Aquatic Species Biological Assessment for Livestock Grazing on the Mill Creek Allotment

LOST RIVER RANGER DISTRICT

SALMON-CHALLIS NATIONAL FOREST

CUSTER AND LEMHI COUNTY, IDAHO

Prepared by: Bart L. Gamett

Fish Biologist

Signature: ______________________________

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1 INTRODUCTION

The Lost River Ranger District of the Salmon-Challis National Forest authorizes livestock grazing activities within the Mill Creek Allotment. This biological assessment describes the proposed action and discusses the probable impacts of that action on listed species and proposed critical habitat that may be affected. This biological assessment forms the basis for any necessary consultation with the Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) (collectively the "Services") pursuant to section 7 of the Endangered Species Act (ESA) of 1973 (as amended) and its implementing regulations. This biological assessment replaces all previous consultations associated with this allotment. The regulations for consultation require the action agency to re-initiate consultation if certain triggers are met (50 CFR 402.16). Occasionally during the implementation of a proposed action, changes in circumstances, situations, or information can raise the question as to whether those re-initiation thresholds have been reached. Should that situation occur, the Salmon-Challis National Forest (SCNF) will assess the changes and any potential impacts to listed species, review the re-initiation triggers, coordinate with Services for advice (if needed), and arrive at a determination whether re-initiation of consultation is necessary.

2 BACKGROUND INFORMATION

The Mill Creek Allotment is primarily within the Sawmill Canyon 5th Field HUC (5th Field HUC: 1704021701) with a small portion of the allotment occurring within the Summit Creek 5th Field HUC (5th Field HUC: 1704021702). Elevations within these two sub-watersheds range from 6,040 feet at the confluence of Summit Creek and Sawmill Creek to 11,612 feet at the summit of Bell Mountain. The geology of the sub-watersheds is primarily volcanic and metamorphic. The physiography of the sub-watersheds includes high relief mountains and associated canyons, alluvial fans, and floodplains. The primary vegetation types are sagebrush steppe, coniferous forests, deciduous riparian communities, coniferous riparian, sub-alpine, and alpine communities. The Sawmill Canyon sub-watershed has a snowmelt dominated stream flow pattern with peak flows typically occurring in early summer and low flows occurring during the winter months. In contrast, streams in the Summit Creek sub-watershed are generally spring fed with relatively stable flows throughout the year. These sub-watersheds are primarily managed by the Forest Service and Bureau of Land Management with lesser amounts of state and private land. Significant management actions within these sub-watersheds have included livestock grazing, timber harvest, road construction, fire suppression, the introduction of non-native fish, stream diversion, and recreation.

3 PROPOSED ACTION

3.1 PROJECT AREA

The Mill Creek Allotment is a 51,568 acre allotment located north of the town of Howe in the Little Lost River basin (Figures 1 and 2). The allotment is within the Sawmill Canyon 5th Field HUC (5th Field HUC: 1704021701) and Summit Creek 5th Field HUC (5th Field HUC: 1704021702) (Figure 3).

FIGURE 1 – MILL CREEK ALLOTMENT VICINITY MAP.

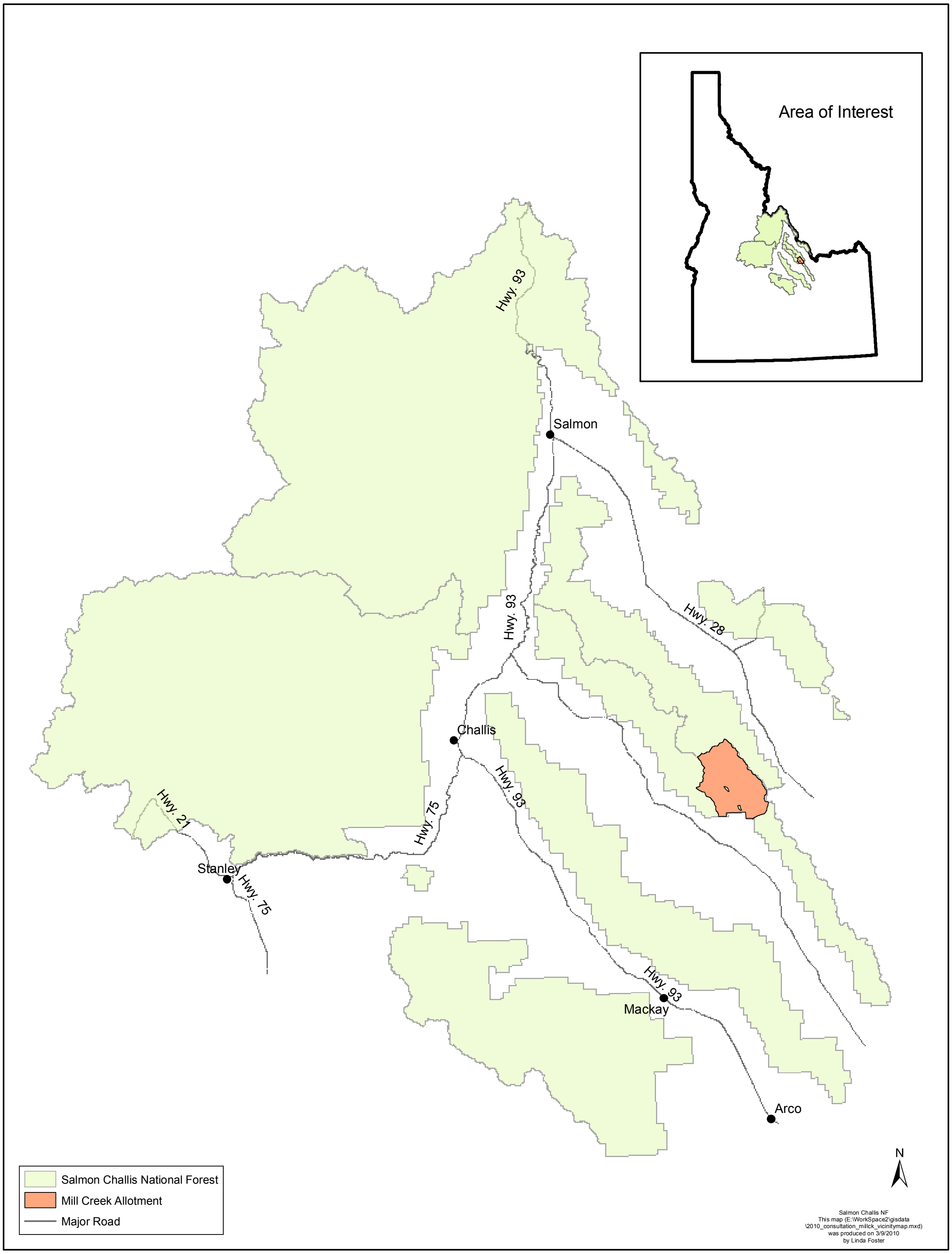


FIGURE 2 – MILL CREEK ACTION AREA.

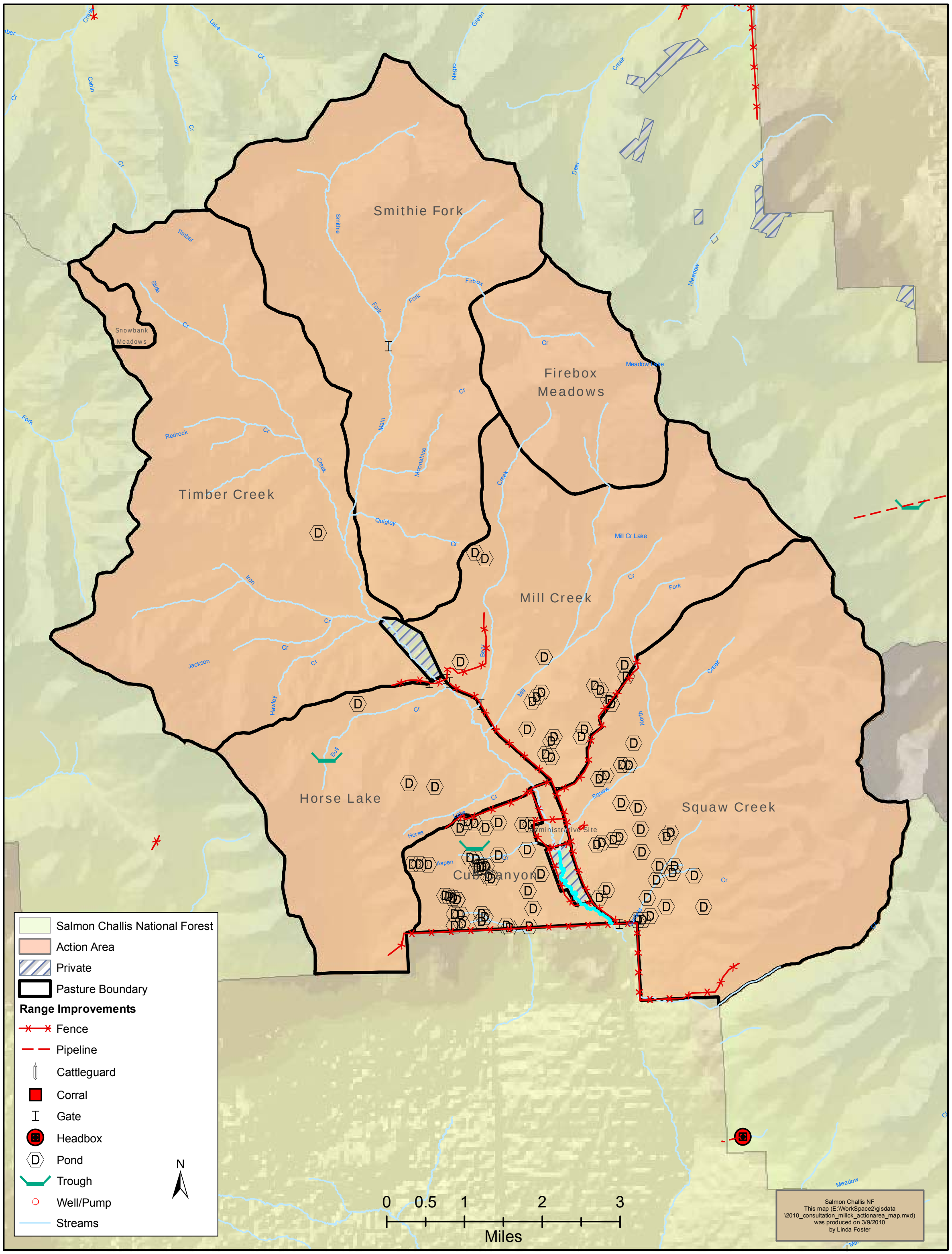
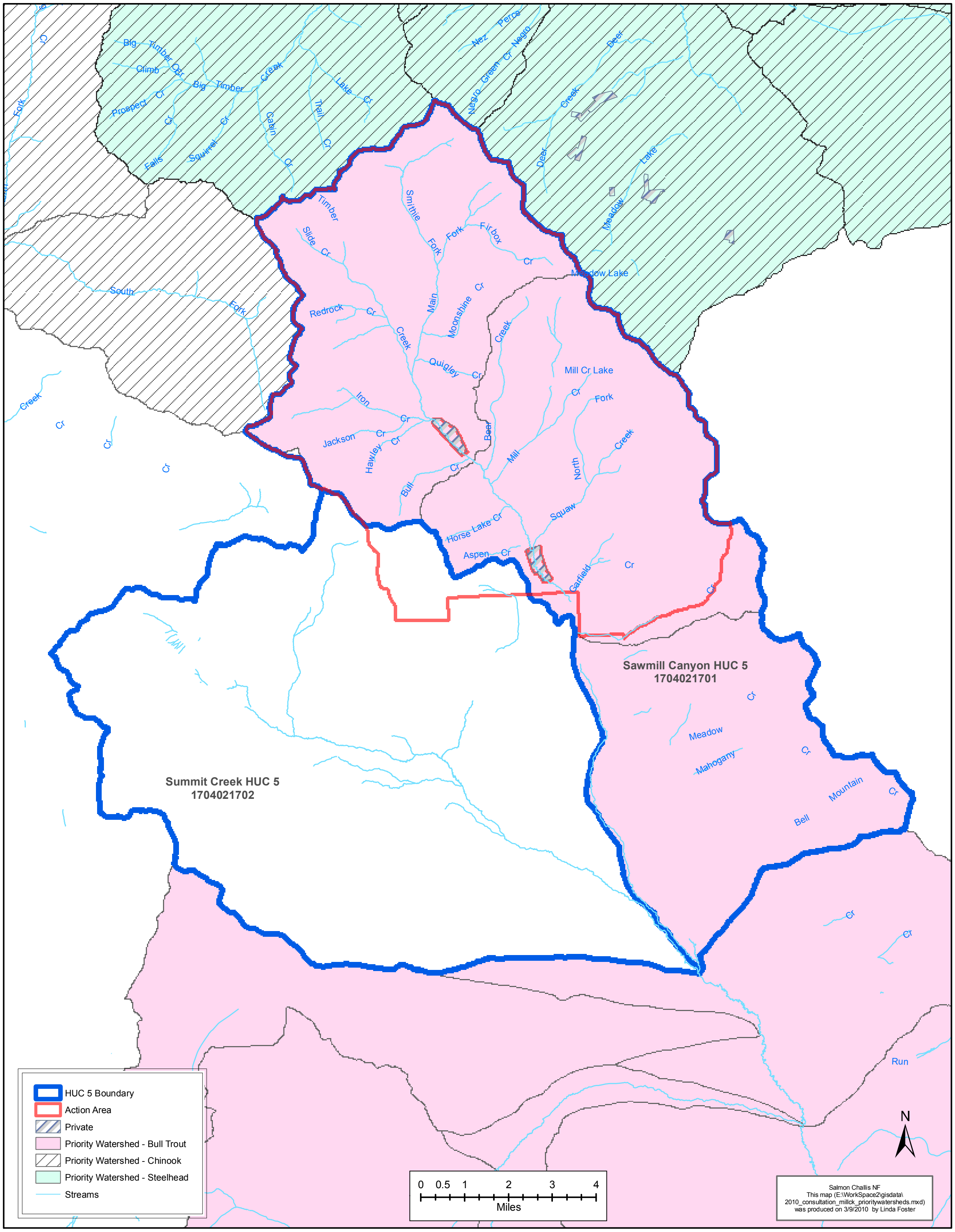


FIGURE 3 – MILL CREEK HUCS AND PRIORITY WATERSHEDS.



3.2 PROPOSED ACTION

3.2.1 CURRENT PERMIT

The grazing permit for this allotment is permit #40134 which expires on December 31, 2014.

3.2.2 GRAZING SYSTEM

Grazing on this allotment will involve grazing up to 554 cow/calf pairs under a deferred grazing system with grazing occurring anytime between July 1 and September 30. The allotment consists of the Squaw Creek, Mill Creek, Smithie Fork, Timber Creek, Horse Lake, and Cub Canyon units. Grazing will not occur within the Firebox Meadows area or within the Forest Service Administrative Site Pasture.[1] There are four general rotations that will generally be used on this allotment (Table 1). Some adjustments may be made to the rotation as conditions arise but livestock must be out of the units on the date specified for a specific year.

A rider is also required to be on the allotment five days per week.

Entry: Livestock enter the allotment from an adjacent BLM allotment.

Exit: Livestock exit the allotment to an adjacent BLM allotment.

Table 1. General rotation schedule.

Year 1	Year 2	Year 3	Year 4
Cub Canyon	Squaw Creek[A]	Squaw Creek[A]	Mill Creek[A]
Horse Creek	Mill Creek[A]	Smithie Fork[A]	Smithie Fork[A]
Smithie Fork[A]	Smithie Fork[A]	Timber Creek[B]	Timber Creek[B]
Timber Creek[B]	Timber Creek[B]	Horse Creek	Horse Creek
Mill Creek	Horse Creek	Cub Canyon	Cub Canyon
Squaw Creek	Cub Canyon	Mill Creek	Squaw Creek

[A] Livestock will not graze within this unit during this rotation after August 15
[B] Livestock will not graze within this unit during this rotation after August 31

3.2.3 RESOURCE OBJECTIVES

Resource Objectives and Effectiveness Monitoring: The allotment is being managed to achieve specific resource conditions in riparian areas. Resource objectives are the Forest's description of the desired land, plant, and water resources condition within riparian areas in the allotment. Some resource objectives are Riparian Management Objectives (RMOs) that were implemented as part of the Inland Native Fish Strategy (INFISH) and the consultation associated with INFISH. INFISH is a strategy implemented by the USDA Forest Service in 1995 that was "…intended to provide interim direction to protect habitat and populations of resident native fish outside of anadromous fish habitat in eastern Oregon, Idaho , western Montana, and portions of Nevada" (USDA Forest Service 1995). INFISH provides riparian management objectives, standards and guidelines, and monitoring requirements.

[1] The Forest Service occasionally grazes horses and mules within the Forest Service Administrative Site Pasture. However, this pasture is not part of the Mill Creek Allotment and this proposed action does not authorize any grazing within this pasture.

INFISH amended the Challis National Forest plan and applies to those national forest lands in the Big Lost River and Little Lost River basins.

Effectiveness monitoring for resource objectives will be monitored every 3-5 years at Designated Monitoring Areas (DMAs) using the Multiple Indicator Monitoring (MIM) technical reference or other best available science as it becomes available. DMAs are areas representative of grazing use specific to the riparian area being accessed and reflect what is happening in the overall riparian area as a result of on-the-ground management actions. They should reflect typical livestock use where they enter and use vegetation in riparian areas immediately adjacent to the stream (Burton et al 2008). Results from monitoring will be available at (http://www.fs.fed.us/r4/sc/projects/range/index.shtml).

The resource objectives area as follows:

Greenline Successional Status: A greenline successional status value of at least 61 (late seral) or the current value, whichever is greatest (see Winward 2000).

Woody Species Regeneration: Sufficient woody recruitment to develop and maintain healthy woody plant populations.

Bank Stability (INFISH): A bank stability of at least 90%[2] or the current value, whichever is greatest.

Water Temperature (INFISH): No measurable increase in maximum water temperature.[3] Maximum water temperatures below 59°F (15°C) within adult holding habitat and below 48°F (8.9°C) within spawning and rearing habitats.

Width:Depth Ratio (INFISH): <10 or by channel type as follows[4]:

A Channel: 21

B Channel: 27

C Channel: 28

Sediment (INFISH): <20% surface fines (substrate <0.25 inches (6.4 mm) in diameter) in spawning habitat or <30% cobble embeddedness in rearing habitat.[5]

3.2.4 MANGEMENT STANDARDS AND GUIDELINES

The following are forest plan standards and guidelines that applies to the management of livestock grazing relative to listed fish and their habitats:

INFISH

GM-1: Modify grazing practices (e.g., accessibility of riparian areas to livestock, length of grazing season, stocking levels, timing of grazing, etc.) that retard or prevent attainment of Riparian Management Objectives or are likely to adversely affect inland native fish. Suspend grazing if adjusting practices is not effective in meeting Riparian Management Objectives.

The INFISH environmental assessment defines "Adverse Effects" to include "…short- or long-term, direct or indirect management-related impacts of an individual or cumulative nature, such as mortality, reduced

[2] The INFISH environmental assessment established a riparian management objective for bank stability of 80%. However, during consultation this standard was increased to 90% within bull trout priority watersheds. This allotment is within a priority watershed.
[3] In this case, maximum water temperature is expressed as the 7-day moving average of daily maximum temperature measured as the average of the maximum daily temperature of the warmest consecutive 7-day period
[4] These values are based on the mean values observed for streams in natural condition within the Salmon River (Overton et al 1995)
[5] The INFISH environmental assessment did not include a riparian management objective for sediment. However, during consultation a riparian management objective for sediment was established in bull trout spawning and rearing areas within bull trout priority watersheds. This allotment is within a priority watershed.

growth, or other adverse physiological changes; harassment of fish; physical disturbance of redds; reduced reproduction success; delayed or premature migration; or other adverse behavioral changes."

GM-2: Locate new livestock handling and/or management facilities outside of Riparian Habitat Conservation Areas. For existing livestock handling facilities inside the Riparian Habitat Conservation Areas, assure that facilities do not prevent attainment of Riparian Management Objectives. Relocate or close facilities where these objectives cannot be met.

GM-3: Limit livestock trailing, bedding, watering, salting, loading, and other handling efforts to those areas and times that would not retard or prevent attainment of Riparian Management Objectives or adversely affect inland native fish.

Land Resource Management Plan for the Challis National Forest – Forest Wide Direction

- Protect anadromous fish spawning areas from disturbance by livestock and other activities.
- Utilize grazing systems on allotments which provide for deferment or rest whenever possible. Season-long grazing or common use will be allowed only where resources can sustain such use.
- Range improvements will be maintained annually by permittees to standards adequate for public safety and established use, and control and proper distribution of livestock. Maintenance will be completed before livestock are allowed on the allotment.
- Rehabilitate existing stock driveways where damage is occurring. Relocate them outside riparian areas if possible.
- Browse utilization within the riparian ecosystem will not exceed 50 percent of new leader production.
- Ensure that all management-induced activities meet State water quality standards, and Forest water quality goals, including sediment constraints.
- Impacts of activities may not increase fine sediment by depth (within critical reaches) of perennial streams by more than 2 percent over existing levels. Where existing levels are at 30% or above new activities that would create additional stream sedimentation would not be allowed. If these levels are reached or exceeded, activities that are contributing sediment will be evaluated and appropriate action will be taken to bring fine sediment within threshold levels.
- Retain at a minimum, 75 percent of natural stream shade provided by woody vegetation.
- Establish forage utilization at levels which will yield 90% inherent bank stability or trends toward 90% where streams or other water bodies are involved.
- Discourage livestock concentrations in riparian areas and within 100 feet of lakes and perennial streams. Restrict livestock grazing in identified problem areas where necessary.
- Livestock driveways and trailing areas will be located away from riparian or streamside areas.

Land Resource Management Plan for the Challis National Forest – Management Area Specific Direction

- Maintain or improve quality and quantity of aspen in the ecosystem. Strive to maintain or increase aspen in the overstory composition by 10%.
- Manage to increase forbs in plant composition.

3.2.5 USE INDICATORS

Annual use indicators are used to ensure that grazing does not prevent the attainment of the resource objectives. Riparian annual use indicators used on the Salmon-Challis National Forest generally include greenline stubble height, bank alteration, and woody browse. In general, greenline stubble height is used to regulate grazing impacts on greenline ecological status, bank alteration is used to regulate grazing impacts on bank stability, and woody browse is used to regulate impacts on woody recruitment. The specific indicators selected for a specific unit should be those that correspond with the riparian resources that are most sensitive to the impacts of livestock grazing. For example, if bank stability was the riparian feature most likely to be impacted by livestock grazing in a unit, then bank alteration would be selected as the annual use indicator for that unit.

Based on the guidelines in section 3.7, available data, and professional experience, the various indicators for this allotment have been established (Table 2). A bank alteration standard is not being established on this allotment at this time. However, bank stability and bank alteration will be monitored for a period of three years beginning in 2010. If bank stability is below 90% at any site in 2012, a bank alteration standard will be implemented for that site in the 2013 grazing season that is lower than the average bank alteration observed during 2010, 2011, and 2012.

TABLE 2. THE ANNUAL USE INDICATORS.

Unit	End of Season Indicators			
	Median Greenline Stubble Height	**Bank Alteration**	**Woody Browse**	**Upland Utilization**
Squaw Creek (M140)	≥ 4 inches	none	≤ 25%	≤ 50%
Mill Creek (Mill Creek) (M137)	≥ 4 inches	none	≤ 25%	≤ 50%
Mill Creek (Bear Creek) (M136)	≥ 4 inches	none	≤ 25%	≤ 50%
Smithie Fork (M138, 139)	≥ 4 inches	none	≤ 25%	≤ 50%
Timber Creek	≥ 4 inches	none	≤ 25%	≤ 50%
Horse Lake (Sawmill Cr.)	≥ 6 inches	none	≤ 25%	≤ 50%
Horse Lake (upland spring)	≥ 4 inches	none	none	≤ 50%
Cub Canyon (M318)	≥ 4 inches	none	≤ 25%	≤ 50%

Annual use indicators will be measured at key areas by key species (on uplands) and at DMA greenlines annually. Key areas are monitoring sites chosen to reflect the effects of grazing over a larger area (Burton et al 2008). Key species are preferred by livestock and an important component of a plant community, serving as an indicator of change (Utilization Studies and Residual Measurements, Interagency Technical Reference 1734-3). The Interagency Technical Reference or other best available science would be used to monitor grazing use. The MIM Interagency Technical Bulletin (Burton et al 2008) or other best available science would be used to monitor grazing use at DMAs. Annual use indicators will be monitored by the Forest Service. Triggers will be used by permittees as a tool to help ensure annual use indicators are met. Results from monitoring will be available at (http://www.fs.fed.us/r4/sc/projects/range/index.shtml).

3.3 IMPROVEMENTS

Existing Improvements: The allotment contains several existing improvements including fences, ponds, and troughs with associated head boxes and pipelines (Figure 2). These will be maintained in accordance with the term grazing permit.

New Improvements: Prior to turnout in 2011, a fence will be constructed that will exclude livestock from that portion of Warm Creek within the allotment with the exception of small water gap and livestock driveway. This is being done to protect and restore degraded bull trout habitat in Warm Creek.

3.4 CHANGES FROM EXISTION MANAGEMENT

The proposed action includes the following changes from existing management:

- Stubble height: The indicators for stubble height are not changing from the existing values

- Bank alteration: There are no indicators for bank alteration on this allotment and none are being established
- Woody browse: The environmental assessment for this allotment and the associated biological assessment for bull trout set woody browse utilization at 20% or less. However, it is being increased to 25% or less in this biological assessment because riparian woody species are generally in good condition and can likely tolerate an increased level of use.
- Livestock grazing is being allowed in spawning areas across the allotment with the exception of the Smithie Fork Unit. When the 1998 biological assessment for this allotment was prepared it was believed that bull trout did not begin spawning on the allotment until after September 15. Subsequently, the allotment was managed so that livestock did not graze in spawning areas after September 15. However, it was later discovered that bull trout may begin spawning on this allotment as early as August 15. With the exception of spawning areas within the Smithie Fork Unit, the current proposed action allows livestock to graze in spawning areas after August 15. This is being done in the Smithie Fork Unit because bull trout populations in this unit have high densities and appear capable of supporting the amount of redd trampling that would occur under the proposed grazing system. Redd trampling is being allowed in the Mill Creek and Squaw Creek units because the proposed action only results in a minor amount of redd trampling. Furthermore, brook trout have nearly replaced bull trout in Squaw Creek and Mill Creek. It is likely that brook trout will completely replace bull trout in these two streams within the next couple of decades whether or not livestock trample bull trout redds.
- Time within any specific unit will no longer be limited to 20 days or less because livestock impacts will be controlled by grazing indicators

3.5 CONSERVATION MEASURES

The following conservation measures will be implemented as part of the proposed action and incorporated into the term grazing permits to avoid and reduce potential impacts to ESA listed fish:

- Livestock grazing will be eliminated on the section of Warm Creek within the allotment with the exception of small water gap and livestock driveway
- The grazing rotation will be staggered so that livestock will not graze in the Smithie Fork Unit during the bull trout spawning and incubation period
- The grazing rotation will be staggered so that livestock do not graze the Timber Creek Unit after August 31 which means they will only be grazing during the first two weeks of the bull trout spawning and incubation period
- The grazing rotation will be staggered so that livestock only graze two out of four years in the Squaw Creek and Mill Creek units during the bull trout spawning and incubation period
- A rider is required to be on the allotment five days per week
- The indicator for woody browse is being set at 25% across the allotment
- The indicator for stubble height is being set at four inches for that portion of Sawmill Creek within the Horse Lake Unit

3.6 MONITROING

Implementation and effectives monitoring will be conducted at designated monitoring areas (DMA's). Each DMA will be located in an area that is representative of grazing use and reflect what is happening in the overall riparian area as a result of grazing activity. The DMA should reflect typical livestock use where they enter and use vegetation in riparian areas immediately adjacent to the stream. Monitoring at the DMA will be completed using the MIM Interagency Technical Bulletin (Burton et al 2008) or other best available science. Results from monitoring will be available at (http://www.fs.fed.us/r4/sc/projects/range/index.shtml).

Implementation Monitoring: The designated indicators (e.g. - stubble height, bank alteration, and woody browse) will be periodically monitored while livestock are in each grazing unit to evaluate the status of the indicators and to determine when livestock need to be moved from the unit. Triggers will be used by permittees as a tool to determine when livestock need to be moved from a unit. The value of the trigger is determined by estimating how much time will be needed to move livestock from the unit before the end of season annual indicator value is met. This value will vary from year to year and unit to unit and should be customized to the specific circumstances of each unit. The designated indicators will be monitored at the end of the grazing season to ensure that the standards have been met.

Effectiveness Monitoring: The condition of the resource objectives will be evaluated in the following manner. Within the Squaw Creek, Mill Creek, and Smithie Fork units, greenline successional status, bank stability, and woody recruitment will be monitored at the DMA's every three to five years to evaluate resource conditions. In the Timber Creek Unit, most riparian areas are dominated by coniferous forest (Figure 4). Since livestock generally have little impact on these types of riparian communities, it is of little value to establish a DMA in these areas. Therefore, a traditional DMA will not be established in this unit. However, there are a few small riparian meadow communities within this unit (Figure 5). While these areas are not representative of riparian conditions across the allotment they are "critical areas" because livestock tend to concentrate in these locations and can have significant impacts to them. Therefore, a monitoring site will be established in at least one of these critical areas on this unit and greenline successional status, bank stability, and woody recruitment will be monitored at this site every three to five years to evaluate resource conditions. The primary stream in the Horse Lake Unit is Sawmill Creek. The banks of Sawmill Creek within this unit are dominated by gravel and cobbles and the riparian vegetation is dominated by trees and shrubs. Subsequently, the stream and riparian area is not very sensitive to livestock grazing and it is of little value to establish a traditional DMA along this stream. Therefore, a traditional DMA will not be established in this unit. However, a series of photo points will be established along Sawmill Creek within this unit in 2010 and these photo points will be re-photographed every three to five years. Sediment and temperature will be monitored at established long-term monitoring sites every three to five years. These sites are established long-term monitoring sites are not necessarily located at the DMA's.

3.7 INTERDEPENDENT ACTIONS

Interdependent actions are actions that have "no independent utility apart from the action under consideration" (50 CFR§402.02). The Forest has not identified any interdependent actions associated with the proposed action. There are activities associated with the proposed action that could potentially affect fish and could be considered interdependent actions. These include livestock grazing on the adjacent BLM allotment, grazing and other agriculture activities on private property that is owned by the permittees and diverting water from streams on private and national forest lands for agricultural purposes. However, we believe that these activities would continue to occur in a manner similar to the way they are currently occurring whether or not livestock graze on this allotment. Therefore, these activities will not be considered as interdependent actions.

3.8 INTERRELATED ACTIONS

Interrelated actions are actions that "are part of a larger action and depend on the larger action for their justification" (50 CFR§402.02). The Forest has not identified any interrelated actions associated with the proposed action.

3.9 ADAPTIVE MANAGEMENT

The adaptive management strategy described below and depicted in Appendix E is intended for allotments requiring consultation. It will be used to ensure: 1) sites at desired condition remain in desired condition; 2) sites not in desired condition have an upward trend or an acceptable static trend to be agreed upon with the Services and the Forest Service; and 3) direction from consultation with the Services is met. The overall strategy consists of a long-term adaptive management strategy and an annual adaptive management strategy. The long-term strategy describes how adaptive management will be used to ensure the resource objectives previously stated are achieved and to maintain consistency with Forest Plan level direction. The annual adaptive management strategy describes how adjustments will be made within the grazing season to ensure annual use indicators and other direction from consultation is met. Both strategies describe when and how regulatory agencies will be contacted in the event direction from consultation is not going to be met.

Ideally, the value associated with the annual use indicator is customized to the specific circumstances in each unit and is based on data and experience. However, customizing this value generally requires a significant amount of data and/or experience with a particular unit. When sufficient data and/or experience are not available to establish the annual use indicators values, the forest has provided default recommendations for establishing the values. These recommendations will be used until such time as sufficient data and/or experience are available to customize the annual indicator values. The recommendations that apply to this allotment are:

- When the greenline ecological status is 61 or greater, the end of season median greenline stubble height will be 4 inches
- When the greenline ecological status objective is less than 61, the end of season median greenline stubble height will be 6 inches
- In priority watersheds, when bank stability is 90% or greater, the bank alteration indicator will be 20%
- In priority watersheds, when bank stability is 70-89%, the bank alteration indicator will be set at a value between 10 and 20% depending on the circumstances specific to that unit
- In priority watersheds, when bank stability is less than 70%, the bank alteration indicator will be 10%
- When there is sufficient woody recruitment to develop and maintain healthy woody plant populations, the woody browse indicator will be 50% woody browse on multi-stemmed species and 30% woody browse on single-stemmed species
- When there is not sufficient woody recruitment to develop and maintain healthy woody plant populations, the woody browse indicator will be 30% woody browse on multi-stemmed species and 20% woody browse on single-stemmed species

4 ESA ACTION AREA DESCRIPTION

The ESA action area is defined as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (50 CFR§402.02). This is the area where the action and any interdependent and interrelated actions will result in direct or indirect affects to listed species or designated critical habitat. Our analysis indicates that the proposed action has the potential to generate direct or indirect affects to aquatic species and aquatic habitats in the area covered by the allotment (Figure 2).

Bull trout priority watersheds are those watersheds that were identified as part of INFISH that are particularly important to bull trout. The consultation associated with INFISH requires a different management strategy within these areas because of their importance to bull trout. With the exception of the Bear Canyon and Cub Canyon drainages, the entire action area is within a bull trout priority watershed (Figure 3).

5 LISTED SPECIES REVIEW

5.1 SPECIES OCCURRENCE

The current semi-annual Species List issued by the U.S. Fish and Wildlife Service (List #14420-2010-SL-0089, issued December 30, 2009) identifies one ESA listed fish species as potentially occurring within the ESA action area. This is:

- Bull trout (Threatened) (Federal Register 63FR31647)

Bull trout are present throughout the ESA action area (Gamett 1999, Garren et al. 2008, Gamett and Bartel 2008) (Figure 6).

5.2 CRITICAL HABITAT

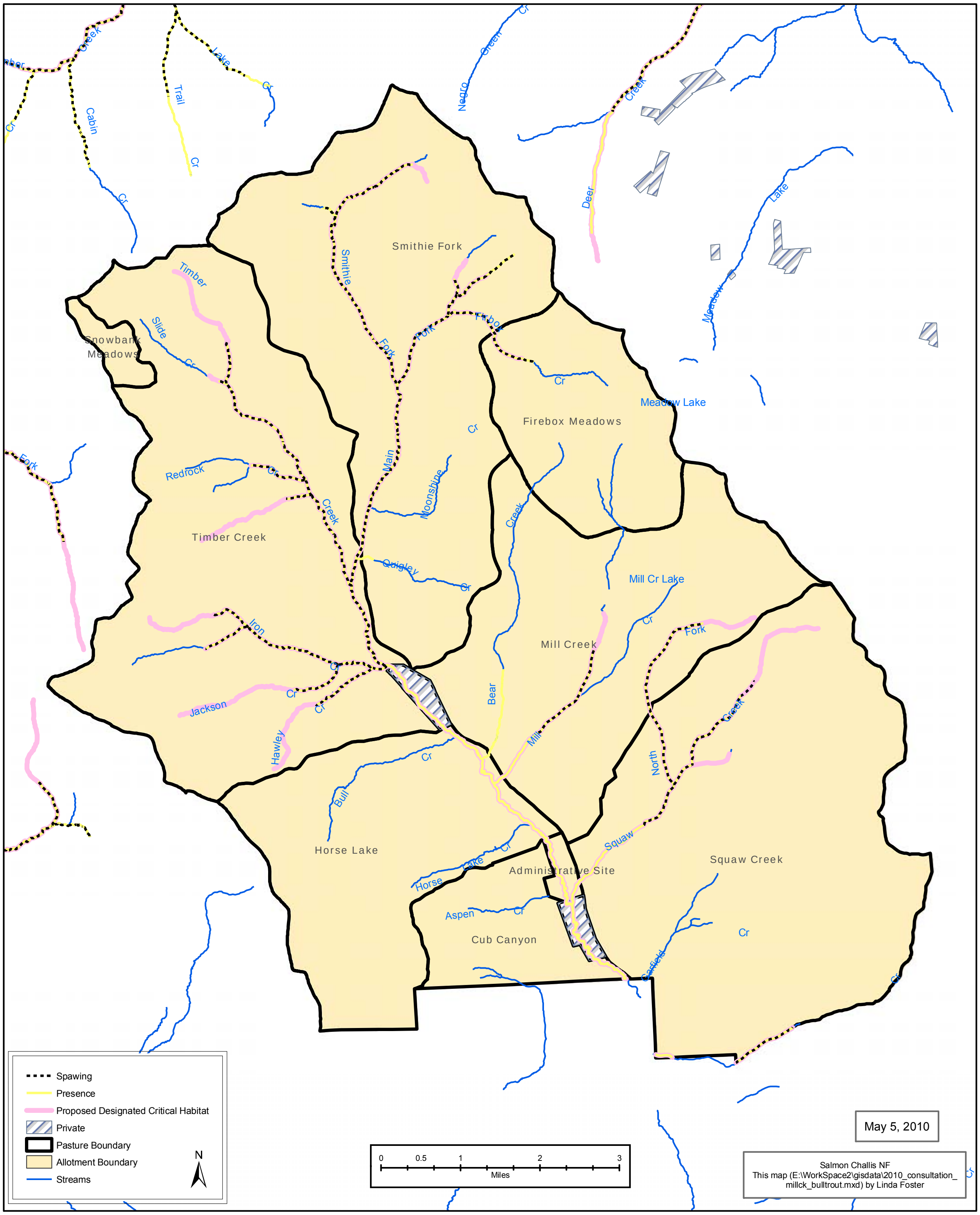
Critical Habitat was designated for bull trout on September 26, 2005 (Federal Register 70FR56212). Currently the USFWS has published a public notice in 2010 (Federal Register 75FR2270) that is proposing to revise the designated critical habitat. While the action area does not contain any currently designated critical habitat, it does contain proposed critical habitat.

This Biological Assessment will assess the potential impact to the Primary Constituent Elements (PCEs) of bull trout proposed critical habitat. These are defined on page 2360 of the referenced Federal register notice. Because these elements are important to the analysis determination for bull trout this Biological Assessment analyzes the potential impacts to the PCEs as they relate to the ESA Action Area (Appendix D).

Figure 4 – Timber Creek within the Timber Creek Unit. This photograph, which shows a riparian area dominated by coniferous forest, is representative of most of the riparian areas within the Timber Creek Unit. (Photograph taken on 7-31-2008)

Figure 5 – Timber Creek within the Timber Creek Unit. This photograph represents one of the small riparian meadow communities within this unit. While these areas are not representative of riparian conditions across the allotment they are "critical areas" because livestock tend to concentrate in these locations and can have significant impacts to them. (Photograph taken on 10-8-2003)

Figure 6 – Bull Trout



6 ENVIRONMENTAL BASELINE DESCRIPTION

The action area is within the Sawmill Canyon 5th Field HUC (5th Field HUC: 1704021701) and Summit Creek 5th Field HUC (5th Field HUC: 1704021702) (Figure 3). The Baseline Matrices of Diagnostic Pathways and Indicators for the Sawmill Canyon sub-watershed is provided in Appendix B. That portion of the Summit Creek sub-watershed within the allotment does not contain listed fish. Therefore, the baseline matrix for the Summit Creek sub-watershed is not provided.

Below is a general summary of baseline conditions within the action area. While the baseline matrix included in Appendix B reflects aquatic/riparian condition and trend at the watershed scale, the baseline descriptions provided below focus only on baseline conditions within the action area. This is done to focus analysis emphasis on those habitat parameters most likely to be influenced by grazing activities and set the context for analyzing the effects of the proposed action on these conditions. As these characterizations reflect the more localized site-specific conditions of the action area, identified condition and/or functionality assessments may vary from those identified for the larger watershed-scale baseline (Appendix B).

6.1 GENERAL DESCRIPTION OF LISTED FISH POPULATIONS

This section provides a general description of the distribution, status, and trend of listed fish populations within the action area. Bull trout are widely distributed and relatively abundant across most of the Mill Creek Allotment (Figure 6, Table C1) The Mill Creek Allotment contains large numbers of bull trout and contains some of the most important bull trout habitat in the Little Lost River basin. Seven of the eleven local bull trout populations in the Little Lost River basin occur within this allotment and the allotment contains 36.75 miles of occupied bull trout habitat. Many stream reaches within the allotment have bull trout densities (fish ≥ 70 mm) that are over 5.0 fish/100 m^2, some stream reaches have densities over 20.0 fish/100 m^2, and densities as high as 39.6 fish/100 m^2 have been observed (Gamett 2002, Gamett 1999). The densities of bull trout found on this allotment are among the highest observed in the species range. It is likely that over 95% of all bull trout in the Little Lost River basin occur within this allotment (B. Gamett, personal observation). Both resident bull trout and migratory bull trout occur on this allotment and it is believed that most of the fluvial bull trout in the Little Lost River basin spawn on this allotment. Although there are large numbers of bull trout on this allotment, bull trout densities are in a downward trend in many areas (Table C1).

While bull trout are widely distributed on the allotment and densities are high in many areas, it is unclear if bull trout will persist in the allotment or within the Sawmill Canyon sub-watershed in the long term. Brook trout occur within the sub-watershed and have nearly replaced bull trout in the Squaw Creek, North Fork Squaw Creek, and Mill Creek drainages. Furthermore, data indicate that brook trout are expanding into other areas as well and brook trout x bull trout hybrids have been found in many locations throughout the sub-watershed. It is possible that brook trout will completely replace bull trout within the sub-watershed in the next 50 years unless management action is taken.

6.2 GENERAL DESCRIPTION OF HABITAT CONDITIONS

This section provides a general description of the status and trend of bull trout habitat within the action area. More specific information on habitat conditions, including specific habitat data, is provided later in this section and in Appendices B and C.

Habitat conditions within the allotment are in relatively good condition. However, impacts associated with anthropogenic activities have impacted some areas. Until recently there were several artificial barriers within the allotment. These were generally stream culverts that prevented or interfered with the upstream movement of fish. However, most of these have been eliminated through a series of projects that were implemented over the last several years.

6.3 MAJOR LIMITING FACTORS

This section provides a general description of the major anthropogenic factors impacting listed fish and listed fish habitat in the action area. The biggest impacts that are currently affecting listed fish in the action area are 1) introduced brook trout, 2) reduced habitat quality associated with livestock grazing, 3) reduced habitat quality associated with roads. More specific details on the impacts of livestock grazing on fish and fish habitat are provided below.

6.4 GRAZING FOCUS INDICATORS

A Framework to assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Subpopulation Watershed Scale is a tool that was developed to assist in describing the condition of watersheds and streams which listed Chinook salmon, steelhead, and bull trout depend on (Appendix 9 in Lee et al., 1997). It is commonly referred to as the Matrix of Pathways and Indicators, and at its most basic level, is a table which identifies the important elements or indicators of listed salmonid habitat. This table assists biologists to consistently organize and assess current conditions and evaluate how those indicators may be impacted by a proposed action (Lee et al. 1997). The Forest has included a matrix for this allotment in Appendix B. Because the Matrix of Pathways and Indicators was developed to operate at several spatial scales (Lee et al. 1997) the Forest has selected six indicators from the matrix table as their "focus indicators" and the analysis of livestock impacts to fish and designated habitat will be based on these focus indicators. The focus indicators are 1) spawning and incubation, 2) temperature, 3) sediment, 4) width: depth ratio, 5) streambank condition, and 6) riparian conservation areas. These are the indicators that the Forest can easily monitor, have the most specificity with a long running data sets, and most closely reflect the aquatic/riparian baseline pathway and indicator elements considered most likely to be impacted by grazing activities within a watershed.

The Forest has utilized this "Focus Indicator" set to characterize the condition of the habitat for listed fish species in the occupied streams in this allotment. If stream specific information is not available, then observational information or information from similar streams was used. If one (or several) of the focus indicators showed a habitat condition was potentially limiting the ability of listed fish species to thrive; the Forest presented an opinion of the most likely causal factor for that limiting condition. By identifying those potentially limiting factors, the Forest and the Service can focus their analysis on the specific indicators.

These indicators encompass the recently published proposed bull trout critical habitat, and therefore our analysis of these elements will serve as an analysis of impacts to designated and proposed critical habitat.

A description of the condition of the Focus Indicators within the action area is provided below.

6.4.1 SPAWNING AND INCUBATION:

Bull trout appear to spawn over much of the allotment. Available data indicate that bull trout spawn in a total of 29.50 miles of stream on the allotment (Figure 6, Table C2, Table C3). Specifically, bull trout likely spawn within the Squaw Creek, Mill Creek, Smithie Fork, and Timber Creek units. Although bull trout occur within the Horse Lake and Cub Canyon units, they do not appear to spawn within these units. Bull trout begin spawning on the allotment as early as late August (Lost River Ranger District, unpublished data). The Salmon-Challis National Forest has established August 15 as the date on which bull trout may begin spawning unless site specific information clearly indicates a later date is appropriate.

6.4.2 WATER TEMPERATURE

The resource objective for water temperature is to have a maximum water temperature, as expressed by the 7-day moving average of daily maximum temperatures (7DMMAX), below 15°C within adult holding habitat and below 8.9°C within spawning and rearing habitat. Within this allotment, adult holding habitat is considered to be Sawmill Creek below Iron Creek and the lower reaches of Mill Creek and Squaw Creek while all other stream reaches occupied by bull trout are considered to be spawning and rearing habitat.

Water temperatures exceed resource objectives across the allotment (Figure C1, Table C4). The stream temperature resource objective for Sawmill Creek below Iron Creek and the lower reaches of Mill Creek and Squaw Creek is to have a 7DMMAX below 15.0°C. In 2009, the 7DMMAX was 17.7°C in Sawmill Creek and 16.5°C in Squaw Creek. Stream temperature data are not available for Mill Creek from 2009 but in 2002 the 7DMMAX was 16.8°C. The resource objective for all other areas occupied by bull trout on this allotment is to have 7DMMAX below 8.9°C. However, in 2009, the 7MMAX was 14.0°C in Main Fork above Moonshine Creek, 13.8°C in Timber Creek, and 10.4°C Warm Creek. Stream temperature data are not available for Iron Creek, Main Fork above Smithie Fork, and Smithie Fork from 2009 but in 2002 the 7DMMAX was 12.8°C in Iron Creek and 16.7°C in Smithie Fork and in 2001 the 7DMMAX was 14.5°C in Main Fork above Smithie Fork.

It should be emphasized that stream temperatures were likely relatively low in 2009. The summer of 2009 was a relatively wet, cold year and this likely resulted in relatively low stream temperatures compared for drier, warmer years. For example, in 1997, which was a relatively wet, cold year, the 7MMAX in the lower end of Timber Creek was 14.3°C but in 2000, which was a relatively warm, dry year the 7MMAX was 16.0°C (Lost River Ranger District, file data). Subsequently, it is likely that stream temperatures throughout this allotment will be somewhat warmer in “normal” or relatively warm, dry years compared to those observed in 2009.

Stream temperatures likely exceed the resource objective for a variety of reasons. First, the resource objective may be lower than stream temperature would be naturally. Second, a wildfire burned a large portion of the Main Fork drainage in 1988 and the removal of the timber canopy associated with the fire likely caused an increase in stream temperatures in that area. Third, livestock grazing may be having some minor impacts on stream temperatures in some areas.

6.4.3 SEDIMENT

The resource objective for sediment is to have less than 20% fines (< 0.25 inches in diameter). Sediment levels exceed the resource objective in many areas on the allotment. In 2003, the Forest Service evaluated surface fines in several stream reaches in the Mill Creek Allotment (Table C5). Surface fines exceeded 20% in most areas evaluated on the western side of the allotment including Camp Creek, Hawley Creek, Slide Creek, and Redrock Creek and some portions of Jackson Creek, Timber Creek, and Iron Creek. Streams on the eastern side of the allotment had surface fines below 20% as did some parts of Iron Creek, Jackson Creek, and Timber Creek. The Forest Service has also collected depth fine data for several years from various streams on the allotment (Figure C1, Table C6). In 2009, depth fines exceeded 20% in Mill Creek, Squaw Creek, Timber Creek, and the Little Lost River. Smithie Fork was the only stream in this allotment in 2009 with depth fines less than 20%. The depth fines in Iron Creek in 2001, which was the only year in which depth fines were evaluated in this stream, were 45%. The elevated sediment levels found in streams on this allotment have likely been caused by road construction, poorly located trails, timber harvest, dispersed recreation, and livestock grazing. The western portion of the allotment is particularly sensitive to disturbance from grazing and other activities because it is composed primarily of volcanic rock.

6.4.4 WIDTH: DEPTH RATIO

The resource objective for width:depth is to have a width:depth ratio of less than 21 in A channel types, 27 in B channel types, and 28 in C channel types. Width:depth ratios meet the resource objective on most of the allotment. In 2009, the Forest Service evaluated width:depth ratios at several locations on this allotment using the MIM protocol (Figure C1, Table C7). The only stream which did not meet this objective was Mill Creek which had a width:depth ratio of 30.4. It is likely that livestock grazing has contributed to the high width:depth ratios observed in this stream.

Width:depth ratios have not been evaluated on Warm Creek using the MIM protocol. However, visual observations along Warm Creek in the summer of 2009 indicated that the width:depth ratio may exceed the resource objective (B. Gamett, personal observation). An evaluation of Warm Creek in 2009, which included a comparison of that portion of Warm Creek on this allotment with a portion of Warm Creek outside the allotment, indicated that livestock have significantly impacted width:depth ratios on Warm Creek within this allotment.

6.4.5 STREAMBANK CONDITION

The analysis of streambank condition focuses on streambank stability. The resource objective for bank stability on this allotment is to have bank stabilities of 90% or greater. Bank stabilities are below the resource objectives in some areas. In 2009, the Forest Service evaluated bank stability at several locations on this allotment using the MIM protocol (Figure C1, Table C7). Bank stabilities were 45% in Bear Creek, 73% and 79% in Smithie Fork, 85% in the middle section of Squaw Creek, 89% in Mill Creek, and 98% in the lower section of Squaw Creek.

Livestock grazing has likely partially contributed to bank stabilities not meeting the resource objective. Livestock grazing has likely contributed to the low bank stabilities observed in Smithie Fork. Both livestock grazing and the loss of beaver ponds has likely contributed to the low bank stabilities observed in Bear Creek. For example, the MIM site on Bear Creek is within an area where a beaver pond washed out and this has apparently reduced bank stability in this area (C. Leavitt, personal communication). Likewise, livestock grazing is also impacting bank stability on this stream. On November 11, 2009, a review was conducted on a section of Bear Creek that was approximately 1,400 feet long (Lost River Ranger District, unpublished data). This review indicated that there were several areas where livestock were having an “extreme” impact on bank stability (see Figure 7 for an example).

Bank stability data have not been collected from Timber Creek using the MIM protocol. However, data collected using the Salmon-Challis National Forest watershed monitoring protocol in 2009, indicated that bank stability was 82%. Livestock grazing may be affecting bank stability in this stream. As discussed earlier, most riparian areas in the Timber Creek Unit are dominated by coniferous forest and livestock grazing generally has little impact on these areas. However, there are a few small riparian meadow communities within this unit. While these areas are not representative of riparian conditions across the allotment livestock can impact bank stability in these areas and in areas adjacent to these areas (see Figure 8 for an example).

Bank stability data have not been collected from Warm Creek using the MIM protocol. However, visual observations along Warm Creek in the summer of 2009 indicate that bank stabilities on that section of the stream that is within this allotment are significantly below the resource objective (B. Gamett, personal observation). An evaluation of Warm Creek in 2009, which included a comparison of that portion of Warm Creek on this allotment with a portion of Warm Creek outside the allotment, indicated that livestock have significantly impacted bank stabilities on Warm Creek within this allotment (see Figure 9 for an example).

6.4.6 RIPARIAN CONSERVATION AREAS

The analysis of riparian conservation areas focuses on greenline ecological status and woody species recruitment. The resource objective for greenline ecological status is to have a greenline ecological status of 61 or greater. In 2009, the Forest Service evaluated greenline ecological status at several locations on this allotment using the MIM protocol (Figure C1, Table C7). Greenline ecological status exceeded 61 at all locations except Bear Creek which had a greenline ecological status of 46. While this site was below the resource objective, the greenline ecological status at this site was only 15 in 1999 but by 2005 it had increased to 26, indicating that greenline successional status at this site has been on a strong upward trend. Greenline ecological status trends are up or stable across the allotment except at a single site on Smithie Fork. Livestock grazing and the loss of beaver ponds has likely contributed to the low greenline ecological status observed on Bear Creek.

The resource objective for woody recruitment is to develop and maintain healthy woody plant populations. This objective can be evaluated by examining the total density of woody species, the density of seedlings and young, and the percentage of woody plants that are seedlings and young. In 2009, the Forest Service evaluated these parameters on this allotment using the MIM protocol (Table C7). Woody species densities exceed 2,000 plants/acre at all sites except one of the two sites on Smithie Fork. At this site, the density of seedlings and young was also relatively low at 529 seedling-young/acre and seedlings and young comprised 17% of the total woody population. Livestock grazing may be contributing to the low densities of woody species and low levels of woody recruitment at this site. However, another site in close proximity to this site had higher densities of woody species and higher levels of woody recruitment indicating the problem may not occur on the entire unit.

Greenline ecological status and woody recruitment have not been evaluated on Warm Creek using the MIM protocol. However, visual observations along Warm Creek in the summer of 2009 indicate that greenline ecological status and woody recruitment are both likely well below the resource objectives (B. Gamett, personal observation). An evaluation of Warm Creek in 2009, which included a comparison of that portion of Warm Creek on this allotment with a portion of Warm Creek outside the allotment, indicated that livestock are the primary cause for the apparent low greenline ecological status and limited woody recruitment that is observed on that section of Warm Creek within this allotment.

6.4.7 ANNUAL USE INDICATORS AND OBJECTIVES AND THEIR RELATIONSHIP TO FOCUS INDICATORS

Annual use indicators were selected because of their documented ability to maintain and/or achieve riparian objectives described in section 3.2.5. There is considerable overlap; the riparian system effectively integrates vegetation cover, flow regimes, sediment and nutrients (DeBano 1989). The goal is to manage livestock grazing so as not to prevent the attainment and maintenance of healthy aquatic and riparian communities (Gamett et al 2008).

Livestock will affect riparian vegetation and physical conditions differently depending on many factors, including the site's physical characteristics and conditions, the stage of plant development, the nature of the plant communities in both the riparian zone and the uplands, and current weather. There are tradeoffs in potential impacts with regard to time of grazing (Erhart and Hansen 1997). These are grazing and livestock management considerations, and while important to implementing sound riparian grazing management, are generally excluded from the following discussion.

The focus of this section is on the annual use indicators and how managing by them will help maintain or achieve the riparian resource objectives and grazing focus indicators.

Annual Use Indicators and Vegetation in Riparian Areas. How much and what type of vegetation exists in a riparian plant community, particularly on the greenline, determines how well the riparian system performs its function of reducing flow velocity, trapping sediment, building banks and protecting against erosion. The susceptibility of streambanks to damage is influenced by vegetation. Woody vegetation has an essential role in maintaining riparian function; reducing browsing pressure on riparian trees and shrubs is a significant benefit. Roots and rhizomes of herbaceous vegetation provide much of the compressive strength and soil stability for streambanks in meadow situations such as on the Challis National Forest (Clary and Kinney 2000).

Streamside vegetation strongly includes the quality of habitat for anadromous and resident coldwater fishes including shade to prevent adverse water temperatures fluctuations, roots that lend stability to overhanging banks, and the capability to filter sediment and debris (Kauffman and Krueger 1984).

Stubble height on the greenline is directly related to the health of herbaceous plants (Burton et al 2008). Dense vegetation on the floodplain during spring flooding events to trap sediment plus vigorous plant growth to stabilize sediment deposits is critical for bank building and maintenance. Residual herbaceous vegetation of six inches in a 20 year comparison study in southwestern Montana resulted in dense vigorous riparian vegetation as well as a diversity of age classes of vigorous woody riparian species (Myers 1989). In Idaho, maintaining stubble heights of 4 to 5.5 inches allowed streambank recovery (Clary 1999). Shorter stubble heights (up to six inches) are most effective in improving sediment entrapment during the deposition phase while even longer lengths retain a larger portion of deposited sediment (Clary and Leininger 2000). Four inch stubble in either late June or early July resulted in no difference in bank angle or stream width compared to no grazing in the Sawtooth Valley (Clary and Kinney 2000).

Figure 7 – Section of Bear Creek where livestock grazing is impacting stream and riparian habitat. (Photograph taken on 11-2-2009)

Figure 8 – Section of Timber Creek where livestock grazing is impacting stream and riparian habitat. (Photograph taken on 10-8-2003)

FIGURE 9 – SECTION OF WARM CREEK WHERE LIVESTOCK GRAZING IS IMPACTING STREAM AND RIPARIAN HABITAT. (PHOTOGRAPH TAKEN ON 10-22-2009)

TABLE 3. RELATIONSHIP MATRIX

Focus Indicator	Riparian Resource Objective	Related Element Affected by Livestock Grazing	Related Annual Use Indicator
Streambank Condition	Greenline Successional Status	Greenline Status	Greenline Stubble
	Woody Species Regeneration	Woody Species Regeneration	Browse Use
	Bank Stability	Greenline Status, Woody Species Regeneration, Current Year Alteration	Stubble Height, Browse Use, Bank Alteration
Temperature	Water Temperature	Greenline Status, Woody Species Regeneration, Vegetation Overhang	Greenline Stubble, Browse Use, Bank Alteration
Width:Depth	Width:Depth Ratio	Greenline Status, Current Year Alteration	Greenline Stubble, Browse Use, Bank Alteration
Sediment	Sediment	Greenline Status, Bank Stability, Current Year Alteration	Greenline Stubble, Browse Use, Bank Alteration
Riparian Conservation Areas	Greenline Successional Status	Greenline Status	Greenline Stubble
	Woody Species Regeneration	Woody Species Regeneration	Browse Use
	Bank Stability	Greenline Status, Woody Species Regeneration, Current Year Alteration	Stubble Height, Browse Use, Bank Alteration
Spawning and Incubation	N/A	N/A	N/A

Most measurements of streamside variables moved closer to those beneficial for salmonid fisheries when pastures were grazed to four inches of graminoid stubble height; virtually all measurements improved when pastures were grazed to six inches stubble height, or when pastures were not grazed (Clary 1999). The residual stubble or regrowth should be at least four to six inches in height to provide sufficient herbaceous forage biomass to meet the requirements of plant vigor maintenance, bank and sediment entrapment (Clary and Webster 1989). This is a recommended grazing practice for "B" channel types with medium to fine easily eroded soil materials and most "C" channel types, in mid seral conditions. Special situations may require stubble heights of greater than six inches (Clary and Webster 1989, Myers 1989).

Cattle are destructive to willow stands when they congregate in them (Kovalchik and Elmore 1991, Schulz and Leininger 1990). When herbaceous forage quality diminishes, by either utilization or curing, cattle switch from grazing to browsing (Hall and Bryant 1995, Clary and Leininger 2000). The degree to which browsing of willows is compatible with maintaining willow stands depends on the relative number of willows present. Where willow browsing is light and seedling survival is high the vigor of willows is high. (Kovalchik and Elmore 1991). There is a loop between vigorous willow [and sedge] regrowth, excellent streambank protection and soil and water relationships favorable to continued willow [and sedge] production (Kovalchik and Elmore 1991).

Resistance of common riparian woody plants to defoliation has not been investigated. However, genera commonly represented in riparian areas such as dogwood, maple, cottonwood, willow and birch appear to be more resistant to foliage and twig removal than genera common to xeric uplands (Clary and Webster 1989). Many upland species can tolerate 50 – 60% use, including desirable browse species such as antelope bitterbrush, rose and aspen (Ehrhart and Hansen 1997). Less than half of heavily clipped or browsed willow stems survive into the following year (Smith 1980 and Kindschy 1989 as cited in Kovalchik and Elmore). Willow use is most critical (most likely to occur) when grazing extends into the hot summer season or fall (Myers 1989, Clary and Webster, 1989, Kovalchik and Elmore 1991). Removing cattle before 45 - 50% forage use improves the response of willows (Edwards 2009, Kovalchik and Elmore 1991). The Bureau of Land Management has concluded that exceeding 50% use of current year browse leaders would likely reduce woody vegetation vigor, modify normal growth form, and in the longer-term diminish the age class structure, all of which could affect riparian habitat conditions. Where there is current upward trend of ecological condition it is expected to continue by managing for no more than 50% browse use (USDI BLM 2009).

A study on Stanley Creek in central Idaho (Clary and Kinney 2000) applied three levels of forage use - moderate (50%), light (25%) and no grazing - on mountain meadows in the last half of June. Results were an increase in willow height and cover. Other studies cited in Clary and Kinney show that by maintaining an adequate herbaceous forage supply, and controlling the period of grazing, impacts on the willow community are reduced.

Annual Use Indicators and Streambank Alteration. Grazing along streambanks does as much or more damage to stream-riparian habitats through bank alteration as through changes in vegetation biomass. Overuse by cattle can easily destabilize and break down streambanks as vegetation is weakened and hoofs shear bank segments (Clary and Kinney 2000). A major resource management need is to consider the maintenance of streambank structure and channel form as key factors in fisheries habitat and hydrologic function.

It is widely known that bank alteration by trampling, shearing, and exposure of bare soil can be an important source of stream channel and riparian area degradation (Clary and Webster, 1989, Belsky et al., 1999). Impacts of bank alteration may include channel widening (and loss access to floodplains by peak flows), loss of riparian vegetation (which then makes banks more vulnerable to further erosion), localized lowering of water tables in riparian areas (and loss of water storage in floodplains and stream channels), and changes in sediment transport capacity of stream channels (Clary and Webster 1989).

Literature such as Clary and Webster (1989) often refers to the indirect effect on streambank trampling. A number of other authors who reviewed the literature summarized that careful control of grazing duration and season results in maintenance of the streambank vegetation and limitation of trampling, hoof slide, and accelerated streambank cave-in (Erhart and Hansen 1997, Clary and Leininger 2000).

Some researchers have concluded that bank alteration, taking natural channel stability into account, is the most important factor to consider in evaluating physical stream channel conditions and impacts from land use. Streambank alterations of 20% or less are expected to allow for upward trend of streams with stream widths narrowing and depths increasing (Bengeyfield, 2006).

In southwestern Montana, stream channels narrowed and deepened when streambank disturbance from cattle did not exceed 30 feet per 100 feet of stream reach (Dallas 1997 cited in Mosley et al., 1997). Based on Cowley's literature review, "it appears that 70 percent unaltered streambanks (i.e., 30 percent altered streambanks) is the minimum level that would maintain stable conditions. All of [the] authors consider both natural and accelerated alteration in the totals". Cowley suggested that 80% unaltered streambanks should allow for "making significant progress" toward stream channel improvement, and that this value should be the maximum allowable streambank alteration (Cowley 2002 cited in Simon 2008).

7 ANALYSIS OF EFFECTS

This section contains the effects analysis. The effects of the proposed action are described below and summarized in Table 4. The analysis emphasizes the expected effects of the proposed action on the six focus indicators.

7.1 DIRECT AND INDIRECT EFFECTS

Direct effects are those effects that are a direct result of the action. Indirect effects are “caused by the proposed action and are later in time, but still are reasonably certain to occur” (50 CFR§402.02).

Direct effects of livestock grazing may occur when livestock enter streams occupied by listed salmonids to loaf, drink, or cross the stream. Livestock entering fish-spawning areas can trample redds, and destroy or dislodge embryos and alevins (Belsky et al. 1997, Gamett et al. 2009).

Improperly managed grazing can additionally have adverse indirect effects to streams and riparian areas (Menke 1977; Clary and Webster 1989; Belsky et al. 1997). These effects can include modifications to stream temperatures, sediment levels, width:depth ratios, bank stability, and riparian vegetation.

A variety of conservation measures can be implemented to minimize or eliminate potential grazing related effects to listed fish and their aquatic and riparian habitats. These include:

- Strategic Rotation: Unit rotation strategies designed to move livestock off streams during critical spawning periods can avoid direct impact to spawning fish or their incubating redds.

- Fencing: Fencing sensitive riparian areas can be an effective way of protecting riparian resources, fish habitat and fish populations. Platts (1991) found that, in 20 of 21 studies, stream and riparian habitats improved when grazing was prohibited in fenced riparian zones.

- Utilization Standards: Establishing utilization standards for forage utilization and moving livestock when these standards are approached or reached, can help avoid many of the adverse effects that livestock grazing can have on fish and their habitat.

The likely impacts of the proposed action on the six grazing focus indicators are discussed below.

7.1.1 SPAWNING AND INCUBATION

Livestock wading through streams can step on salmonid redds (Gregory and Gamett 2009, Ballard and Krueger 2005a, Ballard and Krueger 2005b). This process has been referred to as redd trampling (Gregory and Gamett 2009) and may result in the death of eggs and alevines which are developing in the gravel. Gregory and Gamett (2009) estimated that livestock grazing under routine conditions on national forest lands could trample up to 78% of bull trout redds. This level of trampling could result in a significant reduction in egg and alevin survival and could significantly reduce the size of the bull trout population.

The proposed action will result in livestock trampling bull trout redds. Bull trout spawn in the Squaw Creek, Mill Creek, Smithie Fork, and Timber Creek units and it is believed that they begin spawning in these areas sometime after August 15. Gregory and Gamett (2009) estimated that livestock would trample 33% of the bull trout redds in the Smithie Fork Unit. However, livestock will not graze in the Smithie Fork Unit after August 15 thereby eliminating the potential for livestock to trample bull trout redds in that unit. This is significant in that this unit contains the most important spawning habitat in the Little Lost River basin in terms of numbers of fish.

Livestock will graze the Squaw Creek, Mill Creek, and Timber Creek units after August 15. However, the impact to bull trout redds is expected to be limited. In the Timber Creek Unit, the impact of redd trampling will be limited by prohibiting grazing in the unit after August 31. Livestock will be removed from the Timber Creek Unit by August 31. Data collected from a reach of Timber Creek in 2001 indicated that only about 17% of the bull trout redds had been completed by August 31 (Lost River Ranger District, file data). If this is typical of other years and other streams in the unit, prohibiting livestock grazing in this unit after

August 31 would mean that only 17% of the bull trout redds in this unit would susceptible to being trampled by livestock. Furthermore, Gregory and Gamett (2009) estimated that livestock would only likely trample about 12% of the bull trout redds in the Timber Creek Unit. Therefore, if livestock are removed from the Timber Creek Unit by August 31, it is estimated that only 2% of the total annual bull trout redd production would be trampled by livestock. In the Mill Creek and Squaw Creek units, the impact of redd trampling is being limited by the rotation. Livestock will only graze these two units after August 15 during two of the four years in the rotation cycle. Furthermore, the number of bull trout redds trampled by livestock in these two units will likely be similar to that reported by Gregory and Gamett (2009) for the Timber Creek Unit, which was 17%. Therefore, in a four year period it is estimated that approximately 9% of the redds in these two units would be trampled by livestock.

7.1.2 WATER TEMPERATURE

Stream temperatures can have a significant impact on bull trout distribution and abundance. Gamett (2002) evaluated the relationship between bull trout distribution and abundance in the Little Lost River basin and found that bull trout were always present in stream reaches where the July-September mean temperature (JSMT) was less than 10.0°C but were never present where the JSMT was greater than 12.0°C. This work also found that bull trout densities (fish >70mm/100 m^2) were highest where the JSMT was 7.0-7.9°C but dropped sharply as the JSMT increased. Specifically, mean bull trout density was 15.0 fish/100 m^2 where the JSMT was 7.0-7.9°C, 10.1 fish/100 m^2 where the JSMT was 8.0-8.9°C, 1.6 fish/100 m^2 where the JSMT was 9.0-9.9°C, 0.4 fish/100 m^2 where the JSMT was 10.0-10.9°C, 0.1 fish/100 m^2 where the JSMT was 11.0-12.0°C, and 0.0 fish/100 m^2 where the JSMT was greater than 12.0°C. This work suggests that even small increases in stream temperature could result in dramatic decreases in bull trout abundance.

Livestock grazing can modify stream temperatures (Armour et al. 1994). Stream temperatures are controlled by a complex interaction between stream shading, width:depth ratio, ground water input, water volume, air temperature, and source water temperature. Livestock can have significant impacts on stream shading, width:depth ratios, groundwater input, and water volume and through these mechanisms they can impact stream temperatures. Subsequently, summer stream temperatures are often higher in grazed areas compared to ungrazed areas (Platts 1991). Isaak and Hubert (2001) found that cattle density was inversely related to maximum summer stream temperatures. Stream temperature modeling completed by Gamett (2002) indicated that changes in water temperature brought about by modifications to streamside shading could have significant impacts on bull trout populations. This work evaluated how water temperature and bull trout abundance might change in a hypothetical stream typical of some streams in the Little Lost River basin when stream shade was reduced from 90% to 10%. This work found that such a change could increase the maximum water temperature observed on August 1 from 10.4°C to 21.6°C and that such a reduction would reduce the probability of bull trout being present from 100% to 6% and would reduce the number of salmonids that were bull trout from 88% to 7%.

Although biologists typically consider the effects of livestock grazing on summer stream temperatures, the impact of livestock grazing on winter temperatures should not be overlooked. While livestock grazing can result in higher summer stream temperatures it can also cause lower stream temperatures in the winter (Armour et al. 1994). This can occur when livestock grazing results in a loss of cover or when livestock grazing increases the width:depth ratio thereby increasing the surface:volume ratio. Either of these affects can reduce the ability of a stream to buffer itself against cold winter air temperatures and can lead to increased icing and a subsequent loss of habitat.

Livestock grazing has likely resulted in elevated summer stream temperatures on this allotment. Stream temperatures currently exceed resource objectives across the allotment and it is likely that livestock grazing is at least partially responsible for these high stream temperatures. Livestock grazing on this allotment has likely modified stream channels and riparian vegetation along several streams in a manner that has resulted in increased stream temperatures. For example, livestock grazing appears to have modified the riparian vegetation and stream channel in Bear Creek in a manner that would increase stream temperatures (Figure 7). This also appears to be the cases on other streams such as Mill Creek and Smithie Fork. These impacts have likely resulted in a small, but measurable, increase in stream temperature in these streams. The work completed by Gamett (2002) suggests that even small increases in summer stream temperature can reduce bull trout abundance in streams. Therefore, it is likely that the small increases in stream temperature that have resulted from livestock grazing on this allotment have reduced the ability of streams to support bull trout. Furthermore, such increases in stream temperature may lead to situation in which brook trout are able to replace bull trout (Gamett 2002). Subsequently, the increases in stream temperature associated with livestock grazing could result in brook trout expanding into additional streams on this allotment where they may eventually replace bull trout.

While livestock grazing has likely increased stream temperatures on this allotment, the proposed action will likely not lead to any additional increases in water temperature. The proposed action 1) allows livestock to graze to a stubble height of four inches in all units except a portion of the Horse Lake Unit where livestock can graze to a stubble height of 6 inches and 2) allows livestock to browse up to 25% on woody plants on all units except of portion of the Horse Lake Unit where there is not a browse standard. There is no bank alteration standard anywhere on the allotment. This grazing system will likely result in continued impacts to features that regulate stream temperature such as stream shading and width:depth ratios. However, this grazing system is similar to the one that been used on this allotment over the last ten years. Therefore, it is expected that the effects of the proposed action on stream and riparian habitats, including stream temperature, will be similar to those that have occurred over the last ten years. Therefore, while grazing has and will likely continue to impact stream temperatures, this impact is not expected increase under the proposed action.

7.1.3 SEDIMENT

Increased sediment in streams can reduce the survival of salmonid eggs and alevins that are incubating in the stream substrate. For example, Reiser and White (1988) evaluated the impact of fine (<0.84 mm) and coarse (0.84-4.6 mm) sediment on the survival of Chinook salmon and steelhead eggs in the laboratory. They found that the survival of steelhead eggs was about 85% when fine sediment was 0% but when fine sediment was 10% survival dropped to about 25%. Almost no eggs survived when fine sediments were 30%. With Chinook salmon eggs, they found that the survival was about 65% when fine sediment was 0% but that survival was only about 10% when fine sediment was 10%. Like the steelhead, almost not eggs survived when fine sediments were 30%. Experiments with course sediments also showed a sharp decline in the survival of both Chinook salmon and steelhead eggs as sediment levels increased from 0 to 30%. Similarly, Phillips et al. (1975) found that the survival of steelhead and coho salmon eggs dropped sharply as the amount of fines (1-3 mm) in the substrate increased. Although data relating to relationship between sediment and the survival of bull trout eggs are not available, increased sediment levels undoubtedly reduces the survival of bull trout eggs.

Sediment can also have impacts on trout abundance. For example, Watson and Hillman (1997) found that bull trout densities were negatively correlated with the amount of surface fines (< 2 mm). Similarly, Zoellick and Cade (2006) found that redband trout densities in southwestern Idaho were often greater than 40.0 fish/100 m^2 where surface fines (< 2 mm) were less than 20% but that densities were never greater than 40.0 fish/100 m^2 when surface fines were greater than 40%.

Livestock grazing can significantly increase stream sediment levels. This is done through impacts to upland vegetation thereby increasing sediment generated from the uplands and by impacts that reduce bank stability thereby increasing sediment generated by bank erosion. Subsequently, streams in grazed areas typically have more fine sediment than streams in ungrazed areas (Platts 1991). Lusby (1970) evaluated sediment production in grazed and ungrazed watersheds in Colorado and found that sediment production was about 45% less in ungrazed watersheds compared to grazed watersheds. Dahlem (1979) studied changes in stream sediment levels following the elimination of cattle grazing in the Mahogany Creek watershed in Nevada. He found that just two years after livestock were removed from the watershed, the amount of stream bottom covered by silt had declined from 27% to 11% and that spawning gravels increased from 52% to 70%. Hubert et al. (1985) compared sections of a Wyoming stream that were grazed with those that had not been grazed for four years. They found that the substrate in sections of the stream that were grazed was 22% silt whereas the substrate in sections of stream that had not been grazed for four years was just 13% silt. Since livestock grazing can lead to increased sediment levels in streams and subsequently impact fish populations it is important to consider the effect of livestock grazing on stream sediment levels.

Livestock grazing has likely resulted in elevated sediment level in many streams on this allotment. Sediment levels currently exceed resource objectives in many parts of this allotment and it is likely that livestock grazing is at least partially responsible for these high sediment levels. Livestock grazing on this allotment has likely modified upland vegetation, riparian vegetation, and stream banks along several streams in a manner that has resulted in increased sediment levels. For example, livestock grazing appears to have modified riparian and stream channel habitats in Bear Creek in a manner that would increase sediment levels (Figure 7). This also appears to be the cases on other streams such as Mill Creek, Iron Creek, Timber Creek, and Warm Creek. These impacts have likely resulted in measurable increases in sediment levels in these streams which has likely reduced the ability of these streams to support bull trout.

While livestock grazing has likely increased sediment levels on this allotment, the proposed action will likely not lead to any additional increases in sediment. The proposed action 1) allows livestock to graze to a stubble height of four inches in all units except a portion of the Horse Lake Unit where livestock can graze to a stubble height of 6 inches and 2) allows livestock to browse up to 25% on woody plants on all units except of portion of the Horse Lake Unit where there is not a browse standard. There is no bank alteration standard anywhere on the allotment. This grazing system will likely result in continued impacts to features that affect sediment levels such as riparian vegetation and bank stability. However, this grazing system is similar to the one that been used on this allotment over the last ten years. Therefore, it is expected that the effects of the proposed action on stream and riparian habitats, including sediment, will be similar to those that have occurred over the last ten years. Therefore, while grazing has and will likely continue to impact sediment levels, this impact is not expected increase under the proposed action.

7.1.4 WIDTH: DEPTH RATIO

Fish abundance is often negatively correlated with width:depth ratio (Lanka et al. 1987, Scarnecchia and Bergersen 1987). Kozel et al. (1989) studied several streams in Wyoming and found a negative correlation between width:depth ratio and trout biomass. Similarly, Dunham et al. (2002) studied several streams in Nevada and found that Lahontan cutthroat trout densities were often greater than 30 fish/100 m^2 when width:depths ratios were less than 20 but were generally less than 30 fish/100 m^2 when width width:depth ratios were greater than 30.

Livestock grazing can increases width:depth ratios (Platts 1991, Riedel et al. 2006). Hubert et al. (1985) compared sections of a Wyoming stream that were “heavily grazed” and “lightly grazed” and found that the width:depth ratio in the “heavily grazed” section was 43 while in the “lightly grazed” section it was just 21. On another stream they compared sections of stream that were grazed with those that had not been grazed for four years. They found that the width:depth ratio in the grazed sections was 37 whereas the width:depth ratio in the ungrazed sections was just 28.

Clary (1999) studied the effect of livestock grazing on width:depth ratios in Stanley Creek in Idaho. He evaluated the changes in width:depth ratios that occurred when grazing was changed from season long, heavy use (60-65% utilization in dry meadows) to either grazing in late June with medium use (35-50% utilization in dry meadows), grazing in late June with light use (20-25% utilization in dry meadows), and no grazing at all. He found that there was a significant decrease in width:depth ratios with all three grazing strategies but that the decrease was greatest in the areas where livestock were not grazed at all.

Overton et al. (1994) compared width:depth ratios in sections of grazed and ungrazed streams in California. In Coyote Valley Creek, they found that two rested sections of stream had width:depth ratios of 3.5 and 3.0 whereas the three grazed sections had width:depth ratios of 6.8, 7.4, and 7.6. In Silver King Creek, they found that two rested sections had width:depth ratios of 21.4 and 15.4 whereas two grazed sections had width:depth ratios of 27.7 and 16.4. Two ungrazed streams similar to Silver King Creek had width:depth ratios of 15.3 and 14.6.

Livestock grazing has likely resulted in elevated width:depth ratios in some streams on this allotment. Width:depth ratios currently exceed resource objectives in Mill Creek and possibly Warm Creek and it is likely that livestock grazing is at least partially responsible for these high width:depth ratios. Livestock grazing on this allotment has likely modified riparian vegetation and stream banks along these streams in a manner that has resulted in measurable increases in width:depth ratios which has likely reduced the ability of these streams to support bull trout.

While livestock grazing has likely increased width:depth ratios on this allotment, the proposed action will likely not lead to any additional increases in width:depth ratios. The proposed action 1) allows livestock to graze to a stubble height of four inches in all units except a portion of the Horse Lake Unit where livestock can graze to a stubble height of 6 inches and 2) allows livestock to browse up to 25% on woody plants on all units except of portion of the Horse Lake Unit where there is not a browse standard. There is no bank alteration standard anywhere on the allotment. This grazing system will likely result in continued impacts to features that affect width:depth ratios such as riparian vegetation and bank stability. However, this grazing system is similar to the one that been used on this allotment over the last ten years. Therefore, it is expected that the effects of the proposed action on stream and riparian habitats, including width:depth ratios, will be similar to those that have occurred over the last ten years. Therefore, while grazing has and will likely continue to impact width:depth ratios, this impact is not expected increase under the proposed action.

The exception to this is on Warm Creek. Prior to turnout in 2011, an exclosure will be constructed on most of Warm Creek. This will eliminate the affects of livestock grazing along this stream which should lead to reduced width:depth ratios.

7.1.5 STREAMBANK CONDITION

Bank stability can have important affects on fish populations. Zoellick and Cade (2006) found that redband trout densities in southwestern Idaho were often greater than 40.0 fish/100 m^2 in stream reaches where bank stability exceeded 80% but were rarely greater than 40.0 fish/100 m^2 when bank stability was less than 80%.

Livestock grazing can significantly reduce bank stability. This occurs when livestock modify the abundance or composition of riparian vegetation in a manner that makes the bank more vulnerable to erosion or when livestock directly impact the bank through bank trampling. Subsequently, streams in grazed areas often have lower bank stabilities than streams in ungrazed areas (Platts 1991). Riedel et al. (2006) evaluated the impact of livestock grazing on bank stability in the Nemadji River watershed in Minnesota and found that grazing “significantly reduced stream bank stability.” Overton et al. (1994) compared bank stabilities in sections of grazed and ungrazed streams in California. In Coyote Valley Creek, they found that two rested sections of stream had bank stabilities of 92.8 and 98.9% whereas three grazed sections had bank stabilities of 62.2, 45.6, and 42.5%. In Silver King Creek, they found that the two rested sections had bank stabilities of 82.4 and 63.7% whereas the two grazed sections had bank stabilities of 60.0 and 60.2%. Two ungrazed streams similar to Silver King Creek had bank stabilities of 91.5 and 100%. Hubert et al. (1985) compared sections of a Wyoming stream that were grazed with those that had not been grazed for four years. They found that banks in grazed sections had 23% bare soil whereas banks in sections that had not been grazed for four years had just 12% bare soil. Since livestock grazing can reduce bank stability and subsequently impact fish populations it is important to consider the effect of livestock grazing on bank stability.

Livestock grazing has likely reduced bank stability in several streams on this allotment. Bank stabilities are currently well below resource objectives in Bear Creek, Smithie Fork, and Timber Creek and are likely well below objectives in Warm Creek. It is likely that livestock grazing is at least partially responsible for these low bank stabilities. Livestock grazing on this allotment has likely modified riparian vegetation and stream banks along these streams in a manner that has resulted in measurable reductions in bank stability which has likely reduced the ability of these streams to support bull trout.

While livestock grazing has likely reduced bank stability on this allotment, the proposed action will likely not lead to any additional reductions in bank stability. The proposed action 1) allows livestock to graze to a stubble height of four inches in all units except a portion of the Horse Lake Unit where livestock can graze to a stubble height of 6 inches and 2) allows livestock to browse up to 25% on woody plants on all units except of portion of the Horse Lake Unit where there is not a browse standard. There is no bank alteration standard anywhere on the allotment. This grazing system will likely result in continued impacts to features that affect bank stability such as riparian vegetation and bank stability. However, this grazing system is similar to the one that been used on this allotment over the last ten years. Therefore, it is expected that the effects of the proposed action on stream and riparian habitats, including bank stability, will be similar to those that have occurred over the last ten years. Therefore, while grazing has and will likely continue to impact bank stability, this impact is not expected increase under the proposed action.

The exception to this is on Warm Creek. Prior to turnout in 2011, an exclosure will be constructed on most of Warm Creek. This will eliminate the affects of livestock grazing along this stream which should lead to increased bank stability.

7.1.6 RIPARIAN CONSERVATION AREAS

Modifications to riparian habitat can have significant impacts on fish populations. Changes in riparian vegetation caused by livestock grazing can 1) increase the ability of livestock to access the stream thereby increasing redd trampling, 2) increase stream temperatures in the summer and lower streams temperatures in the winter, 3) increase stream sediment levels, 4) increase width:depth ratios, and 5) reduce bank stability. All of these modifications can have negative impacts on fish populations.

In addition, modifications to riparian vegetation can modify cover for fish. Boussu (1954) studied the effects of cover on trout abundance in a stream in Montana and found that when willow cover was added to sections of stream that post treatment fish numbers more than doubled and fish biomass more than tripled compared to pre-treatment levels. In sections of stream where cover was removed, post treatment fish numbers remained relatively unchanged but post treatment fish biomass declined by nearly half. Likewise, Kozel et al. (1989) found a positive correlation between the amount of overhanging vegetation along the stream and trout biomass in several streams in Wyoming.

Livestock grazing can have important impacts on riparian vegetation (Armour et al.1994). Schulz and Leininger (1990) studied the effects of cattle grazing on riparian vegetation in the Sheep Creek watershed in Colorado and found considerable differences in the riparian vegetation between grazed and ungrazed areas. For example, they found considerable differences in the composition of some plants species between grazed and ungrazed areas and also found that vascular vegetation provided 26% more ground cover in ungrazed areas. They also observed about five times as much bare ground ungrazed areas and that the mean standing crop of vegetation was 2,410 kg/ha in ungrazed areas and but was only 1,217 kg/ha inside caged plots within the grazed areas. Clary (1999) studied the effect of livestock grazing on riparian vegetation on Stanley Creek in Idaho. He evaluated the response of riparian vegetation when grazing was changed from season long, heavy use (60-65% utilization in dry meadows) to either grazing in late June with medium use (35-50% utilization in dry meadows), grazing in late June with light use (20-25% utilization in dry meadows), and no grazing at all. He found that there was a significant increase in late seral species in both lightly grazed and ungrazed areas whereas late seral species decreased in the areas with medium use.

Livestock grazing can also have a pronounced impact on woody species. For example, Schulz and Leininger (1990) found 5.5 times more shrub cover and 8.5 times more willow cover in ungrazed areas compared to grazed areas. They also found that willows were older and larger in ungrazed areas compared to grazed areas. Clary (1999), found that willow cover increased by 29% in areas with medium use, 37% in areas with light use, and 56% in areas that were not grazed at all. Hubert et al. (1985) compared sections of a Wyoming stream that were grazed with those that had not been grazed for four years and found that while woody vegetation was abundant in both grazed and ungrazed areas that cottonwoods were not present in the grazed area but were present along the ungrazed sections of stream. Gunderson (1968) studied the effects of livestock grazing on riparian and stream habitat in Rock Creek, Montana and found that stream cover provided by overhanging brush was twice as high in ungrazed areas compared to grazed areas.

While livestock grazing has likely affected riparian vegetation over most of this allotment, greenline ecological status and woody recruitment resource objectives are being met over most of the allotment. The greenline ecological status objective is not being met on Bear Creek and woody recruitment levels appear low in portions of Smithie Fork. Likewise, visual observations indicate that greenline ecological status and woody recruitment objectives are not being met on Warm Creek. It is likely that livestock grazing is at least partially responsible for these objectives not being met. These impacts have likely resulted in measurable reductions in greenline successional status and woody species recruitment which has likely reduced the ability of these streams to support bull trout.

While livestock grazing has likely reduced greenline successional status and woody recruitment on this allotment, the proposed action will likely not lead to any additional reductions greenline successional status and woody recruitment. The proposed action 1) allows livestock to graze to a stubble height of four inches in all units except a portion of the Horse Lake Unit where livestock can graze to a stubble height of 6 inches and 2) allows livestock to browse up to 25% on woody plants on all units except of portion of the Horse Lake Unit where there is not a browse standard. There is no bank alteration standard anywhere on the allotment. This grazing system will likely result in continued impacts to greenline successional status and woody recruitment. However, this grazing system is similar to the one that been used on this allotment over the last ten years. Therefore, it is expected that the effects of the proposed action on greenline successional status and woody recruitment will be similar to those that have occurred over the last ten years. Therefore, while grazing has and will likely continue to impact greenline successional status and woody recruitment, this impact is not expected increase under the proposed action.

The exception to this is on Warm Creek. Prior to turnout in 2011, an exclosure will be constructed on most of Warm Creek. This will eliminate the affects of livestock grazing along this stream which should lead to increased greenline successional status and woody recruitment.

7.2 CUMULATIVE EFFECTS

Cumulative effects as used for Section 7 consultation under the Endangered Species Act are “those effects of *future State or private activities*, not involving Federal activities, that are *reasonably certain to occur* within the action area” (50 CFR§402.02, emphasis added). This definition should not be confused with the broader definition that is used under the National Environmental Policy Act and other environmental laws. In this context, cumulative effects apply only to future state and private activities that are reasonably certain to occur. Furthermore, if an activity is currently occurring and will likely continue to occur in the future with similar effects, it is not considered under cumulative effects because it has already been considered in the description of baseline conditions. There are no known future state or private activities that will occur in the action area that are not already occurring.

7.3 SUMMARY OF EFFECTS

The proceeding analysis has described the likely effects of the proposed action on the six focus indicators. The effects of the proposed action on the pathways and indicators is provided in Table 4. The effects analysis concluded that the proposed action will likely result in the death of bull trout eggs. Furthermore, the proposed action will continue to impact stream temperatures, sediment levels, width:depth ratios, bank stabilities, greenline successional status, and woody recruitment. These effects are not discountable and will likely reduce the ability of streams on this allotment to support bull trout.

8 EFFECTS DETERMINATION

The effects determination for bull trout was made using the above analysis and the effects determination key (Table 4). The specific determinations are identified below and summarized in Table 5.

The effects analysis concluded that the proposed action may have direct effects to bull trout redds which will likely lead to the death of bull trout eggs. Although the conservation measures limit the number of redds that will be impacted, the proposed action will still results in some redds being trampled and the likely death of some bull trout eggs. Therefore, the proposed action results in a “MAY AFFECT, LIKELY TO ADVERSELY AFFECT” determination for bull trout.

The effects analysis concluded that the proposed action may have some effects on proposed bull trout critical habitat. These impacts are expected to be more than be insignificant or discountable and will likely limit the ability of the habitat to support bull trout. Therefore, the proposed action results in a “MAY AFFECT, LIKELY TO ADVERSELY AFFECT” determination for proposed bull trout critical habitat.

TABLE 4. SUMMARY OF EFFECTS (INDICATORS ASSOCIATED WITH THE SIX "FOCUS INDICATORS" HAVE BEEN SHADED).

Pathway	Indicators	Functionality Of Baseline	**Response Column A** Will the proposed action or any interrelated or interdependent actions likely generate any direct or indirect effects to this indicator?			**Response Column B** Are these effects expected to exceed beneficial, insignificant, or discountable?		
			CH	SH	BT	CH	SH	BT
Subpopulation Characteristics	Subpopulation Size		na	na	YES	na	na	YES
	Growth and Survival (including incubation survival)		na	na	YES	na	na	YES
	Life History Diversity and Isolation		na	na	NO	na	na	NO
	Persistence and Genetic Integrity		na	na	NO	na	na	NO
Water Quality	Temperature		na	na	YES	na	na	YES
	Sediment		na	na	YES	na	na	YES
	Chemical Characteristics		na	na	NO	na	na	NO
Habitat Access	Physical Barriers		na	na	NO	na	na	NO
Habitat Elements	Substrate Embed.		na	na	NO	na	na	NO
	LWD		na	na	NO	na	na	NO
	Pool Frequency and Quality		na	na	YES	na	na	YES
	Off-channel Habitat		na	na	YES	na	na	YES
	Refugia		na	na	NO	na	na	NO
Channel Condition and Dynamics	Width:Depth Ratio		na	na	YES	na	na	YES
	Streambank Condition		na	na	YES	na	na	YES
	Floodplain Connectivity		na	na	YES	na	na	YES

Flow/Hydrology	Change in Peak/Base Flows		na	na	NO	na	na	NO
	Increase in Drainage Networks		na	na	NO	na	na	NO
Watershed Conditions	Road Density and Location		na	na	NO	na	na	NO
	Disturbance History		na	na	NO	na	na	NO
	Riparian Conservation Areas		na	na	YES	na	na	YES
	Disturbance Regime		na	na	NO	na	na	NO
Integration of Species and Habitat Conditions	Habitat Quality and Connectivity		na	na	YES	na	na	YES

TABLE 5. EFFECTS DETERMINATION SUMMARY.

	Chinook Salmon		**Steelhead**		**Bull Trout**	
	Species	Designated Critical Habitat	Species	Designated Critical Habitat	Species	Designated Critical Habitat
Determination[1]	na	na	na	na	Likely to Adversely Affect	Likely to Adversely Affect

[1] The 'Species' column is for determining effects to the species. The 'Habitat' column is for determining effects to designated or proposed critical habitat. The species determinations are made as follows: No Effect (NE) if the species is not present in the action area or the proposed action or any interrelated or interdependent actions will not affect any individuals, May Affect- Not Likely to Adversely Affect (MA-NLAA) if the proposed action or any interrelated or interdependent actions may affect but will likely not adversely affect any individuals, and May Affect- Likely to Adversely Affect (MA-LAA) if the proposed action or any interrelated or interdependent actions will result in take of individuals. The habitat determinations are made as follows: NE if the action area does not contain designated critical habitat or all of the responses associated with habitat in 'Response Column A' are 'NO', NLAA if all of the responses associated with habitat in 'Response Column B' are 'NO', LAA if any of the responses associated with habitat in 'Response Column B' are 'YES'.

APPENDIX A
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APPENDIX B
WATERSHED BASELINES WITH
MATRICES OF DIAGNOSTIC PATHWAYS AND INDICATORS

Table 1. Status of baseline conditions for upper Sawmill Canyon sub-watershed.

Agency: USDA Forest Service, Salmon-Challis National Forest	**5th Field HUC and Name: 1704021701, Sawmill Canyon**
Unit: Lost River Ranger District	**Spacial Scale of Matrix:** One 5th HUC
Fish Species Present: Bull Trout	**Designated Critical Habitat Present:** Bull Trout (proposed)
Anadromous Species Population: na	**Anadromous Species Subpopulation:** na
Bull Trout Core Area: Little Lost River?	**Local Population:** Warm Creek, Squaw Creek, Mill Creek, Iron Creek, Timber Creek, Smithie Fork Creek, and Upper Little Lost River
Management Actions: Ongoing	**Updated:** 4-1-2010

Pathway	Indicators	Functionality Of Baseline	Description
Subpopulation Characteristics	Subpopulation Size	Appropriately	The draft Little Lost River bull trout recovery plan delineates 11 local bull trout populations in the Little Lost River basin. The Sawmill Canyon sub-watershed contains seven of these populations. These populations are Warm Creek, Squaw Creek, Mill Creek, Iron Creek, Timber Creek, Smithie Fork Creek, and Upper Little Lost River. These populations range in size from less than a few hundred individuals to several thousand individuals. Brook trout appear to have nearly replaced bull trout in the Mill Creek and Squaw Creek drainages. Bull trout populations appear to be in a downward trend in many portions of the sub-watershed.
	Growth and Survival	Appropriately	Growth and survival of bull trout within the sub-watershed appears to be good.
	Life History Diversity and Isolation	At Risk	The sub-watershed contains both migratory and resident bull trout populations. Access to most bull trout habitat is at natural levels. However, culverts may completely block the movement of bull trout into Moonshine Creek. Likewise, culverts may restrict the upstream movement of small bull trout in Squaw Creek, Main Fork, and Hawley Creek. Additionally, habitat conditions in the lower Little Lost River basin may prevent adult fluvial bull trout from accessing this sub-watershed. Recent projects in Camp Creek, Redrock Creek, Timber Creek, and Jackson Creek have restored natural levels of fish passage in those streams. (Data on file at Lost River Ranger District)
	Persistence and Genetic Integrity	At Risk	It is unclear if bull trout will continue to persist in the long term within the sub-watershed. Brook trout have nearly replaced bull trout in the Squaw Creek and Mill Creek drainages and appear to be expanding into other areas as well. Brook trout x bull trout hybrids have been found in many locations throughout the sub-watershed. It is possible that brook trout will completely replace bull trout within the sub-watershed in the next 50 years. (Population data on file at Lost River Ranger District)

Water Quality	Temperature	Appropriately	Factors influencing water temperature within the sub-watershed such as stream shading, width:depth ratios, and flows are believed to be functioning at near natural levels. Therefore, it is believed that water temperatures are also functioning at near natural levels throughout the system. (Temperature data on file at Lost River Ranger District)
	Sediment	At Risk	Surface fine data have been collected from throughout the sub-watershed using the Forest Service R1/R4 Fish Habitat Inventory Procedures. Likewise, depth fines have been collected at several locations throughout the sub-watershed. These data indicate that surface fines are generally low throughout the sub-watershed but management related disturbances appear to have increased sediment levels in some areas.
	Chemical Characteristics	Appropriately	The chemical characteristics of water within this sub-watershed are believed to be functioning at natural levels.
Habitat Access	Physical Barriers	Appropriately	In the past, there were numerous barriers associated with culverts and road construction in this sub-watershed. However, most of these barriers have been eliminated over the last decade.
Habitat Elements	Substrate Embed.	At Risk	The low levels of sediment throughout most of the sub-watershed suggest that substrate embeddedness is at near natural levels in most areas. However, substrate embeddedness has likely increased in areas where sediment levels have been elevated.
	LWD	Appropriately	Large woody debris data have been collected from throughout the sub-watershed using the Forest Service R1/R4 Fish Habitat Inventory Procedures. The amount of large woody debris within the sub-watershed is believed to be functioning at near natural levels.
	Pool Frequency and Quality	Appropriately	Pool frequency data have been collected from throughout the sub-watershed using the Forest Service R1/R4 Fish Habitat Inventory Procedures. Pool frequency is believed to be functioning at near natural levels.
	Off-channel Habitat	Appropriately	The amount and quality of off channel habitat is believed to be functioning at near natural levels.
	Refugia	Appropriately	The amount and quality of refugia is believed to be functioning at near natural levels.
Channel Condition and Dynamics	Width:Depth Ratio	Appropriately	Width:depth ratio data have been collected from throughout the sub-watershed using the Forest Service R1/R4 Fish Habitat Inventory Procedures (see Appendix A). Width:depth ratios are believed to be functioning at near natural levels in most areas.
	Streambank Condition	Appropriately	Bank stability data have been collected from throughout the sub-watershed using the Forest Service R1/R4 Fish Habitat Inventory Procedures (see Appendix A). Bank stabilities are generally in excess of 80% and are thought to

			be functioning at near natural levels in most areas.
	Floodplain Connectivity	Appropriately	The connectivity between the stream and the flood plain appears to generally be at natural levels (B. Gamett, personal observation). Some activities have resulted in a reduction in flood plain connectivity in some localized areas (B. Gamett, personal observation).
Flow/Hydrology	Change in Peak/Base Flows	Appropriately	This indicator is thought to be functioning at near natural levels. The *Little Lost River Sub-basin Assessment* completed by the Idaho Department of Environmental Quality determined that the entire Little Lost River watershed was functioning appropriately with the exception of diversions within the basin. There is one small diversion in the sub-watershed which is located on the Little Lost River above Iron Creek. This diversion removes approximately 1% of the total stream flow (B. Gamett, personal observation).
	Increase in Drainage Networks	Appropriately	There do not appear to have been any significant changes in the drainage network within this sub-watershed (Sawmill Canyon Watershed Assessment, on file at the Lost River Ranger District) and this indicator is thought to be functioning at near natural levels.
Watershed Conditions	Road Density and Location	At Risk	Road density within the sub-watershed is 1.0 miles of road/mile^2 (Sawmill Canyon Watershed Assessment, on file at the Lost River Ranger District). Some roads do adversely affect riparian areas and abandoned roads may be contributing sediment to some streams on the west side of the sub-watershed.
	Disturbance History	Appropriately	Approximately 11% of the sub-watershed has been affected by wildfire and approximately 12% of the sub-watershed has been affected by historic logging (Sawmill Canyon Watershed Assessment, on file at the Lost River Ranger District).
	Riparian Conservation Areas	Appropriately	Riparian vegetation over most of the sub-watershed is at a near natural state. Riparian vegetation is generally rated as late seral or potential natural community over most of the sub-watershed (MIM data on file at Lost River Ranger District). Some activities have resulted in some localized disturbance to riparian areas.
	Disturbance Regime	Appropriately	Current human related disturbances within the sub-watershed include recreation, livestock grazing, road and trail maintenance, and some minor development of private lands. Historic timber harvest has also impacted the area. The impacts resulting from these activities are relatively minor. It is expected that fish habitat and populations would be able to quickly recover under the current disturbance regime.
Integration of Species and Habitat Conditions	Habitat Quality and Connectivity	At Risk	There are seven local bull trout populations and several thousand bull trout within this sub-watershed. Although there have been some management related impacts to bull trout habitat within this sub-watershed, habitat conditions are in relatively good condition and the habitat is capable of sustaining large bull trout populations. However, brook trout appear to be replacing bull trout within the sub-watershed and it is possible that brook trout will completely replace bull trout within the sub-watershed in the next 50 years. (Population data on file at Lost River Ranger District)

APPENDIX C
MONITORING DATA AND SUMMARIES

Figure C1 – Mill Creek Allotment Monitoring Sites

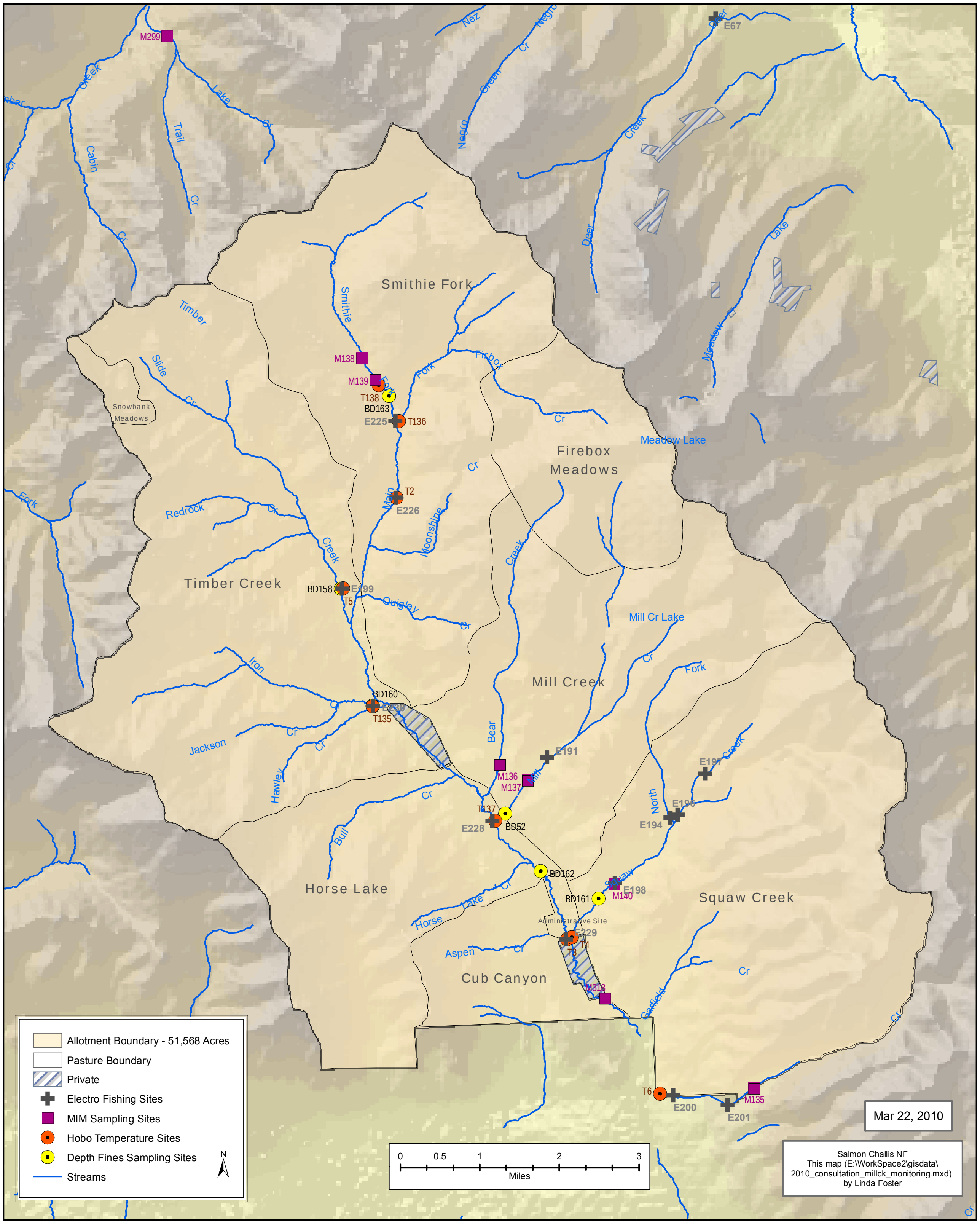


TABLE C1. SELECTED DATA FROM FISH POPULATION MONITORING SITES ON THE MILL CREEK ALLOTMENT (DATA ARE AVAILABLE FROM THE LOST RIVER RANGER DISTRICT OFFICE).

Stream (Site ID)	Date	Length (m)	Mean Width (m)	Abundance (Fish ≥ 70 mm/100 m^2)					
				All Trout	Rainbow Trout	Brook Trout	Bull Trout	Cutthroat Trout	Brook x Bull Trout [A]
Iron Creek (E230)	7/1987[B]	132	3.6	6.6	0.3[B]	0	6.3[B]	0	0
	9/8/2000	108	2.8	13.6	0	0	13.6	0	0
	8/1/2006	100	3.0	4.3	2.0	0	2.3	0	0
Main Fork Little Lost Riv. (E226)	7/1987[B]	95	4.6	3.9	0	0	3.9[B]	0	0
	8/8/1995	117	5.5	4.2	1.1[C]	0	3.1[D]	0	0
	7/15/1997	114	5.3	7.8	1.0	0	6.8	0	0
	8/31/1999	102	10.1	28.5	1.7	0	26.8	0	0
	8/2/2006	90	5.4	14.6	5.1	0	9.5	0	0
Mill Creek (E191)	8/16/1995	70	3.4	20.2	2.1	11.8	6.3	0	0
	8/22/1997	73	4.1	21.1	0.7	14	0.7	0	5.7
	8/1/2006	200	4.8	6.2	0.9	5.0	0.3	0	0
	7/6/2009	70	5.4	11.1	0.3	10.8	0	0	0
North Fork Squaw Creek (E194)	8/20/2001	100	1.8	7.8	0.6	6.1	0	0	1.1
	8/25/2004	101	2.6	5.3	0	4.2	1.1	0	0
	7/8/2009	100	2.0	29.0	0.5	27.5	0	0	1.0
Sawmill Creek (E229)	7/1987[B]	303	9.5	10.1	6.4[B]	1.6[B]	2.1[B]	0	0
	9/14/1995	162	7.6	8.9	8.4	0.3	0.2[E]	0	0

	7/17/1997	158	9.2	5.7	5.1	0.4[F]	0.1	0	0.1
	8/1/1006	100	5.3	15.2	13.8	0.4[G]	0.6[H]	0	0.4[I]
Sawmill Creek (E228)	7/1987[B]	100	5.9	7.8	4.0[B]	1.2[B]	2.6[B]	0	0
	9/13/1995	103	5.7	9.2	7.2	1.5	0.5	0	0
	7/17/1997	112	7.8	8.7	5	3.7	0	0	0
	7/17/1997	112	7.8	8.7	5	3.7	0	0	0
	8/5/2004	110	7.3	6.1	4.6	1.0	0.1	0	0.4
	8/1/2006	152	7.4	12.3	10.6	1.5	0.2	0	0
Smithie Fork (E225)	8/23/1995	108[J]	2.8	27.3	1.7	0	25.6	0	0
	7/11/1997	116[J]	3.2	19.9	0.5	0	19.4	0	0
	8/1/2006	100	4.3	27	4.2	0	22.6	0	0.2
Squaw Creek (E197)	8/18/1999	98	1.3	14.2	0	0	7.9	0	6.3
	7/8/2009	98	0.8	7.7	0	0	7.7	0	0
Squaw Creek (E198)	7/30/1999	103	3.0	2.2	1.3	0.6[K]	0	0	0.3[L]
	8/24/2001	100	2.4	7.9	4.2	3.3	0.4	0	0
	7/9/2009	103	2.3	9.3	1.3	7.6	0.4	0	0
Squaw Creek (E194)	8/11/1999	102	2.1	13.5	4.2	5.1	1.4[M]	0	2.8
	8/16/2001	119	1.8	16.3	3.3	10.7	0.9	0	1.4
	8/25/2004	95	2.0	1.6	0	0	1.6	0	0
	8/1/2006	200	1.6	4.7	0	4.7	0[N]	0	0
	7/8/2009	102	1.6	21.5	0	20.9	0.6	0	0

Timber Creek (E199)	7/1987[B]	104	3.7	7.5	0	0	7.5[B]	0	0
	8/8/1995	133	3.6	5.0	0.8	0	4.2	0	0
	7/11/1997	133	4.7	7.0	0.3	0	6.7	0	0
	7/13/2000	105	2.7	16.2	2.1	0	14.1	0	0
	8/20/2001	128	2.7	16.5	2.0	0	14.5	0	0
	8/24/2004	113	2.7	6.5	1.3	0	5.2	0	0
	8/1/2006	100	4.1	11.9	2.9	0	8.8	0	0.2
	7/31/2008	127[O]	4.2	7.0	1.7	0	4.5	0	0.8
	7/23/2009	127	3.5	6.9	1.3	0	4.9	0	0.7
Warm Creek (E200)	6/27/1995	47	2.6	6.6	6.6	0	0	0	0
	7/7/2009	47	2.3	7.4	4.6	0	0	0	2.8

[A] Brook trout x bull trout hybrids may not have always been correctly differentiated from brook trout and bull trout prior to 1999. Beginning in 1999, improved identification methods allowed for more consistent identification of brook trout x bull trout hybrids.

[B] This site was sampled by Corsi and Elle (1989). The exact location of the site was not reported but the site is in the same general area as the site that was sampled in subsequent years. The total trout density and percent composition was reported for this site but the density of individual species was not. The density of individual species was estimated by multiplying the total trout density by the percentage of fish comprising that species.

[C]The removal pattern for rainbow trout was 2 fish on the first pass, 3 fish on the second pass, and 2 fish on the third pass. We assumed the population estimate to be the number of fish captured.

[D] The removal pattern for bull trout was 8 fish on the first pass and 10 fish on the second pass, and 2 fish on the third pass. We assumed the population estimate to be the number of fish captured.

[E] The removal pattern for bull trout was 1 fish on the first pass and 2 fish on the second pass. We assumed the population estimate to be the number of fish captured.

[F] The removal pattern for bull trout was 2 fish on the first pass and 4 fish on the second pass. We assumed the population estimate to be the number of fish captured.

[G] The removal pattern for brook trout was 0 fish on the first pass, 0 fish on the second pass, 1 fish on the third pass, 1 fish on the fourth pass ,and 0 on the fifth pass. We assumed the population estimate to be the number of fish captured.

[H] The removal pattern for bull trout was 1 fish on the first pass, 0 fish on the second pass, 1 fish on the third pass, 0 fish on the fourth pass, and 1 fish on the fifth pass. We assumed the population estimate to be the number of fish captured.

[I] The removal pattern for brook trout x bull trout hybrid was 0 fish on the first pass, 1 fish on the second pas, 0 fish on the third pass, 1 fish on the fourth pass, and 0 fish on the fifth pass. We assumed the population estimate to be the number of fish captured.

[J] The site included a side channel that is not included in the length and mean width reported here but that were included in the surface area used to calculate the population densities

[K] The removal pattern for brook trout was 0 fish on the first pass, 2 fish on the second pass and 0 fish on the third pass. We assumed the population estimate to be the number of fish captured

[L] The removal pattern for brook x bull trout hybrid was 0 fish on the first pass, 0 fish on the second pass and 1 fish on the third pass. We assumed the population estimate to be the number of fish captured

[M] The removal pattern for bull trout was 1 fish on the first pass and 2 fish on the second pass. We assumed the population estimate to be the number of fish captured

[N] Young-of-the-year bull trout were captured at this site but no fish over 70 mm were found

[O] The length was not recorded in 2008. However, the site was approximately the same length as the 2009 site. Therefore, we used the length recorded in 2009.

TABLE C2. FISH PRESENCE, SPAWNING, AND PROPOSED CRITICAL HABITAT BY STREAM.

Stream	Bull Trout Present (miles)	Bull Trout Spawning (miles)	Bull Trout Proposed Critical Habitat (miles)
Bear Creek	1.25	0.00	0.00
Firebox Creek	1.47	1.47	1.30
Hawley Creek	0.55	0.55	0.55
Iron Creek	2.67	2.67	2.67
Jackson Creek	0.75	0.75	2.32
Main Fork	4.56	4.56	4.85
Mill Creek	2.19	1.33	2.69
North Fork Squaw Creek	2.51	2.51	3.21
Quigley Creek	0.25	0.00	0.00
Redrock Creek	0.77	0.77	0.77
Sawmill Creek	5.27	1.29	5.27
Slide Creek	0.11	0.11	0.24
Smithie Creek	3.85	3.85	3.85
Squaw Creek	3.57	2.47	5.11
Timber Creek	3.90	3.90	5.16
Warm Creek	1.07	0.85	1.07
(blank)	2.42	2.42	6.02
Total	37.15	29.50	45.08

TABLE C3. FISH PRESENCE, SPAWNING, AND PROPOSED CRITICAL HABITAT BY UNIT.

Unit-Stream	Bull Trout Present (miles)	Bull Trout Spawning (miles)	Bull Trout Proposed Critical Habitat (miles)
Cub Canyon Unit	0.60	0.00	0.60
Sawmill Creek	0.60	0.00	0.60
Horse Lake Unit	2.57	0.00	2.44
Bear Creek	0.13	0.00	0.00
Mill Creek	0.15	0.00	0.15
Sawmill Creek	2.29	0.00	2.29
Mill Creek Unit	4.68	2.85	4.76
Bear Creek	1.12	0.00	0.00
Mill Creek	2.03	1.33	2.54
North Fork Squaw Creek	1.52	1.52	2.22
Smithie Fork Unit	9.99	9.81	9.75
Firebox Creek	0.74	0.74	0.74
Main Fork	4.05	4.05	4.34
Quigley Creek	0.18	0.00	0.00
Smithie Creek	3.85	3.85	3.85
(blank)	1.17	1.17	0.82
Squaw Creek Unit	5.38	4.32	7.45
North Fork Squaw Creek	0.99	0.99	0.99
Squaw Creek	3.32	2.47	4.86
Warm Creek	1.07	0.85	1.07
(blank)	0.00	0.00	0.53
Timber Creek Unit	11.92	11.80	18.24
Hawley Creek	0.55	0.55	0.55
Iron Creek	2.67	2.67	2.67
Jackson Creek	0.75	0.75	2.32
Main Fork	0.51	0.51	0.51

Quigley Creek	0.06	0.00	0.00
Redrock Creek	0.77	0.77	0.77
Sawmill Creek	1.35	1.29	1.35
Slide Creek	0.11	0.11	0.24
Timber Creek	3.90	3.90	5.16
(blank)	1.24	1.24	4.66
Total	37.15	29.50	45.08

Table C4. Selected stream temperature data from the Mill Creek Allotment (data are available from the Lost River Ranger District office).

		Temperature		
Stream (Site ID)	**Year**	**Maximum (°C)**	**7-day Moving Maximum (°C)**	**Mean (°C) (July 1-Sept 30)**
Iron Creek (T135)	1999	13.7	12.7	6.9
	2000	15.8	14.4	7.9
	2001	15.3	14.3	8.4
	2002	13.7	12.8	7.6
Main Fork Little Lost River (E226)	1999	14.4	13.3	8.3
	2000	16.8	15.4	9.2
	2001	16.5	15.3	9.9
	2002	17.1	15.9	9.1
	2009	14.6	14.0	9.1
Main Fork Little Lost River (T136)	1999	14	13	8.1
	2000	16.2	14.5	8.7
	2001	15.5	14.5	9.1
	2002	-	-	-
Mill Creek (T137)	2001	19.2	17.7	11.3
	2002	18.2	16.8	10.3
Sawmill Creek (T3)	2009	19.2	17.7	11.4
Smithie Fork (T138)	1999	15.2	14.2	8.7
	2000	17.4	15.7	9.2

	2001	17.1	15.8	9.9
	2002	17.5	16.7	9.4
Squaw Creek (T4)	1999	14.8	13.7	8.3
	2000	15.9	14.5	9.2
	2001	16.4	14.9	9.7
	2002	17.1	16.1	9.3
	2009	17.3	16.5	10.7
Timber Creek (T5)	1999	14.1	12.8	8.1
	2000	17.1	16	9.4
	2001	16.5	15.3	9.5
	2002	17.4	16	9.2
	2009	14.6	13.8	9
Warm Creek (T6)	2009	11.1	10.4	7.4

Table C5. Surface fine (< 0.25 inches) data collected in 2003 from the Mill Creek Allotment (data are available from the Lost River Ranger District office).

Stream	Reach	Channel Type	Geology	Surface Fines (%)	Natural Condition Mean for this Stream/Geology Type (%)	Exceeds Natural Conditions Level	Exceeds INFISH Criteria of 20%
Bear Creek	Above Sawmill Road	B	M	10	16	No	No
Camp Creek	Above Timber Creek	A	V	23	25	No	Yes
Hawley Creek	Below Iron Creek Road	B	V	47	27	Yes	Yes
Hawley Creek	About 1 km above Iron Creek Road	A	V	25	25	No	Yes
Iron Creek	Below Hawley Creek	B	V	6	27	No	No
Iron Creek	Below Jackson Creek	B	V	16	27	No	No
Iron creek	About 500 m above Iron Creek Rd	B	V	21	27	No	Yes
Jackson Creek	Below Iron Creek Road	A	V	29	25	Yes	Yes
Jackson creek	About 1 km above Iron Creek Road	A	V	9	25	No	No
Main Fork	Above Moonshine	B	M	13	16	No	No
Main Fork	Above Smithie Fork	B	M	17	16	Yes	No
Mill Creek	Above Sawmill Road	B	M	16	16	No	No
Mill Creek	Above Campground	A	M	7	14	No	No
Redrock	Above Timber Creek	A	V	41	25	Yes	Yes
Sawmill Creek	Below Iron Creek	B	M	3	16	No	No
Slide Creek	Above Timber Creek	B	V	27	27	No	Yes

Smithie Creek	About 800 m above Main Fork	B	M	11	16	No	No
Squaw Creek	Below North Fork	A	M	17	14	Yes	No
Timber Creek	About 500 m above Timber Cr. CG	B	V	49	27	Yes	Yes
Timber Creek	Below Camp Creek	B	V	37	27	Yes	Yes
Timber Creek	Above Redrock Creek	B	V	12	27	No	No
Timber Creek	Between Redrock and Slide creeks	B	V	32	27	Yes	Yes
Timber Creek	Below Slide Creek	B	V	29	27	Yes	Yes
Timber Creek	About 30 m above Slide Creek	B	V	45	27	Yes	Yes
Timber Creek	About 100 m above Slide Creek	B	V	15	27	No	No

TABLE C6. DEPTH FINE (< 0.25 INCHES) DATA FROM THE MILL CREEK ALLOTMENT (DATA ARE AVAILABLE FROM THE LOST RIVER RANGER DISTRICT OFFICE).

	Depth Fines (< 0.25 inches) (%)														
Stream (Site ID)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Iron Creek							44.5								
Little Lost River (BD162)									32.6	30.4	10.68	15.1	9.9	20.5	22.6
Mill Creek (BD52)		21.3	30.9	21.9	27.4	21.0	34.0	25.3	34.5	28.5	27.1				23
Smithie Fork (BD163)									29.0	22.6	15.2				19.9
Squaw Creek (BD161)							28.1		29.9	24.9	36.7		16.,4		29.7
Timber Creek (BD158)							29.4								34.3

TABLE C7. MULTIPLE INDICATOR MONITORING (MIM) DATA FROM THE MILL CREEK ALLOTMENT (DATA ARE AVAILABLE FROM THE LOST RIVER RANGER DISTRICT OFFICE).

Unit	Stream (Site ID)	Year	Width:Depth Ratio	Bank Stability (%)	Woody Species Abundance			GES[A]	Trend in GES[B]
					Total (#/acre)	**Seedling-Young (#/acre)**	**Seedling-Young (%)**		
Mill Creek	Bear Creek (M136)	2009	12.9	45	5754	2593	45	46 (MS)	Up
		2005	-	-	-	-	63	26 (ES)	Static
		2002	-	-	-	-	57	28 (ES)	Up
		1999	-	-	-	-	-	15 (VES)	Baseline
	Mill Creek (M137)	2009	30.4	89	4869	1644	34	78 (LS)	Static
		2005	-	-	-	-	58	69 (LS)	Static
		2002	-	-	-	-	57	66 (LS)	Up
		1999	-	-	-	-	14	53 (MS)	Baseline
Smithie Fork	Smithe Fork (Site 1-M138)	2009	16.5	73	2213	379	17	66 (LS)	Down
		2005	-	-	-	-	45	84 (LS)	Static
		2002	-	-	-	-	65	79 (LS)	Static
		1999	-	-	-	-	36	75 (LS)	Baseline
	Smithe Fork (Site 2-M139)	2009	13.2	79	1765	529	30	79 (LS)	Up
		2005	-	-	-	-	33	66 (LS)	Down
		2002	-	-	-	-	62	78 (LS)	Up
		1999	-	-	-	-	78	65 (LS)	Baseline
Squaw	Squaw Creek (M140)	2009	9.8	85	4647	706	15	92 (PNC)	Up

Creek									
		2005	-	-	-	-	13	74 (LS)	Up
		2002	-	-	-	-	27	53 (MS)	Static
		1999	-	-	-	-	13	59 (MS)	Baseline
Cub Canyon	Squaw Creek (M318)	2009	n/a	98	2403	632	26	100 (PNC)	Baseline

[A] Greenline ecological status where 0-15=Very Early Seral (VES), 16-40=Early Seral (ES), 41-60=Mid Seral (MS), 61-85=Late Seral (LS), ≥86 Potential Natural Community (PNC)

[B] Greenline ecological status trend where an increase of 10 points or more is considered an upward trend, a decrease of 10 points or more is considered a downward trend, and a change of less than 10 points is considered a static trend.

APPENDIX D

PRIMARY CONSTITUENT ELEMENTS OF CRITICAL HABITAT

Primary Constituent Elements of Critical Habitat

The Forest has utilized six "Focus Indicators" to characterize the condition of the habitat for listed fish species on streams within allotments on the Salmon-Challis National Forest. These are: 1) spawning and incubation, 2) temperature, 3) sediment, 4) width: depth ratio, 5) streambank condition, and 6) riparian conservation areas. These indicators also serve to form the basis for potential impacts to the Primary Constituent Elements (PCEs) for Chinook salmon, steelhead and proposed bull trout critical habitat.

The following are the specific PCEs for the proposed bull trout critical habitat (January13, 2010, Federal Register 75FR2270) and examples of habitat indicators that can be used to assess the condition of the PCEs. Many of the Forest "focus indicators" match the examples (highlighted in the Associated Habitat Indicators). They have been thoroughly addressed within the environmental baseline conditions and the site specific effects analysis. Therefore, they form the basis for the Forest's determination for effects to the species and potential critical habitat.

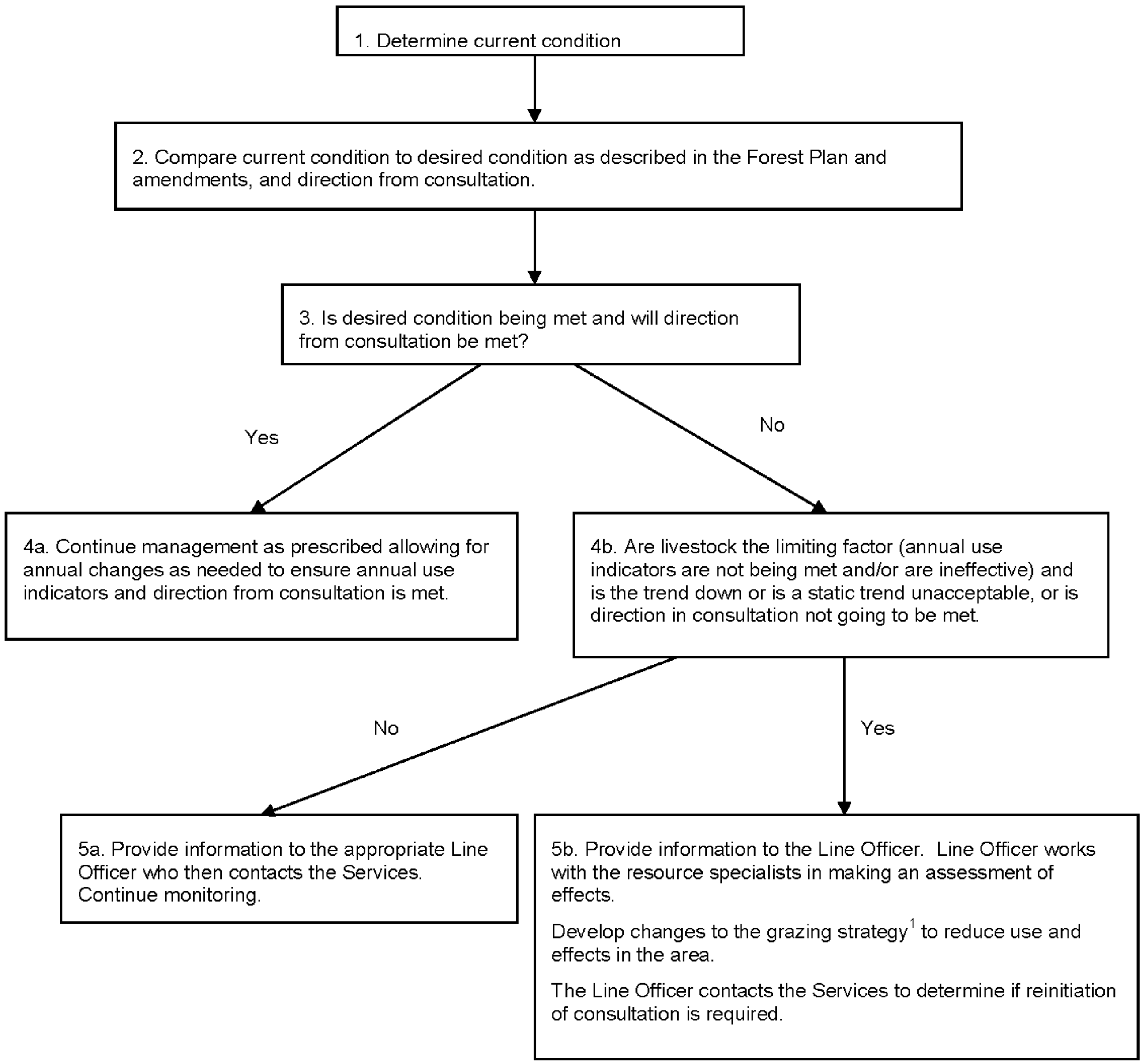
Primary Constituent Elements for Proposed Bull Trout Critical Habitat and Associated Habitat Indicators

PCE #	PCE Description	Associated Habitat Indicators
1.	Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia.	floodplain connectivity, change in peak/base flows, increase in drainage network, **riparian conservation areas**, chemical contamination/nutrients
2.	Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	life history diversity and isolation, persistence and genetic integrity, **temperature**, chemical contamination/nutrients, physical barriers, **average wetted width/maximum depth ratio in scour pools in a reach**, change in peak/base flows, refugia
3.	An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	growth and survival, life history diversity and isolation, **riparian conservation areas**, floodplain connectivity (importance of aquatic habitat condition indirectly covered by previous seven PCEs)
4.	Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.	large woody debris, pool frequency and quality, large pools, off channel habitat, refugia, **average wetted width/maximum depth ratio in scour pools in a reach**, **streambank condition**, floodplain connectivity, **riparian conservation areas**
5.	Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence.	**temperature**, refugia, **average wetted width/maximum depth ratio in scour pools in a reach**, streambank **condition**, change in peak/base flows, **riparian conservation areas**, floodplain connectivity
6.	Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g., less than 12 percent) of fine substrate less than 0.85 mm (0.03 in.) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions.	**sediment**, **substrate embeddedness**, large woody debris, pool frequency and quality

7.	A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.	change in pea k/base flows, increase in drainage network, disturbance history*, disturbance regime (* Information relative to disturbance history is often found in the baseline narrative)
8.	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	**sediment**, chemical contamination/nutrients, change in peak/base flows
9.	Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present.	persistence and genetic integrity, physical*barriers* (* Information relative to disturbance history is often found in the baseline narrative)

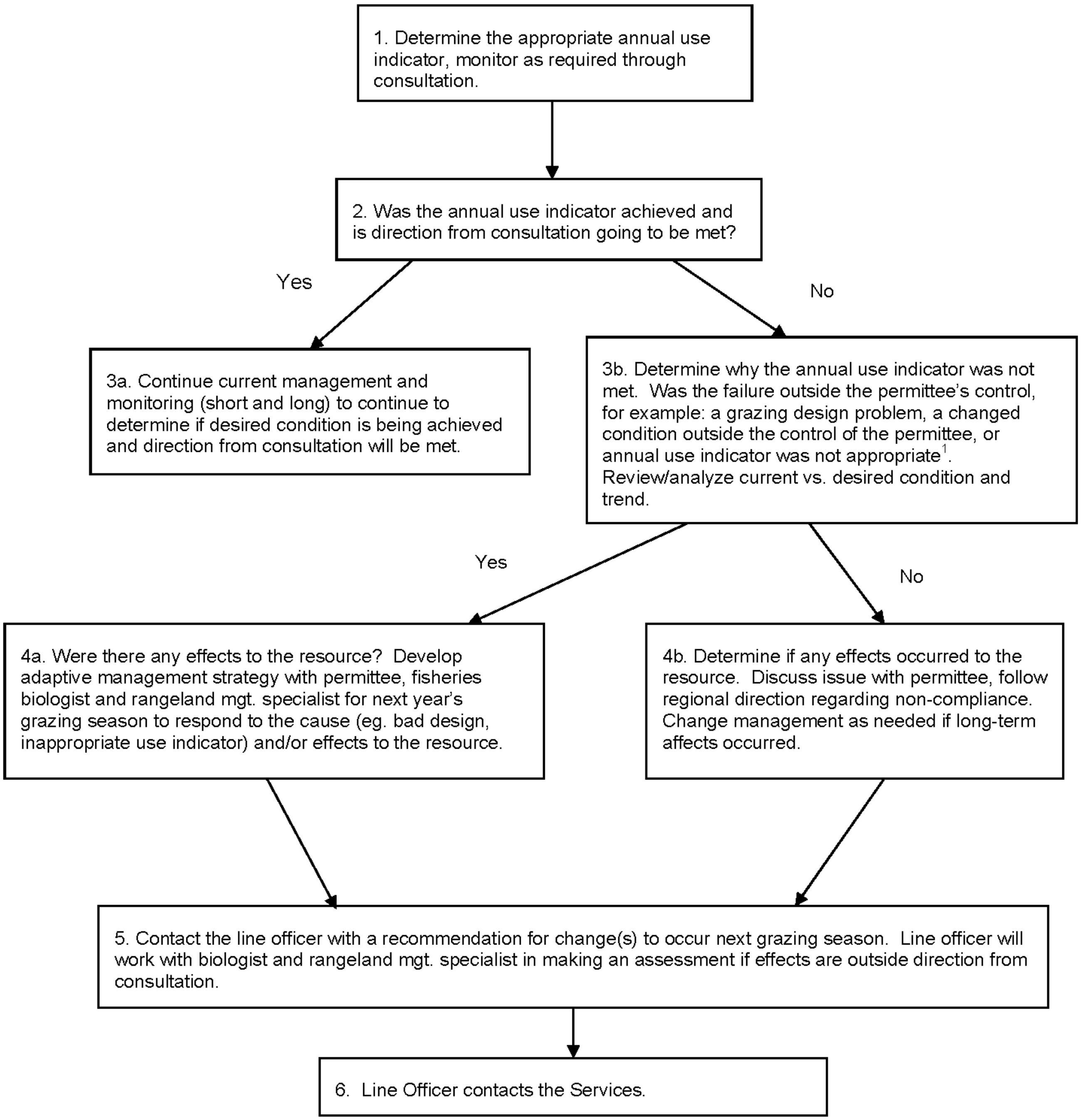
APPENDIX E
ADAPTIVE MANAGEMENT DIAGRAMS

Diagram 1.0 – Implementation of Long-Term Adaptive Management Strategy for Allotments Requiring Consultation.



[1]Management actions will initially reduce use in the area. It is expected this may occur in any number of ways including but not limited to changing the season of use, reducing numbers, changing amount of use on annual indicator, changing herding practices, changing salting practices and/or reconstructing/constructing range improvements. If use can't be reduced and livestock continue to be the limiting factor total removal of livestock from the area may be necessary. Effectiveness of changed management will be monitored through adjusted annual use indicators and effectiveness monitoring.

Diagram 2.0 - Implementation of Annual Adaptive Management Strategy for Allotments Requiring Consultation.



[1]An inappropriate annual use indicator is an indicator that does not most accurately identify the weak link or first attribute that would indicate excessive livestock impacts. In this situation, changing to a more appropriate indicator will help achieve or maintain desired conditions.