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Subject: Barton Springs Commercial Thinning. Fisheries Report and Biological Evaluation

To: District Ranger

This report covers existing condition and environmental consequences to aquatic resources from the proposed Barton Springs Commercial Thinning project on the Pintler Ranger District. The proposal is to thin approximately 140 acres in previously harvested ponderosa pine and douglas-fir stands in the Barton Springs area, located in Township 10 North, Range 15 West, Sections 25, 26 and 36. The enclosed Biological Evaluation discusses the potential effects to sensitive and ESA listed aquatic species. These species include westslope cutthroat trout (*Oncorhynchus clarki lewsi*), boreal toad (*Bufo boreas*), northern leopard frog (*Rana pipiens*) and bull trout (*Salvelinus confluentus*).

Project Description

The Pintler Ranger District of the Beaverhead-Deerlodge National Forest is proposing to implement a thinning project on the ridge dividing Harvey and North Fork Lower Willow creeks drainages in the John Long Mountains. All ground disturbing activities will occur in the North Fork Lower Willow Creek 6th field watershed.

This project consists of commercial thinning on 140 acres in previously harvested ponderosa pine and douglas-fir stands in the Barton Springs area, located in Township 10 North, Range 15 West, Sections 25, 26 and 36.

The project has several objectives. These include:

- Reduce risks of insect activity on Ponderosa pine "plus" trees and general seed collection trees.
- Reduce risks of insect activity on Douglas-fir trees.
- Reduce the density of conifers within the forested stand to improve the vigor of the remaining conifers, especially ponderosa pine for cone production and seed collection.
- Reduce overall shading in the area/stand decreasing shading/cooling that enhances bark beetle activity.

In order to achieve these objectives the following activities will occur within the unit.

1. Slashing (cutting down) of small diameter (0.5-6.9 inches diameter breast height) mainly Douglas-fir and lodgepole pine trees within the stand.
2. Cutting of infected/dead trees within the stand. All soft snags, >10" diameter will be left standing except where they pose a safety risk to the operators.

3. Thinning of Douglas-fir, lodgepole and ponderosa pine trees using a ground-based (tractor) logging system. An approximate basal area of 60-80 will be kept on the site were it exists.
4. Hand piling or removal of slashed material followed by burning of hand piles. In some areas, hand piling of existing fine fuels (less than four inches in diameter) may occur.
5. Pile burning would be initiated when the piled fuels are dry and weather conditions provide for safe ignition.
6. Existing roads and skid trails within the stand will be used for harvest activities. No new or temporary roads are proposed. Roads and skid trails will be reseeded upon the conclusion of harvest activities, with the exception of road which appears on the current forest travel plan. This road will be maintained for public use.
7. Leave 5-15 tons per acre of downed woody material – favoring larger pieces where available.

Analysis

The analysis for this project included a review of current literature on sensitive and ESA listed species, review of the Montana Interagency Stream Database (MFISH), a review of amphibian observational records from the FAUNA and the Natural Heritage Program databases, and a review of fish, amphibian and in-stream habitat surveys throughout the North Fork Lower Willow 6th field watershed (NRCS # 170102020403) and Harvey Creek 6th field watershed (NRCS #170102020609) between 1990 and 2002. Fisheries personnel visited the project site with the IDT on April 19, June 4, and July 1, 2004.

Sensitive and ESA Listed Aquatic Species Potentially Affected

There are three sensitive aquatic and one ESA listed fish species that may potentially be affected by this project: westslope cutthroat trout (*Oncorhynchus clarki lewisi*), northern leopard frog (*Rana pipiens*), boreal toad (*Bufo boreas boreas*), and bull trout (*Salvelinus confluentus*).

Westslope Cutthroat Trout

Westslope cutthroat trout, (WCT) inhabit streams on both sides of the continental divide. Its east side distribution is largely in Montana, but includes some headwaters in Wyoming and southern Alberta (Behnke 1992). It occurs in the Missouri basin downstream to about 60 km below Great Falls and in headwaters of the Judith, Milk, and Marias rivers. On the west side the subspecies occurs in the upper Kootenai River, the Clark Fork River, the Spokane River above Spokane Falls, the Coeur d'Alene and the St. Joe Drainages, and the Clearwater and Salmon Rivers.

Westslope cutthroat's distribution and abundance are in decline (Behnke 1992; Liknes and Graham 1988). East of the continental divide, less than 5% of its historic range is occupied within the upper Missouri River drainage in Montana. Extinction risk for 144 known populations, on federally managed lands, was assessed using a 'customized' Bayesian viability assessment procedure (Shepard et al 1997). Probability of persistence was estimated based on subjective evaluation of population survival and reproductive rates as influenced by environmental conditions (Lee and Rieman 1997). Results indicated 90% of the populations

were at a high, to very high risk of extinction over the next 100 years. These findings prompted completion of a statewide conservation strategy, which was completed in 1999.

Habitat abundance and quality is a significant concern for WCT because of increased risk of local and general extinction. Major factors in the decline of WCT include competition and hybridization with non-native salmonids, overfishing, and habitat loss, fragmentation and degradation (Reiman and Apperson 1989; Liknes and Graham 1988).

In general, east of the continental divide, westlope cutthroat trout now reside primarily in small, headwater, mountain streams as the forces leading to their decline described above have most prominently affected larger streams and rivers. West of the continental divide westslope cutthroat trout occupy a larger percentage of their historic habitat. In many locations, migratory populations still exist, providing somewhat greater resiliency to environmental and human caused impacts although these populations are affected by the same factors listed above.

Bull Trout (ESA listed as - *Threatened*)

The following discussion of bull trout habitat requirements in Montana is taked from MBTSG 1998. The majority of migratory bull trout spawning in Montana occurs in a small percentage of the total stream habitat available. Spawning takes place between late August and early November, principally in third and fourth order streams. Spawning adults use low gradient areas (< 2%) of gravel/cobble substrate with water depths between 0.1 and 0.6 m and velocities from 0.1 to 0.6 m/s. Proximity of cover for the adult fish before and during spawning is an important habitat component. Spawning tends to be concentrated in reaches influenced by groundwater where temperature and flow conditions may be more stable. The relationship between groundwater exchange and migratory bull trout spawning requires more investigation. Spawning habitat requirements of resident bull trout are poorly documented.

Successful incubation of bull trout embryos requires water temperatures below 8° C, less than 35-40% of sediments smaller than 6.35 mm in diameter, and high gravel permeability. Eggs are deposited as deep as 25.0 cm below the streambed surface and the incubation period varies depending on water temperature. Spawning adults alter streambed characteristics during redd construction to improve survival of embryos, but conditions in redds often degrade during the incubation period. Mortality of eggs or fry can be caused by scouring during high flows, freezing during low flows, superimposition of redds, or deposition of fine sediments or organic materials. A significant inverse relationship exists between the percentage of fine sediment in the incubation environment and bull trout survival to emergence. Entombment appeared to be the largest mortality factor in incubation studies in the Flathead drainage. Groundwater influence plays a large role in embryo development and survival by mitigating mortality factors.

Rearing habitat requirements for juvenile bull trout include cold summer water temperatures (15° C) provided by sufficient surface and groundwater flows. Warmer temperatures are associated with lower bull trout densities and can increase the risk of invasion by other species that could displace, compete with, or prey on juvenile bull trout. Juvenile bull trout are generally benthic foragers, rarely stray from cover, and they prefer complex forms of cover. High sediment levels and embeddedness can result in decreased rearing densities. Unembedded cobble/rubble substrate is preferred for cover and feeding and also provides invertebrate production. Highly variable streamflow, reduction in large woody debris, bedload movement, and other forms of

channel instability can limit the distribution and abundance of juvenile bull trout. Habitat characteristics that are important for juvenile bull trout of migratory populations are also important for stream resident subadults and adults. However, stream resident adults are more strongly associated with deep pool habitats than are migratory juveniles.

Both migratory and stream-resident bull trout move in response to developmental and seasonal habitat requirements. Migratory individuals can move great distances (up to 250 km) among lakes, rivers, and tributary streams in response to spawning, rearing, and adult habitat needs. Stream-resident bull trout migrate within tributary stream networks for spawning purposes, as well as in response to changes in seasonal habitat requirements and conditions. Open migratory corridors, both within and among tributary streams, larger rivers, and lake systems are critical for maintaining bull trout populations.

Northern Leopard Frog

The northern leopard frog historically ranged from Newfoundland and northern Alberta in the north to the Great Lakes region, the desert Southwest and the Great Basin in the south (Maxell 2000). In Montana they have been documented across the eastern plains and in many of the mountain valleys on both sides of the Continental Divide at elevations up to 6,000 feet. Over the last few decades the leopard frog has undergone declines across much of the western portion of their range (Stebbins and Cohen 1995 as reported in Maxell 2000). Most northern leopard frogs in western Montana became extirpated in the 1970's or early 1980's. The only 2 population centers known to exist in western Montana are near Kalispell and Eureka (Maxell 2000). The northern leopard frog is a sensitive species in all the Region 1 Forests.

Northern leopard frogs tend to use permanent slow-moving or standing water bodies with considerable vegetation, wet sedge-meadows, cattail meadows, springs, and beaver ponds in streams as habitat (Maxell 2000, Reichel and Flath 1995). They usually breed in ponds or lake edges with dense aquatic vegetation (Corkran and Thoms 1996). Adults are usually found in riparian habitats or on prairies near permanent waters (summarized by Maxell 2000). Adults overwinter burrowed into lake or pond bottoms, or beneath substrate in streams or in underground crevices that don't freeze (Maxell 2000).

Boreal Toad

The western toad (*Bufo boreas)*, is currently recognized as two subspecies ranging from the Rocky Mountains to the Pacific Coast and from Baja Mexico to southeast Alaska and the Yukon Territory (Stebbins 1985 as reported in Maxell 2000). One subspecies, the boreal toad, is recognized in Montana.

Within the last 25 years, populations of western toads have undergone population crashes in Colorado, Utah, southeast Wyoming and New Mexico (Loeffler 1998). It is listed as endangered by the state of Colorado but is no longer considered a candidate species for federal listing by the USFWS in the southern Rocky Mountains (Colorado, southeast Wyoming and northern New Mexico) (USFWS 2005).

In the northern Rocky Mountains western toads have also undergone declines. Surveys in the late 1990's revealed they were absent from a number of areas they historically occupied. While they remain widespread across the landscape, they appear to be occupying only 5 to 10 percent or less of the suitable habitat (Maxell 2000). Based on these findings the USFS listed the western toad as sensitive in all of Region 1's National Forests, and initiated a regional inventory in Montana. As a result, a systematic inventory of standing water bodies in 40 randomly chosen 6th level hydrologic unit code (HUC) watersheds was completed, across western Montana, during the summer of 2000. Results indicated they were widely distributed, but extremely rare.

Adult boreal toads (the subspecies recognized in Montana) reside in a wide range of habitats including wetlands, forests, woodlands, sagebrush, meadows, and floodplains (reviewed by Maxell 2000). Breeding takes place in shallow, quiet water in lakes, marshes, bogs, ponds, wet meadows, beaver ponds, slow-moving streams, backwater channels of rivers, and roadside ditches (Loeffler 1998, Maxell 2000).

Adult and juvenile toads are freeze-intolerant. During winter they hibernate in subterranean chambers underlaid by flowing groundwater to prevent freezing (Campbell 1970) or in small mammal burrows below the frost line (Loeffler 1998, reviewed by Maxell 2000). Adults feed on a variety of ground dwelling invertebrates and are known to eat smaller individuals of their own species. Breeding typically occurs from May to July in shallow areas of large and small lakes, ponds, slow moving streams and backwater channels of rivers (Metter 1961 and Black 1970a as reported in Maxell 2000). Tadpoles metamorphose in mass and metamorphs can be found in dense aggregations of hundreds of individuals adjacent to breeding habitats upon emergence during summer (Black and Black 1969, Maxell 2000). Young toads are limited in distribution and movement by available moist habitat but adults can move several miles and may reside in marshes, wet meadows, or forested areas (Loeffler 1998). During winter adults hibernate in subterranean chambers underlaid by flowing groundwater to prevent freezing (Campbell 1970) or in small mammal burrows below the frost line (reviewed by Loeffler 1998).

Proximity of Project to Sensitive and ESA Listed Aquatic Species

One sensitive fish species, westslope cutthroat trout **(Oncorhynchus clarki lewisi)** and one federally listed species, bull trout **(Salvelinus confluentus),** are found west of the continental divide on the Beaverhead-Deerlodge National Forest. We have documented the presence of westslope cutthroat trout in North Fork Lower Willow Creek, and both westslope cutthroat and bull trout in Harvey Creek, in the adjacent watershed to the west and north. Western (boreal) toads (**Bufo boreas**) have been documented on lands administered by the Beaverhead-Deerlodge National Forest and northern leopard frogs (**Rana pipiens**) may exist on the Beaverhead-Deerlodge National Forest. The nearest documented boreal toad location, to the project area, is located about 13 km NNE of the project area, off NFS lands, adjacent to the Bearmouth rest area on I-90. Leopard frogs have not been documented in Granite County.

Existing Watershed Conditions in the North Fork Lower Willow 6th Field Watershed #170102020403

This sub-watershed lies in the Flint Creek drainage and flows from the eastern face of the John Long Mountains. It comprises approximately 19,144 acres. Elevations range from 4,800 to 7,600 feet. Forty-eight percent of the land base is inside the Forest Boundary (about 9,239 acres). Vegetation within this subwatershed is comprised of: 12,852 acres of coniferous forest, 262 acres subalpine meadow, 645 acres shrubland, 5,207 acres grassland, 112 acres aspen/cottonwood, and 61 acres non-vegetated.

About 57.2 miles of road are present throughout the HUC. Around 19.9 miles of road are within the NF boundary. Road density is high for the HUC (1.9 miles/ square mile), based on criteria used in the ICBEMP assessment. Within the Forest, road density is moderate (1.4 miles/ square mile). Total miles of road within 300 feet of streams are 4.4 and 13.6 on Forest and off, respectively.

Results from the 2002 inventory of road/stream crossing culverts on USFS administered lands indicate three culverts on Forest roads are complete barriers to upstream fish (and presumably other aquatic organisms) movement. These include the culvert under Forest Development Road (FDR) #4326, on the North Fork Lower Willow Creek, and two culverts under the forks of Senia Creek. Culverts outside the Forest boundary were not inventoried.

There has been 1,256 acres of timber harvest on the 9,239 acres of FS lands. Thus, 14% of the FS acreage has been harvested. Portions of 5 grazing allotments provide for use of 9,279 acres of FS land in this HUC.

This sub-watershed contains approximately 33 miles of perennial streams and an additional 29 miles of intermittent/ephemeral stream channel. Based on these numbers and those above, generated from our GIS stream and road layers, 29% of the total stream channel length has a road within 300 feet.

Fish-bearing streams in this HUC include the North Fork and West Fork of Lower Willow Creeks, Senia Creek and Mojave Gulch. The Montana Fisheries Information System (MFISH) lists westslope cutthroat trout and eastern brook trout as present in this 6th field watershed. Forest Service sampling has detected only cutthroat trout.

Montana FWP, in their 2002 assessment of westslope cutthroat trout populations designated one "conservation population" in the North Fork Lower Willow Creek 6th field watershed. This conservation population includes fish in seven named streams within the watershed – North Fork Lower willow Creek, West Fork North Fork Lower Willow Creek, Spring Creek, Senia Creek, Mohave Gulch and Goose Gulch, occupying about 27 miles of stream. Fish numbers in this population were rated as "significantly below potential" in the assessment. Cutthroat trout from the North Fork Lower Willow Creek were analyzed for genetic composition in 1986. Results from this allozyme analysis indicated that these fish were genetically pure westslope cutthroat trout.

North Fork Lower Willow Creek

Two surveys were completed by hydrology crews in 1997 and 1998. The downstream reach is located about 1/4 mile upstream from USFS boundary, and immediately down-slope of the project site. This site represents over 1/2 mile of stream. The stream alternates between "B" and "C" channel types. This reach appears to deal well with a substantial bedload. Activities within the riparian area include historical logging in addition to past and current grazing. This reach is within a livestock grazing pasture. Current grazing activities appear to maintain PFC.

The upper reach is located about 1000 feet above the crossing of FDR #4326, it represents a 1/2 mile of stream above the crossing. Current management actions near or within the stream corridor include livestock grazing, roads and power line maintenance. However, none of these actions appear to exert appreciable effects on stream function. Bedload movement is substantial in this reach, and plays a role in stream channel stability. However, the source has not been determined. Cumulative watershed effects do not appear to play a role in generating bedload; only a very small part of the watershed has been disturbed by roads and timber harvest. About 88% of the channel regime is dominated by riffles, more than is typically expected for a "C" stream type. The Riffle Armor Stability Index indicates that 94% of the substrate in a riffle is transported during bankfull flow events, which shows a fairly unstable condition. If bedload amounts can be attributed to natural causes (eg. unstable landtypes within the watershed), the stream function class would be PFC. This reach was classified as “functioning at low risk”. It was considered to be 30% over-widened and the bank erosion potential was classified as high.

Fisheries personnel conducted a qualitative “walkthrough” survey of instream fish habitat conditions from the Forest Boundary upstream for 2 miles, in 1998. The lowermost reach covers the same area as the lower hydrology survey. This reach (≈ 0.6 miles) contains about 40% by length pool habitat, formed mostly by scour at meander bends and from in-channel LWD. The average channel width in this reach is 13 feet. Average pool depth is 1.3 feet, with a maximum depth of 2.2 feet. Sixty percent of this reach flows through coniferous forest which contributes 7-10 pieces of LWD/ 100 meters of stream. WCT were observed in this reach.

The next reach includes the upper hydrology reach, but continues upstream for another 0.6 miles. Forty percent of this reach flows through coniferous forest. The reach contains 30%, by length, pool habitat which is formed mostly by scour at meander bends. The average pool depth is 1.1 feet with a maximum depth of 1.3 feet. Channel stability and instream habitat quality improve towards the upstream end of this reach as livestock-related impacts decrease. WCT were observed in this reach.

The uppermost reach surveyed encompasses <0.5 miles of stream. It flows through a steep-sided, confined, forested valley bottom. Pools, formed by LWD, comprise 50% of the length of this reach. Pools average 1.1 feet deep, with a maximum depth of 2.0 feet. The stream channel is 11 feet wide, with a W/D ratio of 14/1. Streambanks are stable over 80% of their length.

West Fork Lower Willow Creek, Senia Creek and Mojave Gulch

On National Forest lands, the south half of this sub-watershed burned in a wildfire approximately 80 years ago. Senia Creek, Mojave Gulch and the West Fork of Lower Willow are still recovering from this disturbance. Large woody debris is under-represented and there is a lack of

pool development, primarily due to a continued movement of excessive bedload. WCT inhabit all three of these streams.

Below the Forest boundary there is a significant amount of industrial forest lands that have been managed for timber harvest. This has probably had impacts on the lower reaches of these streams, although no data exists to support this determination.

Amphibian Populations

No systematic surveys have been conducted in this watershed for R1 sensitive amphibians. The nearest observation of any R1 sensitive amphibian (boreal toad) is located about 13 km NNE of the project area adjacent to the Bearmouth rest area on I-90 (Montana Natural Heritage Program 2004). There is very limited information concerning amphibian species occurrence and distribution in this area. Tailed frogs (Ascaphus montanus) have been repeatedly sampled in conjunction with electrofishing surveys in Harvey Creek (6HUC #170102020609). A single observation of a long-toed salamander (Ambystoma macrodactylum) was documented on May 24, 2004 adjacent to a pothole in T10N, R15W, Section 26. Spotted frogs have repeatedly observed near the confluence of Eightmile and Harvey creeks and were observed in four of five ponds in close proximity to this project when surveyed on 7/01/2004. Werner et al (2004) list the nearest population of northern leopard frogs as occurring in northwest Montana, in Lincoln and Flathead counties.

Direct and Indirect Effects of the Proposed Action

This project consists of commercial timber harvest on 140 acres of ponderosa pine and Douglas-fir. The prescription calls for thinning to an average spacing of 35-50 feet, favoring ponderosa pine as leave trees. Several old existing “2-tracks” exist in the project area. Some of these would be re-opened to provide access to the unit, negating the need to construct new, temporary roads. These roads would have improved drainage relief installed and be seeded with an approved seed mix following the sale. Trees would be whole-tree skidded to landings and slash generated by this activity would be burned at the landing sites. Small diameter material would be hand-piled and burned throughout the stand. The minimum slope distance between this project and the North Fork Lower Willow Creek is greater than 300 feet.

The pathways by which timber harvest can impact stream channels and wetlands include increased sediment delivery, reduced shading of the waters surface and reduced recruitment of woody debris and introduction of toxic fuel or fluids into these areas. Amphibians can also be directly impacted by equipment operations and slash disposal and indirectly by reducing the amount of down woody material on the ground that creates suitable microsites for amphibians.

Sensitive Fish

Timber harvest can have a negative impact to fish species or fish habitat by increasing sediment delivery to the stream, removing trees that shade and may eventually fall into the stream, introducing toxic substances into the stream and increasing water yield resulting in higher peak flows during spring runoff and storm events.

Sediment delivery to streams is a result of the movement of soil particles exposed to erosive forces by ground disturbing activities. Belt et al (1992) reviewed numerous studies associated with roads and found that vegetated buffer widths of 200-300' were generally effective in controlling unchannelized sediment flows. Quigley and Arbelbide (1997) reviewed work by Ketcheson and Megahan (1996) that describes both slope and volume of material as important predictors of the sediment travel distance. While these studies describe sediment movement distances in the context of road construction, less attention has been given to sediment transport distances from timber harvesting in the intermountain west. Typically, less ground disturbance is associated with harvesting activities than with road construction and use. The minimum distance between this project and the North Fork Lower Willow Creek is over 300 feet slope distance. Based on the literature cited, this distance should be effective in minimizing potential sediment delivery to the stream.

Belt et al (1992) also reviewed numerous studies associated with the effects of removing vegetation within riparian buffer strips. These studies seem to indicate that removing overhanging canopy along streams can increase daily variability in water temperatures. Given the distance between the project and the North Fork Lower Willow Creek, shading and the recruitment of large woody material into the creek will be unaffected.

The possibility of introducing toxic substances into the North Fork of Lower Willow Creek as a result of a fuel or fluid spill is likewise very low, given the distance between the unit and the stream.

The scale and type of proposed activities will not alter the timing or magnitude of peak flows in the North Fork Lower Willow creek sub-watershed. Less than 1% of the sub-watershed would be treated if this proposal is implemented. Given that this project will not completely remove the tree canopy, the processes (snow accumulation, rate and timing of melt, evapotransporation rates, etc.) by which the timing and magnitude of flows could be altered is even less affected.

This project, as proposed, will have no impact on fish or fish habitat in the North Fork Lower Willow Creek. The distance between activities and this stream, the method and timing of implementation, and scale of the projects makes impacts to sensitive and ESA listed fish species unlikely to occur.

Recommendations to Reduce Impacts to Sensitive Fish Species

Harvesting during winter months when the ground is either frozen or snow covered results in the least amount of ground disturbance. Conducting harvest activities during this season would minimize ground disturbance, thus erosion and sediment delivery potential to the North Fork Lower Willow Creek.

Impacts to Sensitive Amphibians

It is possible that this project could affect individual boreal toads. Boreal toads can be found in a wide variety of habitats including wetlands, forests, woodlands, sagebrush, meadows, and

floodplains in the mountains and mountain valleys (Maxell, 2000). Adult boreal toads may move more than four kilometers away from water after breeding and can remain away from surface water for relatively long periods of time (Maxell, 2000). Juvenile toads may disperse up to four kilometers from their natal site (Maxell, 2000). Because of these characteristics it is possible that individuals could use the sale area and be directly affected by the logging operation. Direct mortality of toads could occur as a result of crushing during harvest operations. Indirect impacts to amphibians associated with timber harvest may be associated with changes in microsite climates due to opening of the tree canopy resulting in increased solar radiation and soil drying, the use and maintenance of roads in the project area and potential sedimentation and toxicant delivery to adjacent streams and wetlands (Maxell, 2000).

This project is unlikely to impact northern leopard frogs as the nearest known populations of frogs exist in Flathead and Lincoln counties in northwest Montana.

Recommendations to Reduce Impacts to Sensitive Amphibian Species

Restricting ground disturbing activities to the late fall and winter minimizes potential impacts to boreal toads by concentrating activities during time periods when amphibians are typically inactive. Although the North Fork Lower Willow Creek does not appear to offer habitats that are preferred by this species, several small ponds and other wet areas that may offer better breeding habitat are located nearby. One of these (Barton Springs) lies adjacent to this unit. Potential indirect impacts to amphibians can be mitigated by leaving some concentrations of down wood and debris scattered throughout the unit to provide moist microsites for toads.

Cumulative Effects

Past, present and reasonablely foreseeable future activities in this watershed that may impact fish, amphibians, instream habitat, stream channel and wetland conditions include the existing road network, continued livestock grazing, both on Forest allotments and on private property, the Harvey Cabin pre-commercial thinning project that surrounds this project and continued timber harvest on private land below the Forest Boundary.

Given the scale of this project, the type of activities proposed within the treatment unit and the location of the treatment unit in relation to the North Fork Lower Willow Creek, the effects of other past, ongoing or reasonablly foreseeable future acivities, it is unlikely that the Barton Springs Commercial Thinning project will cumulatively impact aquatic sensitive species.

Criteria for Reaching the Effects Determinations

Criterion	Bull Trout	WCT	Northern Leopard Frog	Boreal Toad
1. Does the activity likely involve the 'direct taking' of bull or cutthroat trout, leopard frog, or boreal toad (including the capture, collection, harassment, or harm to individual ESA listed fish)?	No	No	No	possible
2. Is the activity likely to involve the introduction of substantial amounts of sediment (or other materials) into a perennial stream or wetland?	No	No	No	No
3. Is the activity likely to substantially change the natural process of Large Woody Debris (LWD) input into a perennial stream?	No	No	No	No

4. Is the activity likely to measurably increase water temperatures during critical low flow periods, or decrease winter water temperatures?	No	No	No	No
5. Is the activity likely to substantially disturb stream, lake, pond, or marsh banks or morphology within areas suitable for any of these species?	No	No	No	No
6. Is the activity likely to substantially change riparian vegetation along a perennial stream or riparian area?	No	No	No	No
7. Is the activity likely to substantially change water quantity through diversion, withdrawal, or a change in water yield or groundwater?	No	No	No	No
8. Does the activity involve substantial amounts of toxic or hazardous materials that could possibly be introduced into a streamcourse or wetland area?	No	No	No	No
9. Does the activity involve activity on landtypes with the potential for mass movement and does the activity have the potential to change the natural rate and volume of mass movement?	No	No	No	No
10. Does the activity involve heavy vehicle traffic near habitat for the amphibian species?	N/A	N/A	No	Possible
11. Is the activity likely to alter or damage amphibian burrows (i.e. small mammal burrows) or woody refugia?	N/A	N/A	No	Possible
12. Is there significant question or controversy regarding the potential effect of this activity on bull trout, cutthroat trout, leopard frog, boreal toad or downstream habitat?	No	No	No	No

Determination of Effects

Considering the effects of this project, and the effects of past and ongoing actions in the North Fork Lower Willow 6th field watershed, it is my professional determination that this project will have **no impact on westslope cutthroat trout** in the North Fork Lower Willow Creek. This project will have **no effect on the federally listed bull trout**. This project could **impact individuals boreal toads but should not adversely affect the overall status or population numbers of this species**. **Northern leopard frogs will be unaffected** by this project given the distance between this project and the nearest known extant population of this species.

Sensitive Aquatic Species Determinations

Species	**NI** = No Impact	**MIIH** = May Impact Individuals or Habitat, but Will Not Likely Result in a Trend in Federal Listing or Reduced Viability for the Population or Species	**WIFV** = Will Impact Individuals or Habitat with a Consequence that the Action may Contribute To Federal Listing or Result in Reduced Viability for the Population or Species	**BI** = Beneficial Impact
Westslope Cutthroat Trout	**X**			
Boreal Toad		**X**		
Leopard Frog	**X**			

ESA Listed Species Determination

Species	**NE** = No Effect	**MANLAA** = May Affect Not Likely to Adversely Affect	**MALAA** = May Affect Likely to Adversely Affect
Bull Trout	**X**		

Compliance with Forest Plan and other Applicable laws

The project complies with the standards and guides for timber management, TM-1, found in appendix E of INFISH (amended to the Forest Plan in 1995). The timber standard states that timber harvest, including fuelwood cutting, is prohibited in Riparian Habitat Conservation Areas except for dealing with catastrophic events or appling silvicutural practices to achieve desired conditions for riparian management objectives. This project is not dealing with any catastrophic events and it is not designed to change the current condition of the existing riparian habitat and does not have any activity within the Riparian Habitat Conservation Area, therefore the project will not change, for better or worse, any of the habitat features of adjacent streams or wetlands.

The determination that this project "may impact individual boreal toads…" is based on three factors; documentation of toads in the general area (northern Granite county) of the project, the presence of suitable habitat within dispersal distance to the project area and the potential, that if toads are present, they could be impacted by implementing this project. This determination of impacts is a very conservative call given that boreal toads have not been documented to occur in the immediate vicinity of the project. For these factors, the determination of "may impact individual boreal toads…" does not rise to the level of an extraordinary circumstance, as defined in FSM 1909.15, chapter 30.3.

Signature

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