$0	L	L
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	$0	L	L
Sediment	FUR	FAR	15 years	3	$0	L	L

There are no records of bull trout currently occupying this HUC. There is currently no FS land in the HUC. Habitat information is extremely limited.

Temperature: Temperatures are probably elevated because it has been extensively logged and roaded.

Barriers: Unknown.

Pools: Pools are likely impacted and would benefit from large woody debris additions.

Sediment: Sediment is likely elevated and would decrease with road reductions.

Most important activities to improve bull trout population:

1. Unknown. Discussions with PCTC to assess habitat quality and identify opportunities would be the most logical first step.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Meadow Creek - 170102130202							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 48%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$0	L	L
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	$0	L	L
Sediment	FUR	FAR	15 years	3	$0	L	L

Bull trout have not been detected in Meadow Creek. This is a relatively small, low elevation watershed with poor habitat and it is unlikely that bull trout are currently present. It has moderate potential to support bull trout

Temperature: Temperatures are likely impaired in the lower reaches from harvest and road development throughout the watershed. Discussions with Plum Creek Timber Company should occur to look at possibilities to improve riparian vegetation and reduce road impacts.

Barriers: There are no known human caused barriers.

Pools: Pools are likely limited due to roads and past riparian harvest. Discussions with Plum Creek Timber Company should occur to look at possibilities to improve large woody debris through direct placement and riparian revegetation.

Sediment: Sediment is elevated in this HUC from an extensive road system. Discussions with Plum Creek should be initiated to develop a less extensive road system with fewer sediment sources and road effects.

Most important activities to improve bull trout population:

1. State agencies and NGO's should initiate discussions with Plum Creek to address the above habitat conditions. However, higher priority watershed that currently support bull trout in the Thompson River system should be addressed first.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Chippy Creek - 170102130203							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 87%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$50,000	M	H
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	$50,000	M	H
Sediment	FUR	FAR	15 years	3	$200,000	M	H

Bull trout have not been detected in Chippy Creek. However, there has been limited electrofishing effort, and it is possible that bull trout do exist somewhere in the watershed. Chippy Creek is similar to Big Rock Creek, although slightly smaller. It has moderate potential to support bull trout, and is relatively high up in the Thompson River system, so its importance from a geographical location standpoint is accentuated. The 2007 Chippy Creek fire burned through the Chippy Creek watershed.

Temperature: Temperatures are impaired in the lower reaches of Chippy Creek from riparian harvest, roads and land development of Plum Creek lands. Discussions with private landowners, including Plum Creek Timber Company, should occur to look at possibilities to improve riparian vegetation in this area. In the upper reaches, temperatures are likely to be impaired for several years due to the fire that burned in 2007, but there are no measures proposed to improve temperatures in the upper portions of Chippy Creek.

Barriers: There are no barriers and no future actions needed to address this indicator.

Pools: Pools may be slightly limited on private lands in the lower portion of Chippy Creek. Discussions with private landowners, including Plum Creek Timber Company, should occur to look at possibilities to improve large woody debris through direct placement and riparian revegetation. There will be an improvement in pools in Chippy Creek from an influx of large woody debris from the fire that occurred in 2007 in the upper portion of Chippy Creek.

Sediment: Sediment is likely elevated in this HUC from the 2007 fire and the road system on National Forest and Plum Creek Timber lands. After the fire, a substantial amount of work was conducted on the road system on National Forest System lands through BAER (Burned Area Emergency Recovery) and post salvage activities to reduce sediment delivery. Extensive road maintenance was conducted which upgraded Best Management Practices through installation of additional drainage, straw wattle placement and/or slash filter windrows on culverts and other areas identified as potential sediment sources, culvert upgrades where necessary , and seeding. Discussions with Plum Creek should occur to implement travel planning and road reduction in this watershed.

Most important activities to improve bull trout population:

1. Assess the road system on all ownerships in Chippy Creek to identify additional opportunities to reduce sediment delivery and other associated road effects.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Marten Creek, 170102130204							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 83%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$0	L	L
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	$0	L	L
Sediment	FUR	FAR	15 years	3	$0	L	L

This HUC is misidentified on the maps. It should be called Bear Creek, the primary drainage in the HUC. Bear Creek is similar to Big Rock and Chippy Creeks. While bull trout have not been detected in Bear Creek, there has been limited electrofishing effort, and it is possible that bull trout do exist somewhere in the watershed. Bear Creek is slightly smaller and steeper than Chippy Creek, and therefore has slightly less potential to support bull trout. Its importance from a geographical location standpoint is similar to that of Big Rock and Chippy Creeks. The 2007 Chippy Creek fire burned through portions of the Bear Creek watershed.

Temperature: Temperatures are impaired in the lower reaches of Bear Creek from riparian harvest and road development. Discussions with Plum Creek Timber Company should occur to look at possibilities to improve riparian vegetation in this area.

Barriers: There are no barriers and no future actions needed to address this indicator.

Pools: Pools are likely limited on private lands in the lower portion of Bear Creek. Discussions with Plum Creek Timber Company should occur to look at possibilities to improve large woody debris through direct placement and riparian revegetation.

Sediment: Sediment is likely elevated in this HUC from the road system on National Forest and Plum Creek Timber lands. The road system on National Forest System land is located at mid slope and outside of riparian areas except at stream crossings.

Most important activities to improve bull trout population:

1. Assess the road system on all ownerships in Bear Creek to identify opportunities to reduce sediment delivery and other road-related effects, especially through road reductions.
2. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in the mainstem Thompson River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle Thompson River - 170102130205							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 7%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	Unknown	H	H
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	Unknown	H	H
Sediment	FUR	FAR	15 years	3	Unknown	M	H

The Middle Thompson River is an important migratory corridor and juvenile rearing habitat for bull trout. It may also potentially provide some spawning habitat. Its significance at the present time is probably limited due to the fact that there are few fluvial bull trout left in the system, and even fewer this high up the Thompson River. However, under future population scenarios it may be an important link in the Thompson River system. Currently, there is only a very small amount of LNF land in the HUC.

Temperature: Temperatures are probably elevated because it has been extensively logged and roaded. There is probably extensive opportunity to add large woody debris and improve riparian conditions through active planting or improved land management to allow trees to grow and recruit to the stream. Road management and relocation may also be an option in some locations to improve riparian conditions and therefore temperatures.

Barriers: Unknown.

Pools: Pools are likely impacted and would benefit from large woody debris additions. This is a key habitat component to focus on in this HUC, since it is a migratory corridor and overwinter/juvenile rearing habitat.

Sediment: Sediment is probably elevated and would decrease with road reductions throughout the HUC and in tributary HUCs upstream.

Most important activities to improve bull trout population:

1. State agencies and NGOs should initiate discussions with PCTC to assess habitat quality and identify opportunities to directly improve bull trout habitat quality. It is likely that investments in this HUC would contribute to recovery of bull trout in the Thompson River system, even though populations in the HUC are probably very low at the present time.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Little Thompson River - 170102130301							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 98%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$50,000	M	H
Barriers	FUR	FA	15 years	3	$100,000	L	M
Pools	FAR	FA	5 years	3	$50,000	M	H
Sediment	FUR	FAR	15 years	3	$200,000	M	H

This HUC contains the Upper Little Thompson River, Alder and Teepee Creeks. There are no recent records of bull trout in the HUC. However, bull trout likely historically occupied reaches in the HUC. A bull trout was sampled in McGinnis Creek, the adjacent HUC, as recently as a decade ago. This HUC provides much of the potential spawning habitat for the Little Thompson River, which is one of the largest tributaries to the Thompson River. While the Little Thompson is a large tributary, current habitat conditions are marginal for bull trout and priorities for restoration are much greater in the Fishtrap and West Fork Thompson River local populations at the present time. Most of the land is in LNF ownership, with the exception of some patented land along the mainstem of Alder Creek that is mostly used for ranching at the present time. There is a large ditch that bisects the headwaters of Alder and McGinnis Creek and diverts water over the divide to the east on the Flathead Indian Reservation. This ditch was identified as a significant threat to bull trout in the 1998 initial screening of projects potentially affecting bull trout due to the water withdrawal and potential entrainment issues.

Temperature: Temperatures are elevated due to water withdrawal, riparian harvest, and grazing. There is also beaver activity through much of the HUC – it is unclear how this is affecting temperatures. There are opportunities to allow vegetation to recover and develop cooperative projects to reduce grazing impacts.

Barriers: The Alder/McGinnis ditch is a complete barrier to upstream movement in Alder Creek. However, it is unlikely that bull trout would occur this high in the watershed, so its effect may be less than indicated by the baseline call. Discussions should be undertaken with the Salish-Kootenai Tribe to address issues associated with the ditch.

Pools: Pools are limited due to impacts from cattle grazing. Grazing practices have changed over the last 10-20 years, but recovery of bank damage is a slow process. There are active beaver complexes that help to improve pool conditions. Brook trout densities are extremely high in this HUC, and this may limit bull trout recovery.

Sediment: Sediment is elevated in this HUC from roads and grazing. There are numerous opportunities for the LNF to reduce road densities and impacts associated with roads. Identify opportunities to reduce road related effects.

Most important activities to improve bull trout population:

1. Address habitat and temperature impacts.
2. Evaluate and manage the road system to reduce effects to aquatic habitat.
3. Work cooperatively with landowners to determine if additional measures are needed to reduce grazing impacts on private lands.
4. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in the Little Thompson River and the Thompson River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): McGinnis Creek - 170102130302							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 99%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$50,000	M	H
Barriers	FUR	FA	15 years	3	$100,000	L	M
Pools	FAR	FA	5 years	3	$50,000	M	H
Sediment	FUR	FAR	15 years	3	$200,000	M	H

This HUC contains the McGinnis Creek, a main tributary to the Upper Little Thompson River. There are no recent records of bull trout in the HUC. However, one bull trout was observed in sampling approximately 10 years ago. Bull trout may have existed in other locations throughout the HUC in the past. This HUC provides much of the potential spawning habitat for the Little Thompson River, which is one of the largest tributaries to the Thompson River. While the Little Thompson is a large tributary, current habitat conditions are marginal for bull trout and priorities for restoration are much greater in the Fishtrap and West Fork Thompson River local populations at the present time. Most of the land is in LNF ownership. There is a large ditch that bisects the headwaters of Alder and McGinnis Creek and diverts water over the divide to the east on the Flathead Indian Reservation. This ditch was identified as a significant threat to bull trout in the 1998 initial screening of projects potentially affecting bull trout due to the water withdrawal and potential entrainment issues.

Temperature: Temperatures are elevated due to past riparian harvest and grazing. Grazing impacts on LNF lands have been addressed through an electric fence exclosure of a small portion of the riparian zone where past impacts occurred. Recovery in this area is good, however, impacts have moved upstream and should be looked at more closely in future years.

Barriers: The Alder/McGinnis ditch is a complete barrier to upstream movement in McGinnis Creek. However, it is unlikely that bull trout would occur this high in the watershed, so its effect may be less than indicated by the baseline call. Discussions should be undertaken with the Salish-Kootenai Tribe to address issues associated with the ditch.

Pools: Pools are limited due to impacts from timber harvest and riparian roads. Grazing practices have impacted relatively localized areas on LNF lands that are being monitored. Brook trout densities are extremely high in this HUC, and this may limit bull trout recovery.

Sediment: Sediment is likely elevated in this HUC from roads and grazing. There are numerous opportunities to reduce road densities and impacts associated with roads.

Most important activities to improve bull trout population:

1. Evaluate and manage the road system to reduce effects on aquatic habitat including opportunities for road reductions.
2. Identify actions needed to reduce current grazing impacts upstream of the existing exclosure.
3. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in the Little Thompson River and the Thompson River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle Little Thompson River - 170102130303							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 87%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$50,000	M	H
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	$50,000	M	H
Sediment	FUR	FAR	15 years	3	$200,000	M	H

The Middle Little Thompson River HUC could potentially be an important migratory corridor and overwinter/juvenile rearing area if there were currently bull trout in the Upper Little Thompson River. Its importance to future bull trout recovery is potentially high, but at the current time it is a low priority due to limited or no bull trout occurrence. In addition, this HUC contains the North Fork Little Thompson River, which could support bull trout if populations were more robust. While the Little Thompson is a large tributary, current habitat conditions are marginal for bull trout and priorities for restoration are much greater in the Fishtrap and West Fork Thompson River local populations at the present time.

Temperature: Temperatures are impaired from riparian harvest and road development in the watershed. Most of the roads in the North Fork are long distances from riparian areas, so the effect in this portion of the HUC is likely less than in the rest of the watershed. Discussions with Plum Creek should be initiated to reduce road densities, especially those lower in the HUC.

Barriers: There are no barriers and no future actions needed to address this indicator.

Pools: Pools may be slightly limited on private lands in the lower portion of the North Fork. Discussions with private landowners, including Plum Creek Timber Company, should occur to look at possibilities to improve large woody debris through direct placement and riparian revegetation.

Sediment: Sediment is likely elevated in this HUC from an extensive road system on National Forest and Plum Creek Timber lands. Discussions with Plum Creek should be initiated to identify opportunities to reduce sediment delivery including road reductions.

Most important activities to improve bull trout population:

1. Work cooperatively with Plum Creek to identify opportunities in the HUC to reduce sedimentation and improve stream temperatures and channel habitat and riparian conditions, especially through road reductions.
2. Add large woody debris to improve pool habitat in the lower reaches where appropriate.
3. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in Little Rock Creek and the Thompson River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Mudd Creek - 170102130304							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 36%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$0	L	L
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	$0	L	L
Sediment	FUR	FAR	15 years	3	$0	L	L

Mudd Creek is a relatively small watershed tributary to the Little Thompson River in its lower reaches. There are no records of bull trout currently occupying this HUC. There is currently very little FS land in the HUC. Habitat information is extremely limited.

Temperature: Temperatures are probably elevated because it has been extensively logged and roaded.

Barriers: Unknown.

Pools: Pools are likely impacted and would benefit from large woody debris additions.

Sediment: Sediment is likely elevated due to the road system and grazing and would decrease with road reductions. An unpaved county road is located adjacent to Mudd Creek for a portion of its length.

Most important activities to improve bull trout population:

1. Unknown. Discussions with PCTC to assess habitat quality and identify opportunities would be the most logical first step.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Little Thompson River - 170102130305							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 16%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$0	L	L
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FA	5 years	3	$0	L	L
Sediment	FUR	FAR	15 years	3	$0	L	L

The Lower Little Thompson River HUC could be an important migratory corridor and overwinter/juvenile rearing area if bull trout were currently present in the upper and middle reaches. It is potentially important to bull trout, but at the current time is low priority for restoration due to the lack of bull trout occupancy. In addition, it contains Marten Creek – a relatively small watershed with limited importance for bull trout due to its size.

Temperature: Temperatures are impaired from riparian harvest and road development in the watershed.

Barriers: There are no barriers and no future actions needed to address this indicator.

Pools: Pools are probably impacted by past riparian timber harvest and road development. Discussions with Plum Creek Timber Company should occur to look at possibilities to improve large woody debris through direct placement and riparian revegetation.

Sediment: Sediment is likely elevated in this HUC from the road system. Discussions with Plum Creek should occur to identify opportunities to reduce sediment contributions from roads, especially through road reductions.

Most important activities to improve bull trout population:

1. Add large woody debris to improve pool habitat in the lower reaches where appropriate.
2. Work cooperatively with Plum Creek to identify opportunities in the HUC to reduce sedimentation and improve stream temperatures and channel habitat and riparian conditions, especially through road reductions.
3. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in the Little Thompson River if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Thompson River - Deerhorn Creek - 170102130406							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 82%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FUR	FAR	15 years	3	$50,000	H	H
Barriers	FUR	FA	5 years	3	$100,000	H	H
Pools	FAR	FA	5 years	3	$50,000	H	H
Sediment	FUR	FAR	15 years	3	$200,000	H	H

Bull trout are present this reach of the Thompson River and fluvial bull trout have been identified spawning in Deerhorn Creek. This is an important HUC for bull trout and future bull trout recovery. Much of the ownership is currently Plum Creek, and so limited information is known regarding habitat conditions and opportunities.

Temperature: Temperatures are probably impacted by the mainstem roads along the Thompson River and road development and timber harvest in Deerhorn Creek. There are likely opportunities to reduce road densities and road impacts, and also to allow for vegetative recovery along riparian zones to improve temperatures.

Barriers: It is unclear where barriers exist in this HUC. A specific assessment should be undertaken to determine if barriers are affecting bull trout movement and populations.

Pools: Pools are probably impacted from riparian harvest and road systems in Deerhorn Creek and along the main Thompson River. Discussions with Plum Creek Timber Company should occur to look at possibilities to improve large woody debris through direct placement and riparian revegetation. The Lolo National Forest should pursue opportunities with Plum Creek and Sanders County to consolidate the two roads paralleling the main Thompson River.

Sediment: Sediment is likely elevated in this HUC from the road system on National Forest and Plum Creek Timber lands. Discussions with Plum Creek should occur to manage the road system to reduce sediment delivery in this watershed.

Most important activities to improve bull trout population:

1. Pursue opportunities to consolidate the parallel road systems along the Thompson River.
2. Work cooperatively with Plum Creek to manage the road system and identify other opportunities in the Deerhorn Creek watershed to reduce sedimentation and improve stream temperatures and channel habitat and riparian conditions, especially through road reductions.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Thompson River -- Goat Creek - 170102130407							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 99%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	15 years	3	$50,000	H	H
Barriers	FUR	FA	5 years	3	$100,000	L	L
Pools	FAR	FA	5 years	3	$50,000	H	H
Sediment	FUR	FAR	15 years	3	$200,000	H	H

Bull trout are present this reach of the Thompson River. It is a critical overwinter and juvenile rearing area for bull trout produced in tributary streams higher up in the watershed. The primary limiting factor is the parallel road systems on both sides of the river. Goat Creek, the largest tributary in the HUC, does not support bull trout due to the high gradient nature of the stream channel.

Temperature: Temperatures are elevated due to the mainstem roads along the Thompson River. These roads have effectively eliminated much of the riparian vegetation and shading from the stream channel, and this results in higher summer temperatures and lower winter temperatures. Both of these can have negative impacts on bull trout. The high summer temperatures in this HUC are especially problematic in that they can limit upstream bull trout migration to important spawning tributaries. There are numerous opportunities to reduce temperatures. The main opportunity lies in consolidating the two road systems and restoring riparian vegetation and floodplain function to one side of the stream, thereby providing shade and long-term natural woody debris recruitment. In the short-term, however, there are opportunities to plant the road shoulder on the road segments that will likely be retained. There are also numerous opportunities to add large woody debris to the stream channel to increase pool habitat and complexity, and indirectly reduce temperatures.

Barriers: There are no barriers in the main river. The baseline call is driven by a total barrier at the mouth of Goat Creek. This barrier is 20 feet downstream from another total barrier on private land, which is only a short distance downstream from high gradient that naturally restricts passage. Therefore, it is not important to address from a bull trout perspective.

Pools: Pools are directly impacted from by the parallel road systems along the main Thompson River. The Lolo National Forest should pursue opportunities with Plum Creek and Sanders County to consolidate these two roads. In addition, significant numbers of large trees in conglomerates sufficient in size to stay in the channel and create habitat should be added to the river throughout this HUC. This would significantly improve habitat quality and complexity for bull trout.

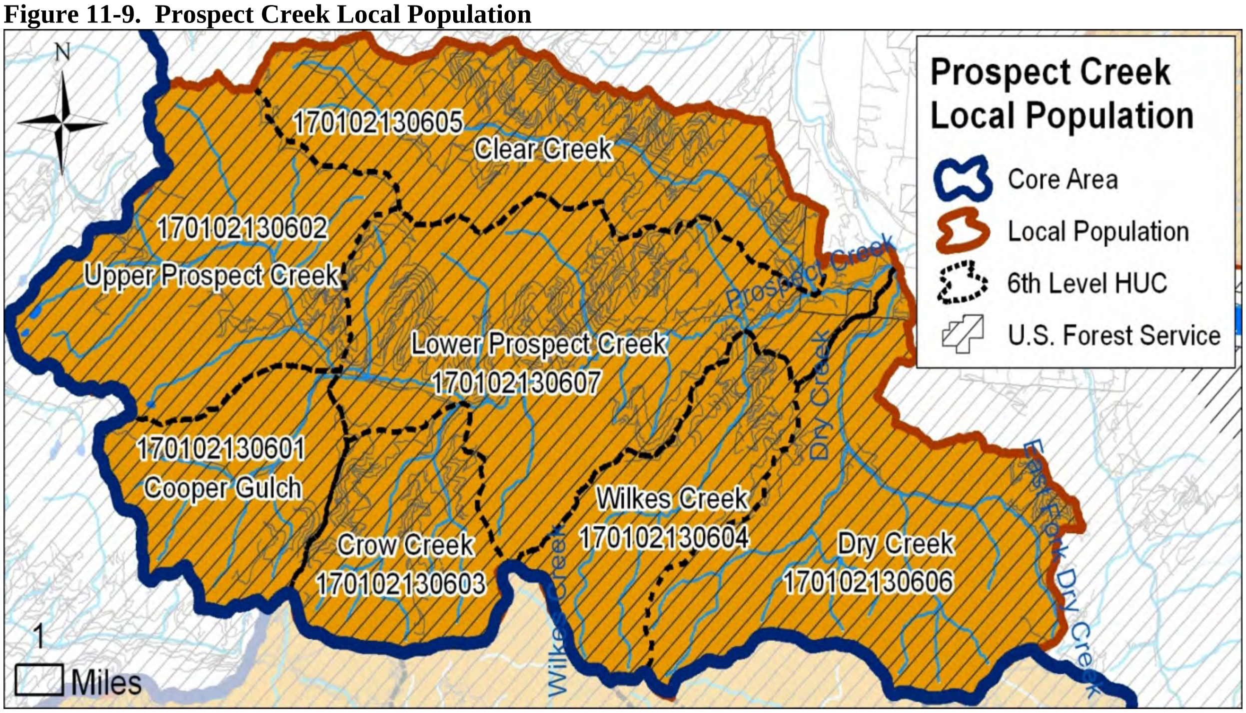
Sediment: Sediment is elevated from contributions from upstream tributary watersheds and the impacts of the two parallel roads along the main river channel. Sediment reduction in tributary watersheds is critical to improve main river conditions for overwintering and juvenile rearing habitat.

Most important activities to improve bull trout population:

1. Pursue opportunities to consolidate the parallel road systems along the Thompson River.
2. Manage the road system in upstream tributary watersheds to reduce sedimentation and improve juvenile rearing capacity. Management actions could include road decommissioning, storage and relocation.
3. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in the Thompson River if it would benefit bull trout recovery in the watershed.

Local Population: Prospect Creek

Figure 11-9. Prospect Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 11-2. Prospect Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250 Migratory 50-250 Res	Unknown	Migratory, Fragmented	1	High in Noxon Reservoir. Minimal in Prospect Creek itself, although brook trout are present.
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High – Stream mouth is just downstream of Thompson Falls dam, so upstream migrating bull trout may use it for spawning in higher proportion.		Moderate. Fragmentation of main river system (3 dams) is an issue, but Prospect is a large, mostly connected system within itself. The watershed drains high elevation, high precipitation zone, so could be important in warmer, drier climate. Rain on snow is prevalent – may cause greater instability in different climate.		None known.

Driving Factors Determining Bull Trout Population:

Key limiting factors are fragmentation of the main river system and intermittent flow portions of the stream where fish stranding occurs and access can be an issue. Intermittent flows are probably at least partly natural, and they do provide important groundwater exchange areas that are very important for spawning and rearing. Channel instability is an issue, especially in the lower reaches on private land and where YPL and power line corridors have affected riparian conditions. Habitat conditions and non-native species associated with the reservoirs are not as big of an issue in Prospect because it is upstream of impoundment, in the remaining riverine section. However, non-native concerns for juveniles in the reservoir are still an issue. Extensive work is underway through AVISTA relicensing to address fish passage and connectivity to Lake Pend Oreille.

Confidence in your assessment (H,M,L): M

Prospect Creek Local Population Discussion:

The Prospect Creek local population includes all of Prospect Creek, from the headwaters to the confluence with the Clark Fork River near Thompson Falls, Montana. Bull trout densities were historically much higher than they are today. Distributions may not have been significantly different, as populations are still relatively widespread where suitably sized streams exist. It is unclear whether the proportion of fluvial to resident forms is currently different that it was in the past. Upper Prospect Creek has been naturally isolated for at least 10,000 years (USGS 2008). Resident population occurrence in these areas may therefore be similar to what it was historically.

USFS Biologists estimate that 150 to 350 fluvial redds may have been present in the Prospect Creek local population historically. This is supported by 1950's data that shows only slightly lower numbers when populations were already in decline in many areas (Pratt and Huston 1993). As with most bull trout populations, overall numbers were likely highly variable from year to year, based on natural climatic and disturbance patterns.

Bull trout populations in Prospect Creek were likely first exposed to human-caused impacts in the late 1800's with limited timber harvest (accessible cedars and other species useful for building materials), localized mining and some fishing. The majority of stream bottom routes, including the main Prospect Creek road, were developed in the late 1800's and used for trade and mining between Thompson Falls, Murray and Wallace. These routes improved access for fishing without restrictions on bull trout.

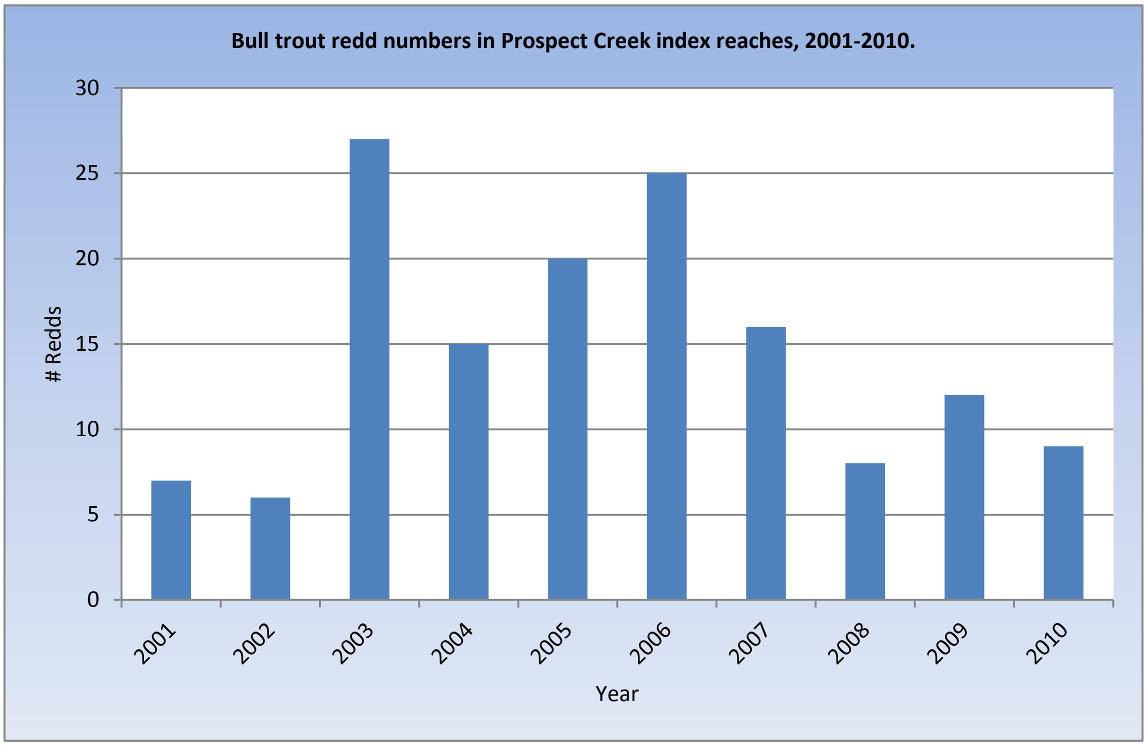
The next significant era impacting Prospect Creek bull trout was during the early to mid-1950s when three large dams, a petroleum pipeline and power lines were constructed on the Clark Fork River. Cabinet Gorge and Noxon Rapids Dams were constructed in the mid-1950's and limited access into Prospect Creek. In 1954, the Yellowstone Pipeline was installed in Prospect Creek and has had significant impacts to stream channel form and function, large woody debris and riparian health. Two major power lines were constructed in the 1940's to 1960's in the Prospect Creek drainage and have further degraded stream and riparian health.

The next significant era impacting Prospect Creek bull trout was during the 1970's and early 1980's, when extensive road building and timber harvest resulted in higher sediment levels, less stream cover, and higher water temperatures in many drainages. The Prospect Creek Highway was reconstructed and paved in 1980 and has had a significant impact on the stream channel and habitat in Prospect Creek. In 1995/1996, significant flooding caused several pipeline exposures along Prospect Creek and road damage in Clear Creek and Cooper Gulch. Finally, a decade of successive drought years in the late 1990's caused warm water temperatures that facilitated the upstream expansion on non-native species (brown, brook and rainbow trout) into lower Prospect Creek, further impacting bull trout populations. Despite past fish stocking, upper Prospect Creek remains a native fishery.

Many of these past impacts have been reduced or eliminated, and therefore some stressors on the populations no longer play as large of a role as they did historically. For instance, few new roads are constructed any longer. Timber harvest is at low levels relative to historic, although there are two current sales in the watershed in Therriault and Clear Creeks. The drought seems to have subsided, and regulation changes do not allow people to keep, or intentionally fish for, bull trout.

Despite this, bull trout numbers in Prospect Creek are alarmingly low. Figure 11-11 shows bull trout redd numbers in index reaches throughout the basin from 2001 through 2010. These data must be interpreted with care, because early surveys did not count resident redds, and some index reach locations have changed throughout the period. Based on this, it is difficult to determine with confidence what trend the population has.

Figure 11-10. Bull trout redd numbers in Prospect Creek, 2001-2010. This graph also shows linear trends.



As seen in Figure 11-10, the population trend for bull trout in Prospect Creek is variable. Importantly, these numbers are likely well below what they were historically.

Currently, the two lower dams on the Clark Fork River likely limit recovery of bull trout in Prospect Creek to some degree. There is an active program at Cabinet Gorge Dam to transport fluvial fish over the dam in order for them to complete their migration.

It is unlikely that dams are entirely responsible for the current populations in Prospect Creek. Numerous other significant impacts, such as extensive non-native communities in the middle and lower reaches (mainly brown and rainbow trout, but also brook trout in some tributaries), the Prospect Creek highway and other main valley bottom roads (Clear Creek, Crow Creek, Cooper Gulch, for example) which parallel major riparian areas, extensive land management and road construction in many of the tributaries, private land development in lower Prospect Creek, construction and maintenance of the three utility corridors, and to a lesser extent, inadvertent fishing mortality probably also contribute significantly to the current population trend.

Northwestern Energy, Bonneville Power Administration (BPA) and Yellowstone Pipeline (YPL) maintain utility corridors in the Prospect Creek watershed. Regular vegetation clearing in these utility corridors precludes establishment of mature trees in the riparian area, and thus restricts large woody debris recruitment into Prospect Creek, Crow Creek and Cooper Gulch. Clearing of riparian vegetation in these areas may also impact stream shading, stream temperature, bank erosion, and sediment delivery. Utility corridors and the roads used to access them may also be a source of sediment. Over 40% of Prospect Creek is encroached on by utility corridors.

The Prospect Creek Highway, originally constructed in the late 1800’s and further developed (including paving) in the 1980’s has similar impacts as discussed above on Prospect Creek. The highway has additionally caused issues with stream morphology due to meander cutoffs and increased sedimentation due to highway sanding. Almost 30% of Prospect Creek is encroached on by the Prospect Creek highway.

Temperature is also a main limiting factor in Prospect Creek, mostly due to the utility corridors and highway discussed above. Agriculture, grazing and residential development have also been concentrated in the valley bottoms thereby having the greatest effect to vegetation in the riparian community of Prospect Creek. Also along Prospect Creek and many of its tributaries, riparian harvest has also played a role in decreasing overstory cover and thus increasing temperatures.

Prospect Creek is characterized by both intermittent and perennial flow sections. Much of the intermittent nature of Prospect Creek is naturally occurring, based on USGS studies. However, stream intermittency may have been exacerbated by sediment deposition linked to the fires of 1889 and 1910 and the large magnitude floods that followed in 1916. Since that time, additional sediment sources and channel disequilibrium in mainstem Prospect Creek have increased sediment production and deposition resulting in aggraded sections of the channel. The effects of this aggradation as a result of these natural and anthropogenic watershed disturbances are reflected in the intermittent nature of Prospect Creek. During summer when surface flows decrease, Prospect Creek becomes intermittent in multiple reaches of up to 2.5 miles in length. Due to the intermittency of Prospect Creek, there has been a decrease in the amount of available habitat, especially during the summer and fall spawning season, and an increased chance of mortality from fish being trapped in dry sections.

While none of the previously mentioned impacts is easy to address, it will be necessary to change them in order to maintain a long-term population of bull trout in the Prospect Creek Core Area. It is unlikely that the impacts from any one of these sources can be eliminated entirely, but rapid and successive improvements in each will contribute synergistically to a stronger population, and this will allow us time to work further towards reducing additional impacts.

For example, discussions with Northwestern Energy could develop an action plan for moving much of their line away from Cooper Gulch and Prospect Creek. There are opportunities, especially in Cooper Gulch, to move the power line within the road corridor, thus eliminating a power line corridor directly over Cooper Gulch. This area could then be revegetated, creating more shading and potential large woody debris.

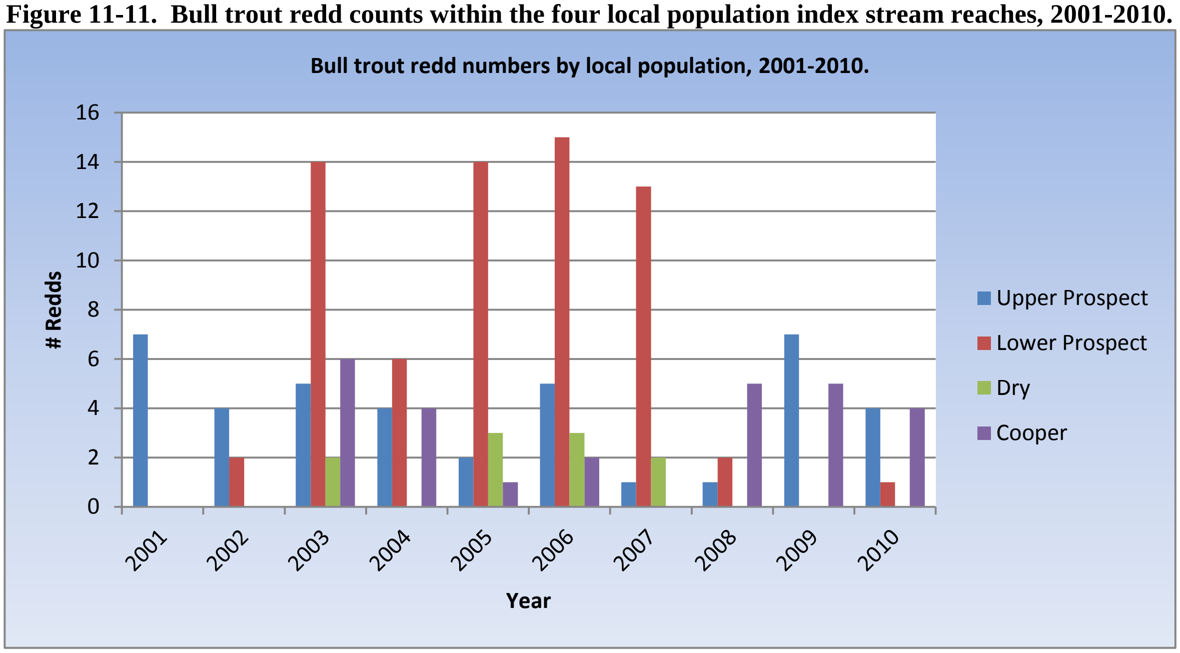
Sediment is probably one of the main limiting factors in Prospect Creek from five different sources: bank erosion, forest roads, culvert failure, upland timber harvest and traction sand on the Prospect Creek highway. There are definite opportunities to decrease sediment contributions from forest roads in the core area. The Forest Service uses Inland Native Fish Strategy buffers to minimize our impacts from upland timber harvest. Although traction sand may not be able to be completely eliminated, there are opportunities to work with Department of Transportation to minimize the effects of traction sand on Prospect Creek.

It is unlikely that we would be able to completely eliminate non-native fish from the watershed. However, changes in fishing regulations, as well as direct management efforts (i.e., electrofishing, trapping, etc.) could be used to reduce populations on non-natives. With less competition, westslope cutthroat trout and bull trout populations may respond favorably, benefitting both native fish populations and the entire aquatic community in Prospect Creek. This outcome is uncertain at the present time due to limited long-term studies and uncertainty regarding the magnitude and interaction of other limiting factors.

There are 7 6th level HUCs within the local population on the Lolo National Forest – Clear Creek, Cooper Gulch, Crow Creek, Lower Prospect Creek, Upper Prospect Creek, Wilkes Creek and Dry Creek. While fluvial bull trout may spawn in other tributaries, these seven local populations support the majority of fluvial spawning.

Figure 11-11 shows redd count data from the four index streams/reaches over the 2001-2010 time-period. Again, these data should be viewed with caution since not all redds were counted in early years and some index reach locations have changed. As can be seen, redd numbers in any given stream are highly variable from year to year. This is partly a result of the extremely low numbers within index reaches, but also a result of the inherent variability in bull trout spawning. Most streams/reaches usually support less than ten bull trout redds, and often support only a few.

Figure 11-11. Bull trout redd counts within the four local population index stream reaches, 2001-2010.



Of primary concern is the fact that some of these index streams have years where no spawning occurs. This is largely due to the extremely low numbers of bull trout in the population, and may be an indicator that these streams will not support bull trout in the future. Since index reaches are the cornerstones that support the overall population in the Core Area, loss of any one represents a significant setback to overall sustainability and recovery of the population.

Of the four local populations where redd counts occurred, Lower and Upper Prospect Creek appear to be the strongest. However, over the last three years redd numbers in Lower Prospect Creek have taken a serious decline (over 10 in 2007 to less than 2 between 2008 and 2010). Upper Prospect

Creek and Cooper Gulch appear to be a little more stable than Lower Prospect Creek, but numbers are still low.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Clear Creek - 170102130605							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 98%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	20 years	3	$300,000	H	L
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FUR	FAR	20 years	3	$200,000	M	L

This HUC currently contributes little to the bull trout population, but it is a relatively large, low gradient system in the lower part of Prospect Creek, so it does have potential. Approximately 4-5 miles of Clear Creek is intermittent and only flows for approximately 2-3 months during the year. Prospect is a very important watershed for bull trout, and the amount of habitat currently used is relatively small, so expansion within this population is a priority. Water temperatures and intermittent flow might limit bull trout in Clear Creek. Past restoration efforts for the Clear Creek valley bottom to re-establish healthy riparian communities and streambank stability have not been very successful. There is an extremely high density of brook trout within this watershed, which may also be limiting bull trout populations. Planning is currently underway in the 6th level HUC to improve stream stability and reduce sediment sources. Proposed management actions include decommissioning excess roads, storing roads not needed for several decades, maintaining roads to be kept available for public and administrative use, and replacing undersized culverts. In addition, the project proposes heavy maintenance on the main valley bottom road (Clear Creek road #153) and realigning road segments away from the stream where road/stream interface issues exist. It should be noted that while road maintenance intended to reduce aquatic effects is one tool, leaving a road prism along channels comes with effects that typically cannot be fully mitigated. Road maintenance is also a short-term solution unless BMP's are fully maintained into the future. Woody debris placement, riparian planting, and other bank stabilization techniques are also included.

Temperature: Temperatures in Clear Creek are well outside of reference conditions and are affected by a loss of riparian vegetation from historical riparian harvest, the main Clear Creek Road, and current beaver activity. R-establishing cottonwoods and willow in over-widened D stream reaches would improve the long-term recovery of historical riparian community and would provide channel shading. Discussions with landowners in the lower 4 miles of Clear Creek should be instigated to develop a plan for revegetation along Clear Creek. The lower 1 mile of private land and lower 3-4 miles of FS are key for revegetation.

Barriers: There are no barriers from a bull trout migration perspective. No future actions are needed to address this indicator.

Pools: Pools are generally lacking in Clear Creek due to loss of potential large woody debris from riparian harvest and roads. Much of the stream on FS is intermittent. The upper reaches of Clear

Creek are generally in good condition with abundant pools. The lower reaches on private property are lacking large woody debris. Discussions with landowners in the lower 4 miles of Clear Creek should be initiated to look for opportunities to develop pools in this area.

Sediment: Sediment is elevated in Clear Creek from bank erosion, riparian roads (especially the main Clear Creek road) and the extensive road network throughout the drainage. The Forest Service is currently proposing a project in Clear Creek that would address sediment sources on FS property, including a large amount of road decommissioning/storage, BMPs and partial road relocation, especially along the main Clear Creek Road. Implementing this project should significantly decrease sediment in this 6th level HUC.

Most important activities to improve bull trout population:

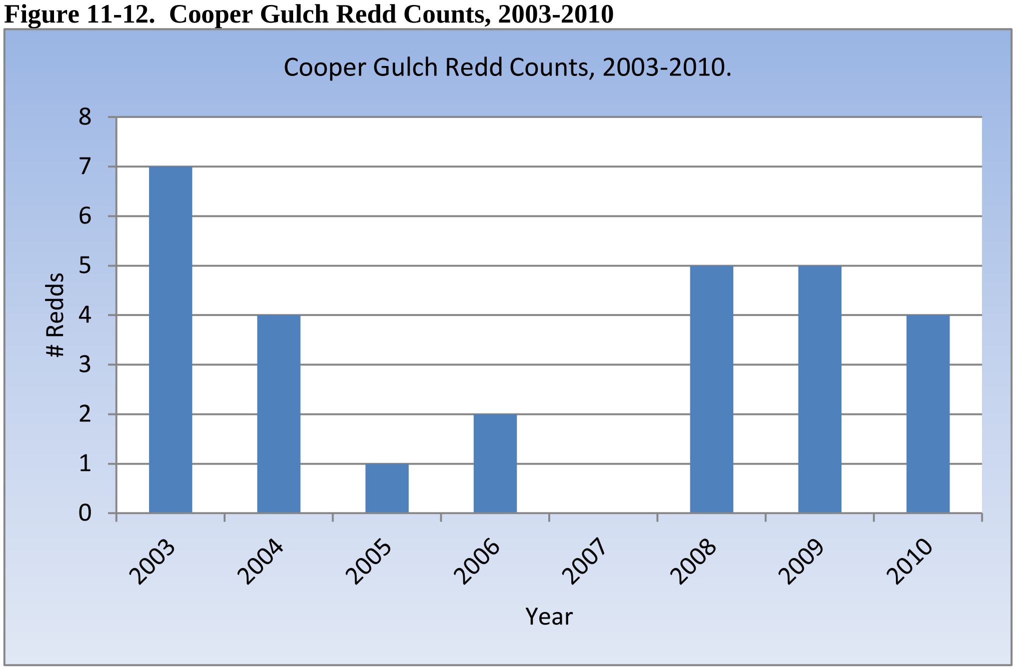
1. Implement extensive travel planning and road reductions (planning currently underway). This should include looking at opportunities to remove the greatest threats to aquatic habitats.
2. Implement BMPs and consider areas for relocation along the main Clear Creek road to reduce sedimentation and address road/stream interface issues (planning currently underway).
3. Implement natural channel design activities including establishing appropriate channel dimension, pattern & profile and rigorous revegetation along the upper 1 mile of private land and lower 3-4 miles of FS land.
4. Replace or remove culverts that are undersized to reduce sedimentation potential. Some of these culverts are fish passage barriers to westslope cutthroat trout (planning currently underway).
5. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in the Clear Creek and Prospect Creek if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Cooper Gulch - 170102130601							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 98%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	3	$300,000	H	H
Barriers	FUR	FA	5 years	3	$100,000	M	H
Pools	FAR	FA	5 years	3	$100,000	H	H
Sediment	FUR	FAR	10 years	3	$200,000	H	H

Cooper Gulch supports the majority of spawning for the fluvial Prospect Creek population. Two issues limit the potential of Cooper Creek. The first is low/sub flows in the lower reaches – this is probably natural and is common throughout the Prospect drainage. The second issue is the presence of a road and NWE power line up the valley bottom. Both of these have significant impacts on the stream. We are currently consulting on the power line, so the timeliness of opportunities is good. The road is more problematic. Past efforts to remove barriers have been effective – the remaining barriers are probably not impactive to bull trout populations due to their locations on small tributaries to Cooper Gulch. Relocating portions of the road and power line would improve all three indicators above and measurably improve habitat and decrease risks for bull trout. LWD was added to about 1.5 miles of Cooper Gulch in 2009 through AVISTA funding – this should also improve habitat conditions for bull trout. In 2012, the remaining undersized culverts on the main Cooper Gulch Road were replaced and the road was gravel surfaced and additional BMPs applied to reduce sedimentation into Cooper Gulch. This stream has been a focal area for AVISTA funding in the last 5 years due to its importance to the Prospect Creek local population.

Figure 11-12. Cooper Gulch Redd Counts, 2003-2010



Temperature: Temperatures in Cooper Gulch are somewhat elevated and affected by a loss of riparian vegetation, mainly from the Northwestern Energy power line corridor that runs through the riparian area. Discussions with Northwestern Energy should be instigated to develop a plan for moving the power line corridor out of the riparian area. There are opportunities to either align the corridor more closely with the road corridor or move the power line to align with the BPA power line in Crow Creek. The road probably influences temperatures to a lesser extent, but there may be opportunities to relocate the road in areas where it is directly influencing Cooper Gulch. A rigorous revegetation plan should then be developed for the area once the power line and road issues are addressed.

Barriers: All potential barriers that influenced migratory bull trout have been remedied. There are currently no barriers in this 6th level HUC.

Pools: Pool conditions are impaired in Cooper Gulch. In 2009, large woody debris jams were imported into Cooper Gulch, mostly in areas directly under the power lines where potential large woody debris had been removed from power line construction and maintenance. Further investigations of Cooper Gulch should take place to determine if there is any more need to import large woody debris into the system.

Sediment: Sediment is elevated in Cooper Gulch, mainly due to the main Cooper Gulch Road. Maintenance has been sparse on this road over the last decade. However, substantial BMP improvements, including gravel surfacing, were completed in 2012. Opportunities to realign the road away from Cooper Gulch should also be investigated. Additional road decommissioning opportunities should be addressed in the upper watershed, although road densities in Cooper Gulch are much lower than other 6th level HUCs in Prospect Creek.

Most important activities to improve bull trout population:

1. If feasible, discuss opportunities to relocate Northwestern Energy power line out of the riparian area in Cooper Gulch. A rigorous riparian revegetation plan should then be implemented to promote shading and improve habitat along Cooper Gulch.
2. Investigate road relocation opportunities along the Cooper Gulch road to minimize sediment and stream impacts to Cooper Gulch. Identify additional areas for large woody debris placement where needed in Cooper Gulch.
3. Implement travel planning and road reductions in the watershed to address unneeded road to reduce sedimentation.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Crow Creek - 170102130603							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$200,000	H	H
Barriers	FUR	FA	5 years	3	$100,000	M	H
Pools	FAR	FA	5 years	3	$100,000	H	H
Sediment	FUR	FAR	10 years	3	$300,000	H	H

Bull trout redd surveys were conducted in Crow Creek from 2003 to 2007. No bull trout redds were found during inventories. Bull trout redds were detected in 2012 surveys.

There are some roads and crossings that contribute to sediment, temperature, and pool problems. Barriers are mostly addressed already; however, there is one crossing on the East Fork that is potentially very important for bull trout and westslope cutthroat trout. It's an open bottom arch at stream grade, but the model shows that it's a barrier for both juveniles and adults. This needs to be field verified. Recent AVISTA projects in the lower reaches have increased pool and woody debris levels. However, the main road and the BPA power line still affect the creek. Timeliness to address these is high with the current consultation on the power line just getting underway.

Temperature: Temperatures in Crow Creek are elevated and affected by a loss of riparian vegetation from power line construction and maintenance, historical riparian harvest and riparian roads in the watershed. The likelihood of relocating the BPA power line in this drainage is low, but modifying maintenance activities may help reduce impacts to riparian vegetation. Revegetation in the upper mainstem in 2007 should help improve conditions through this section. Other opportunities for riparian revegetation should be explored.

Barriers: Modeling shows that one crossing on East Fork Crow Creek is a barrier to both juveniles and adults. Field verification should be done to determine if, in fact, this is a barrier. If it is a barrier, it should be priority for replacement.

Pools: Pools are generally lacking in Crow Creek and its tributaries due to a loss of potential and active large woody debris from power line construction and maintenance, riparian roads and historic riparian harvest. Restoration efforts in 2007 in the upper mainstem of Crow Creek improved pools through this reach. An assessment should be conducted to identify additional areas for large woody debris recruitment, especially under the BPA power lines.

Sediment: Sediment is at elevated levels in Crow Creek, with the largest contributor being roads in the watershed. Future analysis in the area should address sediment sources. Management actions could include road decommissioning, storage, and relocation. Discussions with BPA should occur to identify any access roads that may be unneeded in the future.

Most important activities to improve bull trout population:

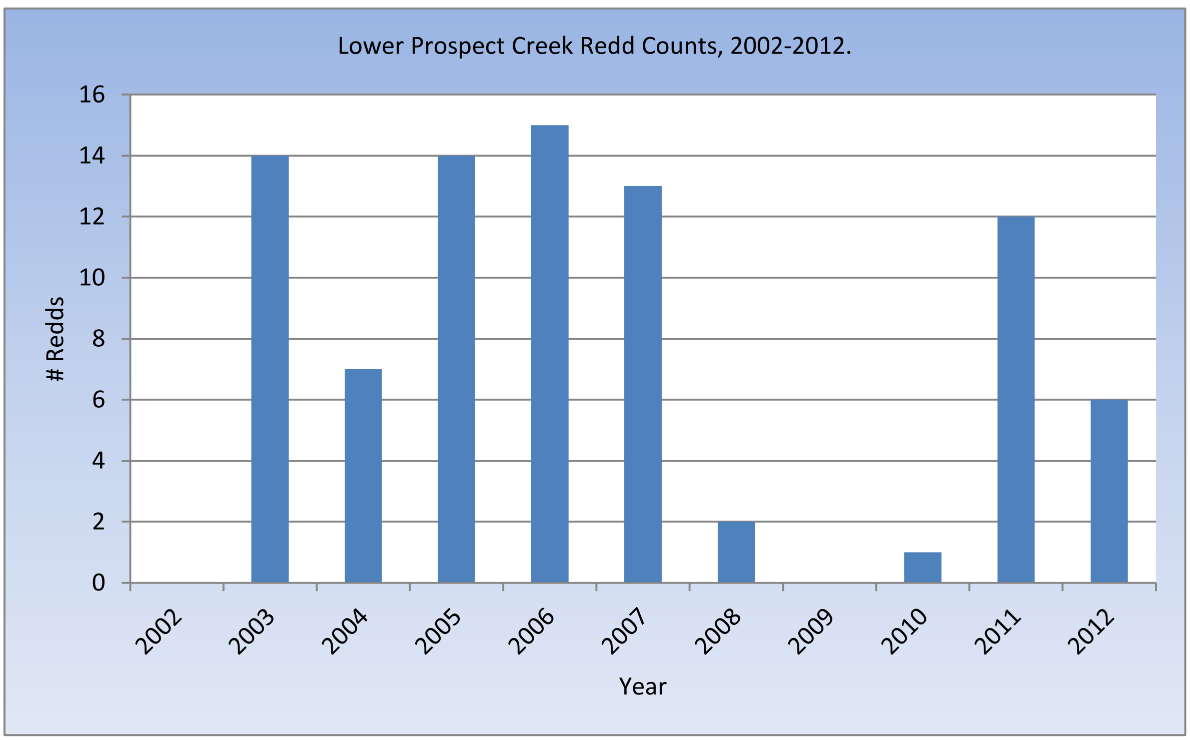
1. Implement extensive travel planning and road reductions in Crow Creek to reduce sediment sources improve stream temperature and channel habitat and riparian conditions. Work with BPA to identify any access roads that are not needed for future management. Riparian roads will be especially important for reducing sediment.
2. Assess the need to replace the undersized culvert on East Fork Crow Creek from a fish passage perspective. If it is a barrier, replacement of this structure is a high priority.
3. Assess the potential to construct large woody debris jams to improve fish habitat in Crow Creek, including West Fork and East Fork Crow Creek.
4. Discuss modifying maintenance activities on the BPA power line to reduce impacts to aquatic resources.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Prospect Creek - 170102130607							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 97%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FUR	FAR	10 years	3	$200,000	H	H
Barriers	FUR	FAR	20 years	3	$500,000	L	L
Pools	FAR	FA	5 years	3	$100,000	H	H
Sediment	FUR	FAR	20 years	3	$300,000	M	M

Lower Prospect Creek is primarily a migration corridor. However, the lower redd index reach is right at the upper boundary of this HUC. This HUC contains numerous small tributaries and the mainstem of Prospect Creek. The small tributaries are important for westslope cutthroat trout and very important for contributing flow to Prospect Creek for bull trout. Prospect Creek subs in several reaches through this HUC, and this is probably one of the main limiting factors, so the tributaries are important for flow and temperature refugia for bull trout. There are several barriers on the small streams – these are generally moderately important to fix for westslope cutthroat trout and to remove chance of failure, but not directly limiting bull trout habitat availability. There are some private land effects along the mainstem. The Yellowstone Pipeline corridor impacts the riparian zone to a large extent. ROW management of this corridor is not consistent with a healthy, resilient floodplain. In addition, the pipeline poses a risk of leak or rupture, although this risk is deemed low. The BPA and NWE power line corridors also affect the mainstem to varying degrees – the BPA line is generally less impactive in this HUC than the NWE line. The Cox Gulch Antimony Mine is located in the floodplain at the top of this HUC, and poses a large risk to contamination under high flows. All of these issues should be addressed, but they are difficult politically. There are opportunities to mitigate some of these effects by addressing stream temperatures and large pools in the mainstem. There are few large woody debris complexes in the mainstem – addition of wood to the mainstem would definitely benefit bull trout. Additional large wood in the system may also help to trap sediments and small gravels and increase instream physical diversity. This may help to reduce subsurface flows, and would contribute towards maintaining temperature refugia. The most important issues to address are temperature and pools, in order to maintain a passable migration corridor to tributaries. Some riparian planting has been completed along the mainstem of Prospect Creek and in the long-term should help with temperatures in the mainstem.

Figure 11-13. Lower Prospect Creek Redd Counts



Temperature: Temperatures in Lower Prospect Creek are elevated and affected by a loss of riparian vegetation from power line and pipeline construction and maintenance, historical riparian harvest and private land development in the Prospect Creek floodplain. Much of the riparian corridor in this 6th level HUC is under private land ownership. Discussions with private landowners should take place to determine feasibility of riparian revegetation along their properties. Large conifers plantings would have the greatest benefit in terms of temperature reductions. Large woody debris complexes should also be constructed in the mainstem to provide important temperature refugia areas. Discuss modifying maintenance activities on the power lines and pipelines to reduce impacts to riparian vegetation.

Barriers: There are no barriers directly limiting bull trout habitat availability in this 6th level HUC. However, there are undersized culverts on Shorty Gulch, Therriault Gulch and Cox Gulch that are at risk of failure and subsequent downstream sedimentation and are important for westslope cutthroat trout. These barriers should be replaced, but are a low priority. One fish barrier on Cox Gulch is authorized for removed under the 2012 Antimony Decision Notice.

Pools: Pools are lacking in Prospect Creek from a loss of potential and active large woody debris. An assessment should be conducted and discussions with private landowners in the area should take place to identify areas for large woody debris complex construction.

Sediment: Sediment is at elevated levels in lower Prospect Creek, with the largest contributors being riparian roads in the tributaries, the highway along the mainstem (and highway sanding that occurs during the winter), and private land development along Prospect Creek. Future analysis in the area should consider the potential to remove many of the roads in tributaries to Prospect Creek. Discussions with the Department of Transportation should also occur to identify opportunities to reduce impacts from highway sanding.

Most important activities to improve bull trout population:

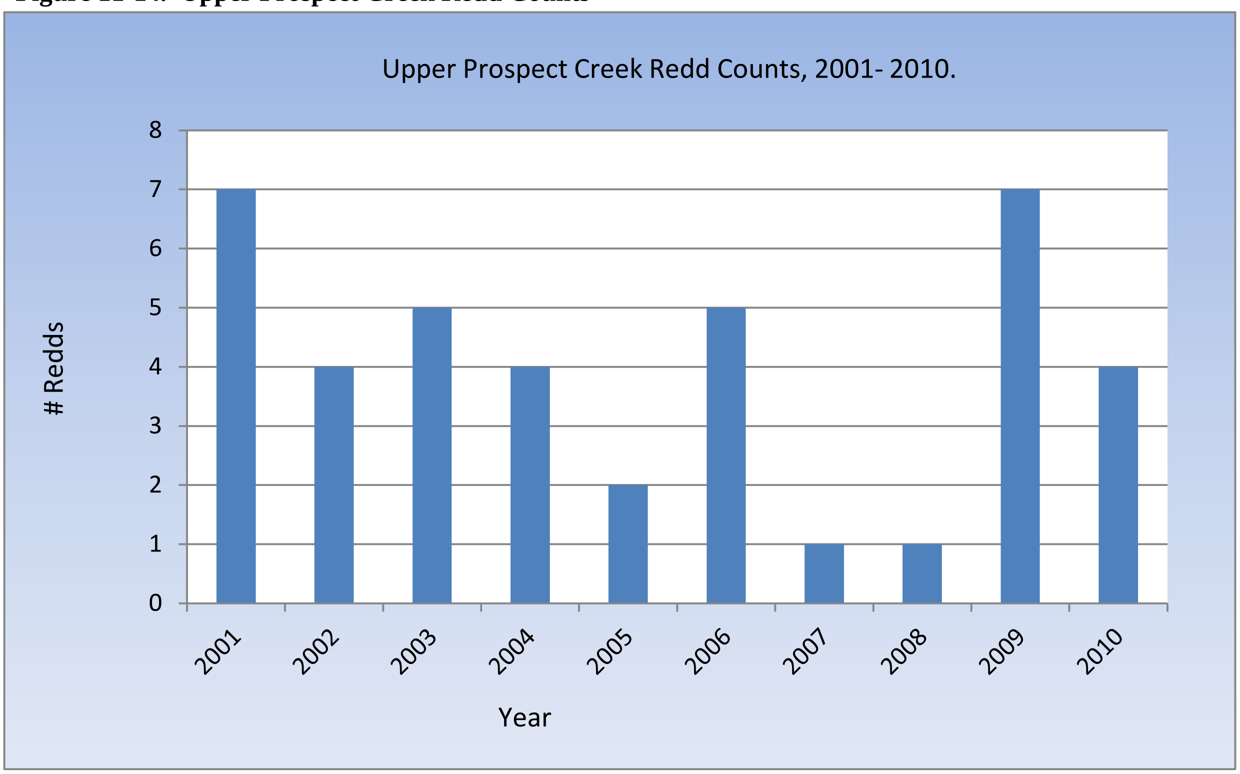
1. Assess the potential to construct large woody debris jams on National Forest and private lands along Prospect Creek to improve fish habitat and create temperature refugia. Construct large woody debris complexes where identified.
2. Identify areas and implement extensive riparian planting along Prospect Creek, especially using large conifers to help with shading. Coordination with NWE, BPA and YPL will need to occur to ensure appropriate measures around their infrastructure are used.
3. Implement extensive travel planning and road reductions in tributaries to Prospect Creek. Manage the road system to reduce sediment sources to improve stream temperature, channel habitat and riparian conditions. Discuss opportunities to minimize impacts from highway sanding with the Department of Transportation.
4. Replace undersized culverts on Shorty, Therriault and Cox Gulch to minimize potential for failure and subsequent downstream sedimentation and to provide passage for westslope cutthroat trout.
5. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in Prospect Creek if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Prospect Creek - 170102130602							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	10 years	3	$100,000	M	M
Barriers	FAR	FA	20 years	3	$100,000	L	M
Pools	FAR	FA	20 years	3	$100,000	L	M
Sediment	FUR	FAR	10 years	3	$100,000	M	M

Most bull trout habitat is downstream of this HUC, in Cooper Gulch and lower Prospect Creek. However, this HUC provides important flows and maintains temperatures. It also probably provides some habitat for bull trout in the lower reaches, and may support more bull trout if the local population were stronger. There are few roads to address. A recent project to remove brook trout in Blossom Lakes was undertaken by FWP and FS – this should benefit downstream bull trout populations. Future management should coordinate with FWP and consider management that reduces numbers and distribution of non-native trout if it would benefit bull trout recovery in the watershed.

Figure 11-14. Upper Prospect Creek Redd Counts



Temperature: Temperatures in Upper Prospect Creek are likely somewhat elevated and affected by the highway corridor running through portions of the riparian area and pipeline construction and maintenance. Efforts to revegetate areas where riparian vegetation has been removed should occur. Emphasis should be placed on revegetation with large conifers to improve shading. Discuss modifying maintenance activities on the YPL pipeline to reduce impacts to riparian vegetation.

Barriers: There are potentially four highway culverts that could be limiting bull trout migration: Twentythreemile Creek, Glidden Creek, Evan Gulch and Blossom Creek. These crossings should be inventoried to determine if they are priorities for replacement. If they are restricting fish passage then they should be prioritized for replacement.

Pools: Pools are somewhat lacking in Upper Prospect Creek from a loss of potential and active large woody debris. An assessment should be conducted to identify key areas for large woody debris complex construction.

Sediment: Sediment is at elevated levels in upper Prospect Creek, with the largest contributors likely being the highway (and highway sanding that occurs during the winter) and other roads in the watershed (although there are fewer than other watersheds). Future analysis in the area should include travel management and road reductions or relocations to address sediment sources in the tributaries to Prospect Creek. Discussion with Department of Transportation should also occur to identify opportunities to reduce impacts from highway sanding.

Most important activities to improve bull trout population:

1. Identify areas and implement extensive riparian planting along Prospect Creek, especially using large conifers to help with shading. Coordination with YPL will need to occur to ensure appropriate measures around their infrastructure are used.
2. Assess the potential to construct large woody debris jams in Prospect Creek to improve fish habitat and create temperature refugia. Construct large woody debris complexes where identified.
3. Implement extensive travel planning and road reductions in tributaries to Prospect Creek. Once identified, decommissioning roads in these areas to reduce sediment delivery, stream temperatures, and improve channel habitat and riparian conditions.
4. Discuss opportunities to minimize impacts from highway sanding with the Department of Transportation.
5. Assess the need to replace undersized highway culverts on Twentythreemile Creek, Glidden Creek, Evans Gulch and Blossom Creek. If warranted, prioritize these crossings for replacement.
6. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in Prospect Creek if it would benefit bull trout recovery in the watershed.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Wilkes Creek - 170102130604							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	1 year	3	$0	-	L
Barriers	FA	FA	1 year	3	$0	-	L
Pools	FA	FA	1 year	3	$0	-	L
Sediment	FAR	FA	1 year	3	$20,000	-	L

Wilkes Creek provides high quality habitat for bull trout, however numbers are low due to the overall low population density of the Local Population. There is a trail system that may contribute minor amounts of sediment and there may be some opportunity to work on this, but it's minimal. Overall the watershed is functioning well.

Temperature: The temperature indicator, while it does show FAR, is functioning as it would have historically. The call appears to be a function of some talus slopes and areas of naturally sparse riparian vegetation due to shallow and rocky soils. There is no need for actions to address this indicator.

Barriers: There are no barriers and no future actions needed to address this indicator.

Pools: Pool conditions are likely at or near historic levels in Wilkes Creek. There are no future actions needed to address this indicator.

Sediment: Sediment is slightly elevated above historical conditions in Wilkes Creek from the trail system and roads in the lower watershed. Travel planning should take place to identify roads to obliterate in the lower watershed. Trail maintenance activities should be identified to minimize sedimentation into Wilkes Creek.

Most important activities to improve bull trout population:

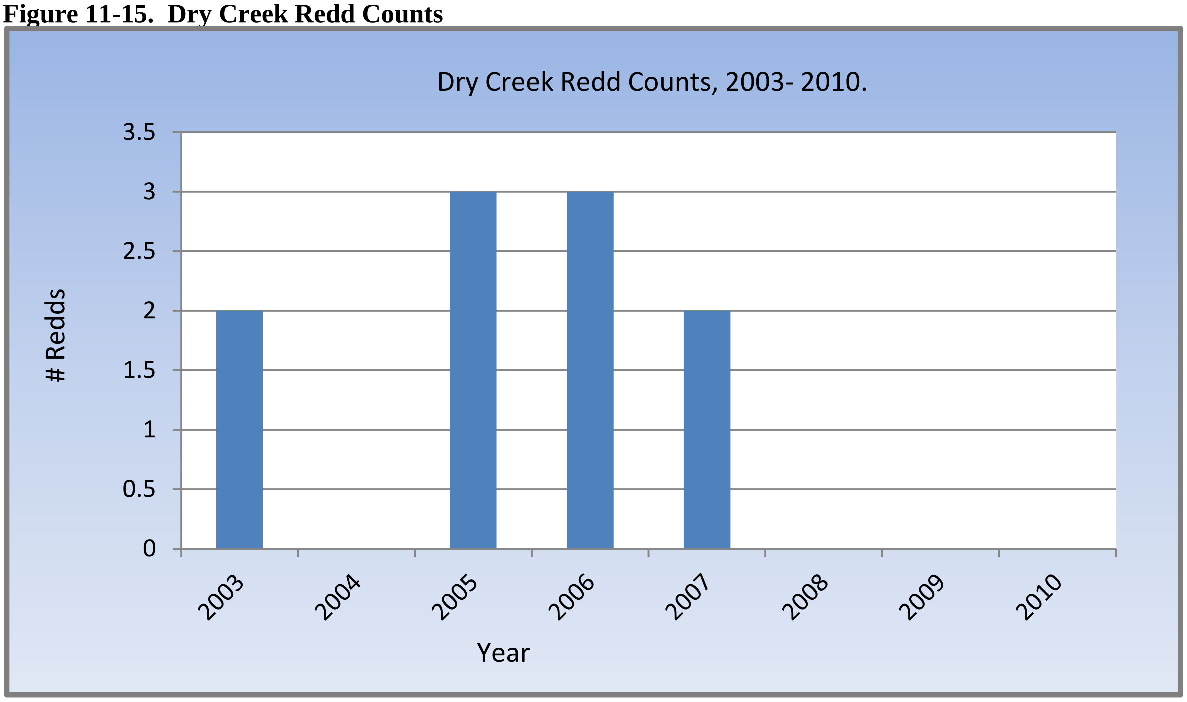
1. Implement travel planning and road reductions in lower Wilkes Creek. Once identified, decommission roads in these areas to minimize reduce sediment delivery and stream temperature, and improve channel habitat and riparian conditions.
2. Identify trail improvements to minimize sediment into Wilkes Creek.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Dry Creek - 170102130606							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 98%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	10 years	3	$100,000	H	H
Barriers	FUR	FA	10 years	3	$500,000	H	H
Pools	FAR	FA	5 years	3	$100,000	H	H
Sediment	FUR	FAR	10 years	3	$300,000	H	H

Dry Creek currently supports few bull trout. However, it is a large watershed that has tremendous potential. There is a barrier near the mouth on private land that needs to be addressed, as well as a barrier on the East Fork. These have significant effects for both bull trout and westslope cutthroat trout in Prospect Creek. Habitat in Dry Creek is affected by subterranean flows in the lower reaches as well. Sediment levels are high because 8-9 miles of the Dry Creek road (#352) are located adjacent to the creek. Decommissioning this road would be socially difficult because it is a tie-through to I-90 and provides access to Clark Mountain, an electronic and communication site. However, there may be opportunities to relocate segments of the road and/or improve the current design of the road to reduce impacts on aquatic habitat. There is also an opportunity to add large wood to the stream system to contribute to large pool formation and storage of water in the system to mitigate for sub flow periods – these large pools would sustain flows to some degree by reestablishing the water table, and they would also provide thermal and flow refugia during critical low flow periods. AVISTA funds are available for Prospect Creek.

Figure 11-15. Dry Creek Redd Counts



Temperature: Temperatures in Dry Creek are somewhat elevated and affected by a loss of riparian vegetation from the main Dry Creek road, historical riparian harvest on NF and private lands downstream, and private land development. Travel planning to relocate the Dry Creek Road, coupled with extensive riparian revegetation, and would help improve temperatures. Areas for riparian revegetation on NF and private lands should be identified. Areas lower in the watershed are especially lacking riparian cover.

Barriers: The barrier near the mouth of Dry Creek on private lands and on the East Fork Dry Creek are important for bull trout passage and should be replaced.

Pools: Pools are generally lacking in Dry Creek from removal of active and potential large woody debris (major influences being the riparian road and historic harvest). Bull trout would directly benefit from large woody debris complex placement, especially in the mainstem Dry Creek and the lower 1-2 miles of the East Fork and West Fork. Discussions with private landowners should also take place to determine if placement if feasible on private property.

Sediment: Sediment is elevated in Dry Creek, with the largest contributor being the main Dry Creek Road, which is within the floodplain of Dry Creek for approximately 8-9 miles. There are several sections where the road has been a continual problem in terms of sediment production. Extensive travel planning should be implemented to weigh the options of obliterating the road, relocating the road, or making significant improvements to the road. Extensive travel planning should also address the other roads in the watershed and opportunities for road decommissioning.

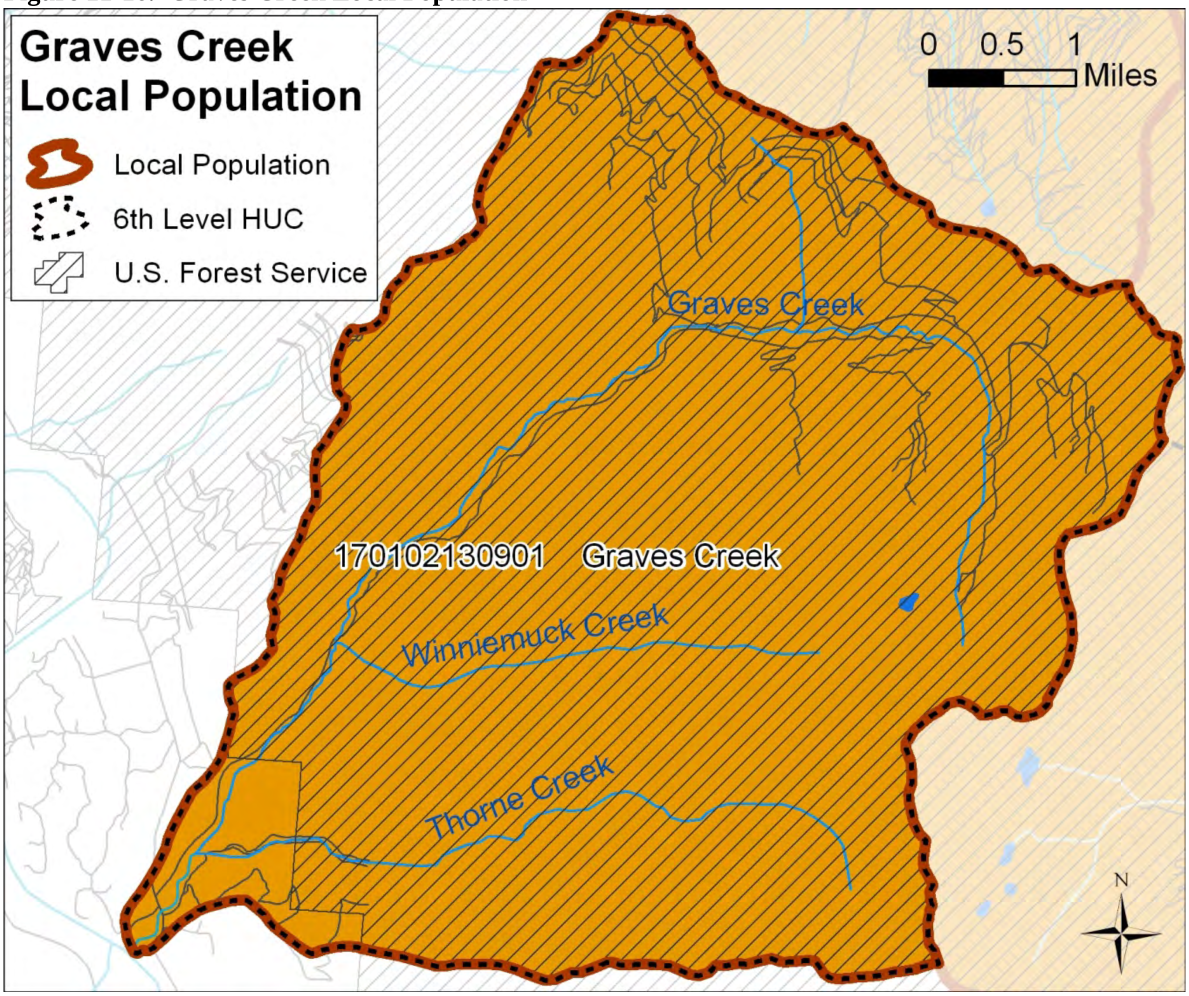
Most important activities to improve bull trout population:

1. Implement extensive travel planning on the main Dry Creek Road, including looking at an alternative to obliterate the road completely. If not feasible, major design changes, including realignment of the road away from Dry Creek, should be implemented.
2. Assess the potential to construct large woody debris jams on National Forest and private lands along Dry Creek to improve fish habitat and create temperature refugia. Construct large woody debris complexes where identified.

3. Replace undersized culverts at the mouth of Dry Creek on private lands and on the East Fork Dry Creek on National Forest.
4. Manage the road system within the watershed to reduce sediment delivery and improve water temperature and channel habitat and riparian conditions. Management actions could include road decommissioning, storage and relocation.
5. Coordinate with FWP and consider management that reduces numbers and distribution of non-native trout in Prospect Creek if it would benefit bull trout recovery in the watershed..

Local Population: Graves Creek

Figure 11-16. Graves Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 11-3. Graves Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50 Migratory	Unknown	Migratory, Fragmented	1	Numerous in Noxon Reservoir, high threat. Minimal in Graves Creek itself.

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Moderate significance – stream produces high number of bull trout for its size. One of only a few practical areas to recover bull trout between Noxon and T. Falls dam (Prospect and Vermillion River being the others).	High vulnerability due to fragmentation of main river system (T. Falls, Noxon, Cabinet Gorge Dams) and low elevation of watershed. Falls restrict upper 2/3 of watershed from use as thermal refugia.	None known.

Driving Factors Determining Bull Trout Population:

Key limiting factors are fragmentation (main river dams – not within Graves Creek itself), habitat conditions (within Noxon Reservoir) and non-native species interactions in the main river system. Extensive work is underway through AVISTA relicensing to address fish passage and connectivity to Lake Pend Oreille. Reservoir non-native species will still be a concern in terms of recruitment (predation), as will reservoir habitat conditions.

Confidence in your assessment (H,M,L): M

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Graves Creek - 170102130701							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 96%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	-	3	$0	-	-
Barriers	FA	FA	-	3	$0	-	-
Pools	FAR	FAR	-	3	$0	-	-
Sediment	FUR	FUR	-	3	$0	-	-

Graves Creek is relatively small, but produces a significant number of bull trout to the core area. It is important due to the fragmentation caused by the Lower Clark Fork dams. Habitat is impacted to some degree on private land, although recent AVISTA projects have improved conditions. The stream is generally limited by its small size, and by natural waterfalls approximately four miles up from the mouth that effectively cut off the upper portion of the watershed to bull trout. With the exception of the main road that parallels the stream for most of its length, there are few opportunities for restoration that have not already been addressed.

Temperature: Temperatures in Graves Creek may be slightly impacted by water withdrawal on private land. This issue should be looked into further, as it is unclear exactly what amount of impact may be occurring at the present time.

Barriers: There are no human-caused barriers. However, there is a large natural waterfall about four miles up from the mouth that limits bull trout movement. There are no restoration needs under this category.

Pools: The indicator call for pools is FAR. It is likely that Graves Creek could benefit from adding large woody debris to create pool habitat, especially large debris jams that specifically benefit fluvial bull trout. This opportunity should be looked into on both FS and private lands.

Sediment: The indicator call for sediment is FUR, and this is largely due to the proximity of the road to the stream throughout most of its length. There are probably numerous opportunities to improve drainage and install/maintain BMPs on the road; however, these have not been specifically identified. It is unlikely that the road would be obliterated, given that it is a tie-through road and no other motorized access exists in the watershed and the fact that the road is probably not the main limiting factor to the bull trout population (see non-native species discussion above).

Most important activities to improve bull trout population:

1. Continue to cooperate with AVISTA in fish passage projects in the main river system.
2. Begin discussions with Montana Fish, Wildlife and Parks regarding activities to reduce the number and impact of non-native species on bull trout in the Noxon Reservoir system.
3. Begin discussions with AVISTA, FWP, and local watershed groups to review current habitat condition information and ascertain the level of impact that habitat conditions have on bull trout. If warranted, begin developing cooperative projects to improve habitat condition.

Lake Pend Oreille Core Area – Kootenai National Forest

Local Population: Vermilion River

Figure 11-17. Vermillion River Local Population

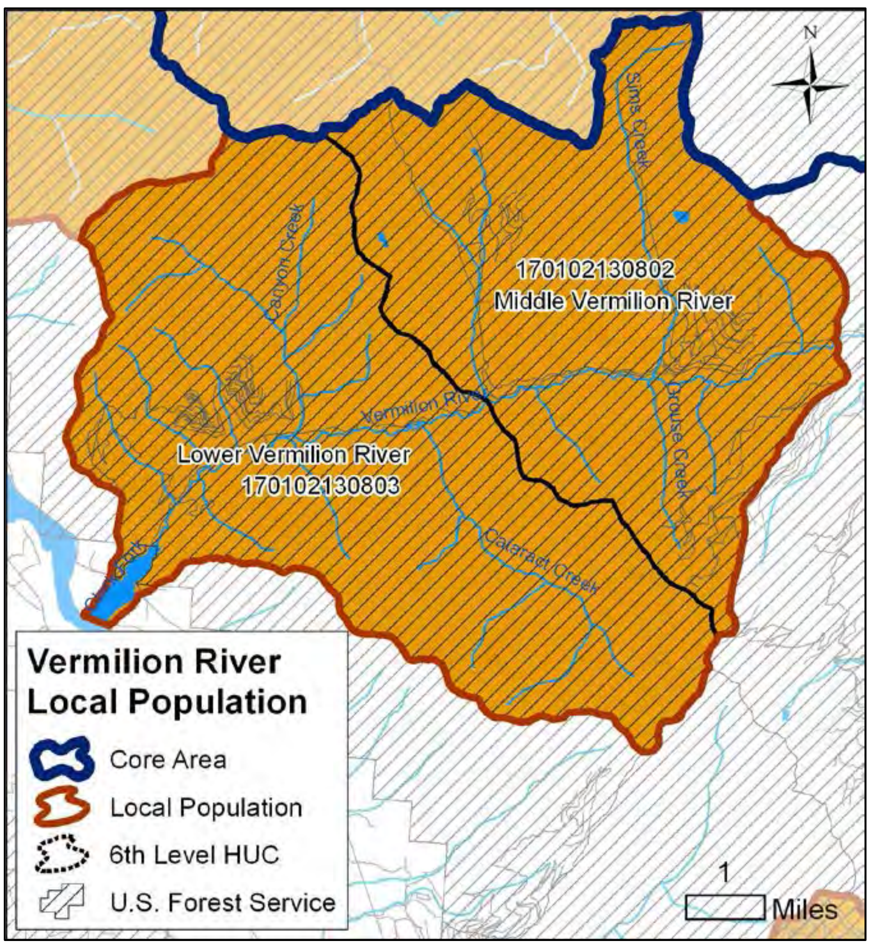


Table 11-4. Upper Vermillion River Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-100	Stable	Fluvial Connected	2	EB, Brown Trout Low
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High significance – This population is one of two occupying large drainages in the Noxon Reach.		Low vulnerability due to high elevation and high precipitation zone.		Fish rear in Noxon Reservoir and Pend Oreille Lake.

Relative Importance of Population to Core Area (H,M,L): H

Driving Factors Determining Bull Trout Population:

Upper Vermilion River has two known spawning reaches with the bulk occurring directly downstream of China Gorge. Spawners number around 40-70 annually. There is limited rearing habitat in Noxon Reservoir which limits productivity. Juveniles move downstream to Pend Oreille and at this point the likelihood of transport back upstream is small. Threats to this local population include sediment, channel instability, poor rearing conditions and movement over the dams into the Pend Oreille system. Much of the riparian vegetation is immature. This reach is bounded upstream by the Vermilion Falls.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle Vermilion River - 170102130802

Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration

% Forest Service Ownership in HUC: 100

Relative Contribution of Habitat in Limiting Local Population: Moderate

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FA	10 years	3	$130,000	M	H
Sediment	FA	FA	-	3	$0	L	L

Table 11-5. Lower Vermillion River Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50	Stable	Fluvial Connected	None	EB, Brown Trout Low
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High significance – This population is one of two occupying large drainages in the Noxon Reach.		Low vulnerability due to high elevation and high precipitation zone.		Fish rear in Noxon Reservoir and Pend Oreille Lake.

Driving Factors Determining Bull Trout Population:

Vermilion River has two known spawning reaches with the bulk occurring directly downstream of China Gorge. This section is a migratory corridor and does not support extensive spawning. Spawners number around 40-70 annually in the reach above. There is limited rearing habitat in Noxon Reservoir which limits productivity. Juveniles move downstream to Pend Oreille and at this point the likelihood of transport back upstream is small. Threats to this local population include sediment, channel instability, poor rearing conditions and movement over the dams into the Pend Oreille system. Much of the riparian vegetation is immature.

Watershed assessments completed for the Vermillion River have identified ten sites for restoration. The first has been completed (Chapel Slide, August 2012) isolating a large natural sediment source. The next phase of active restoration will be completed within the next 10 years.

Confidence in your assessment (H,M,L): H

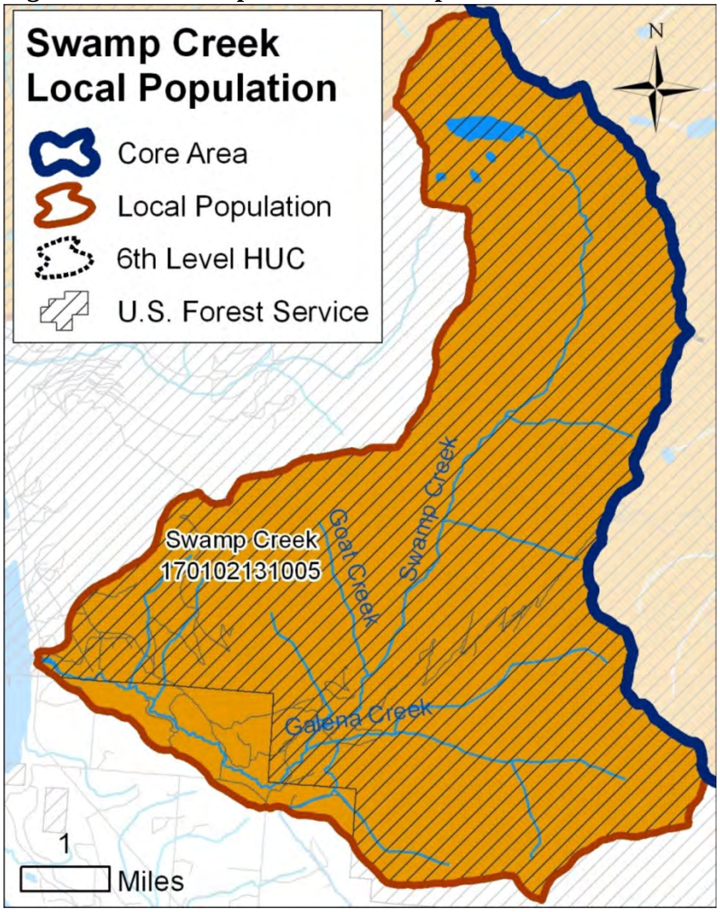
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Vermilion River - 170102130803							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FA	25 years	3	$100,000	M	H
Sediment	FA	FA	10 years	3	$0	L	M

Temperature and barriers are not an issue for the Vermillion River. Quality rearing habitat for juveniles and sub-adults is limiting. Migratory fish typically rear in Noxon Reservoir, however some may migrate to Lake Pend Oreille and upstream connectivity limits returning spawner numbers for the fish that do go to Lake Pend Orielle. Fine sediment levels in the Vermillion measured by McNeil core sampler are below reference levels determined by Weaver and Fraley (1991); however, large sediment sources have been identified for treatment. Most of the sediment volume generated in the watershed has been depositing at its mouth since the inundation of Noxon Reservoir. Riparian restoration and increased riparian tree densities should be a focus of any improvements done in the Vermillion watershed. Species such as black cottonwood and cedar should be favored.

Local Population: Swamp Creek

Figure 11-18. Swamp Creek Local Population



Relative Importance of Population to Core Area (H,M,L): L

Table 11-6. Swamp Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50	Decreasing	Adfluvial Connected	1	EB, Low
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low significance – This population is small with limited productivity.		Low vulnerability due to high elevation, high precipitation zone, and percentage of headwaters in Cabinet Mt. Wilderness.		

Driving Factors Determining Bull Trout Population:

Swamp Creek has one known spawning reach with the bulk occurring in the Cabinet Wilderness. Conditions in the lower reaches are poor due to private development and livestock related agriculture. There is also an irrigation diversion which pulls fish and water out of the system. There is limited rearing habitat in Swamp Creek which limits productivity. Some juvenile bull trout rear in Noxon Reservoir, and some juveniles move downstream to Pend Oreille -- at this point the likelihood of transport back upstream is small. Threats to this local population include poor rearing conditions, sediment, and movement over the dams into the Pend Oreille system.

Confidence in your assessment (H,M,L): H

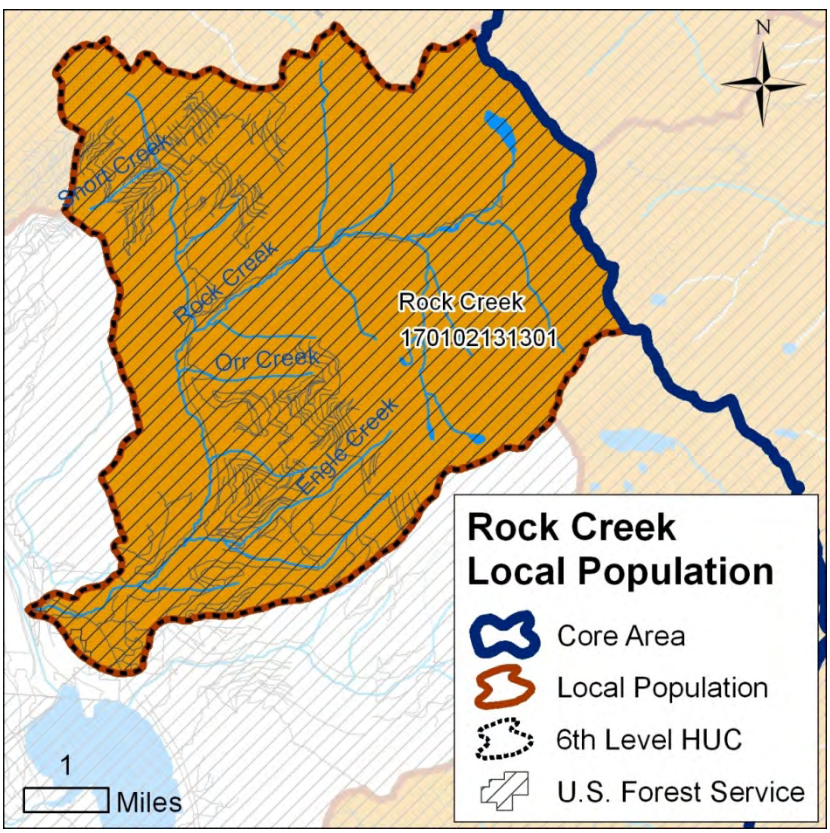
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Swamp Creek - 170102131005							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 94%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Temperature, barriers, pools sediment: Habitat on forest is primarily FA and occurs in the Cabinet Wilderness with no management, historic or otherwise. Conditions on private lands are considerably different with temperature and sediment both FAR.

Local Population: Rock Creek

Figure 11-19. Rock Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 11-7. Rock Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50 migratory fish, primarily residents	Stable, approximately 2,000 individuals	Resident (small Fluvial component) Connected	2	EB, very low in downstream portion
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High significance – This population is one of two occupying large drainages in the Cabinet Gorge Reach.		Low vulnerability due to high elevation and high precipitation zone.		This population is primarily resident fish with a limited adfluvial component

Driving Factors Determining Bull Trout Population:

Rock Creek has two known spawning reaches with the bulk occurring in the East Fork Rock Creek. The population in Rock Creek is predominantly resident fish with a small migratory component. Upstream access to larger migratory fish can be limited due to natural channel intermittency which occurs in most normal flow years. Low flow years exacerbate this condition. Overall stream productivity is low with limited macroinvertebrate production. Fisheries data collected by Washington Water Power (1994, 1995) and now Avista (2010, 2011, and 2012) indicate little change in overall biomass within the Rock Creek watershed.

Juvenile fish that move downstream to Pend Oreille are typically lost to the population as at this point the likelihood of transport back upstream is small. Threats to this local population include poor rearing conditions and movement over the dams into the Pend Oreille system. The downstream transport program may also threaten this population. Proposed mines in the upper drainage pose a serious risk as they could significantly reduce flows in Rock Creek and alter its hydrograph.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Rock Creek - 170102131301							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FAR	FA	-	2	$600,000	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	M	H

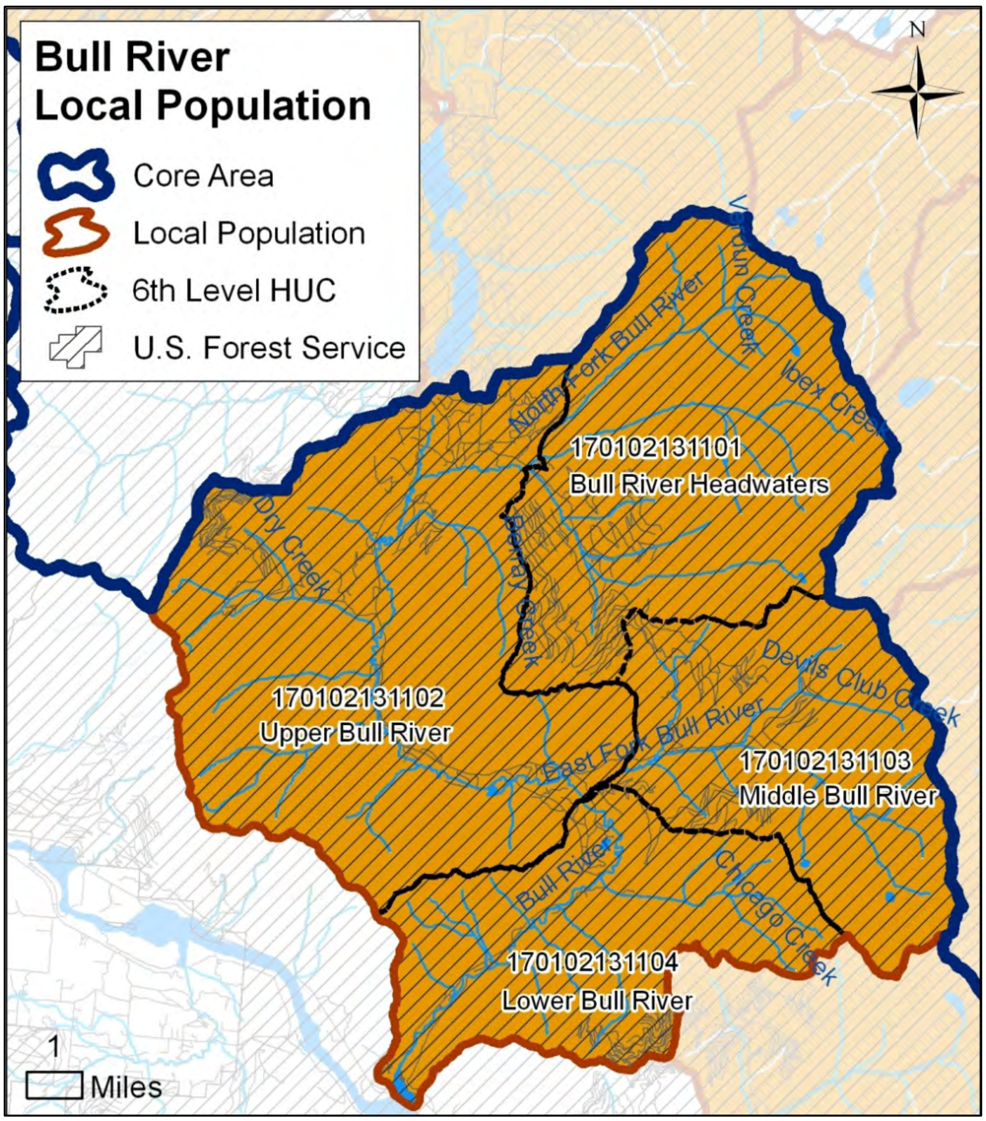
Temperature, Barriers, Pools & Sediment: Comprehensive habitat and fish population surveys conducted in the Rock Creek drainage show that temperature, pools, and sediment are functioning appropriately (Washington Water Power 1996; Salmon Environmental Services 2012). Two passage barriers identified previously are the US Hwy 200 culvert which blocks upstream migration at low flows and the culvert under FSR #150 across the West Fork Rock Creek. Both culverts block upstream fish movement at low flows.

Sediment values determined for Rock Creek using McNeil Core data show that sediment levels are highest in the West Fork Rock Creek. Fine sediment is virtually non-existent in the East Fork Rock Creek. Percent fines in the mainstem Rock Creek are less than 20% and closer to 15% based on core samples collected in 1995, 2001, and 2012.

Habitat variables that limit population numbers in Rock Creek are both naturally occurring; low nutrient availability and intermittency. Improving access under Highway 200 and increasing connectivity at Cabinet Gorge Dam would increase the likelihood for migratory individuals to contribute to this population.

Local Population: Bull River

Figure 11-20. Bull River Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 11-8. Bull River Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50	Stable	Fluvial/Resident Connected	3, dispersed	EB, Brown Trout Low
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High significance – This population is one of two occupying large drainages in the Cabinet Gorge Reach.		Low vulnerability due to high elevation and high precipitation zone.		Fish rear in Cabinet Gorge Reservoir and Pend Oreille Lake.

Driving Factors Determining Bull Trout Population:

Bull River headwaters streams have two known spawning reaches with the bulk occurring in the East Fork Bull River from the Cabinet Wilderness boundary upstream to the confluence of Isabella Creek. Spawners number around 20-40 annually. Rearing habitat is available in the mainstem Bull River but the number of fish utilizing that habitat is unknown. It is well documented that fish from the Bull River move downstream to the lower Clark Fork River. There is limited rearing habitat in Cabinet Gorge Reservoir which limits productivity. Resident bull trout are an important component of this local population. Juveniles move downstream to Pend Oreille and at this point the likelihood of transport back upstream is small. Additionally over the last 12 years the USFWS has trapped and transported juvenile bull trout to Lake Pend Oreille as part of the Avista relicensing mitigations. Threats to this local population include interspecific competition with non-native brown trout, poor rearing conditions in Cabinet Gorge Reservoir and isolation in the Pend Oreille Lake system due to Cabinet Gorge Dam. There are also potential future threats associated with proposed mines in the headwaters.

The middle Bull River reach has dispersed spawning. Rearing habitat is available in the mainstem Bull River but the number of fish utilizing that habitat is unknown. It is well documented that fish from the Bull River move downstream to the lower Clark Fork River. There is limited rearing habitat in Cabinet Gorge Reservoir which limits productivity. Juveniles move downstream to Pend Oreille and at this point the likelihood of transport back upstream is small. Threats to this local population include interspecific competition with non-natives, poor rearing conditions and movement over the dams into the Pend Oreille system.

The lower Bull River has one known spawning reach and some dispersed areas. Historically there was a large concentration of redds roughly 0.5 miles downstream from the confluence with the East Fork. Spawners number around 20-40 annually. Rearing habitat is available in the mainstem Bull River but the number of fish utilizing that habitat is unknown. It is well documented that fish from the Bull River move downstream to the lower Clark Fork River. There is limited rearing habitat in Cabinet Gorge Reservoir which limits productivity. Juveniles move downstream to Pend Oreille and at this point the likelihood of transport back upstream is small. Threats to this local population include interspecific competition with non-natives, poor rearing conditions and movement over the dams into the Pend Oreille system.

Upper Bull River has one known spawning reach. There is limited rearing habitat in Cabinet Gorge Reservoir which limits productivity. Juveniles move downstream to Pend Oreille and at this point the likelihood of transport back upstream is small. Threats to this local population include interspecific competition with non-natives, poor rearing conditions and movement over the dams into the Pend Oreille system.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Bull River Headwaters - 170102131101							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Temperature, barriers, pools, and sediment: The bulk of the spawning habitat for this 6th code HUC lies in the Cabinet Mountain Wilderness. There has been no management within that reach. The remainder of the HUC has had some management however numerous habitat restoration projects have been completed on both private and public lands. Most of the projects have benefitted non-natives. Monitoring has shown native fish have been eliminated in the lower reaches of the East Fork Bull River.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle Bull River - 170102131103							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	H
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	H

Temperature, barriers, pools, and sediment: This stream is a classic E channel based on Rosgen channel types. The stream is functioning appropriately. The main driver of conditions in the automated baselines is State Highway 56 which is proximal to the river through much of the lower Bull River reach.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Bull River - 170102131104							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	H
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	H

Temperature, barriers, pools, and sediment: Mainstem Bull River is a classic E Channel based on Rosgen classification. That is functioning appropriately. The stream transition to a C/B channel as it enters the lower Clark Fork River. Much of the river runs adjacent to State Highway 56.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Bull River - 170102131102							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	H
Sediment	FA	FA	-	3	$0	L	H

Temperature, barriers, pools, and sediment: Mainstem Bull River is a classic E Channel based on Rosgen classification. That is functioning appropriately. The stream transition to a C/B channel as it enters the lower Clark Fork River. Much of the river runs adjacent to State Highway 56.

Lake Pend Oreille/Lower Clark Fork River Core Area Summary:

Table 11-9 summarizes relevant information from each of the 6th level HUC local populations. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire Lower Clark Fork River Core Area within the borders of the Lolo and Kootenai National Forests. It does not include necessary restoration activities in watersheds where the LNF or KNF have no ownership that may be critical for overall restoration of the bull trout population in the Core Area.

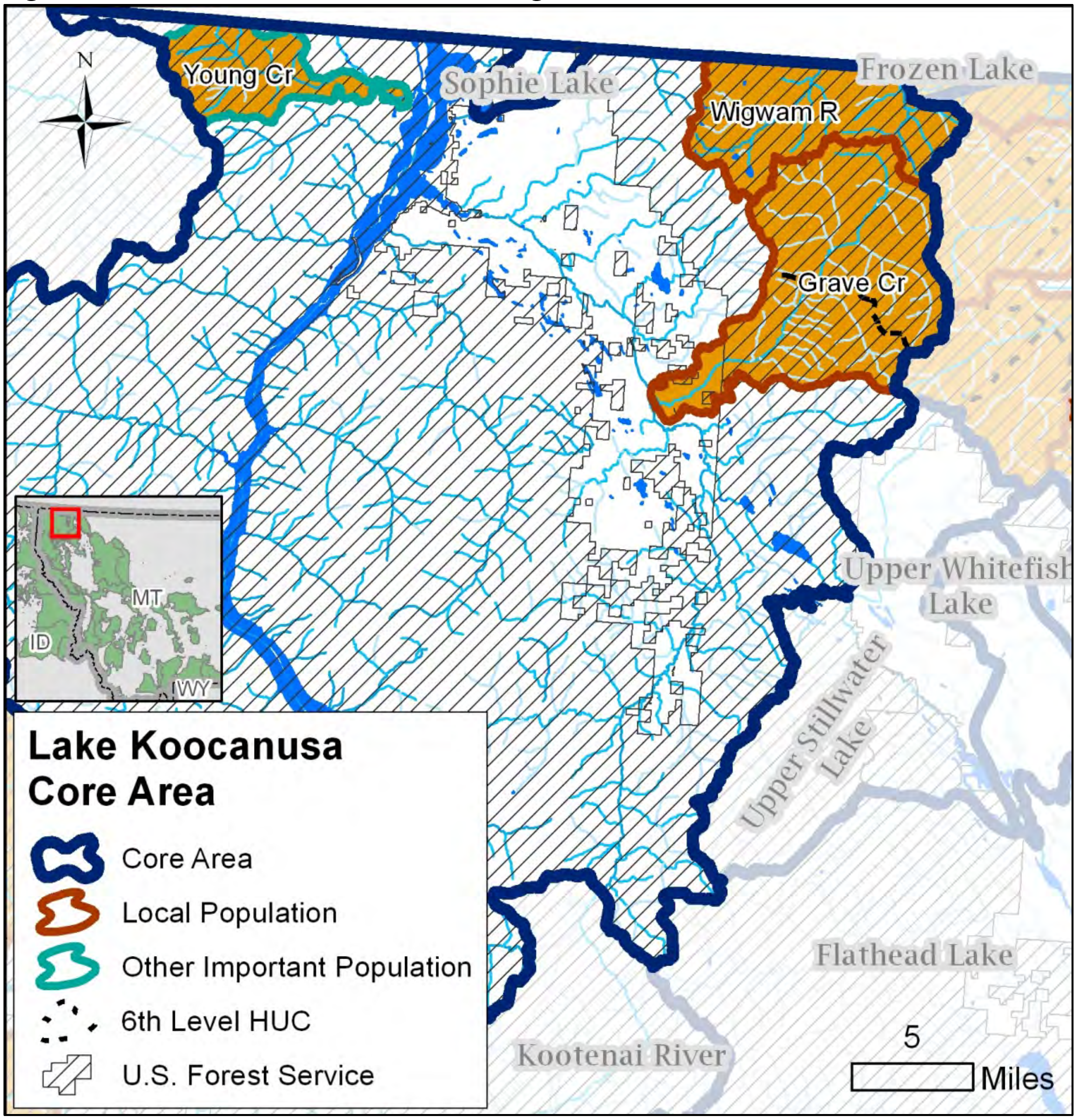
Table 11-9. Summary of important Local Population attributes and conservation recommendations for the Lower Clark Fork River Core Area.

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
Thompson River	West Fork Thompson River	High	Moderate	Active	Barriers & Pools	5 years	$150,000
	Lower Fishtrap Cr	High	High	Active	Temperature, Pools & Sediment	5-20 years	$650,000
	West Fork Fishtrap Cr	High	High	Active	Pools	5 years	$50,000
	Radio Cr	High	High	Active	Pools & Sediment	5-10 years	$550,000
	Upper Fishtrap Cr	High	High	Active	Temperature, Pools & Sediment	5-10 years	$600,000
	Big Rock Cr	High	High	Active	Sediment	15 years	$200,000
	Murr Cr	Moderate	High	Passive	-	-	-
	Lazier Cr	Low	High	Passive	-	-	-
	Thompson River – Twin Lake Cr	Low	High	Passive	-	-	-
	Meadow Cr	Low	High	Passive	-	-	-
	Chippy Cr	Moderate	High	Passive	-	-	-
	Marten Cr	Low	High	Passive	-	-	-
	Middle Thompson River	Moderate	High	Active	Temperature & Pools	5-15 years	Unknown
	Upper Little Thompson River	Moderate	High	Passive	-	-	-
	McGinnis Cr	Moderate	High	Passive	-	-	-
	Middle Little Thompson River	Moderate	High	Passive	-	-	-
	Mudd Cr	Low	High	Passive	-	-	-
	Lower Little Thompson River	Moderate	High	Passive	-	-	-
	Thompson River – Deerhorn Cr	High	High	Active	Temperature, Barriers, Pools & Sediment	5-15 years	$400,000
	Thompson River – Goat Cr	High	High	Active	Temperature, Pools & Sediment	5-15 years	$300,000
Prospect Cr	Clear Cr	Moderate	High	Active	Temperature	20 years	$300,000
	Cooper Gulch	High	High	Active	Temperature, Pools & Sediment	5-10 years	$600,000
	Crow Cr	High	High	Active	Temperature, Pools & Sediment	5-10 years	$600,000
	Lower Prospect Cr	Moderate	High	Active	Temperature & Pools	5-10 years	$300,000
	Upper Prospect	Moderate	Low	Passive	-	-	-

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
	Cr						
	Wilkes Cr	High	Low	Conserve	-	-	-
	Dry Cr	High	High	Active	Temperature, Barriers, Pools & Sediment	5-10 years	$1,000,000
Graves Creek	Graves Cr	Moderate	Moderate	Passive	-	-	-
Vermillion River	Upper Vermillion River	High	Moderate	Active	-	-	-
	Lower & Middle Vermillion River	Moderate	Low	Active	-	-	-
Swamp Creek	Swamp Cr	Low	High	Passive	-	-	-
Rock Creek	Rock Cr	High	Moderate	Active	-	-	-
Bull River	Bull River Headwaters	High	Moderate	Active	-	-	-
	Middle Bull River	Low	Low	Active	-	-	-
	Lower Bull River	High	Low	Active	-	-	-
	Upper Bull River	Moderate	Low	Active	-	-	-

Chapter 12: Lake Koocanusa Core Area

Figure 12-1. Lake Koocanusa and Surrounding Core Areas



Core Area Discussion:

Bull trout densities in the Lake Koocanusa (LK) Core Area were historically less than they are today. A significant amount of fluvial bull trout foraging, migrating, and overwintering (FMO) habitat was flooded with the construction of Libby Dam, but was mitigated and perhaps even enhanced by the subsequent formation of Lake Koocanusa (Koo=Kootenai, can=Canada, usa=USA). The reservoir created a large, deep, cold and relatively secure water body with abundant forage. Bull trout populations increased significantly after a kokanee population became established in the reservoir in the mid-1980's. The Canadian portion of the watershed upstream includes most of the highly productive spawning portions of the Wigwam River, White River, Skookumchuck Creek and other systems.

Like the Lake Pend Oreille Core Area, minor impacts to bull trout populations began in the later part of the 19th century. Significant changes in bull trout populations did not likely occur until the 1920's when development pressures in the form of timber harvest, road construction, and irrigation began to occur. The GLID irrigation ditch and dam were constructed in 1917 and entrained large numbers of both adult and juvenile bull trout which negatively affected the population in Grave Creek, the only significant U.S. local population. The main event affecting populations in the Core Area was the construction of Libby Dam in 1974. This dam fragmented bull trout populations in the upper Kootenai River from those in the rest of the system, creating a new adfluvial population. That adfluvial population increased, likely many fold, following the construction of Libby Dam.

Spawning in the Montana portion of the Core Area occurs primarily in the Grave Creek drainage (roughly 100-200 redds per year) and, to a lesser extent, the upper Wigwam River (4-30 redds per year).

Forest Service Biologists estimate that 100 or more fluvial redds may have been present in the Montana portion of the Lake Koocanusa Core Area prior to the 1850's. There is some uncertainty about the upside, since the natural rearing habitat in the Kootenai River likely had a lower, but largely unquantified potential relative to the existing condition within the reservoir. As with most bull trout populations, overall numbers were likely highly variable from year to year, based on natural climatic and disturbance patterns. The total number of fluvial bull trout in the Core Area (including portions in Canada) was likely much greater (perhaps 2000 to 3000 adults) and in recent times has ranged as high as 10,000 or more adults due to the highly productive FMO (foraging, migrating, and overwintering) habitat provided by the reservoir. At those levels, Lake Koocanusa was one of the strongest core areas anywhere in the range of the species and likely remains so.

Minor impacts to the population occurred throughout the early and middle part of the 20th century as human populations increased. In the 1950's -70's, significant timber harvest of spruce (to combat spruce budworm) and road construction likely caused some populations to decline. These effects were likely very significant in the late 1960's and early 1970's as the entire area of the future reservoir behind Libby Dam was clear-cut. The construction of the dam and filling of the reservoir also had significant but largely unquantified impacts on bull trout populations. Following completion of the dam and subsequent filling of the reservoir in 1974, bull trout upstream of the dam definitely benefitted from the newly created reservoir habitat. Construction of Libby Dam, and the later unintentional establishment of a kokanee population was the single-most significant impact (both negative and positive) to bull trout in the core area during the current era.

Numerous smaller scale impacts to bull trout gradually occurred throughout the Kootenai River valley in the middle part of the 20th century as well. These included grazing and agricultural development along many of the important low gradient spawning and rearing streams, road development in riparian areas, and logging and road development in tributary streams. These all had impacts to bull trout and their habitat, however they were not of the same magnitude as Libby Dam.

Changes in fish species composition within the Kootenai River system, brought about by Montana and B.C. stocking programs and some illegal introductions, have created an additional impact to the system, however this impact to date is not as great as in many Core Areas, and in some cases is positive. Brook trout are the main existing non-native species threat, and they exist in numerous tributary streams that contain bull trout, but typically not at levels considered problematic. The potential for lake trout introduction into Lake Koocanusa is a concern, but thus far has not been reported. The potential effect that lake trout might have on the bull trout population is uncertain, since there are no Mysis shrimp in the reservoir and spawning habitat for lake trout would be poor due to reservoir fluctuations. Within the reservoir, kokanee are the primary nonnative species. They have provided a significant forage base for bull trout. Also present are large Gerrard strain rainbows which have been stocked by Montana FWP to support a trophy trout fishery. They could compete directly with bull trout and cause potential conflicts in the future, but at present there is no direct evidence of a conflict. There is no known natural reproduction of Gerrard rainbows in the reservoir.

Overall, current bull trout numbers in the Lake Koocanusa Core Area are strong compared to nearly all other Core Areas across the range of the species. If fishing pressure is regulated adequately in both Montana and British Columbia, and non-native species are kept out of the Core Area, prospects for a long-term, stable population at high abundance are relatively high.

Lake Koocanusa Core Area – Kootenai National Forest

There are two local populations on lands administered by the Forest Service in the Lake Koocanusa Core Area. They are:

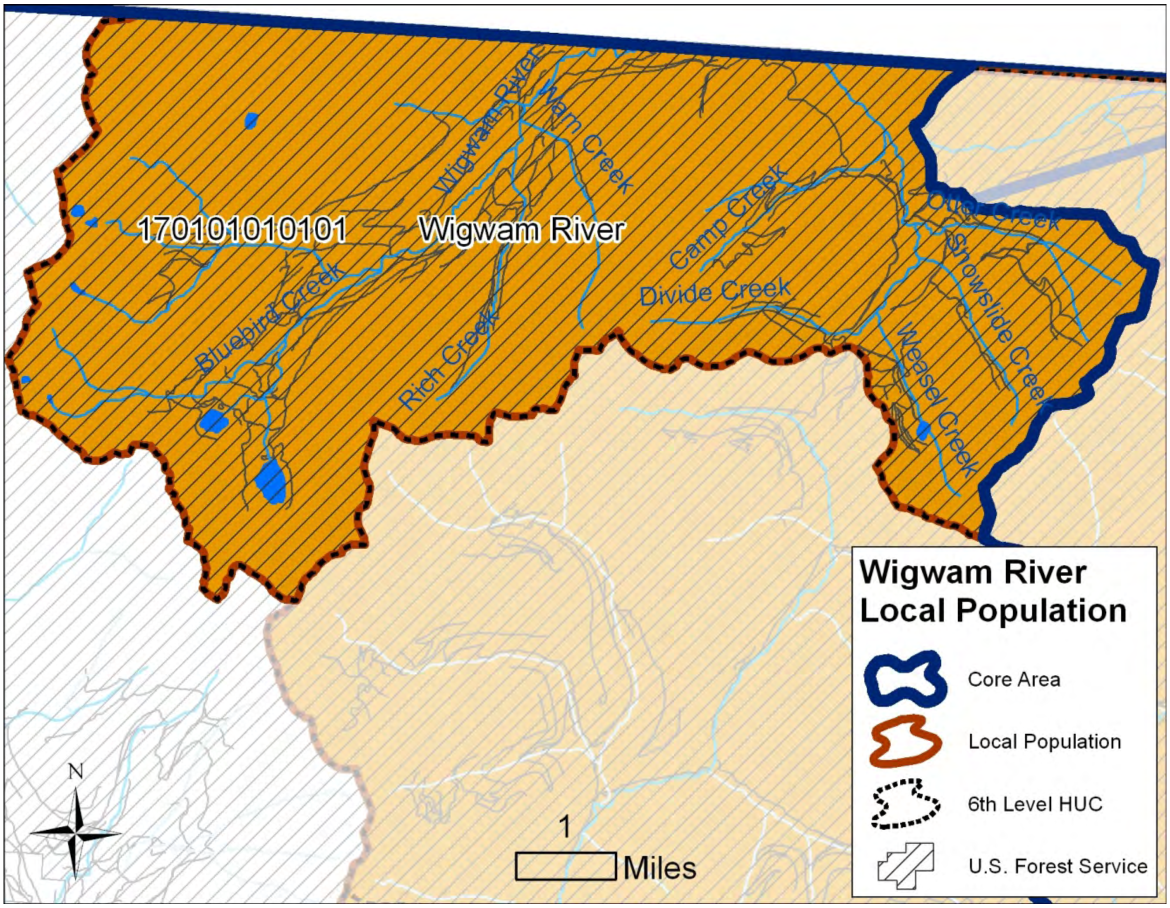
1. Wigwam River (part of river is in BC), and
2. Grave Creek.

This core area lies entirely within the Kootenai National Forest boundary. A discussion for Young Creek, considered to be an important population for bull trout recovery by the Forest Service, is also included in this document, even though it is not designated as a local population. This core area also contains other local (White River, Skookumchuck Creek, etc.) populations that lie entirely in British Columbia and will not be discussed further.

Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population).

Local Population: Wigwam River

Figure 12-2. Wigwam River Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 12-1. Wigwam River Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50	Stable	Adfluvial, Connected	Numerous	None currently
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low significance – This portion of the Wigwam River provides limited habitat compared to the portion in Canada.		Low vulnerability due to high elevation and high precipitation zone. Fish rear in Koocanusa Reservoir.		None

Driving Factors Determining Bull Trout Population:

Up to 4,000-5,000 bull trout spawn in the Canadian portion of the Wigwam River annually (average since 1995 = 2726). Fish that migrate into the upper portions of the river (US) are likely ones spawned here or dispersed downstream. More fish may move into US waters when numbers are higher in suitable habitat in Canada, but this relationship does not consistently show up in redd counts. The greatest risks are potential forest management practices in Canada and the recreational fisheries (Canada and MT) in Koocanusa Reservoir and rivers and tributaries.

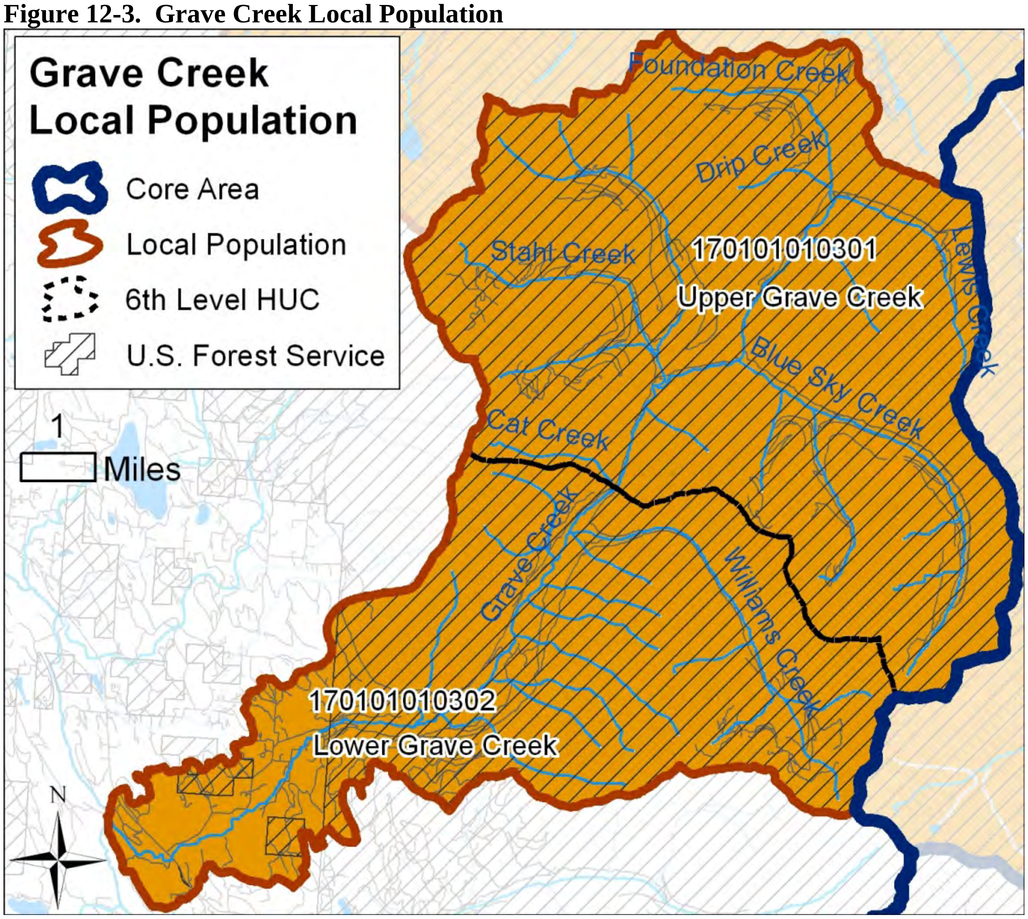
Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Wigwam River - 170101010101							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Local Population: Grave Creek

Figure 12-3. Grave Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 12-2. Lower Grave Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
0	Declining	Fluvial/resident, Connected	0	EB Low

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High significance – This 6th level is a migratory corridor	Low vulnerability due to high elevation and high precipitation zone. Fish rear in Koocanusa Reservoir.	None

Table 12-3. Upper Grave Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
250-500	Declining	Fluvial/resident, Connected	4	EB Low

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High significance – This population is the largest single contributor in the US portion of the Upper Kootenai Core Area.	Low vulnerability due to high elevation and high precipitation zone. Fish rear in Koocanusa Reservoir.	None

Driving Factors Determining Bull Trout Population:

Upper Grave Creek: Since the removal of the historic dam on Grave Creek the number of spawning bull trout has been between 250-500 fish annually. Fish spawn in upper Grave and its tributary streams; Clarence, Stahl, and Blue Sky Creeks. Rearing habitat may be saturated and large numbers of YOY fish emigrate every year. It is undetermined where they migrate to or whether they are lost through density independent mortality factors associated with habitat and predators in the Tobacco system. Presently the greatest threat is the continued operation of the GLID irrigation system which removes water (inhibiting spawning access to upstream reaches) and entrains YOY in large numbers (between 50-700 known YOY annually). Large migratory adults are targeted by the recreational fishery in Koocanusa (which is currently catch and release) and poaching during the kokanee snagging season is also a threat.

Lower Grave Creek: Since the removal of the historic dam on Grave Creek the number of spawning bull trout has been between 250-500 fish annually. Fish spawn in Grave, Clarence, Stahl, and Blue Sky Creeks. Rearing habitat may be saturated and large numbers of YOY fish emigrate every year. It is undetermined where they migrate to or whether they are lost through density independent mortality factors associated with habitat and predators in the Tobacco system. Presently the greatest threat is the continued operation of the GLID irrigation system which removes water (inhibiting spawning access to upstream reaches) and entrains YOY in large numbers (between 50-700 known YOY annually). Large migratory adults are targeted by the recreational fishery in Koocanusa (which is currently catch and release) and poaching during the kokanee snagging season is also a threat.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

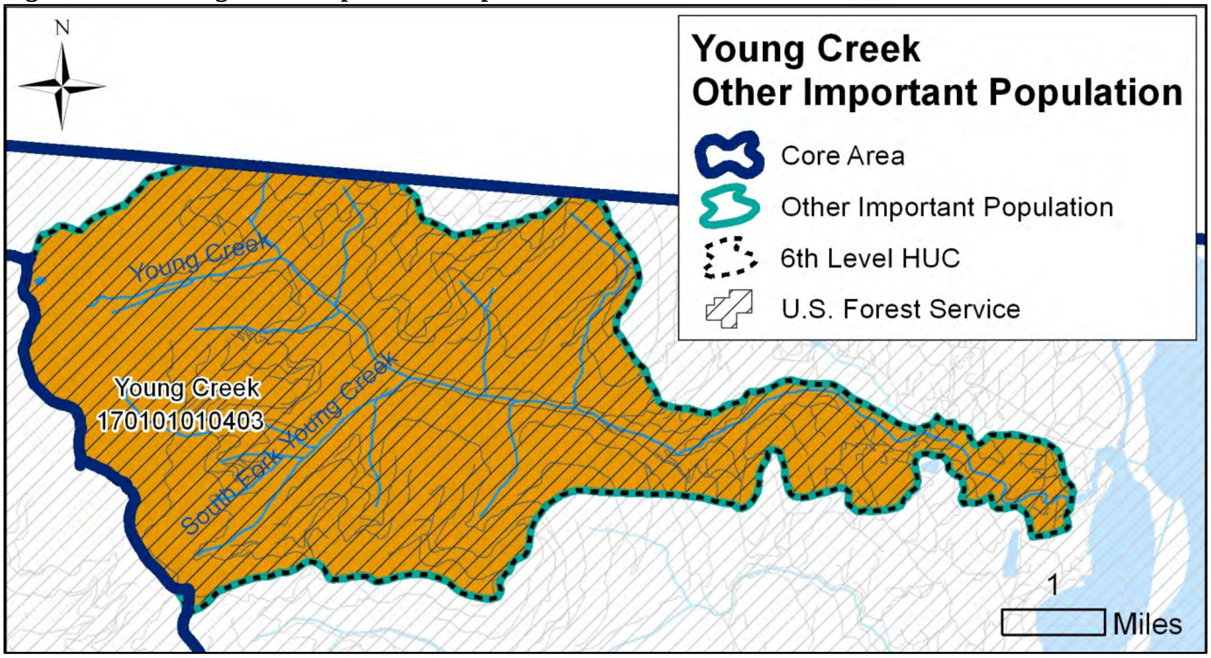
HUC6 (name and #): Lower Grave Creek - 170101010302							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 84%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FA	10 years	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Grave Creek - 170101010301							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FA	5 years	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Other Important Population: Young Creek (NOT designated by FWS as a local population)

Figure 12-4. Young Creek Population Map



Relative Importance of Population to Core Area (H,M,L): L

Table 12-4. Young Creek Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
0	Stable	Rearing Habitat	None	none

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
LOW significance – Occasionally sub adults are collected within the lower reach of Young Creek	Low vulnerability due to high elevation and high precipitation zone. Fish rear in Kootenai River.	None

Driving Factors Determining Bull Trout Population:

This stream provides rearing habitat for sub adults moving out of Koocanusa Reservoir. It may become more utilized as numbers of fish increase.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Young Creek - 170101010403							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Lake Koocanusa Core Area Summary:

Table 12-5 summarizes relevant information from each of the 6th level HUC local populations. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire Upper Kootenai River Core Area within the borders of the Kootenai National Forest. It does not include necessary restoration activities in watersheds where the KNF has no ownership that may be critical for overall restoration of the bull trout population in the Core Area.

Table 12-5. Summary of important Local Population attributes and conservation recommendations for the Upper Kootenai River Core Area.

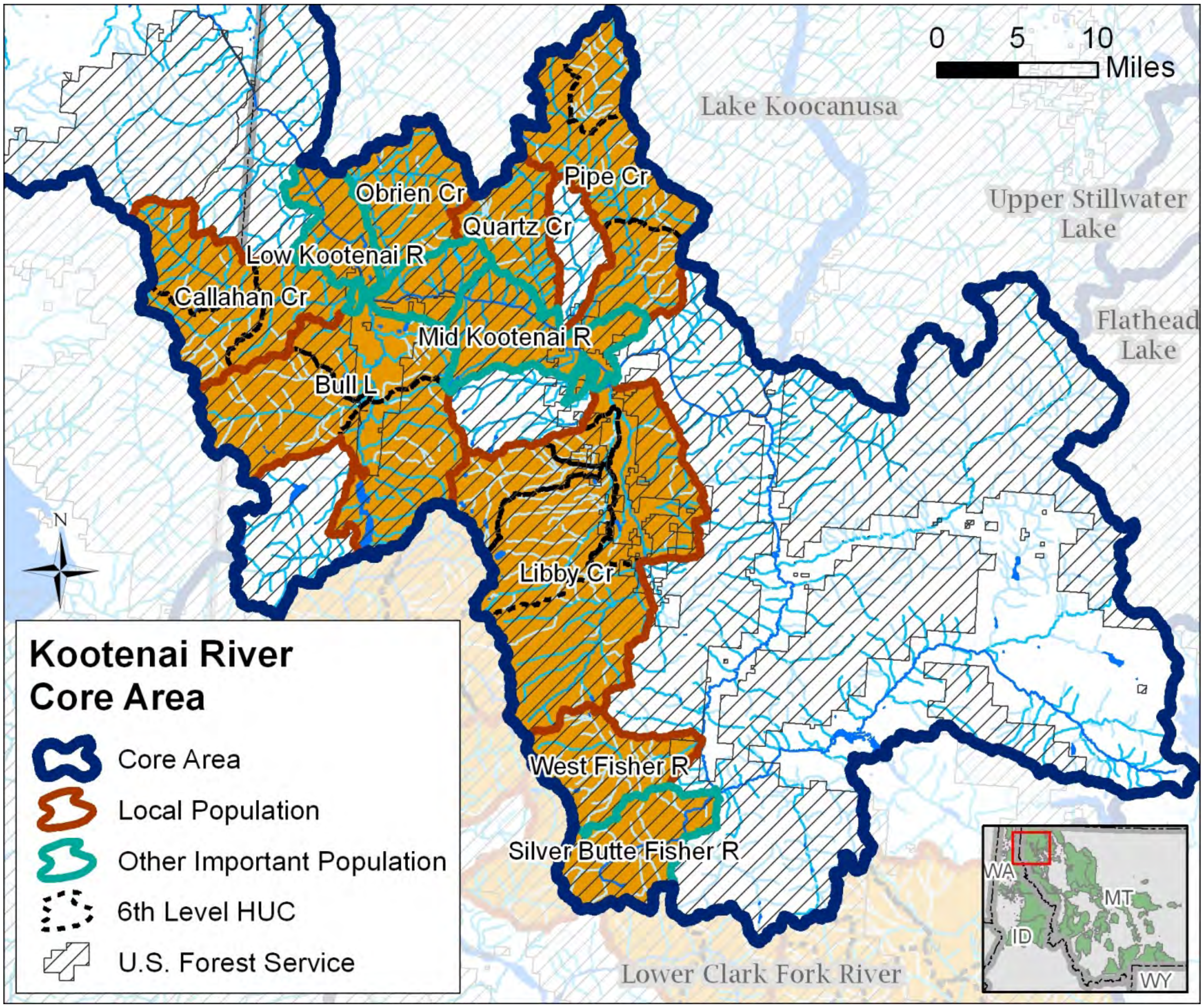
Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
Wigwam River	Wigwam River	Low	Low	Conserve	-	-	-
Grave Creek	Lower Grave Cr	High	Low	Conserve	-	-	-
	Upper Grave Cr	High	Low	Conserve	-	-	-
Young Creek*	Young Creek*	Low	Low	Active	-	-	-

*This is not a local population according to the FWS but is still considered important for bull trout recovery by the Forest Service.

Chapter 13: Kootenai River

Core Area Discussion:

Figure 13-1. Kootenai River and Surrounding Core Areas



Bull trout densities in the Kootenai River (KR) Core Area may have historically been somewhat higher than they are today, but have experienced nowhere near the reductions observed in other western Montana Core Areas. Impacts to bull trout populations in the KR began in the late 19th century with extensive habitat destruction due to gold mining in Libby Creek, agricultural land conversion , and the development of riparian railroads, however more significant changes in bull trout populations likely occurred in the middle part of the century when development pressures in the form of timber harvest and road construction began to occur over relatively large areas of spawning and rearing habitat, including the upper Fisher River.

A major event affecting populations in the Core Area occurred with the construction of Libby Dam in 1974. This dam effectively severed much of the upper watershed, including productive habitat in Grave Creek, the Wigwam River and other river systems in Canada. Movement patterns of fluvial bull trout in the Kootenai River Core Area are therefore significantly restricted from historical patterns. Kootenai Falls also bisects this core area, which (because of the falls) was originally considered to be two separate core areas, but radio telemetry has demonstrated that at least partial upstream passage occurs over the falls. Fluvial populations in the truncated system are, however, geographically distributed throughout the core area, which increases the potential for recovery.

The proportion of fluvial to resident forms as it compares to historic proportions is uncertain. The only known resident bull trout populations is found in Libby Creek above an impassable waterfall. There has been some loss of smaller populations in Parmenter and Flower creeks. The primary cause of loss in Parmenter was due to irrigation withdrawals and irregular flows over the last 75 years. The Flower Creek population became isolated with the development of the Libby municipal water supply and associated dams which isolated the once migratory population. No bull trout have been collected from Flower Creek in the last 10 years. The Kootenai River provides abundant deep water Foraging, Migrating, and Overwintering (FMO) habitat and there does appear to be a relatively strong fluvial component remaining in index spawning reaches. However, the strength of the population is somewhat misleading, as recent genetic testing has indicated that the population appears to be heavily supported by entrainment (one-way, downstream movement) of Lake Koocanusa bull trout through Libby Dam.

Gas bubble disease may be a key factor affecting bull trout in the Kootenai River Core area. Reduced nutrient flow past the dam (due to the reservoir acting as a sink) and reduced phosphate spill in the Canadian portion of the Kootenai River may also be significant. These three issues appear to be key contributors to mainstem rearing capacity limitations. Conversely the dam provides a tremendous food source for bull trout directly downstream. Kokanee salmon entrained by the dam are discharged at the base of the dam. Opportunistic species such as bull trout have benefitted from this condition and bull trout in excess of 20 pounds are occasionally observed in this Core Area as a result of the enhanced food supply. More recently there has been extensive *Didymosphenia geminata* growth below Libby Dam and extending beyond the Idaho-Montana Border. The effects of this nuisance algae growth on bull trout rearing in the mainstem Kootenai River is undetermined.

While Libby Dam significantly affects bull trout populations in the Kootenai River Core Area, the creation of a large reservoir with abundant forage increased bull trout populations upstream of the dam in Lake Koocanusa. This is discussed further in the Lake Koocanusa Core Area chapter.

Forest Service Biologists estimate that as many as 300 to 400 fluvial redds may have been present in the Kootenai River Core Area historically. As with most bull trout populations, overall numbers were likely highly variable from year to year, based on natural climatic and disturbance patterns.

Bull trout populations in the Kootenai River Core Area were first exposed to significant human-caused impacts in the late 1800’s. As the population in the area grew and agricultural production increased there was a need for a steady water supply to local farms. For example, the Glen Lake Irrigation District (GLID) was formed around the turn of the century. The GLID built a log dam and diversion on Grave Creek in 1917. Grave Creek was the primary bull trout stream in this Core Area south of the Canadian border prior to Libby Dam. The GLID dam was not a total barrier but did significantly limit connectivity with the bulk of the available bull trout spawning habitat for fish rearing in the upper reaches of the Kootenai River or what is now Lake Koocanusa (and the Lake Koocanusa Core Area). Timber harvest and road construction impacted most spawning tributaries and cumulatively impacted rearing habitats in the mainstem Kootenai River. The construction of Libby Dam in 1974 was the single-most significant impact to bull trout in this core area during the current era.

Numerous smaller scale impacts to bull trout gradually occurred throughout the Kootenai River valley in the middle part of the 20th century. These included grazing, subdivision, and agricultural development along many of the important low gradient streams, road and energy corridor development in riparian areas, and logging and road development in tributary streams. These all had impacts to bull trout and their habitats; however, they were not of the same magnitude as Libby Dam.

Changes in fish species composition within the Kootenai River system, brought about by Montana Fish, Wildlife and Parks stocking programs and some illegal introductions, have created an additional impact to the system. Brook trout are the main non-native species threat; they exist in numerous tributary streams that contain bull trout and are of particular concern in the O'Brien Creek drainage. Lake trout have been captured in the Kootenai River downstream of Libby Dam and potential establishment and proliferation of a lake trout population downstream in Kootenay Lake could be a major concern. Brown trout also occur, and are increasing downstream of Kootenai Falls in the mainstem and in Lake Creek.

The 1950's-80's saw a rapid expansion of road construction and logging, especially on the upper watersheds of this core area. Further downstream, the climate is more maritime and dominated by rain on snow events. Steep slopes in the middle and upper portions of many Cabinet Mountain drainages produce high bedload levels as a result of their flashy nature. In some cases, this bedload has been exacerbated by road construction and logging. These loads have exceeded the transport capacity of some streams resulting in cobble and boulder dominated systems.

This period of management and heavy road construction also resulted in fragmentation of bull trout populations at undersized culvert crossings in some areas. Most of these barriers have been addressed in recent years and connectivity, aside from Libby Dam, is not a significant issue.

Some past impacts, such as culvert barriers, have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. Logging and road construction have decreased considerably and hundreds of road miles have been removed from the landscape in key bull trout watersheds such as Quartz, Pipe, Callahan, O'Brien Creeks. Fishing regulation changes do not allow people to keep, or intentionally fish for bull trout in most areas (with the exception of Lake Koocanusa, which primarily affects the Lake Koocanusa Core Area). Bull trout poaching was an issue in this core area after angling was closed in 1994 and likely remains.

Overall, current bull trout numbers in the Kootenai River Core Area appear to be relatively stable. Bull trout distribution is relatively good and fluvial components exist in all Local Populations. The mainstem Fisher River has potential to support more bull trout but would require major habitat restoration efforts to restore function and thermal conditions suitable to bull trout. There is some uncertainty as to whether temperature issues could be completely resolved for all life stages.

Biologically, if nonnative brook trout and the potentially emerging lake trout and brown trout threats can be controlled, and headwater spawning and rearing habitat can be improved and connectivity maintained, there is potential for this core area to rebound. However, the apparent population strength is misleading as a significant proportion of the large bull trout routinely encountered downstream of Libby Dam appear (genetic testing has verified) to have originated from upstream of Libby Dam. Also of concern is the prevalence of *Didymosphenia geminate* in the reaches below Libby Dam.

Kootenai River Core Area – Kootenai National Forest

There are six local populations on lands administered by the Forest Service in the Kootenai River Core Area. They are:

1. West Fisher River,

2. Libby Creek,
3. Pipe Creek,
4. Quartz Creek,
5. O'Brien Creek, and
6. Callahan Creek.

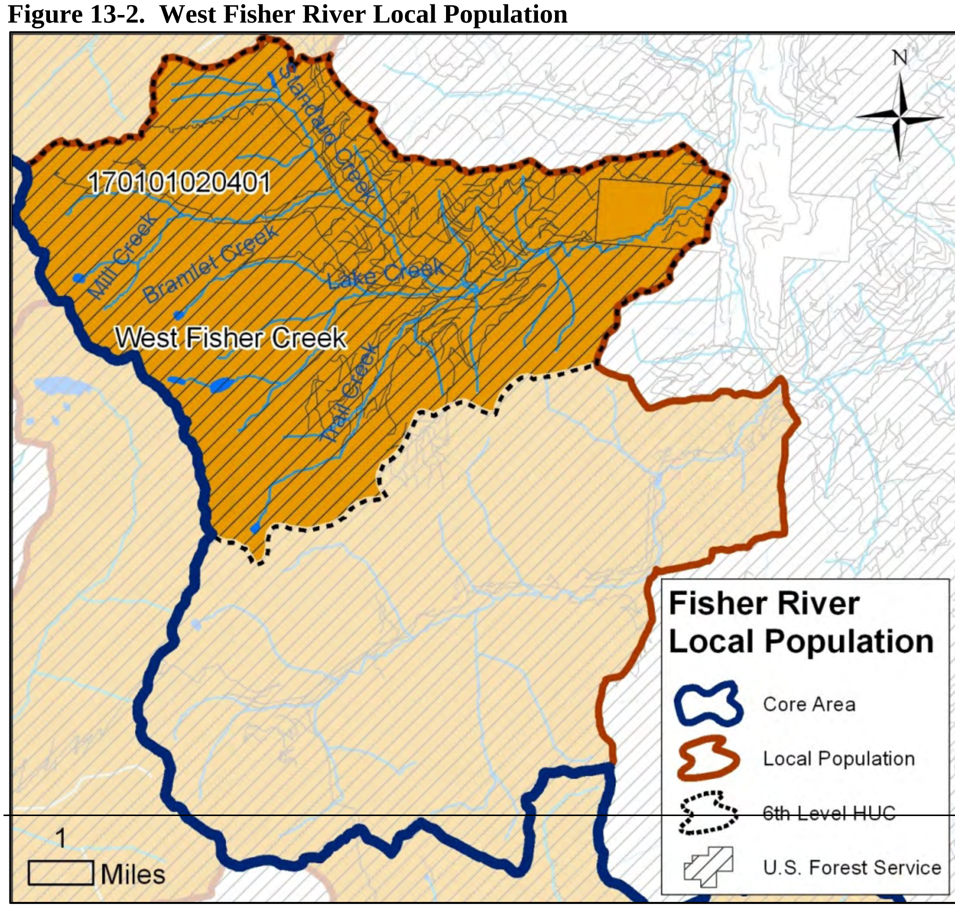
This core area lies entirely within the boundary of the Kootenai National Forest. The Middle and Lower Kootenai River are also discussed in this document, even though they are not considered to be local populations by the FWS. The Kootenai River mainstem is considered to be bull trout critical habitat and thus a discussion in this document is warranted. A discussion of Silver Butte Fisher River is also included in this document due to its importance for bull trout recovery, even though not designated a local population or critical habitat. There are also two local populations that are not discussed further in this document because they are in the state of Idaho (Boulder & Long Canyon Creek).

Bull Lake, a simple core area, is included in this chapter. There, even though it is its own simple core area. Within the Bull Lake Core Area, there is one local population (Keeler Creek) and one other important population that is not recognized as a local population (Lake Creek).

Following is a detailed description of each local population. The framework for each local population is based on the 2010 bull trout baseline completed by the Western Montana Level 1 Team. Driving factors influencing the population are identified, along with a habitat specific assessment that focuses on current and recommended conditions for each of four habitat indicators (sediment, barriers, pools, and temperature) in each 6th level HUC within the local population.

Local Population: West Fisher River

Figure 13-2. West Fisher River Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 13-1. West Fisher River Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50	Stable	Fluvial, Connected	Numerous	EB High
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High significance – This population is the largest group of spawning bull trout in the Fisher River drainage.		Low vulnerability due to high elevation and high precipitation zone. Fish rear in Kootenai River.		None

Driving Factors Determining Bull Trout Population:

Unstable channels and degraded riparian community are the primary drivers for this population. System is flashy due to rain-on-snow events, and this compounds land management impacts. Secondary drivers are high temperatures in the mainstem Fisher which negatively impact rearing capacity and suitability as a migratory corridor. Population is likely below expected carrying capacity.

Confidence in your assessment (H,M,L): H

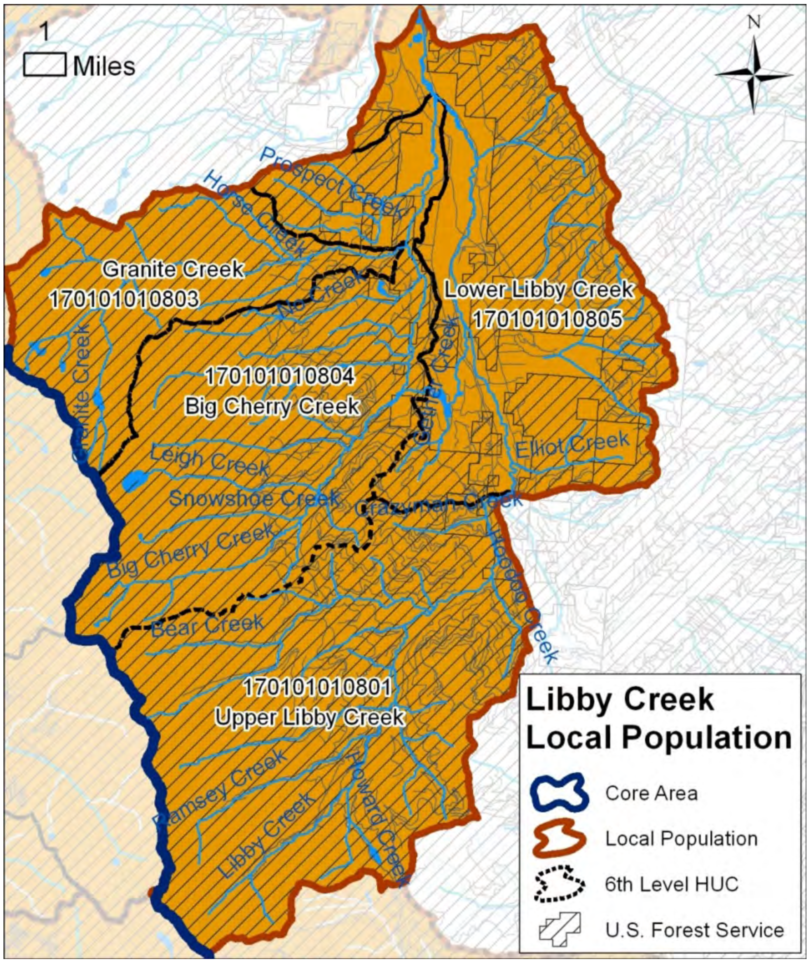
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): West Fisher Creek - 170101020401							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	2	$0	L	L
Barriers	FA	FA	-	-	$0	-	-
Pools	FAR	FA	25 years	2	$0	M	L
Sediment	FA	FA	-	2	$0	M	L

Temperature/barriers/pools/sediment: Some of this watershed is in large roadless areas and wilderness, and some is not. MTFWP has coring and substrate score information on file for all major spawning tributaries.

Local Population: Libby Creek

Figure 13-3. Libby Creek Local Population



Relative Importance of Population to Core Area (H,M,L): L-M

Table 13-2. Libby Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50	Stable	Fluvial, Resident, Connected, Isolated	Numerous/ Dispersed	EB, Low

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
Moderate significance – This population contributes to the Kootenai Core Area.	Low vulnerability due to high elevation and high precipitation zone. Fish rear in Kootenai River.	Supports an isolated resident bull trout population in upper Libby Creek beyond an impassable falls.

Driving Factors Determining Bull Trout Population:

Libby Creek has numerous spawning reaches. Heavy bedload transport and flashy conditions likely limit production of bull trout from this section of Libby Creek.

Upper Libby Creek has numerous spawning reaches with resident fish above a barrier falls upstream of the Public Gold Panning Area. The other primary spawning reach lies in Bear Creek. The Montanore mine is a potential threat to bull trout in Upper Libby Creek.

Granite Creek has several spawning reaches. Upstream access is blocked by a naturally occurring water fall. Available habitat is high quality and much of the watershed (80%) lies within the Cabinet Mountain Wilderness and inventoried roadless areas. Rearing habitat is under-utilized.

Big Cherry Creek has some dispersed spawning reaches. Rearing habitat is under-utilized. Presently the greatest threat to this local population is channel instability. A recent CERCLA project eliminated a source of heavy metals that potentially adversely affected this population until 2009.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Libby Creek - 170101010805							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 66%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	2	$0	M	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FA	25 years	2	$750,000	M	M
Sediment	FA	FA	25 years	2	$750,000	L	M

Temperature/barriers/pools/sediments: The majority of habitat concerns are related to development and land conversion on private property which borders nearly the entire length of lower Libby Creek. Temperatures in the lower Libby Creek often exceed those preferred by bull trout. Numerous fine sediment sources exist and significant portions of the stream become intermittent at low flows; however, these occur on private property.

The percentage of NFS ownership is deceptive as most of that land is located on the east side of the watershed and most tributaries draining that portion of lower Libby Creek have no surface water connection to the mainstem Libby Creek.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Libby Creek - 170101010801							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 66%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	2	$0	M	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FA	25 years	2	$750,000	M	M
Sediment	FA	FA	-	2	$750,000	L	M

Temperature/barriers/pools/sediment: Upper Libby Creek is a migratory corridor for bull trout returning to Bear Creek. There is also a resident bull trout population in the upper reach of the watershed above an impassable waterfall.

Portions of this watershed are unstable due to reduced riparian integrity. The absence of an intact mature riparian is exacerbated by the flashy nature of this watershed. Rain-on-snow events are common causing large bedload movements and channel migration. The net result is reduced large pool habitat and substrates dominated by large cobble.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Granite Creek - 170101010803							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 91%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Temperature/barriers/pools/sediment: Forest monitoring data supports that these variables are functioning appropriately. The opportunities for habitat improvement are limited given that 80% of the watershed is in roadless or wilderness status. Half the remaining acres are in private ownership.

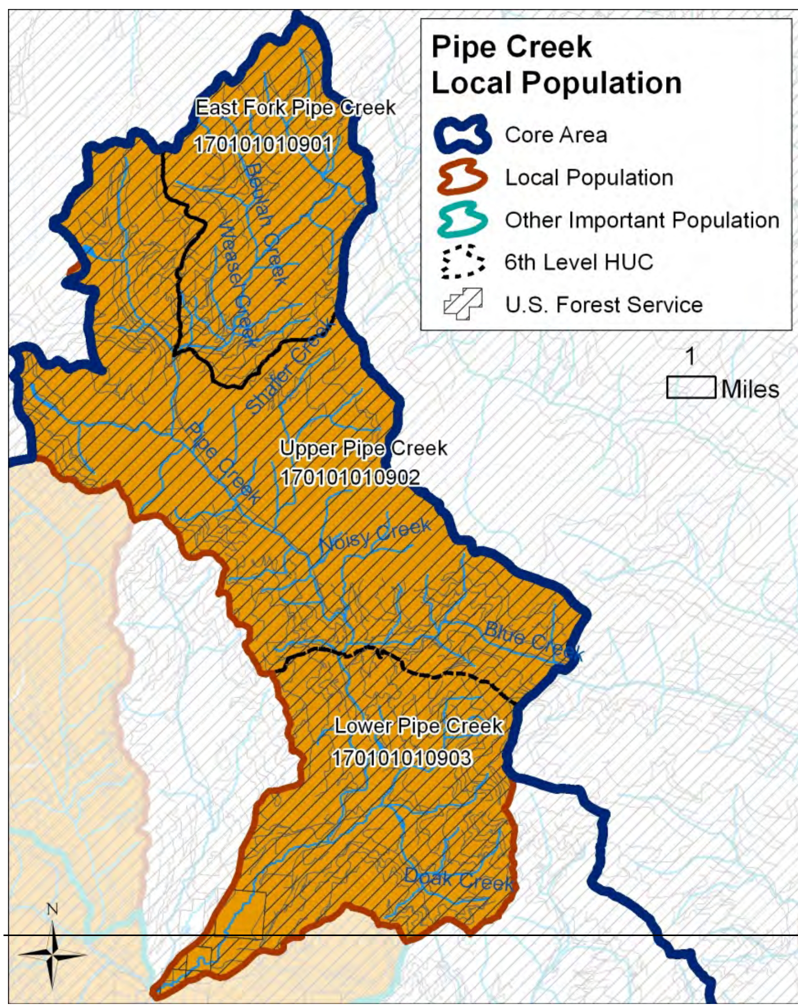
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Big Cherry Creek - 170101010804							
Strategy (Active Restoration, Passive Restoration, Conserve):Passive Restoration							
% Forest Service Ownership in HUC: 91%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	2	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	2	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Temperature/barriers/pools/sediment: Very little is known about the bull trout population using Big Cherry Creek. The population has a migratory component. Much of the watershed is in roadless and the Cabinet Mountain Wilderness.

Local Population: Pipe Creek

Figure 13-4. Pipe Creek Local Population



Relative Importance of Population to Core Area (H,M,L): L

Table 13-3. Pipe Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50	Declining in Lower Pipe Increasing in Upper & East Fork Pipe	Fluvial Connected	3 in Upper Pipe Mainstem Dispersed is East Fork Pipe	EB, High

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
LOW significance	Low vulnerability due to high elevation and high precipitation zone. Fish rear in Kootenai River.	None

Driving Factors Determining Bull Trout Population:

Pipe Creek has numerous spawning reaches in the upper mainstem and East Fork Pipe Creeks. The East Fork contribution is low due to marginal habitat. Spawners number between 2 and 16 annually, with an average of 11 over the past five years. Rearing habitat is under-utilized. Threats to this local population include swimming dams made by recreationists, hybridization, and a lack of high quality spawning habitat. Considerable habitat survey and temperature data would indicate these variables are in fact both FA.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Pipe Creek - 170101010903

Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration

% Forest Service Ownership in HUC: 99%

Relative Contribution of Habitat in Limiting Local Population: High

Functional Significance to Local Pop: High

Indicator	Current Baseline Condition	Proposed Baseline Condition	Timeframe to change baseline	Recovery Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FA	FAR	-	3	$0	L	L
Barriers	FA	FA	5 years	1	$1,500	H	H
Pools	FA	FA	-	3	$0	M	M
Sediment	FA	FA	-	3	$0	L	L

Temperature/barriers/pools/sediment: There have been three phases of a habitat improvement project implemented on Pipe Creek under a 10(a)(1)(A) Recovery Action Permit to increase large pool habitat on Pipe Creek. Extensive R1/R4 fish habitat surveys identified a lack of large quality pools throughout the length of Pipe Creek. The pools built over the last ten years addressed that issue and currently provide deep quality pools. One large debris jam was also removed as part of the recovery action to improve access by returning spawning bull trout. Attempts to educate local recreationists have met with limited success as they continue to build dams to provide swimming opportunities.

Forest Monitoring conducted over the last 15 years show sediment and temperature to be functioning appropriately.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Pipe Creek - 170101010902							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	M	M
Sediment	FA	FA	-	3	$0	L	L

Temperature/barriers/pools/sediment: Extensive fish habitat surveys have been completed as part of the Pipestone Project. Those surveys document that barriers and pools are FA. Long-term temperature monitoring documents that temperature is functioning appropriately. Finally, the areas of sediment recruitment along FSR 336 have been hardened with barb deflectors and vanes. The road surface has been graveled to reduce sediment. Core sampling done as part of forest monitoring shows instream fines are also FA. Three phases of a watershed restoration project has been completed and monitored to document increased quality pool habitat. A major debris jam was removed to improve connectivity for upstream migrants.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

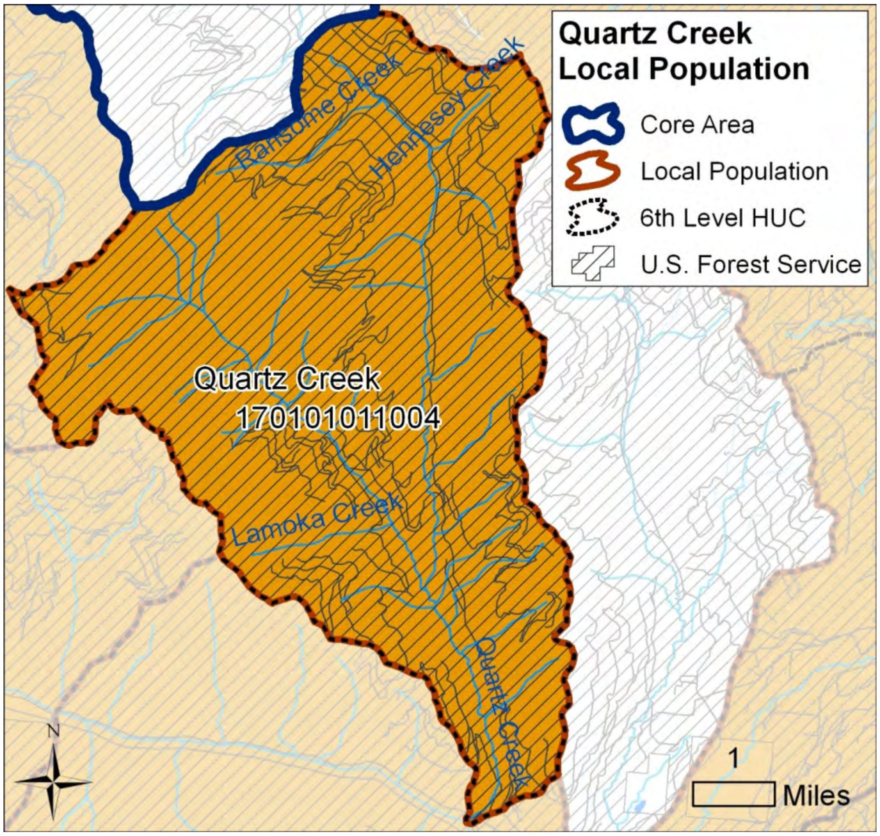
HUC6 (name and #): East Fork Pipe Creek - 170101010901							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Temperature/barriers/pools/sediment: The East Fork Pipe Creek may support limited numbers of spawning bull trout. Connectivity can be a risk due to man-made dams built for recreation in Lower Pipe Creek. Tradition has been for residents of the Pipe Creek area to build dams forming swimming holes. When this happens, connectivity becomes a problem.

FSR# 336 has been a sediment source in the past; however it has been resurfaced and hardened. Additional hardening may be necessary to reduce sediment contributions to negligible levels.

Local Population: Quartz Creek

Figure 13-5. Quartz Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 13-4. Quartz Creek Local Population Summary

<table>
<tr><th># Spawning Adults</th><th>Short-Term (5yr) Pop Trend</th><th>Life History, Connectivity</th><th># Known Spawn Reaches</th><th>Nonnative Species, threat</th></tr>
<tr><td>50-250</td><td>Declining (last five years included 5 of the lowest redd counts on record and 2012 was the lowest ever).</td><td>Fluvial, Resident, Connected</td><td>Numerous mainstem and West Fork</td><td>EB, Low</td></tr>
<tr><th colspan="2">Significance of geographical location</th><th colspan="2">Vulnerability to Climate Change</th><th>Unique Population Attributes</th></tr>
<tr><td colspan="2">High significance – This population is considered to be the cornerstone of the Kootenai Core Area.</td><td colspan="2">Low vulnerability due to high elevation and high precipitation zone. Fish rear in Kootenai River.</td><td>None</td></tr>
</table>

Driving Factors Determining Bull Trout Population:

Quartz Creek has numerous spawning reaches in the mainstem and West Fork Quartz Creeks. Prior to the last five years, the number of bull trout spawning in Quartz Creek numbered around 200 annually. Rearing habitat is under-utilized. Presently there are no obvious threats to this local population, although there may be a current decrease in spawning habitat quality and access. Considerable habitat survey and temperature data would indicate these variables are in fact both FA. Extensive watershed improvement work was completed in the mid 1990's and no active management has occurred in this watershed in more than 15 years.

Confidence in your assessment (H,M,L): H

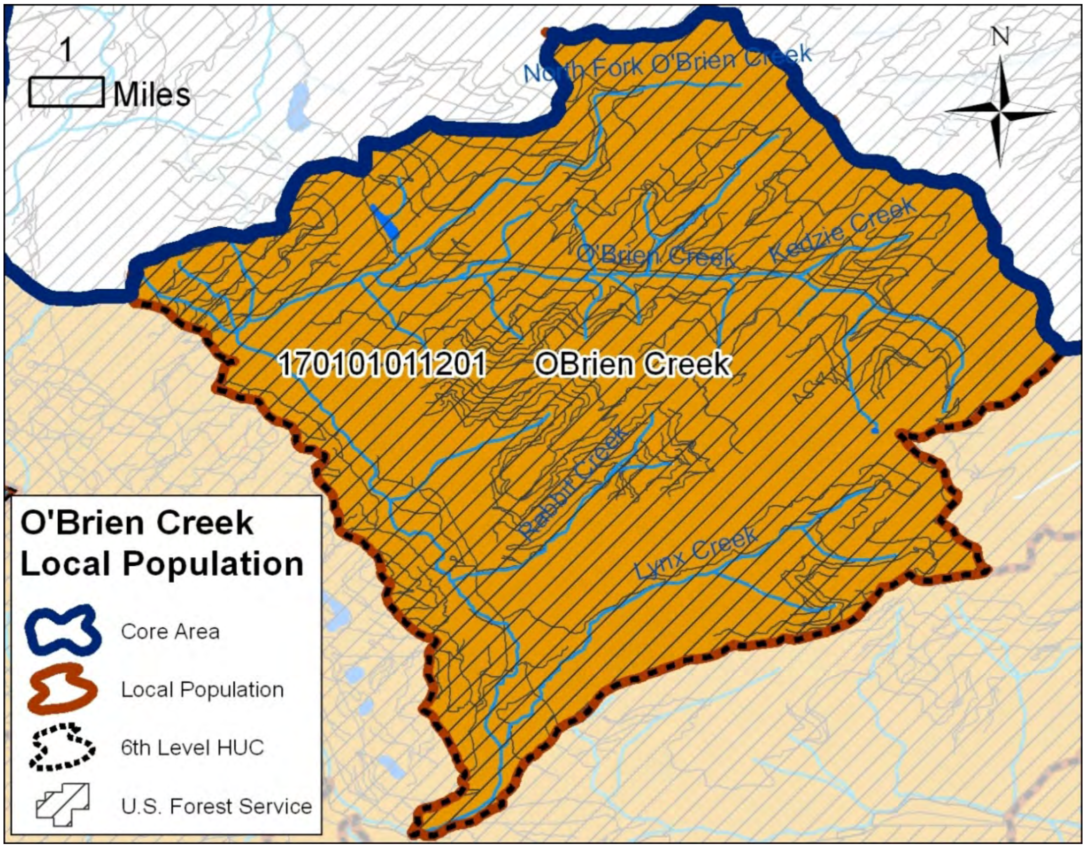
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Quartz Creek - 170101011004							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Temperature/barriers/pools/sediment: Restoration work was initiated in Quartz Creek in 1994 and completed in 1996. Sixteen years of sediment, temperature and redd monitoring data supports that temperature and sediment parameters are in fact functioning appropriately. Comprehensive fish habitat surveys from the mouth of Quartz through the extent of fish presence in both the mainstem and the West Fork Quartz creeks (2002) document pools and barriers are also functioning appropriately. There is some concern that habitat quality in these areas is decreasing, and continued monitoring is necessary to address this issue.

Local Population: O'Brien Creek

Figure 13-6. O'Brien Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 13-5. O'Brien Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250	Decreasing	Fluvial Connected	Numerous	EB, High
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High significance – This population is the largest downstream of Kootenai Falls in the Kootenai Core Area.		Low vulnerability due to high elevation and high precipitation zone. Fish rear in Kootenai River.		None

Driving Factors Determining Bull Trout Population:

O'Brien Creek has numerous spawning reaches in the middle mainstem. Prior to the last 4 years, the number of spawning bull trout in O'Brien Creek numbered around 250 annually. Rearing habitat is under-utilized. USFS habitat survey and temperature data would indicate these variables are in fact both FA, however MTFWP substrate score and fine sediment data indicates that these variables are in poor condition. There is considerable beaver activity in the upper drainages.

Confidence in your assessment (H,M,L): H

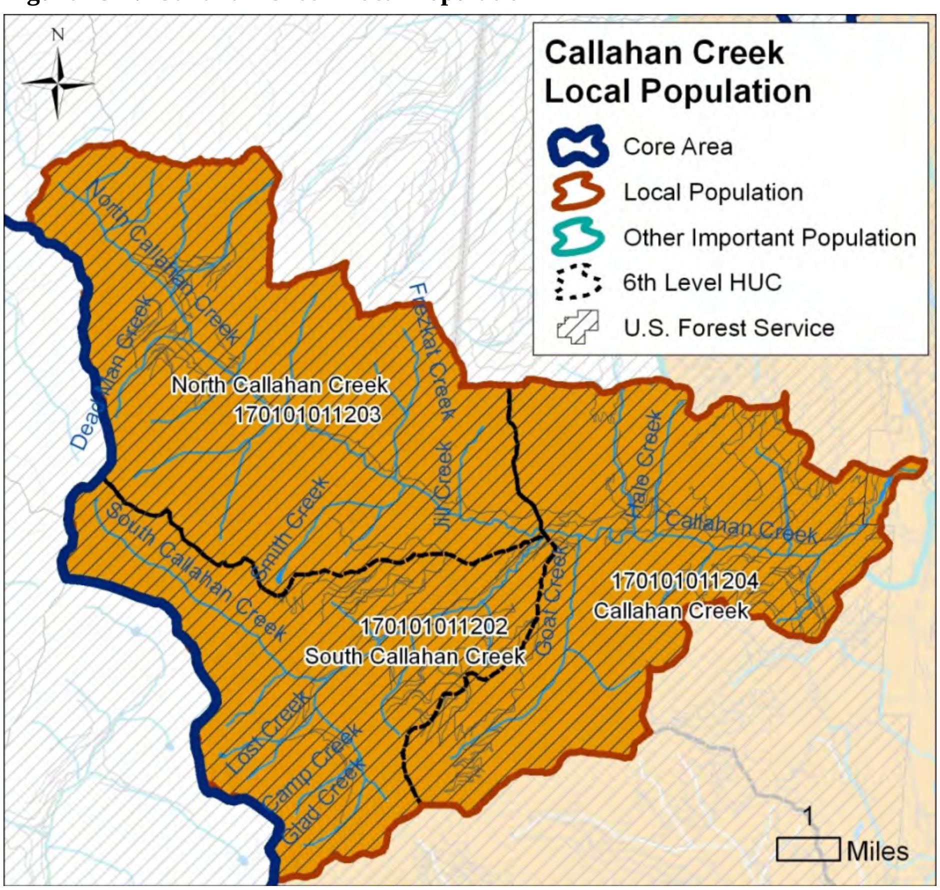
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): O'Brien Creek - 170101011201							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	M	L

Temperature/barriers/pools/sediment: O'Brien Creek is the largest producer of bull trout in the middle Kootenai section of this core population, however redd counts have declined considerably in the last four years. No management has occurred in this watershed for the last 15 years. Long-term USFS monitoring has shown habitat variables to be functioning appropriately, but some MTFWP data contradicts these conclusions.

Local Population: Callahan Creek

Figure 13-7. Callahan Creek Local Population



Relative Importance of Population to Core Area (H,M,L): M

Table 13-6. Callahan Creek Local Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50	Stable or potentially declining	Fluvial Connected	One each in the North and South Forks	EB, Low
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Moderate significance – This population is the second largest downstream of Kootenai Falls in the Kootenai Core Area.		Low vulnerability due to high elevation and high precipitation zone. Fish rear in Kootenai River.		None

Driving Factors Determining Bull Trout Population:

Callahan Creek has two known spawning reaches in the North and South Forks. Spawners typically number around 30-50 annually (35-45 in the North Fork, 5-10 in the South Fork), but have decreased in the last few years. Rearing habitat is under-utilized. Threats to this local population include channel instability and rearing conditions in the Kootenai River. Considerable habitat survey and temperature data would indicate these variables are in fact both FA. Extensive road storage and decommissioning work has occurred in the upper portion of the North Fork so there should be some improvement. The mainstem Callahan functions as a migratory corridor with some potential for dispersed spawning.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Callahan Creek - 170101011204							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 98%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Temperature/barriers/pools/sediment: Extensive fish habitat surveys and temperature monitoring done in the Callahan drainage support the determination that temperature, barriers, pool, and sediment are functioning appropriately. Radio-telemetry data collected by IDFG indicates these fish rear in the Kootenai River between Kootenai Falls and Bonners Ferry.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): North Callahan Creek - 170101011203							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Temperature/barriers/pools/sediment: The substrate in this stream where bull trout occur is dominated by cobble/boulder. Spawning occurs in pockets of gravel. Two decisions occurring over the last 15 years have provided opportunity to collect extensive data sets in North Callahan. Additionally roads and stream crossings that were identified as sediment sources have been treated or removed.

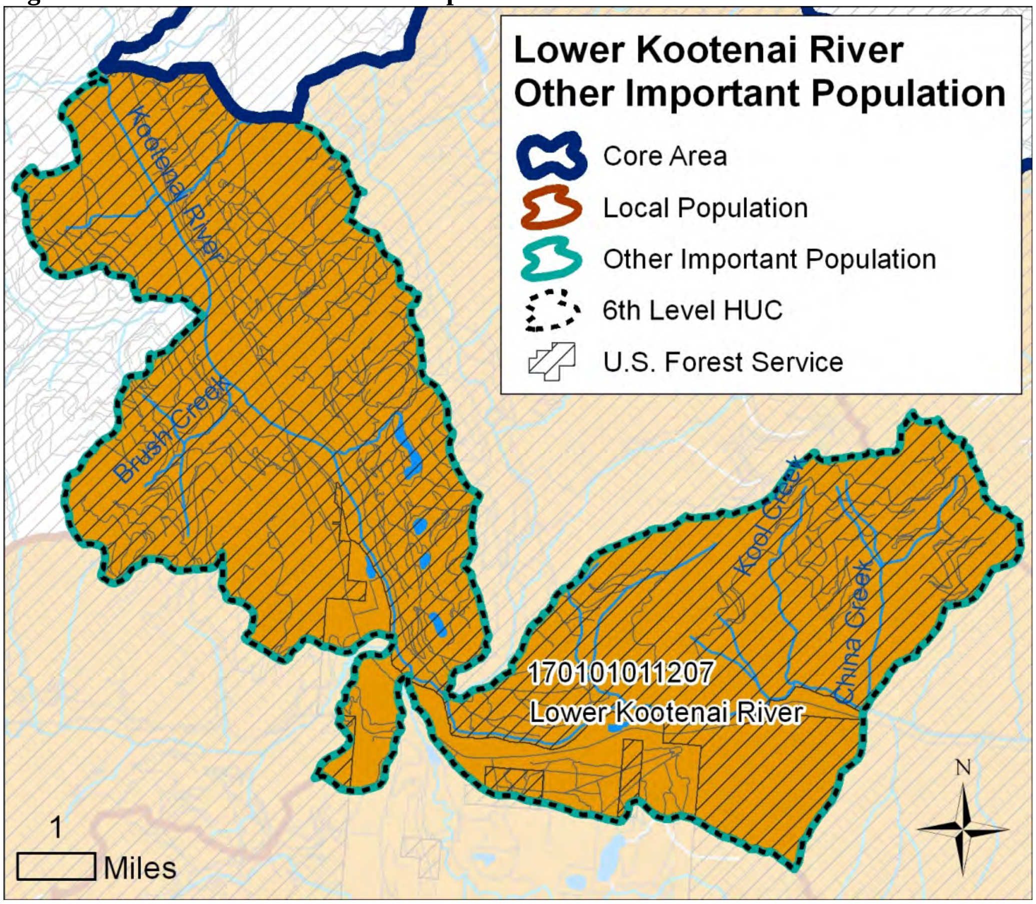
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): South Callahan Creek - 170101011202							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Moderate							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Temperature/barriers/pools/sediment: Extensive fish surveys were conducted as part of the West Troy Project, 2005. Data collected along with long-term temperature monitoring indicate these variables are functioning appropriately.

Other Important Population: Lower Kootenai River (NOT designated by FWS as a local population)

Figure 13-8. Lower Kootenai River Population



Relative Importance of Population to Core Area (H,M,L): H

Table 13-7. Lower Kootenai River Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
Unknown	Stable	Fluvial, Resident, Connected	Unknown	EB, BT, Low

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High significance	Low vulnerability due to high elevation and high precipitation zone. Fish rear in Kootenai River.	None

Driving Factors Determining Bull Trout Population:

The lower Kootenai River consists primarily of fish derived from Callahan and O'Brien Creeks (and fish from Lake Koocanusa entrained through Libby Dam). Numerous other tributaries support the population. The upper end is bounded by Kootenai Falls, which is not a total barrier to upstream fish movement but probably does influence upstream movement to some degree.

Confidence in your assessment (H,M,L): H

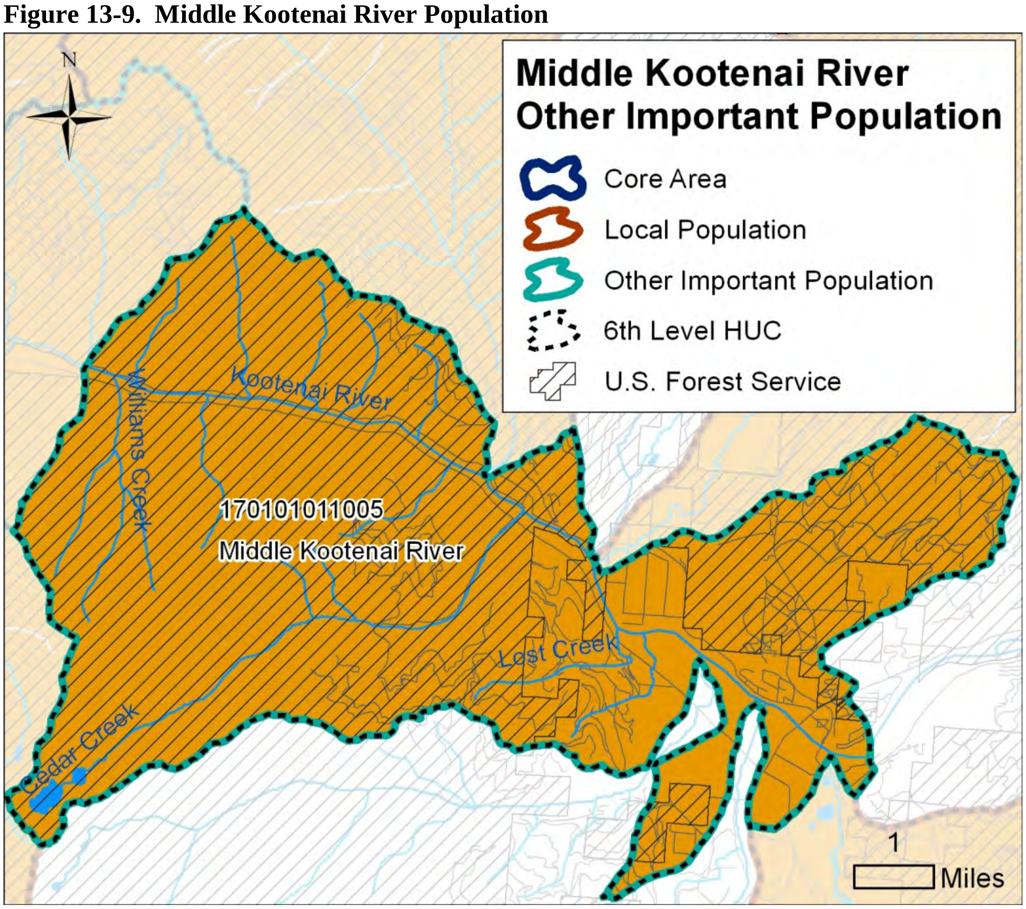
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Kootenai River - 170101011207							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 91%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Temp/barriers/pools/sediment: This is a 7th order stream that flows typically between 7000 – 12,000 cfs during summer low flows. The automated baselines show this HUC as FUR for all four based on the proximity of State Highway 2 and the Kootenai River Road, both of which are paved. All these factors are in fact functioning appropriately.

Other Important Population: Middle Kootenai River (NOT designated by FWS as a local population)

Figure 13-9. Middle Kootenai River Population



Relative Importance of Population to Core Area (H,M,L): H

Table 13-8. Middle Kootenai River Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
Unknown	Stable	Fluvial, Resident, Connected	Unknown	EB, Low
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
High significance		Low vulnerability due to high elevation and high precipitation zone. Fish rear in Kootenai River.		None

Driving Factors Determining Bull Trout Population:

The Middle Kootenai River consists primarily of bull trout derived from Quartz Creek and from Lake Koocanusa entrained through Libby Dam. Numerous other tributaries support the population. The upper end is bounded by Libby Dam and the lower by Kootenai Falls. The falls is not a barrier to upstream fish movement.

Confidence in your assessment (H,M,L): H

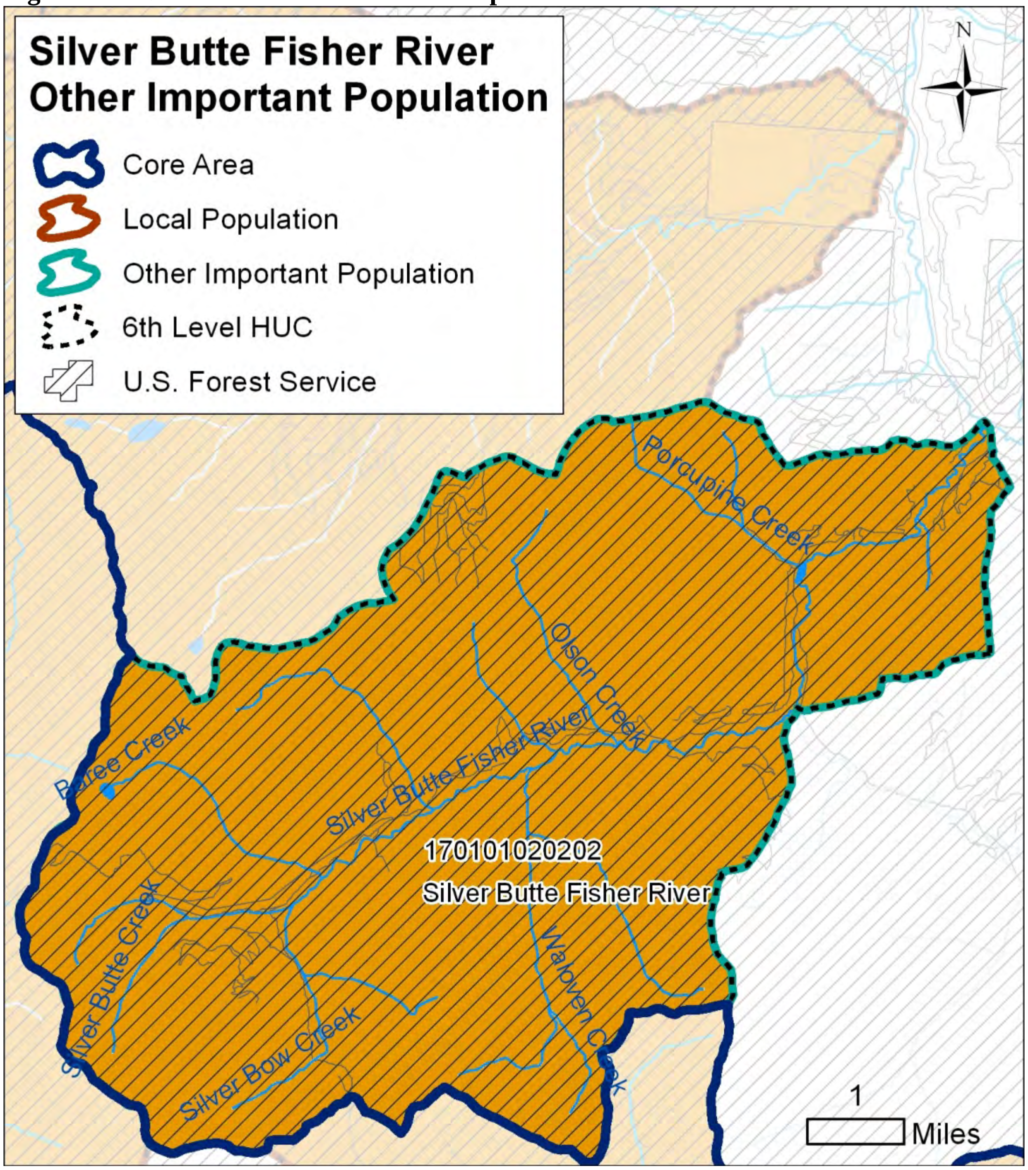
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Middle Kootenai River - 170101011005							
Strategy (Active Restoration, Passive Restoration, Conserve): Conserve							
% Forest Service Ownership in HUC: 82%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FA	FA	-	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FA	FA	-	3	$0	L	L
Sediment	FA	FA	-	3	$0	L	L

Temp/barriers/pools/sediment: This is a 7th order stream that flows typically between 7000 – 12,000 cfs during summer low flows. The automated baselines show this HUC as FUR for all four based on the proximity of State Highway 2 and the Kootenai River Road, both of which are paved. All these factors are in fact functioning appropriately.

Other Important Population: Silver Butte Fisher River (NOT designated by FWS as a local population)

Figure 13-10. Silver Butte Fisher River Population



Relative Importance of Population to Core Area (H,M,L): L

Table 13-9. Silver Butte Fisher River Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
1-50	Stable	Fluvial, Connected	Dispersed	EB, high
Significance of geographical location		**Vulnerability to Climate Change**		**Unique Population Attributes**
Low significance – This population is small and primarily resident fish.		Low vulnerability due to high elevation and high precipitation zone. Fish rear in Kootenai River.		None

Driving Factors Determining Bull Trout Population:

System is somewhat flashy due to rain on snow events. Secondary drivers are high temperatures in the mainstem Fisher which inhibit rearing capacity and suitability as a migratory corridor and potentially high sediment levels. Population is below expected carrying capacity.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Silver Butte Fisher River - 170101020202							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 100%							
Relative Contribution of Habitat in Limiting Local Population: Moderate							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FAR	25 years	3	$0	L	L
Barriers	FA	FA	25 years	3	$0	L	L
Pools	FAR	FAR	10 years	3	$0	M	L
Sediment	FAR	FAR	25 years	3	$0	M	L

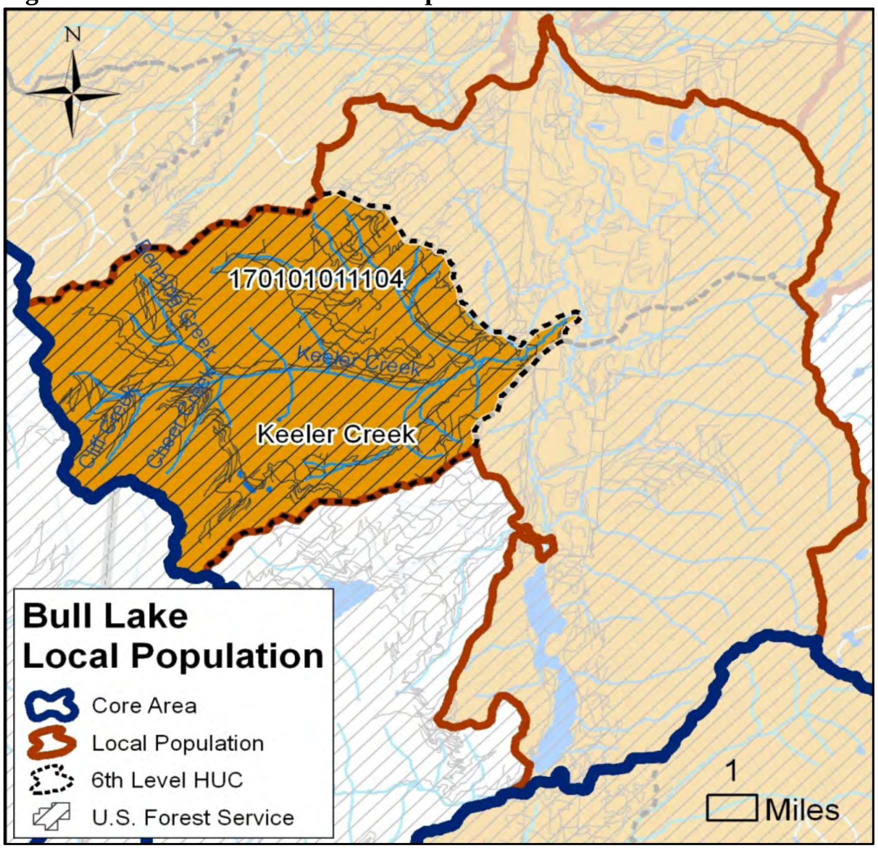
Temperature/barriers/pools/sediment: Little information exists for the Silver Butte Fisher River population. Management has been minimal in this watershed. Some of the watershed's habitat is contained in a large roadless area.

Simple Core Areas

Core Area: Bull Lake

Local Population: Keeler Creek

Figure 13-11. Keeler Creek Local Population



Relative Importance of Population to Core Area (H,M,L): H

Table 13-10. Bull Lake Simple Core Area Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
50-250	Stable	Primarily Adfluvial Connected (may be minor fluvial component)	One each in the mainstem, North and South Forks Keeler	EB Mod to High; BT Low

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High significance – This population is the only one in the Bull Lake Core Area.	Low vulnerability due to high elevation and high precipitation zone.	Fish are isolated. They rear in Bull Lake and move downstream to spawn in Keeler Creek.

Driving Factors Determining Bull Trout Population:

Keeler Creek has three known spawning reaches: one in the mainstem, one in the North Fork, and one in the South Fork. Spawners generally number around 150-250 annually. Rearing habitat is under-utilized. Threats to this local population include development around bull Lake and Lake Creek, sediment, channel instability and rearing conditions. Large wood has been removed in the past and the riparian vegetation is immature. Extensive road storage and decommissioning work has occurred in the upper portion of the North Fork so there should be some improvement. System is heavily influenced by cold, groundwater from numerous springs at ~3,300 feet elevation.

More road storage/decommissioning is proposed for the upper portion of mainstem Keeler. Recent work has been completed to add large wood and stabilize the stream bank at the ~river mile 7.

Lower Lake Creek has is a migratory corridor for spawning fish. It may provide some rearing habitat and could potentially support spawning but to date none has been documented.

Upper Lake Creek is a migratory corridor for spawning fish out of Bull Lake. It may provide some rearing habitat and could potentially support spawning but to date none has been documented. The remainder of the watershed does not support bull trout.

Confidence in your assessment (H,M,L): H

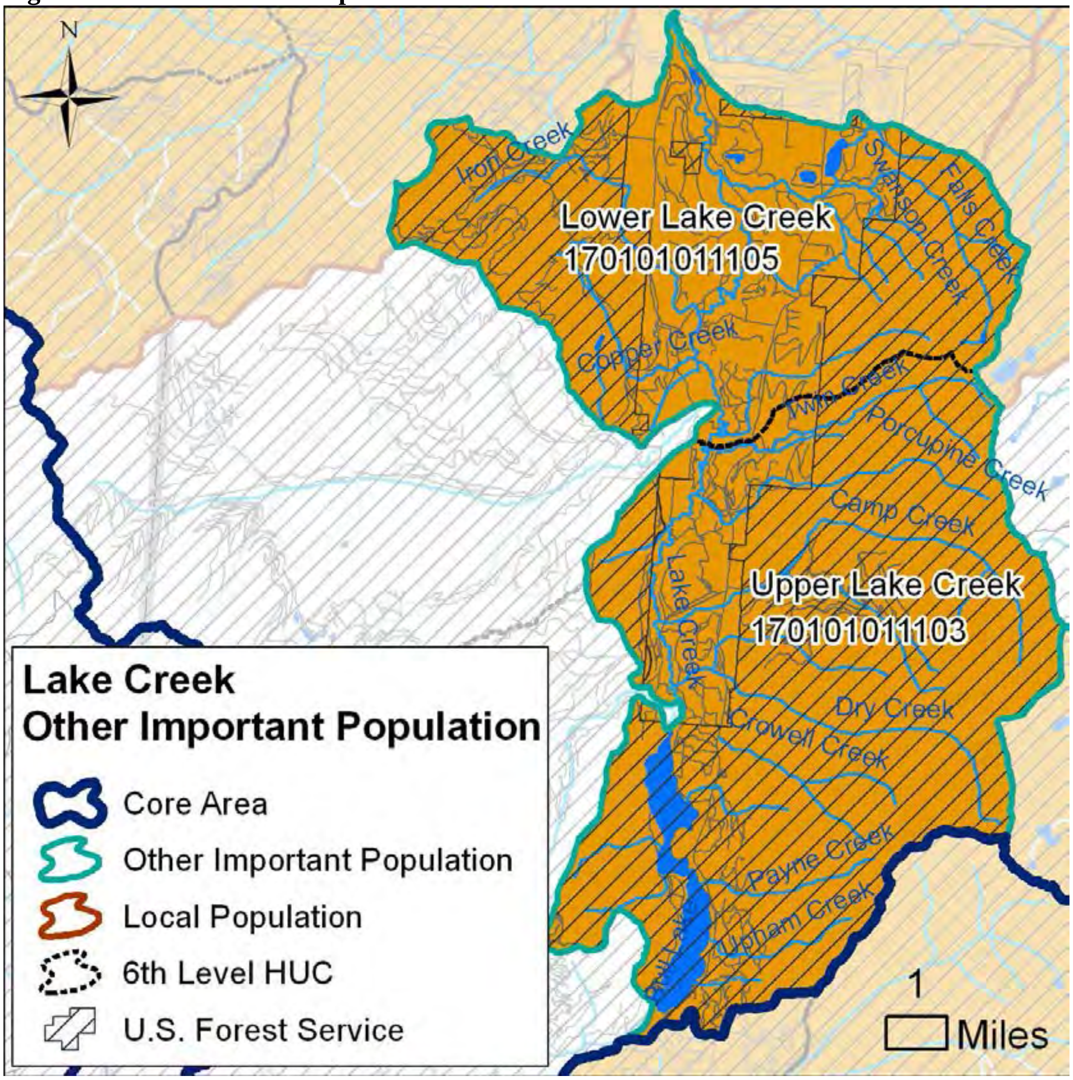
Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Keeler Creek - 170101011104							
Strategy (Active Restoration, Passive Restoration, Conserve): Active Restoration							
% Forest Service Ownership in HUC: 99%							
Relative Contribution of Habitat in Limiting Local Population: High							
Functional Significance to Local Pop: High							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	25 years	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FA	25 years	3	$75,000	L	L
Sediment	FAR	FA	10 years	3	$500,000	M	M

Temperature, barriers, pools, sediment: Channel stability continues to be a concern in Keeler Creek on NFS lands. About 35%-45% of the spawning occurs on private lands in the North Fork Keeler Creek. Improving channel stability and riparian integrity would improve conditions for bull trout.

Other Important Population: Lake Creek

Figure 13-12. Lake Creek Population



Relative Importance of Population to Core Area (H,M,L): L

Table 13-11. Lake Creek Population Summary

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat
Unknown	Stable	Fluvial Connected	none	EB, BT, Low

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes
High significance – There is some juvenile and sub adult use of this area. It also functions as migratory habitat for spawners in the fall.	Low vulnerability due to high elevation and high precipitation zone.	Fish are isolated. They rear in Bull Lake and move downstream to spawn in Keeler Creek.

Driving Factors Determining Bull Trout Population:

Lower Lake Creek may serve as a migratory corridor for spawning fish. It provides some rearing habitat and could potentially support spawning but to date none has been documented.

Upper Lake Creek may serve as a migratory corridor for spawning fish out of Bull Lake. It may provide some rearing habitat and could potentially support spawning but to date none has been documented. The remainder of the watershed does not support bull trout.

Confidence in your assessment (H,M,L): H

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Lower Lake Creek - 170101011105							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 54%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	25 years	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FA	25 years	3	$0	L	L
Sediment	FAR	FAR	25 years	3	$0	L	L

The portion of lower Lake Creek supporting bull trout lies entirely on private lands.

Individual HUC6 (w/in Local Pop) attributes and strategies, based on above factors

HUC6 (name and #): Upper Lake Creek - 170101011103							
Strategy (Active Restoration, Passive Restoration, Conserve): Passive Restoration							
% Forest Service Ownership in HUC: 87%							
Relative Contribution of Habitat in Limiting Local Population: Low							
Functional Significance to Local Pop: Low							
Indicator	**Current Baseline Condition**	**Proposed Baseline Condition**	**Timeframe to change baseline**	**Recovery Priority (1,2,3)**	**Estimated Cost to Complete**	**Expectation of population response (H,M,L)**	**Timeliness of opps (H,M,L)**
Temperature	FAR	FA	25 years	3	$0	L	L
Barriers	FA	FA	-	3	$0	L	L
Pools	FAR	FA	25 years	3	$0	L	L
Sediment	FAR	FA	10 years	3	$1,000,000	M	M

Kootenai River Core Area Summary:

Table 13-11 summarizes relevant information from each of the 6th level HUC local populations. This summary provides an overall assessment of the estimated cost, timeframe, and importance of restoration activities for the entire Kootenai River Core Area within the borders of the Kootenai National Forest. It does not include necessary restoration activities in watersheds where the KNF has no ownership that may be critical for overall restoration of the bull trout population in the Core Area.

Table 13-11. Summary of important Local Population attributes and conservation recommendations for the Kootenai River Core Area.

Local Population	6th level HUC Name	Significance to Local Pop.	Contribution of Habitat in Limiting Pop.	Conservation Strategy	Indicators w/ Expected "High" Population Response	Timeframe (range) (for "High Response" activities)	Cost Estimate (for "High Response" activities)
West Fisher River	West Fisher River	High	High	Active	-	-	-
Libby Creek	Lower Libby Cr	Moderate	High	Active	-	-	-
	Upper Libby Cr	Moderate	High	Active	-	-	-
	Granite Cr	Moderate	Low	Passive	-	-	-
	Big Cherry Cr	Moderate	Moderate	Passive	-	-	-
Pipe Creek	Lower Pipe Cr	High	High	Active	Barriers	5 years	$1,500
	Upper Pipe Cr	High	High	Active	-	-	-
	East Fork Pipe Cr	Low	Moderate	Active	-	-	-
Quartz Creek	Quartz Cr	High	High	Conserve	-	-	-
O'Brien Creek	O'Brien Cr	High	Moderate	Passive	-	-	-
Callahan Creek	Callahan Cr	Moderate	Moderate	Passive	-	-	-
	North Callahan Cr	Moderate	Low	Passive	-	-	-
	South Callahan Cr	Moderate	Low	Passive	-	-	-
Lower Kootenai River*	Lower Kootenai River*	High	Low	Conserve	-	-	-
Middle Kootenai River*	Middle Kootenai River*	High	Low	Conserve	-	-	-
Silver Butte Fisher River*	Silver Butter Fisher River*	Low	Moderate	Passive	-	-	-
Bull Lake**	Keeler Creek	High	High	Active	-	-	-
	Lower Lake Creek	Low	Low	Passive	-	-	-
	Upper Lake Creek	Low	Low	Passive	-	-	-

*** -** Not recognized as a local population by the Fish and Wildlife Service
** - Simple Core Area

Glossary

Term	Definition
Adfluvial (life history)	A life history strategy of bull trout that utilizes larger lake and reservoir rearing habitats to increase growth and egg production opportunities before returning to natal spawning grounds. This life history strategy often requires longer migrations by individuals to capitalize on more productive rearing habitats before returning to natal spawning grounds. Fragmentation of riverine habitats by both large and small dams, and road stream crossings, can cumulatively serve to impair and reduce the fluvial life history component of a population.
Aquatic Ecosystem	Waters of the United States that serve as habitat for interrelated and interacting communities and populations of plants and animals. The stream channel, lake or estuary bed, water, biotic communities and the habitat features that occur therein.
Baseline	A classified state or condition (Functioning Appropriately, Functioning at Risk, and Functioning at Unacceptable Risk) of aquatic and watershed habitat based described through a suite of 19 habitat indicators (e.g., sediment, temperature, fragmentation, pools, etc.). Baseline indicators are characterized at the 6th field hydrologic unit scale. The baseline is intended to be dynamic and track either positive or negative influences on watershed habitats and processes. Baselines are intended to be standardized assessments of aquatic habitat conditions for bull trout across individual Forests that proposed actions can then reference back to in the consultation process.
Best Management Practices (BMPs)	Practice or set of practices that enable a planned activity to occur while still protecting the resource managed, normally implemented and applied during the activity rather than after the activity.
Channel Type	Broad-level descriptions of major stream types based on geomorphic characteristics; from Rosgen's Stream Classification System: A - Steep, entrenched, cascading, step pool streams. High energy/debris transport associated with depositional soils. Very stable if bedrock, boulder or cobble dominated channel. B - Moderately entrenched, moderate gradient, riffle-dominated channel, with infrequently spaced pools. Very stable plan and profile. Stable banks. C - Low gradient, meandering, point-bar, riffle/pool, alluvial channels with broad, well-defined floodplains. D - Braided channel with longitudinal and transverse bars. Very wide channel with eroding banks. E - Low gradient, meandering riffle/pool stream with low width/depth ratio and little deposition. Very efficient and stable. High meander width ratio. F - Entrenched meandering riffle/pool channel on low gradients with high width/depth ratio. G - Entrenched "gully" step/pool and low width-to-depth ratio on moderate gradients.

Core Area (bull trout)

The draft recovery plan for bull trout (USFWS 2002b) identified a bull trout core area as the closest approximation of a biologically functioning unit for bull trout. Core areas require both habitat and bull trout to function, and the number and characteristics of local populations inhabiting a core area provide a relative indication of the core area's likelihood to persist. The draft recovery plan described 121 bull trout core areas across the species range in the five states

Corridors

Avenues along which wide ranging animals can travel, plants can propagate, genetic interchange can occur, populations can move in response to environmental changes and natural disasters, and threatened species can be replenished from other areas.

Critical Habitat

Specific areas within the geographic area occupied by the species on which are found those physical and biological features (1) essential to the conservation of the species, and (2) which may require special management considerations or protection.

Decommission

Demolition, dismantling, removal, obliteration and/or disposal of a deteriorated or otherwise unneeded asset or component, including necessary cleanup work. This action eliminates the deferred maintenance needs for the fixed asset. Portions of an asset or component may remain if they do not cause problems nor require maintenance.

Deferred Maintenance

Maintenance that was not performed when it should have been or when it was scheduled and which, therefore, was put off or delayed for a future period. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased costs to repair, and decrease in asset value. Deferred maintenance needs may be categorized as critical or noncritical at any point in time. Continued deferral of noncritical maintenance will normally result in an increase in critical deferred maintenance. Code compliance (e.g., life safety, ADA, OSHA, environmental, etc.), Forest Plan Direction, Best Management Practices, Biological Evaluations other regulatory or Executive Order compliance requirements, or applicable standards not met on schedule are considered deferred maintenance.

Expectation of Population Response

Estimate of how the local fish population will respond to a given restoration action or set of restoration actions. In part, depends on the degree to which habitat degradation is thought to regulate current population status

Endangered Species

A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range

Fluvial (life history)

A life history strategy of bull trout that utilizes larger rearing habitats such as rivers to increase growth and egg production opportunities before returning to natal spawning grounds. This life history strategy often requires longer migrations by individuals to capitalize on more productive rearing habitats before returning to natal spawning grounds. Fragmentation of riverine habitats by both large and small dams, and road stream crossings, can cumulatively serve to impair and reduce the fluvial life history component of a population.

Fragmentation

A condition in which a continuous area is reduced and divided into smaller sections. Habitat can be fragmented by natural events or development activities.

Functional Significance to Local Population	Importance of a local population to the Core Area, relative to other local populations in the same Core Area.
Habitat Connectivity	The arrangements of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors. The opposite of fragmentation.
Hydrologic Unit (HU)	A hydrologic unit is a drainage area delineated to nest in a multi-level, hierarchical drainage system. Its boundaries are defined by hydrographic and topographic criteria that delineate an area of land upstream from a specific point on a river, stream or similar surface waters. A hydrologic unit can accept surface water directly from upstream drainage areas, and indirectly from associated surface areas such as remnant, non-contributing, and diversions to form a drainage area with single or multiple outlet points. Hydrologic units are only synonymous with classic watersheds when their boundaries include all the source area contributing surface water to a single defined outlet point.
Hydrologic Unit Code (HUC)	The numeric identifier of a specific hydrologic unit consisting of a 2-digit sequence for each specific level within the delineation hierarchy. 4th code refers to the 4th pair of an 8-digit code of a subbasin HU that is generally 450,000 acres in size. 5th code refers to the 5th pair of a 10-digit code of a watershed HU that generally ranges from 40,000 to 250,000 acres in size. 6th code refers to the 6th pair of a 10-digit code of a subwatershed HU that generally ranges from 10,000 to 40,000 acres in size.
Incidental Take	Take of listed fish or wildlife species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by a Federal agency or applicant
Large Woody Debris	Large pieces of relatively stable woody material located within the bankfull channel and appearing to influence bankfull flows. There are categorized as singles, aggregates, or rootwads. Single – A single piece that has a length equal to or greater than 3 meters or two-thirds of the wetted stream width and 10 cm in diameter one-third of the way from the base. Aggregate – Two or more clumped pieces, each of which qualifies as a single piece. Rootwad – Root mass or boles attached to a log less than 3 meters in length.
Local Population (bull trout)	Groups of bull trout that spawn in various tributaries are generally characterized by relatively small amounts of genetic diversity within a tributary, but high levels of genetic divergence between tributaries. This suggests that many bull trout have a high fidelity to specific streams and can be characterized as local populations. For the purposes of this conservation strategy the geophysical scale generally refers to the spawning and rearing habitat that a local population occupies
Maximum Weekly Maximum Temperature (MWMT)	The mean of daily maximum water temperatures measured over the annual warmest consecutive seven day period occurring during a given year
Mitigation	Measures implemented to minimize, reduce, rectify, avoid, eliminate, and/or compensate the potential impacts to resources identified in the effects analysis.

Meta-population	A meta-population is a collection of local populations that periodically interact to hedge against extinction through the migratory life stage. Self-sustaining populations (strongholds) act as source populations for supporting weaker populations or recolonizing extirpated populations or new habitats.
Off-highway Vehicle (OHV)	Any motor vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain.
Proposed Baseline Condition	The proposed state of a given baseline indicator (temperature, barriers, pools, sediment) from its current baseline condition via restoration or conservation action. In some cases there may be no proposed or feasible change, i.e., functioning at risk (FAR) to FAR, while in other cases it may be possible via active restoration improve a baseline indicator from and existing condition of functioning at unacceptable risk (FUR) to functioning appropriately (FA).
Resident (life history)	A life history strategy of bull trout that minimizes movements between spawning and rearing habitats. Individuals often a carry out their entire life cycle in or near their natal stream. Streams are often small in size and limited in production capacity, however, fish are not exposed to risks associated with longer migrations to more productive habitats that migratory (fluvial and adfluvial) are exposed.
Restoration- General	Restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed. It is an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability.
Strategy- Active Restoration	Management intervention systematically focused on improving a degraded habitat condition or dysfunctional watershed processes such that the improved habitat can be maintained via restored processes and removal of impairments. Often requires greater focus of resources and effort across watershed scales.
Strategy- Passive Restoration	A restoration process more typified by simply reducing or eliminating the sources of degradation that may allow recovery over time. For instance, INFISH standards and guidelines are intended to reduce new or ongoing management pressures to riparian areas that can degrade or maintain a de-graded to riparian and stream conditions
Strategy- Conserve	A strategy intended to maintain one or more existing local populations, habitats and processes that, compared to other areas in the Core, are functioning well enough to provide a foundation from which other populations can anchor to and reconnect with as active improvements occur in other Core Area locations.
Riparian Conservation Areas (RCAs)	Portions of watersheds where riparian-dependent resources receive primary emphasis and management activities are subject to specific guidelines.
Road Decommissioning	Activities that result in the stabilization and restoration of unneeded roads to a more natural state.
Road Maintenance	The ongoing upkeep of a road necessary to retain or restore the road in accordance with its road management objective.

Road Reconstruction	Activity that results in improvement or realignment of an existing authorized road defined as follows: Road improvement - Activity that results in an increase of an existing road's traffic service level, expansion of its capacity, or a change in its original design function. Road realignment - Activity that results in a new location of an existing road or portions of an existing road, and treatment of the old roadway
Sensitive Species	Those plant and animal species in which a population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, or by significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.
Stochasticity	A stochastic process is one whose behavior is non-deterministic, in that a system's subsequent state is determined both by the process's predictable actions and by a random element. Environmental stochastic events can include events such as wildfire, landslides, flash floods, etc.
Timeliness of Opportunity	An estimate of degree of readiness of a project or suite of projects either through funding or partner availability, environmental compliance completeness, or a combination of all the above.
Threatened Species	Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and which the appropriate Secretary has designated as a threatened species.
303d-listed Waterbodies	A stream or other waterbody that is listed by the State as being "water quality impaired" by a pollutant in their current 303(d) list or 303(d)/305(b) Integrated Report.
Timeframe to change baseline	The estimated time in which actions needed to change the baseline should occur considering a combination of current population and habitat condition and trajectory.
Total Maximum Daily Load (TMDL)	An estimate of the total quantity of pollutants (from all sources - point, nonpoint, and natural) that may be allowed into waters without exceeding applicable water quality standards.
Unauthorized Road or Trail	A road or trail that is not a forest road or trail or a temporary road or trail and that is not included in a forest transportation atlas.
Watershed	A geographic area of land, water, and biota within the confines of a drainage divide. The total area above a given point of a water body that contributes flow to that point.

Watershed-Scale Aquatics Restoration

Restoration, based on problem-identification through watershed analyses, where the emphasis is on treating the entire catchment area rather than focusing on just a local project or site. The intent is to establish a trend, at the watershed scale, toward a desired condition of functions and processes, or toward Watershed Condition Class I within an acceptable range of variability.

Site-scale restoration is then used to address or treat specific elements of watershed-scale problems. Watershed problems can be defined as anything that interferes with the normal functions and processes that operate in a watershed, from runoff volume and timing of stream flows to slope stability, to canopy conditions in the riparian areas and water quality.

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Appendix 1. Main Components of the Conservation Strategy

A standard tabular and textual format was developed for the conservation strategy assessment. The format is intended to facilitate analysis, interpretation, reporting consistency, and reader access. The BTCS follows biological (core areas and local populations) and spatial/habitat (6^{th} field HUCs) organizations that repeat throughout the document. Each core area receives introduction that discusses recent local population trends, as well as, posited historic population capacity and key historical factors that may have influenced reduction or increase in current populations (see status and distribution of populations section below). The BTCS format is presented as a series of tables that 1) characterize a local population and 2) characterize habitat conditions by 6^{th} field HUC or HUCs that support the local population. We use the habitat status of four key habitat indicators to describe current habitat condition, or “baseline”(temperature, sediment, pools and barriers, all of which are discussed in the following section “Bull Trout Background and Ecology “)A narrative is provided with ratings to describe the “baseline” habitat condition call. If an indicator is proposed for change using site specific information, the narrative discusses the rationale for the modification. The narrative also addresses key habitat or biological conditions that the baseline habitat indicators do not address. For instance, the narrative sometimes includes information on limiting factors when they are present: the influence of water diversion and dewatering, migratory corridor interruption created by impassable dams, predation effects, and interactions with aquatic invasive species. The narrative also provides context for key actions thought important to restoration of physical habitat locally on FS lands, or those physical and biological conditions and needs outside the direct purview of the FS. A more complete description of habitat baselines is addressed later in this introduction.

Following, is an example of the conservation strategy tables. First is a table (green table) that describes attributes of the local population. The second table (orange table) provides information on the importance of a given 6^{th} field HUC in providing bull trout habitat, and key habitat baseline conditions and estimated costs for improving these conditions.

Core Area: “Name of core area here”

Local Population: “Name of local population here”

(Local Population Graph Here, if 5 years of data are available)

Relative Importance of Population to Core Area (H, M, L related to demographic support such as strength, connectivity and location of the population***):***

# Spawning Adults	Short-Term (5yr) Pop Trend	Life History, Connectivity	# Known Spawn Reaches	Nonnative Species, threat

Significance of geographical location	Vulnerability to Climate Change	Unique Population Attributes

Driving Factors Determining Bull Trout Population:

Following are local population table attribute descriptions that are will be used in these tables throughout the document

Number Spawning Adults:
1-50
50-250
250-500
500-1000
1000+

Short-Term Pop Trend:
Severe Decline
Very Rapid Decline
Decline
Unknown
Stable
Increasing
Data based primarily on spawning ground surveys for migratory fish nests ("redds") or trends in numbers of juveniles.

Life History, Connectivity:
Resident or Migratory form dominant,
Fragmented or Connected (are the spawning and rearing habitats connected to larger downstream habitats that serve as migratory pathways and overwintering habitat to allow for the migratory life history component to be expressed, and for potential gene flow among local populations either within the core area or among core areas).

 # Known Spawning Areas:
areas with more than one redd most years- primarily focused on migratory fish

Nonnative Species, Threat:
EB= brook trout, LT= lake trout, BRN= brown trout, RBT= rainbow trout,
Risk level of High, Medium, Low based on data and professional judgment

Significance of Geographical Location:
High, Medium, Low, based on nearness to other pops and spread throughout Core Area

Vulnerability to Climate Change:
High, Medium, Low, a qualitative assessment based on expected contribution under warmer, drier climate with expected greater extremes in peak runoff and potential earlier timing of runoff. Also considers potential changes from a snow dominated to an intermediate or rain dominated hydrograph. This element of the Conservation Strategy is expected to be improved as units or the Region perform more detailed climate-related vulnerability

assessments using modeled climate output for air and stream temperature projections coupled with projections in changes to the hydrograph.

Unique Population Attributes:

Does the population provide unique components (life history, genetics, etc.) not found elsewhere in the Core Area? (Y/N). If yes, this is described.

Driving Factors Determining Bull Trout Population:

Narrative is provided

Individual HUC 6 (w/in Local Population). The information that populates the HUC 6 tables (represented by example here) is based partly on the information in the above local population tables, information from bull trout baselines (described later), local knowledge, experience and professional judgment).

HUC6 (name and #):							
Strategy (Active Restoration, Passive Restoration, Conserve):							
% Forest Service Ownership in HUC:							
Relative Contribution of Habitat in Limiting Local Population:							
Functional Significance to Local Pop: (H, M, L)							
Indicator	*Current Baseline Condition	*Proposed Baseline Condition	Timeframe to change baseline	Restoration Priority (1,2,3)	Estimated Cost to Complete	Expectation of population response (H,M,L)	Timeliness of opps (H,M,L)
Temperature	FA, FAR or FUR	FA, FAR or FUR					
Barriers	FA, FAR or FUR	FA, FAR or FUR					
Pools	FA, FAR or FUR	FA, FAR or FUR					
Sediment	FA, FAR or FUR	FA, FAR or FUR					

* see development of the baseline discussion in the BTCS introduction for clarification on the definition of FA, FAR, and FUR.

This HUC6 table can is repeated if a local population is spread across more than one 6th field HUC. Following are table attribute descriptions as appropriate.

Strategy: **Active restoration** is management intervention systematically focused on improving a degraded habitat condition or dysfunctional watershed processes such that the improved habitat can be maintained via restored processes and removal of impairments; **Passive restoration** is restoration process more typified by simply reducing or eliminating the sources of degradation that may allow recovery over time. For instance, INFISH standards and guidelines are intended to reduce new or ongoing management pressures to riparian areas that can degrade or maintain a de-graded to riparian and stream conditions; **Conservation** is a strategy intended to maintain one or more existing local populations, habitats and processes that, compared to other areas in the core, are functioning well enough to provide a foundation from which other populations can anchor to and reconnect with as active improvements occur in other Core Area locations.

Relative Contribution of Habitat in Limiting the Population: The importance of local limitations in physical stream habitat condition (i.e., substrate, stream temperature, passage, pools, etc.) in affecting the local population status, thus providing improvement opportunities where the Forest Service has at least partial control.

Functional Significance to Local Population: The importance of this 6^{th} field HUC in providing spawning and rearing habitat for bull trout within the local population. Values include: high, medium, low.

Indicators and Baselines: Four key habitat indicators (temperature, barriers, pools, and sediment) are presented for the existing condition or baseline, and projected baseline changes over time expected to result from identified specific or generic suite of actions. Key habitat Indicators can have one of three designations- FA for functioning appropriately, FAR- for functioning at risk, and FUR- for functioning at unacceptable risk. The default condition for FA, FAR, and FUR are designated using a GIS model based on a series of rule sets (see below “Model Development and Establishing the Environmental Baseline” section.

Timeframe to change baseline: Based on identified specific actions or general suite of actions, estimated time it would take to IMPLEMENT the action anticipated to lead to an eventual change on the ground. These time frames were generated using professional judgment based on risk and current population trends. They represent projections of when local populations might be lost if current trends continue and/or risks are not abated. These timeframes reflect a sense of urgency for a given local population based on population trends, the potential influence of habitat on the population, and the overall importance of that population to the Core Area. The timeframes are not absolute and do not set management direction but are expected to help establish priorities for action.

Restoration Priority (1, 2, and 3): Based on if actions implemented would likely lead to a **Population Response** (professional judgment), but also considering the **Estimated Cost to Complete** ($1,000) and **Timeliness of Opportunities** (includes feasibility). One is the highest priority.

Expectation of a population response (H, M, L): Not all restoration activities are expected to have the same level of anticipated population response. Where a remedy is thought remove a key limiting factor or if it addresses a large direct effect on a population the likely hood of a population response is great. Similarly where a remedy could in total lead to improved habitat, it by itself will not likely lead to an expected population response without a concert of other restoration actions.

Timeliness of Opportunity (H, M, L): includes feasibility, partners, available funding, completed environmental compliance documentation.

All of the above population, habitat and restoration need and anticipated bull trout benefits information is used to evaluate the importance of actions within a local population, and aggregated up by core area to give a regional look at where some of the most important bull trout restoration opportunities lie.

Appendix 2. Summary of Western Montana Bull Trout Baseline

Summary of Western Montana Bull Trout Baseline Update for Inclusion and Use in Conjunction with the Western Montana Bull Trout Conservation Strategy

Background on Watershed-level Baselines

In 1998, bull trout were listed as a threatened species under the federal Endangered Species Act (ESA), triggering the Forest Service to review activities for effects to the species. This occurred through the Level 1 Team process, codified in an August 2000 Memorandum of Understanding and the Land Resource Management Plan, Biological Opinion (USDI Fish and Wildlife Service 1998). In this process, the Forest Service (FS) and the US Fish and Wildlife Service (USFWS) established *A Framework to Assist In Making Endangered Species Act Determinations Of Effect For Individual Or Grouped Actions At The Bull Trout Subpopulation Watershed Scale* that provides guidance for a streamlined process of interagency cooperation to meet ESA requirements (USDI Fish and Wildlife Service 1998). This Framework was designed to facilitate and standardize determinations of effects, consultations, and permits. The process has been instrumental in providing shortened consultation time frames at the project level.

The Framework also helped guide development of environmental baselines in Western Montana for both Bureau of Land Management units (BLM- Missoula and Butte Districts) and Forest Service units (Beaverhead Deerlodge, Bitterroot, Flathead, Helena, Kootenai and Flathead Forests) that were to be used in Section 7 Consultation. The baselines were intended as standardized assessments of aquatic habitat conditions for bull trout across individual BLM and FS units. This effort was also intended to allow the USFWS to assess project effects at larger scales- a requirement under ESA for reaching a no jeopardy determination in a timely fashion. Environmental baselines are analyzed at the 6^{th} field watershed (i.e., USGS hydrologic unit code (HUC)) and include information for each of the primary bull trout population and habitat indicators (USDI Fish and Wildlife Service 1998). However, not every BLM and FS unit within the Western Montana classified habitat indicators the same way. For instance, some units relied much more extensively on GIS and standard rule sets and outputs to classify 6^{th} field watershed habitat indicators. Others relied much more extensively on field data to characterize conditions based on condition and trend. Updates were sporadic and inconsistent among the units.

Purpose and Utility of Baseline Update

While BLM and FS units have been individually updating baseline information at the project level on a case-by-case basis, the environmental baselines have not been comprehensively updated since their initial creation in 2000. Baseline environmental conditions have likely changed in many watersheds over time span due to activities such as wildfires, watershed restoration activities, vegetation management, and other natural events. In October 2006, the Level 1 team initiated a programmatic update of the baselines across the western Montana Region to incorporate updated information and ensure the current environmental conditions are accurately described. An additional key objective of this baseline update is to further standardize and automate the analysis process, to improve consistency across Forest boundaries, improve the ability to incrementally update and query and report baseline conditions, including at multiple spatial scales.

Readily available, accessible, and updatable baselines can be used by administrative units for several key functions. First, the process will be instrumental in tracking bull trout habitat at the 6th code HUC watershed scale and anticipated changes resulting from management or natural events such as large-scale fire. The process and baseline "tool", or spreadsheet **(Electronic Spreadsheet attachments 1 (Beaverhead_Deerlodge), 2 (Bitterroot), 3 (Flathead), 4 (Helena), 5 (Kootenai), and 6** (**Lolo))** and associated rule-sets, will be valuable at the project scale for alternative development and evaluating "what-ifs" such as manipulating total or riparian road densities to see how baseline indicators might change in response to a proposed treatment. This logically carries over to project alternative analysis, another very beneficial application of the tool. Also, the Service will have a tool that they can use to better track changes in species' habitat condition at multiple scales such as the Core or Recovery units, and one that will help as they evaluate projects during Section 7 consultation and issue incidental take permits.

These updated, and updatable, baselines address Western Montana lands administered by the Forest Service (Beaverhead-Deerlodge, Bitterroot, Flathead, Helena, Kootenai, and the Lolo National Forests) and the BLM (Missoula and Butte Field Offices) can also contribute substantially to developing strategic watershed and bull trout conservation strategies that help identify activities on BLM and FS land most likely to improve conditions in important 6th-field watersheds that support and/or strongly influence local bull trout populations. Finally, for the Forest Service, this information can help inform the condition calls for habitat indicator and attributes for the currently developing Watershed Condition Framework and Classification- a national effort used to classify watershed for aquatic and terrestrial conditions, and also done at the 6th field HUC scale.

Limitations

A limitation of the updated baselines is that they do not fully capture and integrate environmental conditions on non-BLM and FS administered lands within mixed-jurisdictional HUCs. This is a greater concern in HUCs that are dominated by Non-FS ownership because the magnitude of FS influence typically is reduced. Therefore, in watersheds that are not predominantly managed by the BLM or FS, the baseline conditions described through this analysis should only be attributed to the Federally-managed parcels and with consideration of other non-Forest activities and conditions. These non-BLM/FS conditions have been characterized by the Natural Resource Conservation Service (NRCS) using a similar baseline protocol (with modifications specific to non-federal OR better described as private farm, ranch and non-industrial timber lands) that characterizes habitat baseline conditions in 6th field HUCs with 50% or greater non-Federal ownership (available on request); approximately 15 additional sub-watersheds with <50% private lands were included as requested by the respective Montana Fish Wildlife and Parks or Tribal fisheries biologists. A melding of the two baseline pieces in certain areas of large mixed ownership (e.g., > 50% non-federal ownership) will provide information to help better characterize bull trout habitat conditions across ownerships within BLM and Forest boundaries and in assessing project level baseline conditions and affects.

Another limitation is that the habitat indicators (see description below) appear to fit some landscapes better than others, but recognizing that no model of watershed condition or risk is going to match all conditions on the ground. This appears to be the case especially on the Flathead and Kootenai Forest Units, where geologic processes have led to different contemporaneous landscapes that may not be as directly influenced by road, road location, and erosional processes that can affect fish habitat. In these cases, the units will use information from field data used to characterize stream channel and floodplain conditions (past, present or ongoing) and modify a given indicator state produced by the baseline tool (see description of this process below). This will typically be done as projects in applicable watersheds are being proposed and analyzed for effects.

Overview of the Baseline Update Process

Consistent field data that adequately describe indicator condition or state across most 6th field HUC watersheds is lacking for most Forests in western Montana. Therefore, a suite of GIS data layers were selected as proxies. Standard sets of GIS data that were available for all Forests and relatively consistent among Forests were identified; similarly NRCS used only readily accessible and standard USDA or state of Montana datasets. GIS-based rule-sets were then developed by the Western Montana Level 1 team in an iterative process relying on surrogate data-derived indices to represent the habitat components of the Framework indicators. These are then combined to produce watershed level baseline condition determinations of Functioning Appropriately, Functioning at Risk, and Functioning at Unacceptable Risk (FA, FAR, FUR, respectively) for each 6th field watershed by BLM or Forest.

Eight of 19 habitat indicators were derived and classified directly from GIS-based data sources (**Attachment 1**). These indicators include: increased drainage network, disturbance history, road density and location, riparian conservation area, barriers, large woody debris, chemical contamination, and refugia (**see Attachment 1 indictor classification into FA, FAR and FUR**). The remaining 11 indicators (peak and base flows, disturbance regime, temperature, stream bank stability, width to depth ratio, sediment, embeddedness, floodplain connectivity, off channel habitat, pool quantity and quality, large pools) are derived by using combinations of the eight GIS-derived indicators mentioned above (**Attachment 2**). The condition determination (FA, FAR, and FUR) for these indicator-derived-indicators are determined by the combination of the condition determination for the original GIS –derived-indicator, with weighting to emphasize certain indicators (**Attachment 3**). A final effects determination for each subwatershed is made by integrating the calls for four indicators that are of primary importance to bull trout: barriers, temperature, sediment, and pool quality and quantity (**Attachment 4**). All of this is automated in spreadsheets originally populated with the GIS data, making updating and modifications quicker, more universal, and more consistent.

The best available information including quantitative, qualitative or professional judgment was used to support classification (e.g., FA, FAR, or FUR) of all GIS derived indicators (Appendix 1). For example, we know that roads within riparian areas and near streams have a reasonable likelihood of delivering sediment to streams; and that more miles of road within the RCA tend to result in more sediment delivery. Recognizing this relationship, thresholds were developed to trigger certain calls, based on the best understanding of when conditions begin to moderately or substantially influence sediment delivery. For example it was decided if 5% to 15% of a stream's length has a road within 300 feet there is a reasonable likelihood of moderate impacts that could contribute to the sediment indicator becoming impaired to a level of "Functioning at Risk" (FAR). If greater than 15% of its length is within 300 feet of a road, a greater probability of detrimental habitat effects related to bull trout habitat requirements exist, and thus a Functioning at Unacceptable Risk" (FUR) call.

Overriding GIS Data

In developing a GIS-based analysis process, the Level 1 team recognized that there may be locally derived data that better characterize the watershed baseline conditions than regionally derived broad-scale datasets. Therefore, the baseline update process includes some allowance to adjust the GIS-derived indicators to incorporate Forest-level data. In general, the baseline data should not be changed unless there is a body of evidence suggesting that the GIS based indicator is not representative of watershed conditions and risks at the 6^{th} field HUC scale. Thus, to change a baseline indicator, data should be both spatially and temporally robust enough to justify a baseline call override. Data that may be available to justify an override will likely come from one of two sources.

First is PACFISH INFISH Biological Opinion (PIBO) effectiveness monitoring data. These data are becoming one of the most robust and consistent sets of data for stream channel condition, water temperature and biological indicators developed within the Interior Columbia Basin portion of our region. PIBO sites have been randomly located with the intention of integrating upstream conditions and processes, at roughly the 6^{th} field HUC scale, but typically smaller. The limitation of the PIBO data is that it is not broadly enough distributed to examine conditions in every Forest 6^{th} field HUC (roughly 1/3 of all 6^{th} field HUCs with BLM or FS ownership >50% of the HUC). Nor does it necessarily capture spatial variability of conditions within a watershed. PIBO sites are either visited every 5 years or in the case of Sentinel sites ever year. This will begin to help characterize temporal aspects of stream channel condition. A biologist should not simply use PIBO data to override a Baseline call unless the biologist has some additional qualitative and/or quantitative information to indicate it is justified.

Secondly, baseline overrides can be based on Forest-level monitoring data. These data should be temporally and spatially robust enough that they characterize the overall HUC condition for a given indicator or suite of indicator conditions. This could include using proven survey methods similar to PIBO to measure metrics such as pool quantity or quality, fine sediment, stream temperature, wood, fish passage status of a crossing.. Similarly, NRCS baseline overrides can be based on MT FWP or NRCS monitoring data.

The biologist needs to document and track overrides and rationale. At the very least this includes inserting a comment in the baseline spreadsheet at the point of change that indicates an override to either a specific indicator state or integrated call. A comment inserted at the point of change should include: Name of modifier, date modified, and justification for the change. Justification could include PIBO data "plus" other contributing habitat data including other Forest data such as extensive temperature monitoring, or other spatially explicit stream channel survey data and noting the method. **If a change goes from a more negative state to a more positive state, then make the text color of the changed value green. If a change moves to a more negative state, make the text color of the changed value red.** Once a modification to baseline state is made this will carry over from year to year automatically, as well as the justification. However, if one ever wants to revert back to the original call, all one needs to do is copy a cell above or below the modified call and paste that into the modified cell. The original GIS data and call will be reverted back to is previously modified cell.

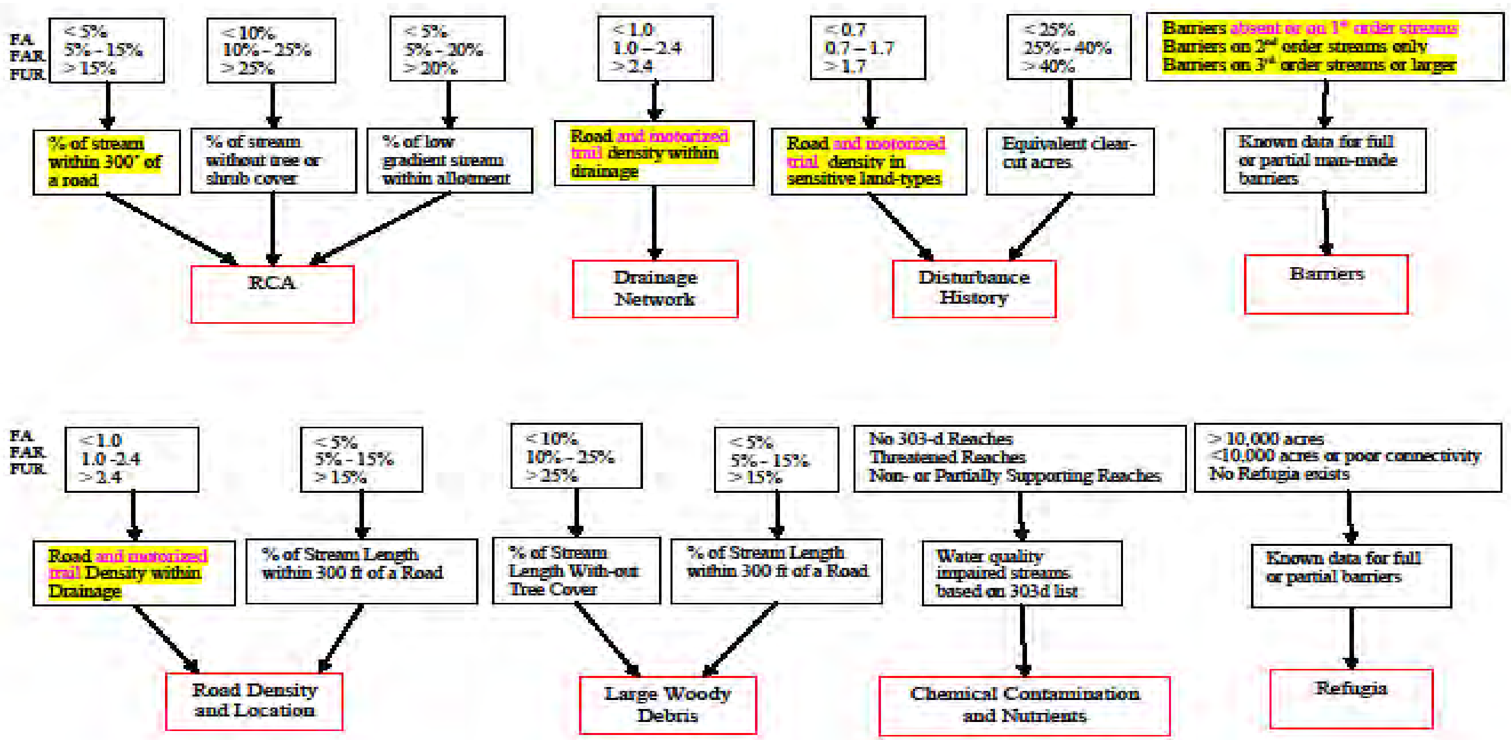
Annual Updates of the Baselines

Annual or reasonable periodic updates of the baseline are anticipated for all Forests within the Western Montana Level 1 Team purview. This will be facilitated by the Regional Office of the FS with advance data calls and GIS support. Also, if science or other information indicates that a given indicator threshold needs to be modified, this can be achieved quickly and universally via modification of the baseline database.

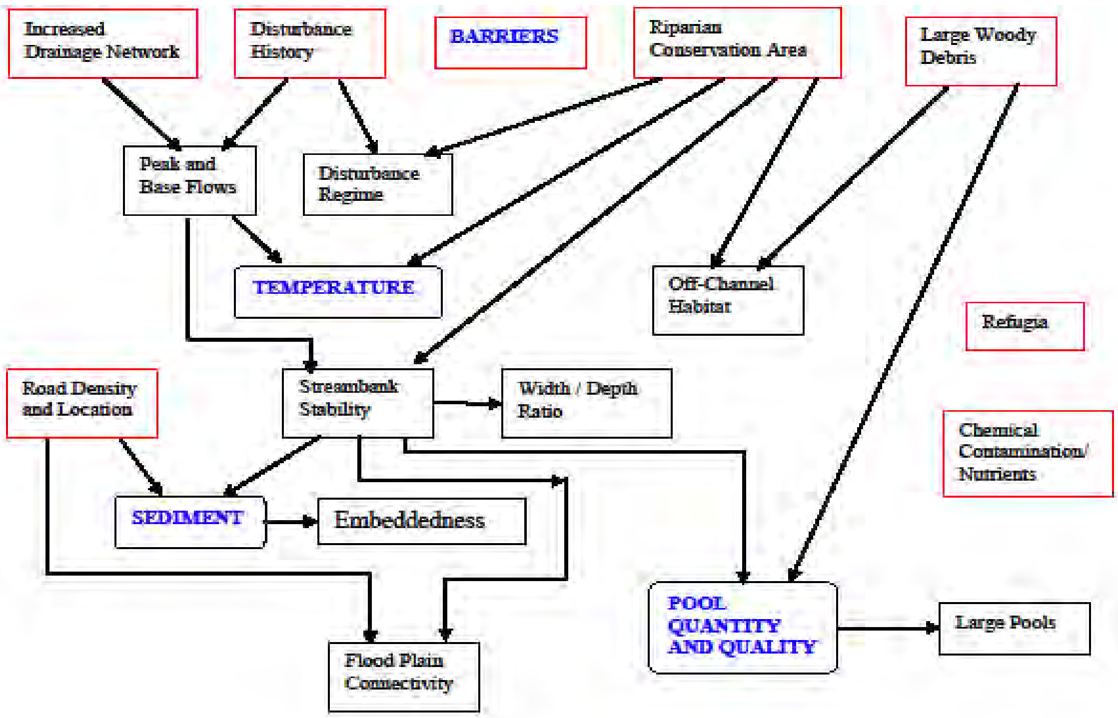
The Regional Office (RO) of the FS, in conjunction with the FWS, will be the stewards of the current baselines and subsequent updates. However, as units use the baselines in project analysis and make overrides, they need to maintain these copies and will submit these changes to the RO and FWS at the end of a year. Especially after the first year of use (end of 2011), the Western Montana Level 1 team should convene and review each unit's modified baseline (that is the baseline with overrides) and compare rational, outcome, and extent of override use. Once overrides are adopted or approved by the Level 1 team, these baselines then become the baseline of record until future formal updates or additional annual overridden data are adopted.

Appendix 3. Attachments

Attachment 1. Components and Threshold Values for GIS-Derived Habitat Indicators



Attachment 2. Components of Indicator-Derived Habitat Indicators



Attachment 3. Threshold rule-sets that classify condition for indicator-derived indicators

GIS Derived Indicators

Indicator Derived Indicators

RCA

Portion of Total Perennial Stream Length w/in 300' of Roads	Portion of Perennial Streams under Other Cover-type	Portion of Total 0 - 2% Gradient Perennial Stream Length w/in Active Allotment	Lookup Code	RCA Rating
BS	BM	BR		CC
FA	FA	FA	FAFAFA	FA
FA	FA	FAR	FAFAFAR	FA
FA	FA	FUR	FAFAFUR	FAR
FA	FAR	FA	FAFARFA	FA
FA	FAR	FAR	FAFARFAR	FAR

Peak / Base Flows

Portion of Watershed in ECA	Drainage Network	Lookup Code	Peak/Base Flows Rating
BH	CD		CR
FA	FA	FAFA	FA
FA	FAR	FAFAR	FAR
FA	FUR	FAFUR	FUR
FAR	FA	FARFA	FAR
FAR	FAR	FARFAR	FAR
FAR	FUR	FARFUR	FUR
FUR	FA	FURFA	FUR
FUR	FAR	FURFAR	FUR
FUR	FUR	FURFUR	FUR

FA	FAR	FUR	FAFARFUR	FUR
FA	FUR	FA	FAFURFA	FAR
FA	FUR	FAR	FAFURFAR	FAR
FA	FUR	FUR	FAFURFUR	FUR
FAR	FA	FA	FARFAFA	FAR
FAR	FA	FAR	FARFAFAR	FAR
FAR	FA	FUR	FARFAFUR	FAR
FAR	FAR	FA	FARFARFA	FAR
FAR	FAR	FAR	FARFARFAR	FAR
FAR	FAR	FUR	FARFARFUR	FUR
FAR	FUR	FA	FARFURFA	FAR
FAR	FUR	FAR	FARFURFAR	FAR
FAR	FUR	FUR	FARFURFUR	FUR
FUR	FA	FA	FURFAFA	FAR
FUR	FA	FAR	FURFAFAR	FAR
FUR	FA	FUR	FURFAFUR	FUR
FUR	FAR	FA	FURFARFA	FAR
FUR	FAR	FAR	FURFARFAR	FUR
FUR	FAR	FUR	FURFARFUR	FUR
FUR	FUR	FA	FURFURFA	FUR
FUR	FUR	FAR	FURFURFAR	FUR

Sediment AND Embeddedness

Streambank Stability	Road Density and Location	Lookup Code	Sediment Rating	Embeddedness Rating
CP	CF		CJ	CK
FA	FA	FAFA	FA	FA
FA	FAR	FAFAR	FA	FA
FA	FUR	FAFUR	FAR	FAR
FAR	FA	FARFA	FAR	FAR
FAR	FAR	FARFAR	FAR	FAR
FAR	FUR	FARFUR	FUR	FUR
FUR	FA	FURFA	FUR	FUR
FUR	FAR	FURFAR	FUR	FUR
FUR	FUR	FURFUR	FUR	FUR

Streambank Stability

Peak / Base Flows	RCA	Lookup Code	Streambank Stability	Width / Depth Ratio

FUR	FUR	FUR	FURFURFUR	FUR

Drainage Network

Road Density Rating	Lookup Code	Drainage Network Code
BV		CD
FA	FA	FA
FAR	FAR	FAR
FUR	FUR	FUR

Disturbance History

Portion of Watershed in ECA	Roads in Sensitive Land-type Density	Lookup Code	Disturbance History Rating
BH	BI		CE

CR	CC		CP	CQ
FA	FA	FAFA	FA	FA
FA	FAR	FAFAR	FA	FA
FA	FUR	FAFUR	FAR	FAR
FAR	FA	FARFA	FAR	FAR
FAR	FAR	FARFAR	FAR	FAR
FAR	FUR	FARFUR	FUR	FUR
FUR	FA	FURFA	FUR	FUR
FUR	FAR	FURFAR	FUR	FUR
FUR	FUR	FURFUR	FUR	FUR

Temperature

RCA	Peak / Base Flows	Lookup Code	Temperature
CC	CR		CL
FA	FA	FAFA	FA
FA	FAR	FAFAR	FA

FA	FA	FAFA	FA	FA	FUR	FAFUR	FAR
FA	FAR	FAFAR	FAR	FAR	FA	FARFA	FAR
FA	FUR	FAFUR	FAR	FAR	FAR	FARFAR	FAR
FAR	FA	FARFA	FAR	FAR	FUR	FARFUR	FUR
FAR	FAR	FARFAR	FAR	FUR	FA	FURFA	FUR
FAR	FUR	FARFUR	FUR	FUR	FAR	FURFAR	FUR
FUR	FA	FURFA	FUR	FUR	FUR	FURFUR	FUR
FUR	FAR	FURFAR	FUR				
FUR	FUR	FURFUR	FUR				

Road Density / Location

Portion of Total Perennial Stream Length w/in 300' of Roads	Road Density Rating	Lookup Code	Road Density / Location Rating

Off Channel Habitat

RCA	Large Woody Debris	Lookup Code	Off Channel Habitat
CC	CH		CL
FA	FA	FAFA	FA
FA	FAR	FAFAR	FAR
FA	FUR	FAFUR	**

BS	BV		CF
FA	FA	FAFA	FA
FA	FAR	FAFAR	FA
FA	FUR	FAFUR	FAR
FAR	FA	FARFA	FAR
FAR	FAR	FARFAR	FAR
FAR	FUR	FARFUR	FUR
FUR	FA	FURFA	FUR
FUR	FAR	FURFAR	FUR
FUR	FUR	FURFUR	FUR

FAR	FA	FARFA	FAR
FAR	FAR	FARFAR	FAR
FAR	FUR	FARFUR	FUR
FUR	FA	FURFA	**
FUR	FAR	FURFAR	FUR
FUR	FUR	FURFUR	FUR

Barriers

Barriers by Stream Order Rating	Lookup Code	Barriers
BZ		CG
FA	FA	FA
FAR	FAR	FAR

Disturbance Regime

RCA	Disturbance History	Lookup Code	Disturbance Regime Rating
CC	CE		CN
FA	FA	FAFA	FA
FA	FAR	FAFAR	FAR
FA	FUR	FAFUR	FAR
FAR	FA	FARFA	FAR
FAR	FAR	FARFAR	FAR
FAR	FUR	FARFUR	FUR

	FUR	FUR	FUR

Large Woody Debris

Portion of Perennial Streams under Other Cover Type	Portion of Total Perennial Stream Length w/in 300' of Roads	Lookup Code	Large Woody Debris Rating
BM	BS		CH
FA	FA	FAFA	FA
FA	FAR	FAFAR	FA
FA	FUR	FAFUR	FAR
FAR	FA	FARFA	FAR
FAR	FAR	FARFAR	FAR
FAR	FUR	FARFUR	FUR
FUR	FA	FURFA	FUR
FUR	FAR	FURFAR	FUR
FUR	FUR	FURFUR	FUR

FUR	FA	FURFA	FAR
FUR	FAR	FURFAR	FUR
FUR	FUR	FURFUR	FUR

Flood Plain Connectivity

Portion of Total Perennial Stream Length w/in 300' of Roads	Stream bank Stability	Lookup Code	Flood Plain Connectivity
BS	CP		CO
FA	FA	FAFA	FA
FA	FAR	FAFAR	FAR
FA	FUR	FAFUR	FUR
FAR	FA	FARFA	FAR
FAR	FAR	FARFAR	FAR
FAR	FUR	FARFUR	FUR

FUR	FA	FURFA	FUR
FUR	FAR	FURFAR	FUR
FUR	FUR	FURFUR	FUR

Pool Frequency / Quality AND Large Pools

Large Woody Debris	Streambank Stability	Lookup Code	Pool Frequency / Quality	Large Pools
CH	CP		CS	CT
FA	FA	FAFA	FA	FA
FA	FAR	FAFAR	FA	FA
FA	FUR	FAFUR	FAR	FAR
FAR	FA	FARFA	FAR	FAR
FAR	FAR	FARFAR	FAR	FAR
FAR	FUR	FARFUR	FAR	FAR
FUR	FA	FURFA	FAR	FAR
FUR	FAR	FURFAR	FUR	FUR
FUR	FUR	FURFUR	FUR	FUR

Attachment 4. Threshold rulesets that produce an integrated condition determination using four key indicators of salmonid habitat condition

INTEGRATED Call

Barriers	Temperature	Sediment	Pool Frequency and Quality	Lookup Code	INTEGRATED 6th Level HUC Rating
CG	CL	CJ	CS		CU
FA	FA	FA	FA	FAFAFAFA	FA
FA	FA	FA	FAR	FAFAFAFAR	FA
FA	FA	FA	FUR	FAFAFAFUR	FAR
FA	FA	FAR	FA	FAFAFARFA	FAR
FA	FA	FAR	FAR	FAFAFARFAR	FAR
FA	FA	FAR	FUR	FAFAFARFUR	FAR
FA	FA	FUR	FA	FAFAFURFA	FAR
FA	FA	FUR	FAR	FAFAFURFAR	FUR

INTEGRATED Call

Barriers	Temperature	Sediment	Pool Frequency	Lookup Code	INTEGRATED 6th Level HUC Rating
FA	FA	FUR	FUR	FAFAFURFUR	FUR
FA	FAR	FA	FA	FAFARFAFA	FAR
FA	FAR	FA	FAR	FAFARFAFAR	FAR
FA	FAR	FA	FUR	FAFARFAFUR	FUR
FA	FAR	FAR	FA	FAFARFARFA	FAR
FA	FAR	FAR	FAR	FAFARFARFAR	FAR
FA	FAR	FAR	FUR	FAFARFARFUR	FUR
FA	FAR	FUR	FA	FAFARFURFA	FAR
FA	FAR	FUR	FAR	FAFARFURFAR	FUR
FA	FAR	FUR	FUR	FAFARFURFUR	FUR
FA	FUR	FA	FA	FAFURFAFA	FUR
FA	FUR	FA	FAR	FAFURFAFAR	FUR
FA	FUR	FA	FUR	FAFURFAFUR	FUR
FA	FUR	FAR	FA	FAFURFARFA	FUR
FA	FUR	FAR	FAR	FAFURFARFAR	FUR
FA	FUR	FAR	FUR	FAFURFARFUR	FUR

INTEGRATED Call

Barriers	Temperature	Sediment	Pool Frequency	Lookup Code	INTEGRATED 6th Level HUC Rating
FA	FUR	FUR	FA	FAFURFURFA	FUR
FA	FUR	FUR	FAR	FAFURFURFAR	FUR
FA	FUR	FUR	FUR	FAFURFURFUR	FUR
FAR	FA	FA	FA	FARFAFAFA	FAR
FAR	FA	FA	FAR	FARFAFAFAR	FAR
FAR	FA	FA	FUR	FARFAFAFUR	FAR
FAR	FA	FAR	FA	FARFAFARFA	FAR
FAR	FA	FAR	FAR	FARFAFARFAR	FAR
FAR	FA	FAR	FUR	FARFAFARFUR	FUR
FAR	FA	FUR	FA	FARFAFURFA	FAR
FAR	FA	FUR	FAR	FARFAFURFAR	FUR
FAR	FA	FUR	FUR	FARFAFURFUR	FUR
FAR	FAR	FA	FA	FARFARFAFA	FAR
FAR	FAR	FA	FAR	FARFARFAFAR	FAR
FAR	FAR	FA	FUR	FARFARFAFUR	FUR
FAR	FAR	FAR	FA	FARFARFARFA	FAR

INTEGRATED Call

Barriers	Temperature	Sediment	Pool Frequency	Lookup Code	INTEGRATED 6th Level HUC Rating
FAR	FAR	FAR	FAR	FARFARFARFAR	FAR
FAR	FAR	FAR	FUR	FARFARFARFUR	FUR
FAR	FAR	FUR	FA	FARFARFURFA	FAR
FAR	FAR	FUR	FAR	FARFARFURFAR	FUR
FAR	FAR	FUR	FUR	FARFARFURFUR	FUR
FAR	FUR	FA	FA	FARFURFAFA	FUR
FAR	FUR	FA	FAR	FARFURFAFAR	FUR
FAR	FUR	FA	FUR	FARFURFAFUR	FUR
FAR	FUR	FAR	FA	FARFURFARFA	FUR
FAR	FUR	FAR	FAR	FARFURFARFAR	FUR
FAR	FUR	FAR	FUR	FARFURFARFUR	FUR
FAR	FUR	FUR	FA	FARFURFURFA	FUR
FAR	FUR	FUR	FAR	FARFURFURFAR	FUR
FAR	FUR	FUR	FUR	FARFURFURFUR	FUR
FUR	FA	FA	FA	FURFAFAFA	FUR
FUR	FA	FA	FAR	FURFAFAFAR	FUR

INTEGRATED Call

Barriers	Temperature	Sediment	Pool Frequency	Lookup Code	INTEGRATED 6th Level HUC Rating
FUR	FA	FA	FUR	FURFAFAFUR	FUR
FUR	FA	FAR	FA	FURFAFARFA	FUR
FUR	FA	FAR	FAR	FURFAFARFAR	FUR
FUR	FA	FAR	FUR	FURFAFARFUR	FUR
FUR	FA	FUR	FA	FURFAFURFA	FUR
FUR	FA	FUR	FAR	FURFAFURFAR	FUR
FUR	FA	FUR	FUR	FURFAFURFUR	FUR
FUR	FAR	FA	FA	FURFARFAFA	FUR
FUR	FAR	FA	FAR	FURFARFAFAR	FUR
FUR	FAR	FA	FUR	FURFARFAFUR	FUR
FUR	FAR	FAR	FA	FURFARFARFA	FUR
FUR	FAR	FAR	FAR	FURFARFARFAR	FUR
FUR	FAR	FAR	FUR	FURFARFARFUR	FUR
FUR	FAR	FUR	FA	FURFARFURFA	FUR
FUR	FAR	FUR	FAR	FURFARFURFAR	FUR
FUR	FAR	FUR	FUR	FURFARFURFUR	FUR

INTEGRATED Call

Barriers	Temperature	Sediment	Pool Frequency	Lookup Code	INTEGRATED 6th Level HUC Rating
FUR	FUR	FA	FA	FURFURFAFA	FUR
FUR	FUR	FA	FAR	FURFURFAFAR	FUR
FUR	FUR	FA	FUR	FURFURFAFUR	FUR
FUR	FUR	FAR	FA	FURFURFARFA	FUR
FUR	FUR	FAR	FAR	FURFURFARFAR	FUR
FUR	FUR	FAR	FUR	FURFURFARFUR	FUR
FUR	FUR	FUR	FA	FURFURFURFA	FUR
FUR	FUR	FUR	FAR	FURFURFURFAR	FUR
FUR	FUR	FUR	FUR	FURFURFURFUR	FUR