Aquatic Species Biological Assessment for the Cape Horn Sheep and Goat Allotment

MIDDLE FORK RANGER DISTRICT

SALMON-CHALLIS NATIONAL FOREST

CUSTER COUNTY, IDAHO

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Date: 6-2-2010

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1 INTRODUCTION

The Middle Fork Ranger District of the Salmon-Challis National Forest authorizes livestock grazing activities within the Cape Horn Allotment. This biological assessment describes the proposed action and discusses the probable impacts of that action on listed species and designated 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

Cape Horn Allotment grazing activities are conducted within the Marsh Creek (1706020503) and Valley Creek (1706020104) HUC5 watersheds of the Lower Middle Fork Salmon River Subbasin. The Marsh Creek watershed encompasses approximately 95,201 acres and support 252 miles of perennial streams. The Valley Creek watershed encompasses approximately 93,080 acres and supports 37 miles of perennial streams (only within the portion managed by the SCNF). The majority of fish-bearing streams within the watersheds are considered low to moderate gradient. Elevations within this action area range from approximately 9700 feet in headwaters areas down to approximately 6400 feet. Soils in the watersheds are derived from granitics, quartzites and Challis Volcanics.

Riparian vegetation in broad valleys generally consists of alder, and willows and a variety of riparian-dependent forbs and grasses. Upland vegetation is generally characterized by mixed conifer over-story, primarily composed on Douglas-fir, and Lodgepole pine, with an understory of Idaho fescue, pine grass, elk sedge, and a variety of shrubs and forbs.

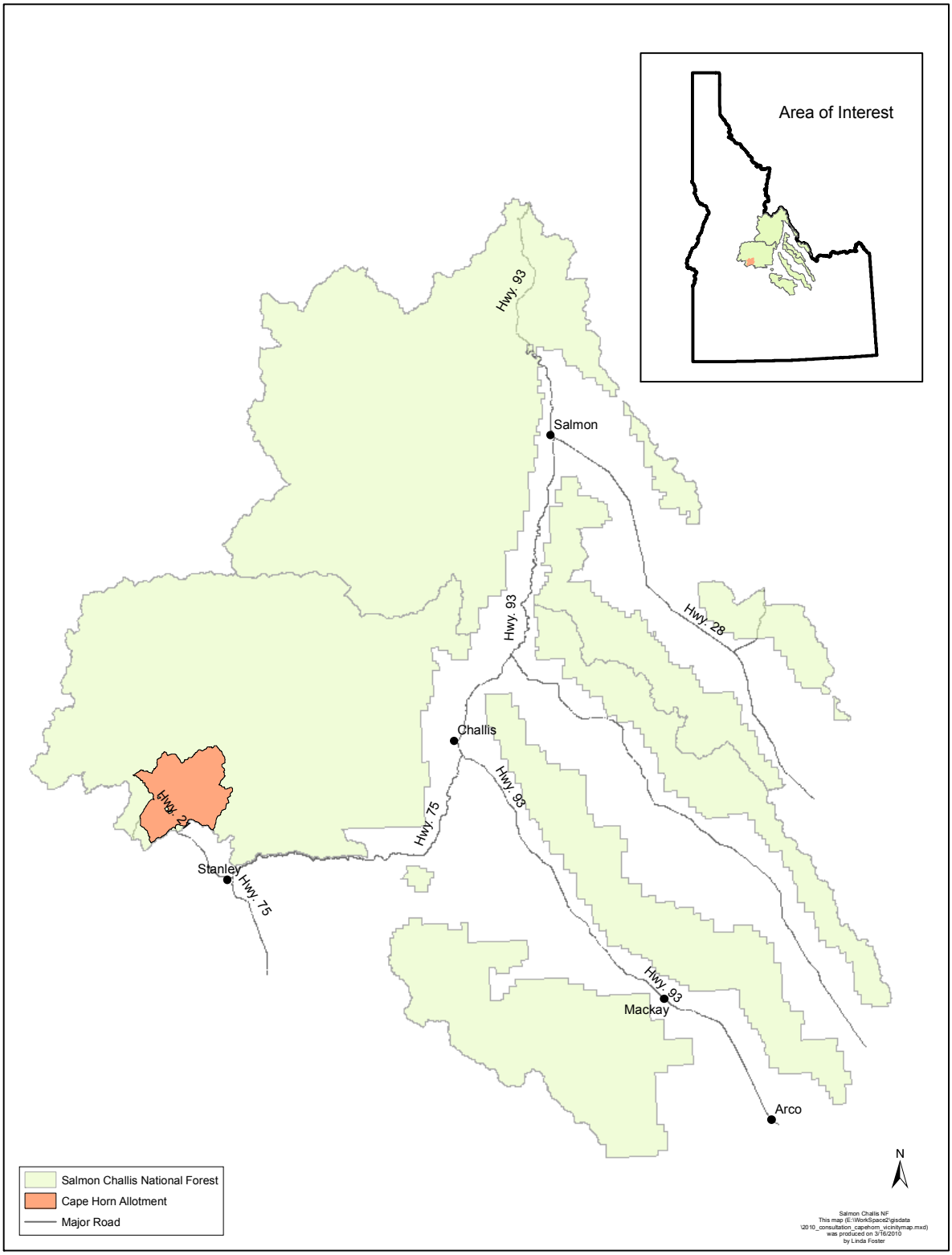
Actions or activities which have occurred or continue to occur within the Marsh Creek and Valley Creek watersheds include fuels reduction, grazing, roads, trails, outfitting and guiding operations, and recreation. The watersheds encompass several private in-holdings.

3 PROPOSED ACTION

3.1 PROJECT AREA

The Cape Horn Allotment is an 86,213 acre allotment located in the Upper Salmon River and Upper Middle Fork Salmon River basins within the Valley Creek 5th Field HUC (5th Field HUC: 1706020104) and Marsh Creek 5th Field HUC (5th Field HUC: 1706020503) (Figure 1, Figure 2).

FIGURE 1 – CAPE HORN ALLOTMENT VICINITY MAP



3.2 PROPOSED ACTION

3.2.1 CURRENT PERMIT

The grazing permit for this allotment is permit #30012 which expires on December 31, 2013.

3.2.2 GRAZING SYSTEM

Grazing on this allotment will involve grazing up to 2,050 ewe/lamb pairs and two horses under a seven pasture deferred rotation grazing system with grazing occurring anytime between June 20 and October 1. The allotment consists of the Dry Creek, Upper Marsh Creek, Valley Creek, Knapp Creek, Beaver Creek, Swamp Creek, and Vader Creek units.

TABLE 1 PROPOSED GRAZING ROTATIONS

Year 1	Year 2
Dry Creek Unit (Band[C] 1)	Dry Creek Unit (Band 1)
Upper Marsh Cr. Unit (Band 1)	Valley Creek Unit (Band 2)[A]
Valley Creek Unit (Band 2)[A]	Swamp Creek Unit (both bands)
Knapp Creek Unit (both bands)	Beaver Creek Unit (both bands)[B]
Beaver Creek Unit (both bands)[B]	Knapp Creek Unit (both bands)
Swamp Creek Unit (both bands)	Upper Marsh Cr. Unit (both bands)
Vader Creek Unit (both bands)	Vader Creek Unit (both bands)

[A] Sheep will not graze this unit after August 10 for Chinook and bull trout spawning
[B] Sheep will not graze this unit before July 15 for steelhead spawning areas
[C] A single Band can include up to 1,500 individuals

Some adjustments may be made to the rotation as conditions arise but the effects to fish and fish habitat will be similar to the two rotations described above.

Grazing will not occur at any time in the following areas within the allotment:

- Cape Horn Creek drainage upstream of State Highway 21
- Marsh Creek drainage downstream of Beaver Creek
- Marsh Creek between Cape Horn Creek and Knapp Creek

Stream Crossing Restrictions:

- Sheep will not cross Cape Horn Creek, Knapp Creek, Beaver Creek below Winnemucca Creek, or Marsh Creek below Knapp Creek except of bridges.
- Sheep will not cross Marsh Creek between Knapp Creek and Vader Creek except at the bridge.
- Sheep will not cross Beaver Creek upstream of Winnemucca Creek except at a single location on Beaver Creek approximately one mile upstream of the of the confluence of Beaver Creek and Winnemucca Creek
- Sheep will not cross the lower two miles of Winnemucca Creek after August 1 except at a location identified by a fisheries biologist; where there are no Chinook salmon redds beginning in the immediate area and extending 200 meters downstream.

Dry Creek Unit

- This unit has no listed ESA species or critical or proposed critical habitat present.

Upper Marsh Creek Unit

- Chinook: Sheep are crossed on bridges during spawning and on all critical habitat reaches.
- Steelhead: Sheep are crossed on bridges during spawning and within critical habitat reaches.
- Bull Trout: Sheep may cross within critical habitat reaches.

Valley Creek Unit

- Chinook: There will be no grazing after August 10th during spawning season.
- Steelhead: Quality spawning habitat is present.
- Bull Trout: There will be no grazing after August 10th during spawning season.

Beaver Creek Unit

- Chinook: Sheep are crossed on bridges during spawning and on all critical habitat reaches.
- Steelhead: There will be no grazing before July 15th during spawning.
- Bull Trout: Sheep will graze in this allotment during spawning.

Knapp Creek Unit

- Chinook: Crossings are kept on bridges during spawning and on all critical habitat.
- Steelhead: There are no crossings during spawning season.
- Bull Trout: Sheep will be grazed in this allotment during spawning.

Swamp Creek Unit

- Chinook: This unit has no Chinook salmon or Chinook salmon designated critical habitat present.
- Steelhead: This unit has no Chinook salmon or Chinook salmon designated critical habitat present.
- Bull Trout: Sheep will graze in this allotment during spawning.

Vader Creek Unit

- This unit has no listed ESA species or critical or proposed critical habitat present.

Cape Horn Creek Unit

- This unit will not be grazed.

3.3 RESOURCE OBJECTIVES

Resource Objectives and Effectiveness Monitoring: The allotment is being managed to achieve the following 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) from PACFISH and its corresponding Biological Opinions (U.S Department of Commerce, National Marine Fisheries Service, 1998). PACFISH is an interim strategy for managing anadromous fish-producing watersheds that was amended into the Salmon and Challis Forest Plans in 1995.

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).

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

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

Bank Stability (PACFISH): A bank stability of at least 90%[1] or the current value, whichever is greatest.

Water Temperature (PACFISH)[2]: No measurable increase in maximum water temperature. Maximum water temperatures below 64°F (17.8°C) within migration and rearing habitats, below 60°F (15.6°C) within spawning habitats, and less than 45 °F (7.2°C) in steelhead spawning areas during steelhead spawning periods.[3]

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

A Channel: 21

B Channel: 27

C Channel: 28

Sediment (PACFISH): <20% surface fine sediment which is substrate <0.25 in (6.4 mm) in diameter in spawning habitat or <30% cobble embeddedness in rearing habitat.[5]

3.3.1 MANGEMENT STANDARDS AND GUIDELINES

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

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 Managements Objectives or are likely to adversely affect listed anadromous fish. Suspend grazing if adjusting practices is not effective in meeting Riparian Management Objectives and avoiding adverse effects on listed anadromous fish.

The PACFISH environmental assessment defines "Adverse Effects" include "…short- or long-term, direct or indirect management-related, impacts of an individual or cumulative nature, such as mortality, reduced growth or other adverse physiological changes, harassment of fish, physical disturbance of redds, reduced reproductive success, delayed or premature migration, or other adverse behavioral changes to listed anadromous salmonids at any life stage."

GM-2: Located 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 or adversely affect listed anadromous fish. Relocate or close facilities where these objectives cannot be met.

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1 The PACFISH environmental assessment established a riparian management objective for bank stability of 80%. However, the 1995 PACFISH biological opinion increased this standard to 90% within Chinook salmon and steelhead priority watersheds. This was reaffirmed by the 1998 PACFISH biological opinion. This allotment is within a priority watershed.

2 7-day moving average of daily maximum temperature measured as the average of the maximum daily temperature of the warmest consecutive 7-day period

3 The PACIFSH environmental assessment did not include a riparian management objective for temperature specific to steelhead spawning. However, the steelhead biological assessment for PACIFSH established a water temperature standard of less than 45 °F (7.2°C) F in steelhead spawning areas during steelhead spawning periods within steelhead priority watersheds.

4 These values are based on the mean values observed for streams in natural condition within the Salmon River (Overton et al 1995). Channel types based on Rosgen (1996).

5 The PACFISH environmental assessment did not include a riparian management objective for sediment. However, the 1995 PACFISH biological opinion established a riparian management objective for sediment in spawning and rearing areas within Chinook salmon and steelhead priority watersheds. This was reaffirmed by the 1998 biological opinion. This allotment is within a priority watershed.

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

- Habitat will be managed to enhance…anadromous fish populations. (Valley Creek drainage only)
- Emphasize improvement of riparian & wet meadow complexes. (Marsh Creek drainage only)
- Manage habitat to enhance T&E species and anadromous fish. (Marsh Creek drainage only)
- Emphasize habitat improvement directed toward improving stream bank stability and cover, in streams rated in fair or poor condition. (Marsh Creek drainage only)

3.3.2 USE INDICATORS

Annual Use Indicators and Implementation Monitoring: Annual use indicators are used to ensure that grazing does not prevent the attainment of the riparian 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.

TABLE 2 ANNUAL USE INDICATORS

Unit	End of Season Indicators			
	Median Greenline Stubble Height	Bank Alteration	Woody Browse	Upland Utilization
Dry Creek	≥ 4 inches	≤ 15%	≤ 30%	≤ 50%
Vader Creek	≥ 4 inches	≤ 15%	≤ 30%	≤ 50%
Swamp Creek	≥ 6 inches	≤ 15%	≤ 30%	≤ 50%
Beaver Creek	≥ 6 inches	≤ 15%	≤ 30%	≤ 50%
Knapp Creek	≥ 6 inches	≤ 15%	≤ 30%	≤ 50%
Upper Marsh Cr.	≥ 6 inches	≤ 15%	≤ 30%	≤ 50%
Valley Creek	≥ 6 inches	≤ 15%	≤ 30%	≤ 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 (Coulloudon et al 1999). 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).

3.3.3 IMPROVEMENTS

The allotment contains two improvements: corrals near the Cape Horn Guard Station and a livestock bridge over Marsh Creek immediately above Knapp Creek (Figure C1). Prior to turnout in 2011, the sheep bridge over Marsh Creek immediately above Knapp Creek will be rebuilt to accommodate recreation traffic. The design will include approach wings that will help to funnel crossing sheep to the bridge.

3.4 CHANGES FROM EXISTION MANAGEMENT

The proposed action includes the following changes from existing management:

- Livestock grazing is being eliminated from the following locations within the allotment:
  - Cape Horn Creek drainage upstream of State Highway 21
  - Marsh Creek drainage downstream of Beaver Creek
  - Marsh Creek between Cape Horn Creek and Knapp Creek
- Sheep will not cross Cape Horn Creek, Knapp Creek, Beaver Creek below Winnemucca Creek, or Marsh Creek below Knapp Creek except on bridges
- Sheep will not cross Marsh Creek between Knapp Creek and a point one mile upstream of Knapp Creek except at the bridge
- Sheep will not cross Beaver Creek upstream of Winnemucca Creek except at a single location on Beaver Creek approximately one mile upstream of the confluence of Beaver Creek and Winnemucca Creek
- A bank alteration indicator of ≤ 15% is being added to all units

- The woody browse indicator is being reduced from 50% to ≤ 30% on all units
- The stubble height indicator is being changed from specific streams to entire units
- The August 15 off date for several streams is being eliminated and replaced with the restrictions on sheep crossing streams that is described above

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:

- This allotment has full time riders with both bands of sheep.
- Livestock grazing is being eliminated from the following locations within the allotment:
  - Cape Horn Creek drainage upstream of State Highway 21
  - Marsh Creek drainage downstream of Beaver Creek
  - Marsh Creek between Cape Horn Creek and Knapp Creek
- Sheep will not cross Cape Horn Creek, Knapp Creek, Beaver Creek below Winnemucca Creek, or Marsh Creek below Knapp Creek except on bridges
- Sheep will not cross Marsh Creek between Knapp Creek and a point one mile upstream of Knapp Creek except at the bridge
- Sheep will not cross Beaver Creek upstream of Winnemucca Creek except at a single location on Beaver Creek approximately one mile upstream of the confluence of Beaver Creek and Winnemucca Creek. Any exceptions to these crossing restrictions will be approved by a forest fish biologist
- Sheep will not bed within 300 feet of any perennial stream.
- Sheep will not bed in the same location more than one night.
- A bank alteration indicator of ≤ 20% is being added to all units
- The woody browse indicator is being reduced from 50% to ≤ 30% on all units
- Continue the 6 inch stubble height indicator that is in place on several streams with listed fish
- Changing the 6 inch stubble height indicator from only applying to specific streams to applying to entire units with listed fish.
- This allotment will be managed as a once-over-grazing scheme where animals will only graze an area or site once during the grazing season.
- Livestock will not have the potential to impact bull trout redds in 7.48 miles of spawning stream or approximately 18% of the total miles of stream where bull trout spawn on the allotment because livestock will either not graze those areas or will graze the areas prior to bull trout spawning.
- Livestock will not graze the Beaver Creek Unit prior to July 15 thereby reducing the potential for livestock to trample steelhead redds in Winnemucca Creek and Beaver Creek above Winnemucca Creek. Furthermore, no livestock grazing will occur at any time within the Marsh Creek Lower Fish Protection, Upper Marsh Creek Fish Protection, and Cape Horn Fish Protection units. These three units include 14.11 miles of stream that is currently used for spawning by steelhead or approximately 35% of the total miles of stream where steelhead spawn on the allotment. Therefore, both redd trampling and impacts to habitats associated with livestock grazing will be eliminated in these stream reaches.
- No livestock grazing will occur at any time within the Marsh Creek Lower Fish Protection, Upper Marsh Creek Fish Protection, and Cape Horn Fish Protection units. These three units include 14.31 miles of stream that is currently used for spawning by Chinook salmon or approximately 38% of the total miles of stream where Chinook spawn on the allotment. Therefore, both redd trampling and impacts to habitats associated with livestock grazing will be eliminated in these stream reaches. Seventy percent of the Chinook salmon redds observed in the Marsh Creek drainage between 1995 and 2008 were within these three units (redd data provided by R. Thurow, Rocky Mountain Research Station).

3.6 MONITROING

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 standards and to determine when livestock need to be moved from the unit. The specific triggers for moving livestock from the unit will be based on the time needed to move the livestock from the unit and may vary from unit to unit and year to year. The designated indicators (e.g. - stubble height, bank alteration, and woody browse) will be monitored within each unit at the end of the grazing season to ensure that the standards have been met.

Effectiveness Monitoring: Greenline successional status, bank stability, and woody recruitment will be monitored every three to five years to evaluate resource conditions.

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 diagrams 1.0 and 2.0 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 as 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 three objectives previously stated are achieved. The annual adaptive management strategy describes how adjustments will be made within the grazing season to ensure annual end-point 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. 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 general guidelines for establishing the values. These guidelines will be used until such time as sufficient data and/or experience are available to customize the annual indicator values. The general guidelines 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 standard will be 20%
- In priority watersheds, when bank stability is 70-89% the bank alteration standard will be 15%

- In priority watersheds, when bank stability is less than 70% the bank alteration standard will be 10%
- When there is sufficient woody recruitment to develop and maintain healthy woody plant populations, the woody browse standard 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 standard 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 that portion of the action area that is within the Marsh Creek and Valley Creek HUC5 watersheds.

Priority Watersheds are those watersheds that have been identified per direction in the 1995 PACFISH Biological Opinion, that require a different management strategy because of their importance to listed fish. Priority Watersheds within the action area are identified in Figure 3.

FIGURE 2 – CAPE HORN ALLOTMENT ACTION AREA

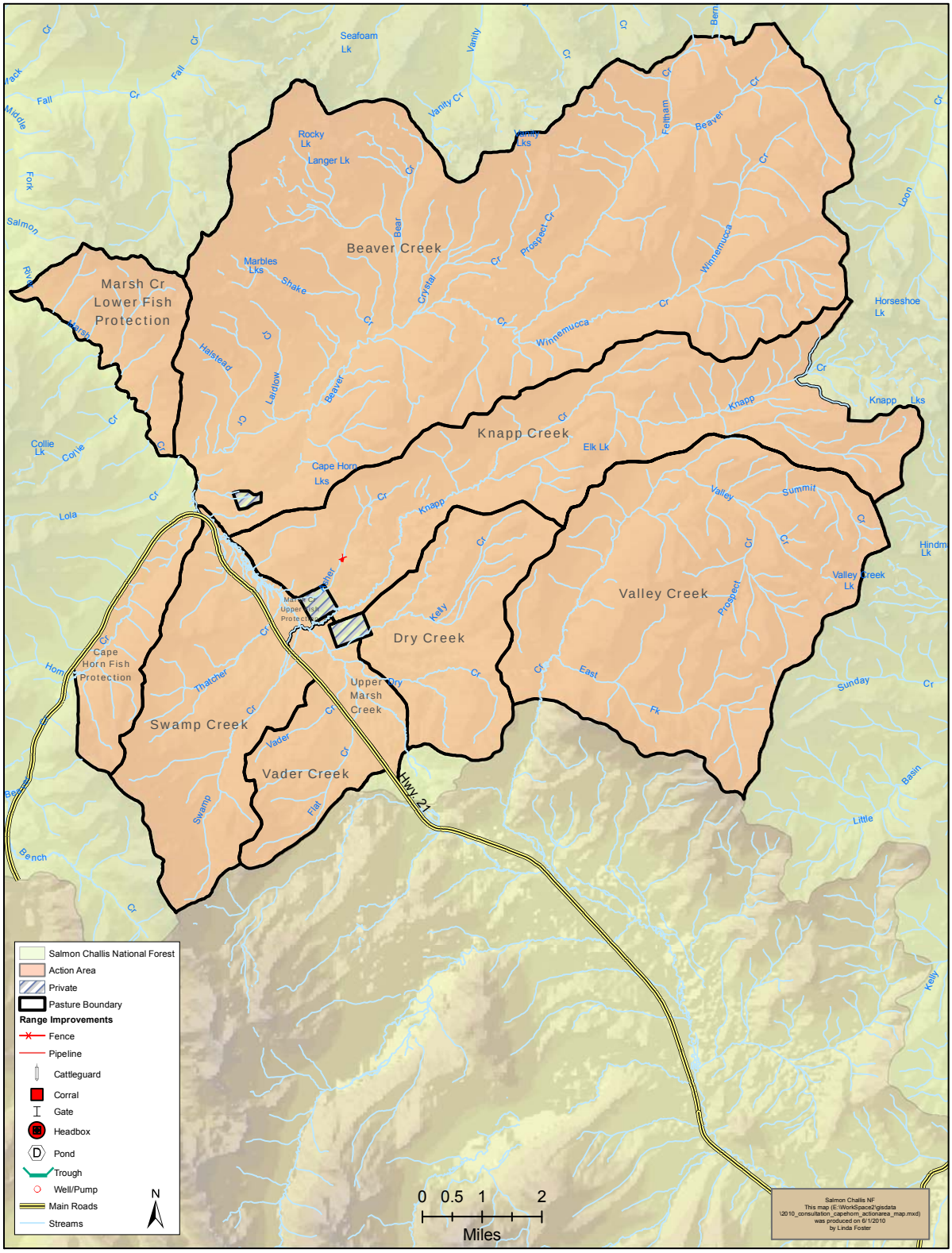
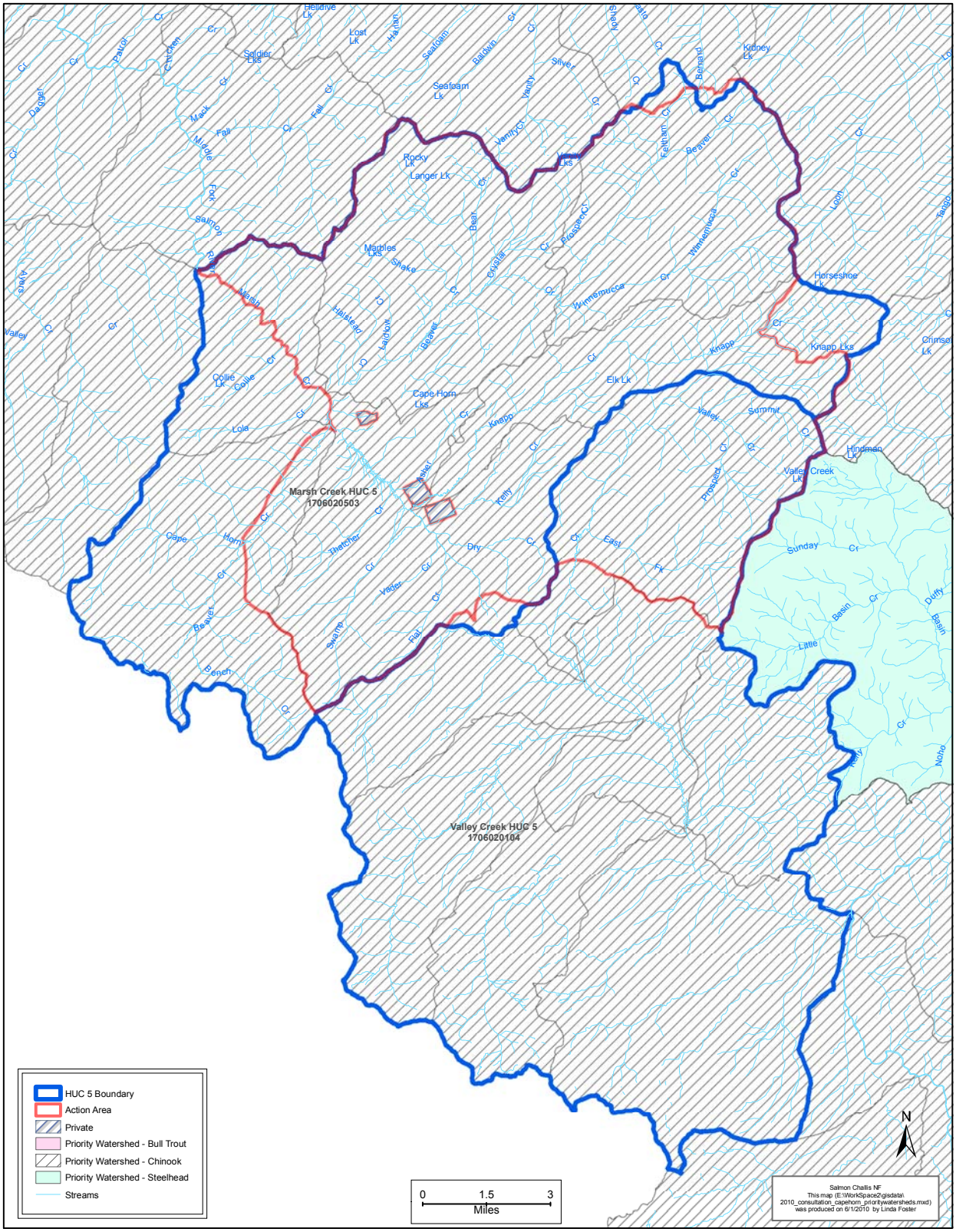


FIGURE 3 – CAPE HORN ALLOTMENT HUCS AND PRIORITY WATERSHEDS



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 Dec. 30, 2009) identifies four ESA listed fish species as occurring on and adjacent to the Salmon-Challis National Forest. These are:

- Snake River Sockeye Salmon (Endangered) (Federal Register 56FR58619)
- Snake River Spring/Summer Chinook Salmon (Threatened) (Federal Register 57FR14653)
- Snake River Steelhead (Threatened) (Federal Register 62FR43937)
- Bull Trout (Threatened) (Federal Register 63FR31647)

Salmon-Challis National Forest and Idaho Department of Fish and Game surveys indicate that three of these species occur within the action area. These species are Chinook salmon (Figure 3), steelhead (Figure 4), and bull trout (Figure 5). Sockeye salmon do not occur within either the action area or the larger Middle Fork Salmon River drainage (Federal Register 56FR58619).

5.2 CRITICAL HABITAT

5.2.1 SNAKE RIVER SPRING/SUMMER CHINOOK SALMON

Critical habitat has been designated for Snake River spring/summer Chinook salmon and includes “river reaches presently or historically accessible…to Snake River spring/summer Chinook salmon” (Federal Register 58FR68543). The Salmon-Challis National Forest has mapped Chinook salmon critical habitat designations within Forest streams following the process identified in Appendix D. It should be emphasized that this process is not to “designate” chinook critical habitat but to portray the Salmon-Challis National Forest’s interpretation of those areas that have already been designated by the rule. Utilizing this process, the Forest has identified mainstem Marsh Creek, Beaver Creek, Knapp Creek, Valley Creek, a small reach of Swamp Creek, and Cape Horn Creek (Figure 4). However, the Cape Horn Creek unit will not be grazed.

5.2.2 SOCKEYE SALMON

Critical habitat has been designated for Snake River sockeye salmon (Federal Register 58FR68543). This designation does not include any waters within the action area.

5.2.3 SNAKE RIVER BASIN STEELHEAD

Critical habitat has been designated for Snake River Basin steelhead (Federal Register 70FR52630). Steelhead designated critical habitat is present within the action area and includes mainstem Marsh Creek including Swamp Creek and Knapp Creek, Beaver Creek including Bear Creek, Crystal Creek, and Winnemucca Creek. Cape Horn Creek is also included but will not be grazed (Figure 5). Critical habitat does not include Valley Creek; however O. Mykiss presence was detected in the lower reach Valley Creek relative to the Forest boundary.

5.2.4 COLUMBIA RIVER BULL TROUT

Critical habitat was designated for bull trout on September 26, 2005. This designation did not include any areas encompassed by the proposed action. Currently, however, the U.S. Fish and Wildlife Service has published public notice (January13, 2010, Federal Register 75FR2270) that it is proposing to revise the 2005 designated critical habitat. While the Cape Horn Allotment action area does not contain any currently designated critical habitat for bull trout, it does contain proposed critical habitat. Proposed critical habitat encompasses Marsh Creek including Knapp Creek, Swamp Creek, and Thatcher Creek. This

proposed designation continues with Beaver Creek including Halstead Creek, the bottom of Shake Creek, Bear Creek, Crystal Creek, Prospect Creek, and Winnemucca Creek. The proposed designation also contains the mainstem of Valley Creek, East Fork Valley Creek and Prospect Creek (Figure 6).

The Forest desires to assess the potential impact to the Primary Constituent Elements (PCEs) of proposed bull trout critical habitat. These are defined on page 2360 of the referenced Federal register notice. Because these elements are important to areas on the Forest where bull trout are present, the Forest would like to demonstrate that potential impacts to the PCEs have been assessed and considered in the proposed action (Appendix E).

FIGURE 4 – CHINOOK SALMON

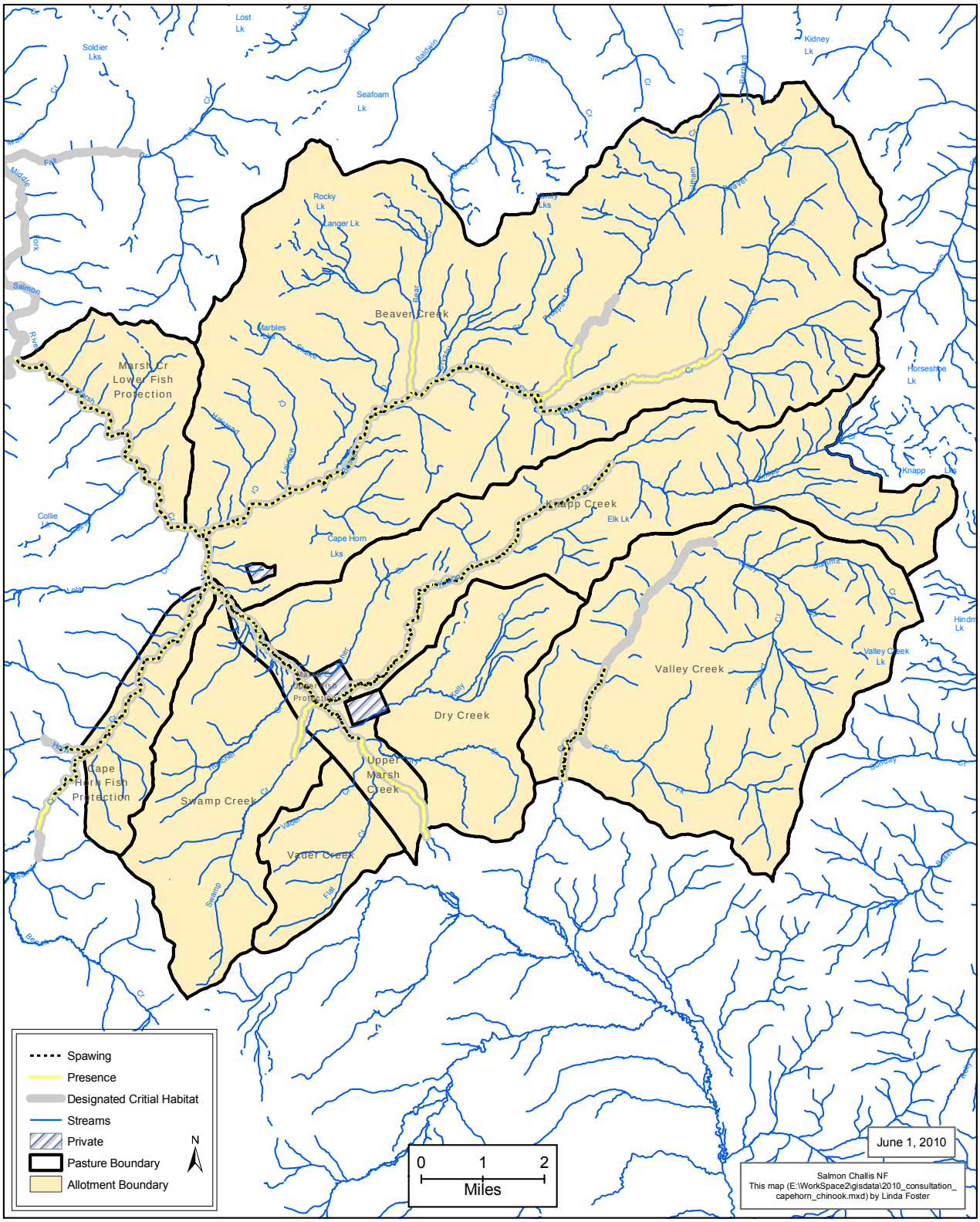


FIGURE 5 – STEELHEAD

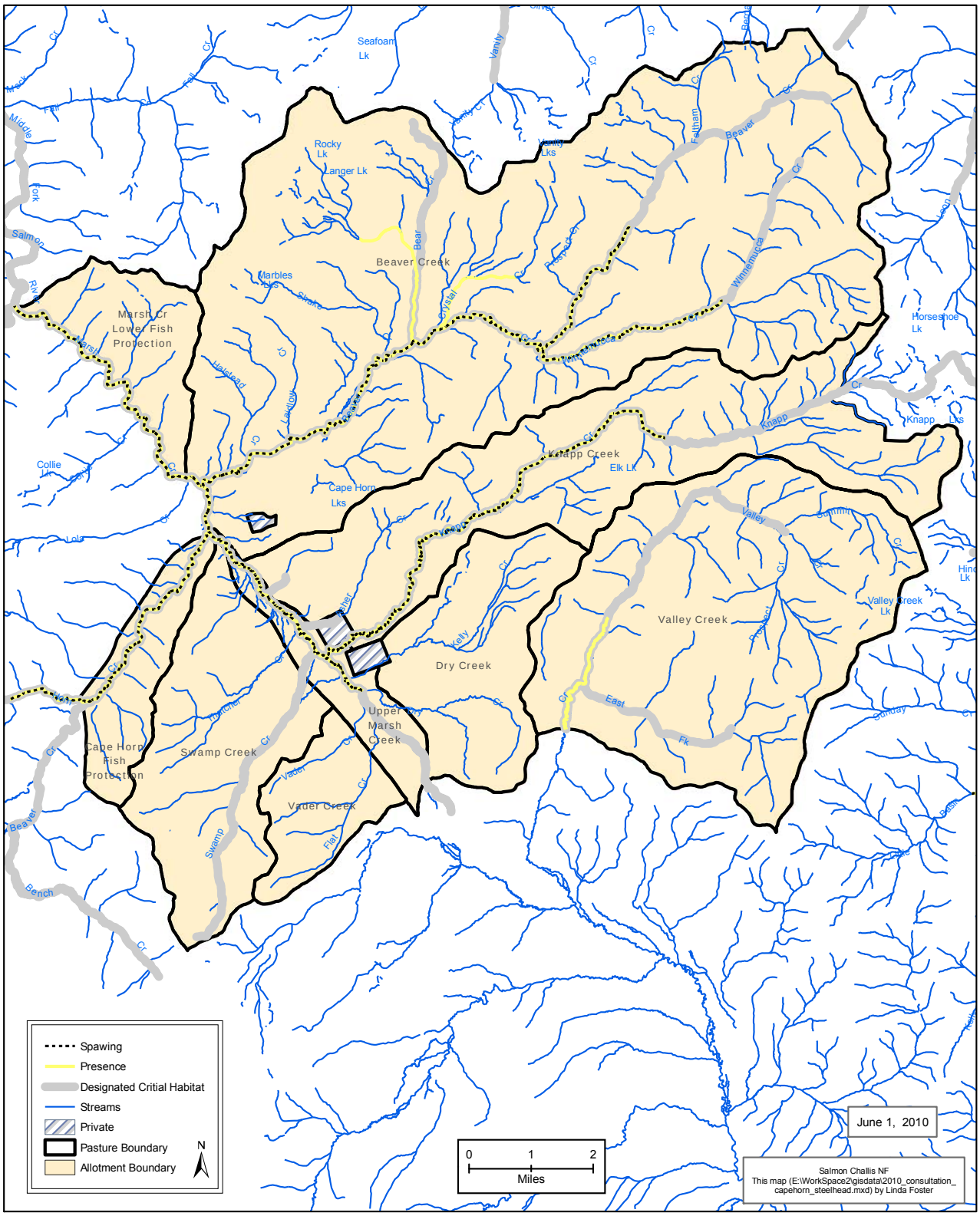
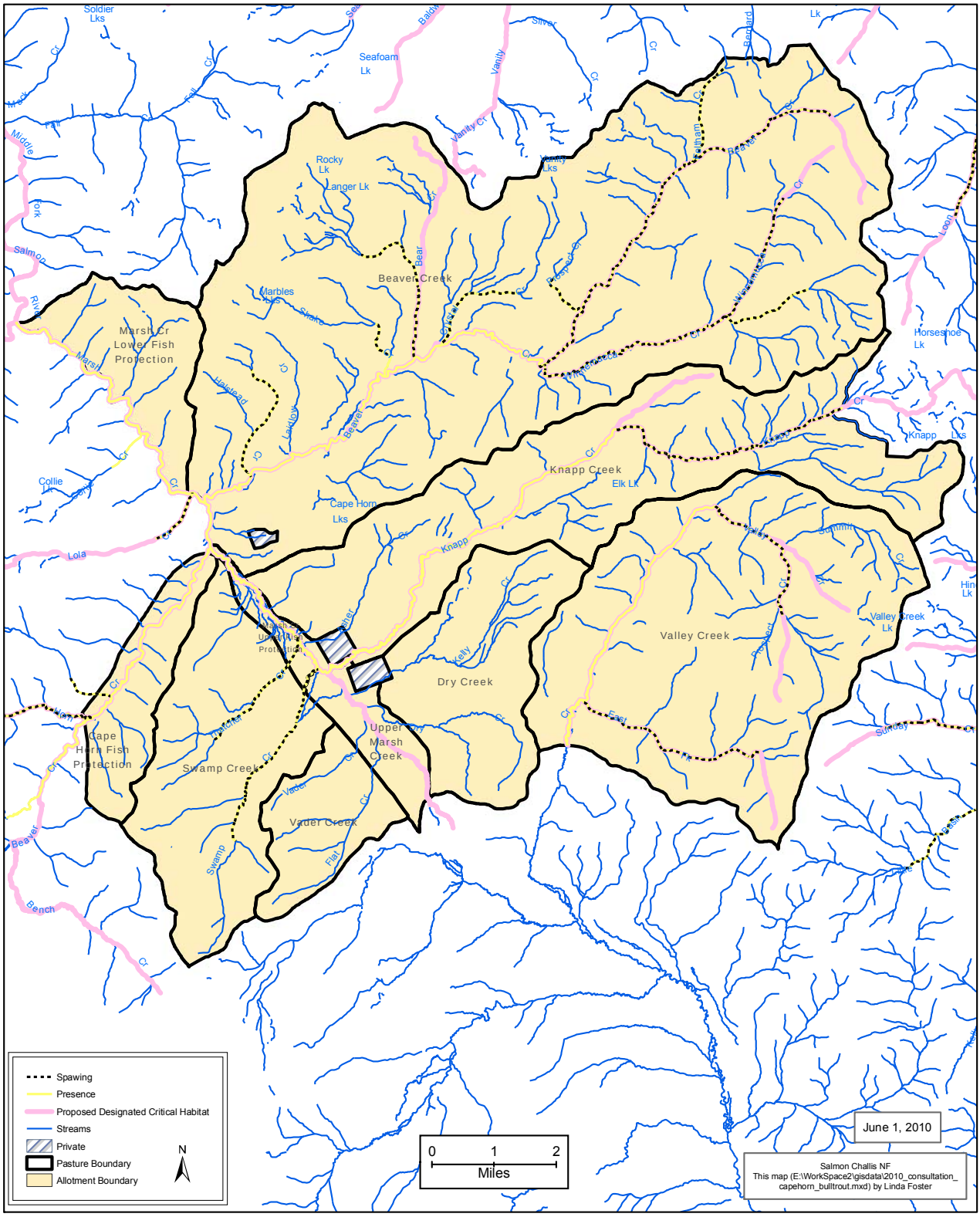


FIGURE 6 – BULL TROUT



6 ENVIRONMENTAL BASELINE DESCRIPTION

The Cape Horn Allotment is an 86,213 acre allotment located in the Upper Salmon River and Upper Middle Fork Salmon River basins within the Valley Creek 5th Field HUC (5th Field HUC: 1706020104) and Marsh Creek 5th Field HUC (5th Field HUC: 1706020503). Baseline Matrix of Diagnostic Pathways and Indicators for these watersheds is provided in Appendix B.

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.

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.

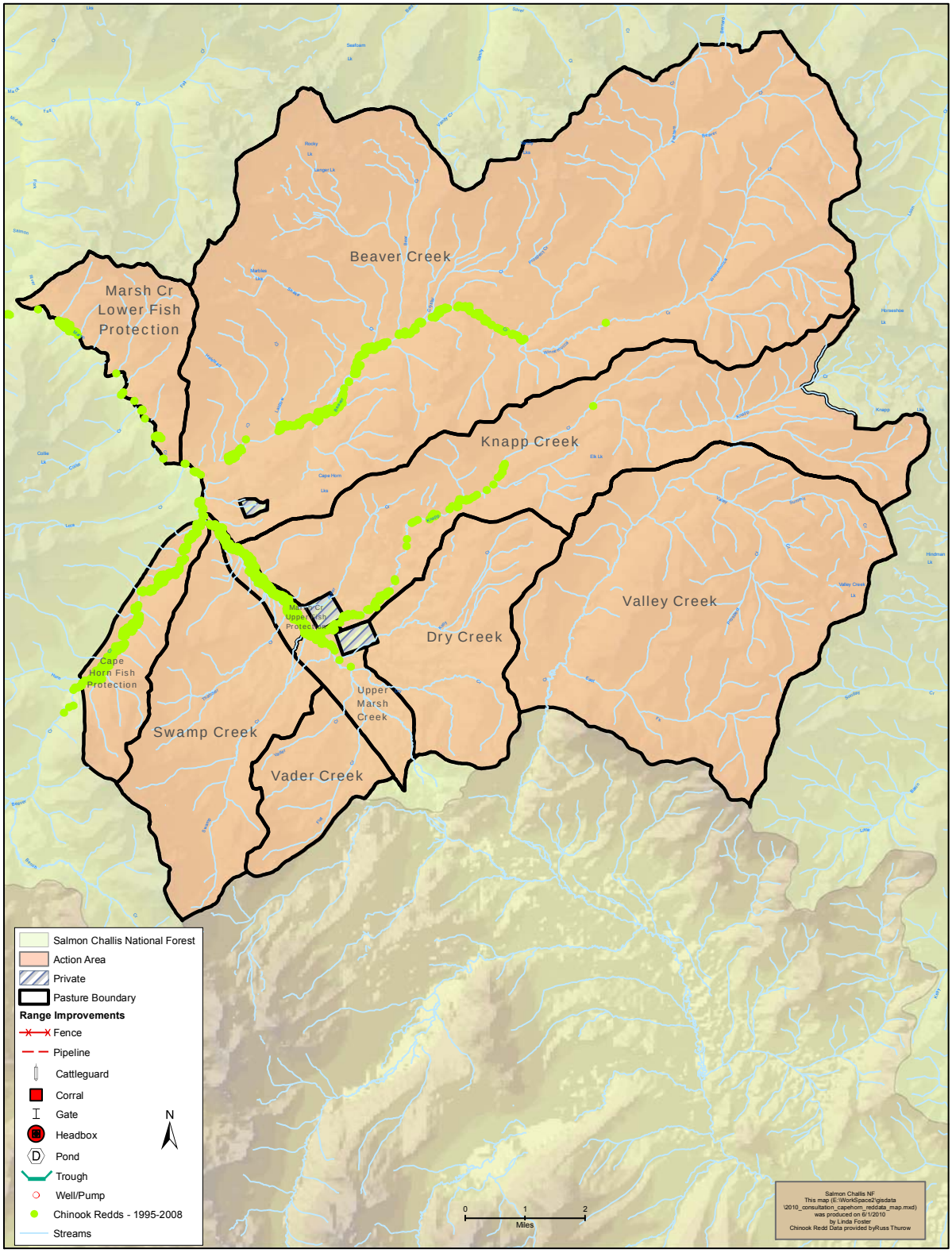
The Cape Horn Allotment action area encompasses 4 mainstem streams and their assorted tributaries (Appendix B) which support populations of, and/ or habitat for, listed fish species. Within the allotment boundaries these include mainstem Marsh Creek, Beaver Creek, Valley Creek and Cape Horn Creek (not grazed). All other streams within areas that will be grazed do not contain listed fish or support designated critical habitat. However, livestock grazing in these areas may indirectly affect listed fish and designated critical habitat in other streams within the allotment.

6.1.1 CHINOOK SALMON

The most current data from the USDA Rocky Mountain Research Center shows that Chinook salmon spawning occurs in mainstem reaches of the Marsh Creek watershed (Figure 5). Local professional judgment considers that Chinook salmon can but only incidentally utilize Valley Creek. Sheep do not graze the Valley Unit during spawning periods. Rearing most likely occurs over a broader area of the watershed. The strong presence of non-native brook trout could have an effect on the growth and survival potential of juvenile Chinook salmon. All other habitat and biological factors seem to be intact within both watersheds and action area.

The National Oceanic and Atmospheric Administration's Fisheries Technical Recovery Team (NOAA TRT) has rated the genetic integrity of the Marsh Creek Chinook salmon subpopulation as very high. This subpopulation is thought to be essentially free from hatchery influence (Thurow, 2000). There is evidence that standard hatchery practices increase the tendency of hatchery salmon to stray (Quinn, 1993). Unpredictable migrational responses, including straying among hatchery fish may affect the productivity of non-targeted stocks in nearby rivers (Steward and Bjornn 1990). Two fish hatcheries and an Idaho Supplementation Studies program occur in the Upper Salmon sub-basin. Research opportunities to study Upper Salmon hatchery stray into the Middle Fork Salmon should be explored. The Middle Fork Salmon subpopulation is very important to the overall ESU because it possesses genetic traits that increase the entire Evolutionarily Significant Unit's (ESU's) likelihood of survival in the wild.

FIGURE 7 – ROCKY MOUNTAIN RESEARCH STATION CHINOOK REDD DISTRIBUTION (1995-2008)



Ground counts of Chinook salmon redds have been conducted by the Idaho Supplementation Studies. Overall trend counts in the Marsh Creek and Valley Creek watersheds for Chinook salmon fluctuate overtime from zero to 462 redds counted. However, it is thought that this is not a reflection of habitat conditions with the two watersheds. Valley Creek within the action area is only sporadically used for spawning. In 2009 IDFG counted one redd in Valley Creek near East Fork Valley Creek.

TABLE 3 ISS CHINOOK REDD GROUND COUNTS

Stream Reach	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Marsh/ Knapp	66	46	4	0	6	38	40	0	30	113	117	252	36	21	36	44	54	42
Cape Horn	16	58	0	0	5	24	46	0	8	83	76	210	10	22	19	12	25	29

6.1.2 STEELHEAD

Current local professional judgment of steelhead in the Marsh Creek watershed is that steelhead may occasionally be present, however, the level at which steelhead actually use the Marsh Creek and Valley Creek watersheds is unknown but is thought to be very minimal and limited. Very few *O. Mykiss* have been sampled in these watersheds and there is at this time no steelhead spawning monitoring program.

6.1.3 BULL TROUT

The most current data available for density analysis shows that 4.3 bull trout $\geq$ 70mm/100m^2 occur in an unnamed tributary to Bear Creek. Other sampling data shows that the Beaver Creek and Cape Horn Creek drainages seem to be the stronghold areas for bull trout with an average of 3-7 fish $\geq$ 70mm/site were documented in 2007-2009. There is a distinct fluvial component to these watersheds where large adults spawn in small tributary reaches in the fall then return to mainstem reaches.

6.2 GENERAL DESCRIPTION OF HABITAT CONDITIONS

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

6.2.1 MARSH CREEK

Fish habitat conditions of mainstem reaches of the Marsh Creek watershed are generally in good condition. Overall aspects of physical habitat conditions including connectivity, water quality, flow/hydrology, channel morphology and structural habitat elements is considered good to be excellent. The watershed supports significant quantity of suitable spawning and rearing habitat for both anadromous and resident fish species. Listed salmonid species continue to successfully spawn, rear, and out-migrate within the Marsh Creek watershed.

6.2.2 MARSH CREEK TRIBUTARIES

Fish habitat conditions of tributary streams that make up Marsh Creek, Beaver Creek, Cape Horn Creek, and Valley Creek are generally in good to excellent condition relative to quantity and quality of aquatic habitat elements.

Two water diversions are located on Knapp Creek. The following table summarizes the effects of these diversions on the aquatic environment and fish. A full description of this information can be found in Gamett et al (2007).

TABLE 4 KNAPP CREEK DIVERSION #1AND #2 SUMMARY

Effect	Determination
Knapp Creek #1	
Diversion Structure – Entrainment	Likely to Entrain
Diversion Structure – Fish Passage	Significant Impact
Diversion Structure – Fish Habitat	Significant Impact
Flow Alteration – Entrainment	Likely to Entrain
Flow Alteration – Fish Passage	Significant Impact
Flow Alteration – Fish Habitat	Significant Impact
Knapp Creek #2	
Diversion Structure – Entrainment	Likely to Entrain
Diversion Structure – Fish Passage	No Impact
Diversion Structure – Fish Habitat	Minor Impact
Flow Alteration – Entrainment	Likely to Entrain
Flow Alteration – Fish Passage	Significant Impact
Flow Alteration – Fish Habitat	Significant Impact

6.2.3 VALLEY CREEK

Valley Creek and its tributaries within the action area contains high quality habitat for all listed fish species. Overall aspects of physical habitat conditions including connectivity, water quality, flow/hydrology, channel morphology and structural habitat elements is considered good to excellent. The watershed supports significant quantity of what seems to be suitable spawning and rearing habitat for both anadromous and resident fish species. However, the level at which anadromous fish actually utilize Valley Creek and its tributaries is quite surprising to local professionals. Quality habitat is available and it is unknown as to why salmonids do not take advantage of this opportunity.

6.3 MAJOR LIMITING FACTORS

There does not appear to be any major limiting factors for habitat quality and the ability of the habitat to support necessary life stages of listed fish species.

6.4 GRAZING FOCUS INDICATORS

One tool developed to assist in describing the condition of watersheds and streams which listed Chinook salmon, steelhead and bull trout depend on is; *A Framework to assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Subpopulation Watershed Scale* (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 a listed salmonid habitat. Using this table assists in consistent organization an assessment of current condition and judging how those indicators may be impacted by a proposed action (Lee et al. 1997). The Forest has included a matrix for this allotment as Appendix B of this Biological Assessment. 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", on which analysis of livestock impacts to fish and designated habitat will be based. These 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 set, 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 of the proposed action's effects on that habitat component.

These indicators encompass the recently published draft PCEs for Chinook salmon, steelhead and 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

6.4.1.1 CHINOOK SALMON SPAWNING AND INCUBATION

Adult Chinook salmon migrate into the Middle Fork Salmon River and into Marsh Creek from June through August. Spawning periodicity data developed by the Upper Salmon Basin Watershed Project Technical Team (Upper Salmon Basin Watershed Project Technical Team, 2005) identify a general initiation date for Chinook salmon spawning activity in the Marsh Creek drainage of August 15. Chinook salmon spawning surveys by Russ Thurow of the Forest Service Rocky Mountain Research Station however, have identified initiation of Chinook salmon spawning in mainstem Marsh Creek reaches as early as July 24 (Thurow, 2000). Incubation of eggs can occur through the end of April of the following year (Upper Salmon Basin Watershed Project Technical Team, 2005).

Within the Cape Horn Allotment, 38.03 miles of stream has been identified as Chinook salmon spawning habitat (see Figure 4, Appendix C, and Chinook Salmon Critical Habitat, Appendix D). The Marsh Creek and Valley Creek watersheds are thought to have a very high spawn→rear→out-migration success rate for Chinook salmon.

Annual ground redd surveys are conducted by the Idaho Supplementation Studies program. Four stream reaches are monitored within the Marsh Creek watershed.

Sheep will not graze the Valley Creek Unit during or after spawning occurs.

6.4.1.2 STEELHEAD SPAWNING AND INCUBATION

Data developed by the Upper Salmon Basin Watershed Project Technical Team (Upper Salmon Basin Watershed Project Technical Team, 2005) identify a general spawning periodicity for steelhead in the Marsh Creek drainage ranging from April through the second week of June, with egg incubation through the second week of July. Observations by Russ Thurow in other Middle Fork drainages however, suggest that steelhead incubation in the Middle Fork Salmon River drainage can potentially extend as late as the third week of August, if and when cool seasonal conditions were to result in late season spawning

followed by low stream temperature regimes which prolonged incubation periods (Russ Thurow, personal communication).

Steelhead spawning in the Marsh Creek and Valley Creek watersheds is largely unknown. Current professional, local knowledge points to the possibility that steelhead do not consistently spawn in this watershed if at all. Quality habitat is available but it is unknown as to why steelhead do not utilize these watersheds. Local professionals seem to think that the timing of spawning as it relates to cold water temperatures and high elevations of the watersheds could be a factor. There are no monitoring programs in place to track spawning.

The most recent fish sampling data shows only sporadic occurrence of O. mykiss and the absence of juveniles leads to the conclusion that steelhead do not consistently spawn or rear in this area.

6.4.1.3 BULL TROUT SPAWNING AND INCUBATION

Figure 6 and Appendix C identify 42.23 miles of bull trout spawning habitat within the Marsh Creek and Valley Creek watersheds (see Figure 4, Appendices C, and Chinook Salmon Critical Habitat, Appendix D). Data developed by the Upper Salmon Basin Watershed Project Technical Team (Upper Salmon Basin Watershed Project Technical Team, 2005) identify a general spawning periodicity for bull trout in the Marsh Creek drainage ranging from mid August to mid October. Incubation of eggs can occur into late April (Upper Salmon Basin Watershed Project Technical Team, 2005).

The majority of bull trout were sampled in the Beaver Creek and Cape Horn Creek drainages. These systems seem to be the stronghold for bull trout.

6.4.2 WATER TEMPERATURE

Water temperature influences many aspects of salmonid fish life history, including reproduction, growth, and migration (Bjornn and Reiser, 1991). PACFISH identifies water temperature criteria for salmon and steelhead species of less than 64 degrees F (17.8 degrees C) for rearing, and less than 60 degrees F (15.6 degrees C) for spawning and incubation. In identified steelhead priority watersheds, PACFISH identifies additional water temperature criteria of less than 45 degrees F (7.2 degrees C) during steelhead spawning periods (U.S Department of Commerce, National Marine Fisheries Service, 1998). PACFISH and INFISH additionally identify bull trout water temperature criteria of maximum temperatures below 59 degrees F (15.0 degrees C) within adult holding habitats, and less than 48 degrees F (8.9 degrees C) within spawning and rearing habitats (ibid; U.S. Department of the Interior, U.S. Fish and Wildlife Service, 1998).

Water temperature conditions in the Marsh Creek and Valley Creek watersheds are considered to be Functioning Appropriately for spawning and incubation relative to these criteria. Water temperatures were monitored at five sites within the watershed during 2009 (Appendix C, Table 8). Overall, observed water temperature regimes within the Cape Horn Allotment have generally been within PACFISH water temperature criteria, but individual streams and stream reaches have periodically displayed periods of elevated temperatures beyond optimum ranges for both spawning and rearing (Appendix C). Elevated temperature regimes are most notable in Knapp Creek above the confluence with Marsh Creek. This is thought to be a natural condition possibly due to the east-west aspect of the drainage, the wide shallow valley, and beaver dam activity causing water to be ponded in open areas exposing surface water to increased amounts of solar input.

6.4.3 SEDIMENT

Stream sediment conditions can influence fish incubation success as well as rearing habitat quantity and quality and fish food base productivity (Bjornn and Reiser, 1991).

Stream sediment conditions are considered to be Functioning Appropriately within the Marsh Creek and Valley Creek watersheds. PACFISH RMO is 20% however this standard is not being met in some areas. This is due to the valley type, channel type, and the geology. Monitoring sites are located on the mainstem of Marsh Creek and Beaver Creek.

6.4.4 WIDTH: DEPTH RATIO

The stream channel width:depth ratio is a function of geomorphic characteristics and flow regimes. Channel width:depth ratios define available living space within stream habitats and influence the nature of other hydrologic flow processes. Channel width:depth ratios are considered to be Functioning Appropriately within the Marsh Creek and Valley Creek watersheds. Channel morphology monitoring within the Cape Horn Allotment has been conducted at sediment monitoring locations and MIM sites (Appendix C, Table C10). Width:depth ratio data at all MIM sites contain dimensionless ratio values defined by Rosgen (1994) where most stream reaches fall into a C channel type.

6.4.5 STREAMBANK CONDITION

Streambank condition can influence the overall stability and resilience of stream channels. Reduced streambank stability can result in reduced structural stability of the stream channel resulting in negative impacts on fish productivity (Platts, 1991).

Streambank conditions are considered to be Functioning Appropriately within Marsh Creek and Valley Creek watersheds. Streambank conditions within the Cape Horn Allotment have recently been inventoried as part of MIMs protocol (Appendix C, Table C10). Five monitoring sites are all located on mainstem channels. Three of the sites show values below 90% stable. These conditions are considered to be natural and are a common C channel type feature (Rosgen, 1994). As streambanks naturally slough along the outside bend of a sinuous channel, opposing point-bars are actively re-vegetating, thus equilibrium is reached between erosion and building of stream banks. Width/depth ratios in the action area are a good indicator that this process is operating.

6.4.6 RIPARIAN CONSERVATION AREAS

Condition of riparian vegetation can strongly influence aquatic habitat quality and fish productivity. Removal of riparian vegetation can result in negative impacts to fish populations (Platts and Nelson, 1989).

Riparian areas are considered to be Functioning Appropriately within the Marsh Creek and Valley Creek watersheds. The riparian habitat conservation areas within the Marsh Creek and Valley Creek watersheds are largely untouched. These conservation areas provide adequate shade, large woody debris, habitat protection, and connectivity. Monitoring within the action area indicate that all five sites monitored are in upward trend or at Late Seral/ Potential Natural Condition (PNC) (Appendix C, Table 10).

The Greenline Ecological Status (GES) of the DMAs in the Cape Horn Allotment are in a late seral state or have reached the potential natural community (PNC). All the sites are dominated by sedge- rush communities and have willow, alder, and birch woody species present. Bank stability ranges from 75% at Marsh Creek to 100% in Knapp Creek. The lower bank stability at Marsh Creek is due to the nature of a low gradient meandering C channel and is not a result of grazing impacts. The use indicators for the streams are six inch stubble height, 15 percent bank alteration, and 20 percent woody browse use. The objective is to maintain or improve the streams to a late seral status. These standards have been in place since the early 1990s and have resulted in the late seral or PNC ecological ratings for these streams.

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).

TABLE 5 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

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.

Sheep tend to prefer upland grazing sites; they do not prefer wet or marshy grazing areas. They are reluctant to penetrate dense vegetation higher than their line of vision. (Glimp and Swanson 1994) The Cape Horn Allotment requires that sheep be herded; this provides a major advantage in that the herder can control the amount of time spent grazing riparian areas and is made easier by the preference of sheep for uplands and drier areas. Therefore, under proper management, sheep are expected to have little effect on riparian streams and vegetation (Platts 1982). Under a grazing strategy such as deferred use combined with good herding, there should be few detrimental effects on the fishery (Platts 1991). This takes in to account the practice of using a different day bedding area each day (Glimp and Swanson 1994).

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 influences 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).

Sheep may chose to spend time in riparian areas when late in the growing season woody riparian plants may be the most palatable available vegetation (Glimp and Swanson 1994). Near the Cape Horn Allotment in general the effects of sheep on woody riparian communities are minimal (USFS 2008) into late September. 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). 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).

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.

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. 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). In

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).

7 ANALYSIS OF EFFECTS

This section contains the effects analysis. The effects of the proposed action are described below and summarized in Table 3. Analysis emphasizes effects to the six focus indicators previously identified as being susceptible to impacts of grazing activities.

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).

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 streambank damage, removal of shade-providing vegetation, widening of stream channels, introduction of fine sediment and channel incision.

A variety of conservation measures were integrated in the Cape Horn Allotment 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 keep sheep off streams during critical spawning periods can avoid direct impact to spawning fish or their incubating redds.

- Herding: Sheep are herded daily and employ daytime bedding practices to avoid direct impacts to spawning fish and incubating redds.

- Cape Horn Creek Unit Closure: The Forest was successful in closing the Cape Horn Creek Unit from all grazing.

Rotation schedules have been refined to best avoid direct impact to spawning fish and incubating redds. Utilization standards have been identified and revised for the various units of the allotment to promote attainment of riparian objectives.

Information on the effectiveness of the proposed conservation measures is limited. Erhart and Hansen (1997) found mixed success when only one technique was applied. However, when applied collectively, this suite of measures has been shown to be effective in minimizing direct livestock impact to spawning habitats and avoiding indirect impacts to aquatic and associated riparian habitats (ibid). Field observations on sheep allotments with proper herding indicates fewer impacts on riparian vegetation and streambanks (Platts 1982, Leonard et al 1997).

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

7.1.1 SPAWNING AND INCUBATION

Livestock can trample salmonid redds when grazing occurs at times and places where redds are present (Gregory and Gamett, 2009). However, sheep are consistently, intensively herded every day throughout the grazing season. Different livestock also have different grazing and resting patterns. . Sheep, compared to cattle, tend to cause less damage to riparian areas because they are reluctant to spend time in low-lying areas where they feel vulnerable to predation (Glimp and Swanson, 1994). It has also been observed over the years that sheep prefer to graze on forbs instead of riparian grasses such as sedges and rushes. Sheep have also been observed to consistently avoid contact with water except for drinking. Combined, these characteristics tend to keep sheep away from riparian areas and surface water.

Chinook salmon, steelhead and bull trout all spawn within portions of the Cape Horn Allotment and it is possible that livestock could trample redds in these streams. Conservation measures, such as the use of full time riders, elimination of grazing from several areas, the use of bridges, and the timing and logistics of moving sheep throughout the allotment help to lessen this potential. Effects to listed-species spawning and incubation within the Cape Horn allotment are discussed individually below. However, it is expected that the proposed action will not impede the ability of the habitat within the allotment to successfully spawn and rear listed fish species. For example, the grazing system has been designed to greatly reduce the potential for redd trampling.

Data are not available relating to the number of salmonid redds potentially trampled by sheep. Gregory and Gamett (2009) evaluated the number of bull trout redds trampled by cattle in three units grazed under routine conditions on national forest lands and estimated that livestock trampled between 17 and 78% of the bull trout redds in the units. Ballard and Krueger (2005) evaluated interactions between cattle and spawning Chinook salmon during two spawning seasons during which they observed six redds for an average of 36 h/redd during 28 day grazing periods. They observed that cattle trampled two (33%) of the redds. While data are not available for sheep, the number of redds trampled by sheep is probably significantly less than cattle because sheep generally do not concentrate in riparian areas and generally do not wade into streams or wet areas, particularly larger streams. These behavior traits have been observed by FS staff over the years.

7.1.1.1 CHINOOK SALMON

Under the proposed grazing strategy, grazing of the Cape Horn Unit will not occur. Therefore, effects to stream and riparian parameters will most likely be beneficial. Recently adopted measures incorporated into the proposed action will minimize effects to Chinook salmon. Potential for redd trampling has been decreased due to; 1) sheep will not graze Valley Creek after August 1, and 2) sheep are prohibited from crossing any streams where Chinook salmon spawn throughout the remainder of the action area. Data of resource objectives at; MIM, core sampling, water temperature, and fish sampling sites within the Cape Horn Allotment show that conditions in this area could be very close to natural. Under the proposed action fish MIM sites are expected to continue to yield similar data. The proposed action will not inhibit the ability of the habitat within the Marsh Creek watershed to support Chinook salmon.

The proposed action will likely not result in livestock trampling Chinook salmon redds on the allotment. Chinook salmon currently spawn in Marsh Creek below Vader Creek, the entire section of Cape Horn Creek on the allotment, Beaver Creek below Winnemucca Creek, the lower 7.98 miles of Knapp Creek, the lower 2.06 miles of Winnemucca Creek, and the lower 3.00 miles of Valley Creek. Livestock will not cross Marsh Creek below Vader Creek, Cape Horn Creek, Beaver Creek below Winnemucca Creek, and Knapp Creek except at bridges thereby eliminating the potential for livestock to trample Chinook salmon redds in those reaches. Livestock will not cross the lower two miles of Winnemucca Creek after August 1 except at a location where 1) there are no Chinook salmon redds and 2) there are no Chinook salmon redds 200 m downstream thereby eliminating the potential for livestock to trample Chinook salmon redds in that stream reach. Livestock will not graze Valley Creek Unit after August 1 thereby eliminating the potential for livestock to trample Chinook salmon redds in Valley Creek. Furthermore, no livestock grazing will occur at any time within the Marsh Creek Lower Fish Protection, Upper Marsh Creek Fish Protection, and Cape Horn Fish Protection units. These three units include 14.31 miles of stream that is currently used for spawning by Chinook salmon or approximately 38% of the total miles of stream where Chinook spawn on the allotment. Therefore, both redd trampling and impacts to habitats associated with livestock grazing will be eliminated in these stream reaches. Seventy percent of the Chinook salmon redds observed in the Marsh Creek drainage between 1995 and 2008 were within these three units (redd data provided by R. Thurow, Rocky Mountain Research Station).

7.1.1.2 STEELHEAD

Under the proposed grazing strategy, grazing of the Cape Horn Unit will not occur. Therefore, effects to stream and riparian parameters will most likely be beneficial within the Cape Horn Unit. Potential for redd trampling has been decreased due to sheep not being allowed to cross any streams where steelhead may spawn except for Beaver Creek above Winnemucca Creek and Winnemucca Creek. However, steelhead incubation is believed to have been completed in this area by July 15. Sheep will not be allowed to graze the Beaver Creek Unit until after July 15. Recently adopted measures incorporated into the proposed action will minimize effects to steelhead. Data of resource objectives at; MIM, core sampling, water temperature, and fish sampling sites within the Cape Horn Allotment show that conditions in this area could be very close to natural. Under the proposed action fish MIM sites are expected to continue to yield similar data. Although the Marsh Creek and Valley Creek watersheds do not seem to be a strong holds, the proposed action will not inhibit the ability of the habitat to support steelhead.

The proposed action will likely not result in livestock trampling steelhead redds on the allotment. The limited numbers of juvenile *O.* mykiss observed on this allotment suggests to local experts that there are very few steelhead that spawn on the Cape Horn Allotment. Nevertheless, steelhead may currently spawn in Marsh Creek below Vader Creek, the entire section of Cape Horn Creek on the allotment, the lower 11.09 miles of Beaver Creek, the lower 9.14 miles of Knapp Creek, and the lower 3.87 miles of Winnemucca Creek. Livestock will not cross Marsh Creek below Vader Creek, Cape Horn Creek, Beaver Creek below Winnemucca Creek, and Knapp Creek except at bridges thereby eliminating the potential for livestock to trample steelhead redds in those reaches. Livestock will not graze the Beaver Creek Unit prior to July 15 thereby reducing the potential for livestock to trample steelhead redds in Winnemucca Creek and Beaver Creek above Winnemucca Creek. Furthermore, no livestock grazing will occur at any time within the Marsh Creek Lower Fish Protection, Upper Marsh Creek Fish Protection, and Cape Horn Fish Protection units. These three units include 14.11 miles of stream that is currently used for spawning by steelhead or approximately 35% of the total miles of stream where steelhead spawn on the allotment. Therefore, both redd trampling and impacts to habitats associated with livestock grazing will be eliminated in these stream reaches.

7.1.1.3 BULL TROUT

Under the proposed grazing strategy, grazing of the Cape Horn Unit will not occur. Therefore, effects to stream and riparian parameters will most likely be beneficial. Recently adopted measures incorporated into the proposed action will minimize effects to bull trout. Data of resource objectives at; MIM, core sampling, water temperature, and fish sampling sites within the Cape Horn Allotment show that conditions in this area could be very close to natural. Under the proposed action fish MIM sites are expected to

continue to yield similar data. The proposed action will not inhibit the ability of the habitat within the Marsh Creek and Valley Creek watersheds to support bull trout. Timing of grazing could overlap with early spawning bull trout and may lead to redd trampling. The potential for redd trampling has been eliminated from the Valley Creek Unit. The stream miles reported in Table C3 could be considered the stream miles exposed to potential redd trampling.

7.1.2 WATER TEMPERATURE

Stream temperatures can have important effects on fish distribution and abundance. Livestock grazing can impact aquatic and riparian habitats by reducing streamside vegetation or reducing stability of stream banks, both of which can result in channel widening and increased solar exposure, leading to elevated stream temperatures (Platts, 1991). Livestock grazing can impact stream temperatures both in areas that are grazed by livestock and in areas downstream from where grazing occurs (see section 6.4.7).

Existing data (Appendix C, Table C10) shows that water temperature is not a limiting factor within the Marsh Creek and Valley Creek watersheds. The proposed action will not impede the ability of the watershed to produce cold surface water to support listed fish species.

7.1.3 SEDIMENT

Elevated levels of stream sediment can affect the survival of salmonid eggs and alevins (Bjornn, et al, 1998). Livestock grazing can increase sediment levels by altering bank stability, riparian vegetation, and upland vegetation (see section 6.4.7). Livestock grazing and unmanaged trailing activities can impact sediment levels in areas that are grazed by livestock and in areas downstream from where grazing occurs.

Existing depth fines data (Appendix C, Table 11) shows that sediment is not a limiting factor within the Marsh Creek and Valley Creek watersheds. The proposed action will not cause the watershed or riparian areas to produce increased levels of sediment delivery. Nor will the proposed action impede the ability of stream channels to make available quality spawning gravels and rearing substrate for listed fish species.

7.1.4 WIDTH: DEPTH RATIO

Stream channel width:depth ratio is one dimension of channel morphology that dictates type and quality of habitat availability. Livestock can impact width:depth ratios by altering bank stability (see section 6.4.7). Livestock reduce bank stability through direct bank trampling or by modifying the amount or type of riparian vegetation. As bank stability declines, the banks are more susceptible to lateral erosion which can lead to a wider, shallower stream (Platts and Nelson, 1989). Livestock grazing primarily impacts width:depth ratios in the areas that are grazed by livestock. If localized disturbances are severe, however, effects can additionally occur further downstream, as stream channels respond to upstream impact.

Existing width:depth data (Appendix C, Table 10) shows that width:depth ratios are not considered a limiting factor within the Marsh Creek and Valley Creek watersheds. Width:depth data points in these watersheds range from 14.7-28.6 and are within the resource objectives (Sec 3.2.3). The proposed action will not alter or impact width/depth ratios. Therefore, the proposed action will not interfere with the availability quality, or quantity of fish habitat.

7.1.5 STREAMBANK CONDITION

Streambank conditions can have important effects on fish habitat and livestock grazing can impact streambank conditions (see section 6.4.7) by direct alteration of the bank or by modifying riparian vegetation (Platts and Nelson, 1989).

Existing MIM data (Appendix C, Table C10) shows that streambank condition is not a limiting factor within -the Marsh Creek and Valley Creek watersheds. MIM data (75-100% stability) reflects naturally sloughing banks indicative of the C channel type. Banks in this watershed are dynamic and provide for quality fish habitat features. The proposed action will not decrease bank stabilities within the Cape Horn Allotment.

7.1.6 RIPARIAN CONSERVATION AREAS

The condition of riparian areas can have important affects on fish populations. Livestock grazing can impact riparian areas by direct reduction or altering of riparian vegetation and/or by impacting protective streambank cover (Platts and Nelson, 1989). Livestock grazing primarily impacts the riparian conditions in the areas that are grazed by livestock.

Greenline Ecological Status data (Appendix C, Table C10) shows that riparian condition is not a limiting factor within the Marsh Creek and Valley Creek watersheds. MIM data shows high scores (77-106) reflecting late seral status to potential natural community. The proposed action will not impede the ability of riparian areas to function properly and provide quality habitat for listed fish species.

7.2 CUMULATIVE EFFECTS

The definition of 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 definition that is used for 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 new future state and private activities that are reasonably certain to occur within the action area.

7.3 SUMMARY OF EFFECTS

The effects analysis identifies a non-discountable potential for direct impact of livestock on spawning Chinook salmon, steelhead and bull trout and their incubating eggs. These potential impacts could directly affect the Growth and Survival Indicator of the Subpopulation Characteristics Pathway, which could produce related indirect effects to the Subpopulation Size and Persistence and Genetic Integrity Indicators. Impacts of proposed grazing activities to aquatic and riparian habitat focus indicators, including water temperature, sediment, width:depth ratio, streambank condition and riparian habitat conservation areas are all identified as insignificant or discountable. The proposed action would maintain these indicators at their current levels of functionality. Table 6 summarizes effects of proposed Marsh Creek Allotment grazing operations on aquatic/riparian Pathways and Indicators, including the six identified Focus Indicators (highlighted) addressed in the Effects section of this document

TABLE 6 EFFECTS SUMMARY FOR CAPE HORN ALLOTMENT GRAZING ACTIVITIES

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	FR	YES	YES	YES	YES	YES	YES
	Growth and Survival (including incubation survival)	FR	YES	YES	YES	YES	YES	YES

	Life History Diversity and Isolation	FR	YES	YES	YES	YES	YES	YES
	Persistence and Genetic Integrity	FR	YES	YES	YES	YES	YES	YES
Water Quality	Temperature	FA	NO	NO	NO	NO	NO	NO
	Sediment	FA	NO	NO	NO	NO	NO	NO
	Chemical Characteristics	FA	NO	NO	NO	NO	NO	NO
Habitat Access	Physical Barriers	FA	NO	NO	NO	NO	NO	NO
Habitat Elements	Substrate Embed.	FA	NO	NO	NO	NO	NO	NO
	LWD	FA	NO	NO	NO	NO	NO	NO
	Pool Frequency and Quality	FA	NO	NO	NO	NO	NO	NO
	Off-channel Habitat	FA	NO	NO	NO	NO	NO	NO
	Refugia	FA	NO	NO	NO	NO	NO	NO
Channel Condition and Dynamics	Width:Depth Ratio	FA	YES	YES	YES	NO	NO	NO
	Streambank Condition	FA	YES	YES	YES	NO	NO	NO
	Floodplain Connectivity	F	NO	NO	NO	NO	NO	NO
Flow/Hydrology	Change in Peak/Base Flows	FA	NO	NO	NO	NO	NO	NO
	Increase in Drainage Networks	FA	NO	NO	NO	NO	NO	NO
Watershed Conditions	Road Density and Location	FA	NO	NO	NO	NO	NO	NO
	Disturbance History	FA	NO	NO	NO	NO	NO	NO
	Riparian Conservation Areas	FA	YES	YES	YES	NO	NO	NO
	Disturbance Regime	FA	NO	NO	NO	NO	NO	NO

Integration of Species and Habitat Conditions	Habitat Quality and Connectivity	FA	NO	NO	NO	NO	NO	NO

8 EFFECTS DETERMINATION

The effects determination for each fish species was made using the above analysis and the effects determination key (Table 6). The specific determinations are identified below and summarized in Table 7.

8.1 SNAKE RIVER SPRING/SUMMER CHINOOK SALMON

The effects analysis concluded that the proposed action may have direct effects on Chinook salmon or Chinook salmon redds which are not considered insignificant or discountable. Although the design criteria of the proposed action and conservation measures limit the adverse effects of grazing activities, there exists a remaining potential for direct trampling of Chinook salmon redds within action area streams. Therefore, the proposed action results in a “MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT” determination for Chinook salmon.

The effects analysis concluded that the proposed action may have effects on designated Chinook salmon critical habitat. However, these effects are expected to be insignificant or discountable. Therefore, the proposed action results in a “NOT LIKELY TO ADVERSELY AFFECT” determination for designated Chinook salmon critical habitat.

8.2 SNAKE RIVER STEELHEAD

The effects analysis concluded that the proposed action may have direct effects on incubating steelhead redds which are not considered insignificant or discountable. Although the design criteria of the proposed action and conservation measures limit the adverse effects of grazing activities, there exists a remaining potential for direct trampling of steelhead redds within action area streams. Therefore, the proposed action results in a “MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT” determination for steelhead.

The effects analysis concluded that the proposed action may have some effects on designated steelhead critical habitat. However, these effects are expected to be insignificant or discountable. Therefore, the proposed action results in a “NOT LIKELY TO ADVERSELY AFFECT” determination for designated steelhead critical habitat.

8.3 COLUMBIA RIVER BULL TROUT

The effects analysis concluded that the proposed action may have direct effects to bull trout or bull trout redds which are not considered insignificant or discountable. Although design criteria of the proposed action and conservation measures limit the adverse effects of grazing activities, there exists a remaining potential for direct trampling of bull trout redds within action area streams. 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. However, these effects are expected to be insignificant or discountable. Therefore, the proposed action results in a “NOT LIKELY TO ADVERSELY AFFECT” determination for proposed bull trout critical habitat.

8.4 SNAKE RIVER SOCKEYE SALMON

The action area does not contain sockeye salmon or sockeye salmon designated critical habitat. Therefore, the proposed action results in a “NO EFFECT” determination for sockeye salmon and a “NO

EFFECT" determination for designated sockeye salmon critical habitat.

8.5 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to evaluate the impact of actions authorized, funded, or undertaken by the agency that may adversely affect the essential fish habitat of commercially harvested species. Within the scope of this action this includes Chinook salmon. Based on the above analysis, the proposed action "WILL NOT ADVERSELY AFFECT" Chinook salmon Essential Fish Habitat.

TABLE 7 EFFECTS DETERMINATION SUMMARY FOR CAPE HORN ALLOTMENT GRAZING ACTIVITIES

	Chinook Salmon		**Steelhead**		**Bull Trout**	
	Species	Designated Critical Habitat	Species	Designated Critical Habitat	Species	Proposed Critical Habitat
Determination[1]	Not Likely to Adversely Affect	Not Likely to Adversely Affect	Not Likely to Adversely Affect	Not Likely to Adversely Affect	Likely to Adversely Affect	Not 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

Matrix of Diagnostic Pathways and Indicators: Marsh Creek Watershed Baseline

USDA Forest Service, Salmon-Challis National Forest	Hydrologic Unit Code and Name: 1706020503 – Marsh Creek
Unit: Middle Fork Ranger District	Spatial Scale of Matrix: One 5th HUC
Fish Species Present: Chinook Salmon, Steelhead, Bull Trout	Designated Critical Habitat Present: Chinook Salmon, Steelhead, Bull Trout
Anadromous Species Population: N/A	Anadromous Species Subpopulation: Marsh Creek
Bull Trout Core Area: Upper Middle Fork Salmon River	Local Population: Marsh Creek
Management Actions: Livestock Grazing Allotment Administration	Updated: 4/1/2010

Pathways Indicators	Baseline	Discussion of Baseline – Current Condition
Subpopulation Characteristics		
Subpopulation Size	**Functioning Appropriately** BT, CK	Bull Trout - Bull Trout occur within the Marsh Creek watershed where all life stages are known to be present. Subpopulation size is largely unknown but is thought to be healthy and viable. Chinook Salmon – Chinook salmon occur within the Marsh Creek watershed where all life stages are present. Repeated Idaho Fish and Game surveys show 70-120 redds in the 4 main tributaries (Marsh, Beaver, Cape Horn, and Knapp) per year. Steelhead – The status of steelhead is largely unknown in these watersheds. It appears that the Marsh Creek watershed does not support a significant amount of activity at all.
Growth and Survival	**Functioning Appropriately** BT **Functioning at Risk** CK	Bull Trout – The growth and survival process is operating within this subpopulation of bull trout. Average length of fish sampled in Cape Horn Creek was 136mm. There is a strong fluvial presence as well with large adults spawning in high elevation environments and returning to mainstem reaches. Chinook Salmon – Consistent presence of redds in the 4 main tributaries of the Marsh Creek show that growth and survival are operational. However, the strong presence of brook trout may have an effect on growth and survival potential due to predation of salmon juveniles. Steelhead – The status of steelhead is largely unknown in this watershed. It appears that the Marsh Creek watershed do not support a significant amount of activity at all.
Life History Diversity and Isolation	**Functioning Appropriately** CK, BT	Bull Trout – Bull trout distribution appears to be wide spread. There is a strong fluvial component of adults spawning in high elevations then returning to higher order streams within the Middle Fork Salmon watershed. Chinook Salmon – The Marsh Creek watershed contains an environment that successfully completes life history cycles. Steelhead – The status of steelhead is largely unknown in this watershed. It appears that the Marsh Creek watershed do not support a significant amount of activity at all.
Persistence and Genetic Integrity	**Functioning at Risk** BT **Functioning Appropriately** CK	Bull Trout – Survey data show the presence of non-native brook trout in the Marsh Creek watershed and that hybridization in currently under way. Chinook Salmon – The Middle Fork population of Chinook salmon is thought to be genetically free from hatchery influence. Steelhead – The presence of steelhead is largely unknown in this watershed. The presence of non-native brook trout in the Marsh Creek watershed puts steelhead at risk through predation of juveniles.
Water Quality		
Temperature 7-day average max	**Functioning**	HOBO water temperature data was collected at five sites within the Cape Horn Allotment in 2009. • Beaver Cr. 7-day moving max = 17.9˚C

	Appropriately	• Cape Horn Cr. 7-day moving max = 16.1˚C • Knapp Cr. 7-day moving max = 19.5˚C • Marsh Cr. above Cape Horn Cr. 7-day moving max = 18.9˚C • Marsh Cr. above Knapp Cr. 7-day moving max = 15.8˚C
Sediment	**Functioning Appropriately**	McNeil core sampling data was collected in the Cape Horn Allotment from 2007 to 2009. Data has been collected from two sites. • Beaver Cr: 25.8 (2009) • Marsh Cr: 26.8 (2007), 23 (2008), 23.9 (2009) The SCNF standard for fine sediment is 30%. These data points meet the standard.
Chemical Contaminants/Nutrients	**Functioning Appropriately**	The EPA lists Marsh Creek (source to Knapp Creek) as "impaired" and a TMDL is needed. This is the only stream segment in the Marsh Creek watershed that occurs under the 303d list.
Habitat Access		
Physical Barriers	**Functioning Appropriately**	There are no known physical barriers of perennial streams within the Marsh Creek watershed.
Habitat Elements		
Substrate Embeddedness	**Functioning Appropriately**	Field observations during pebble count surveys at the Cape Horn Creek MIM sites indicate that substrate material is relatively free from fine sediment embeddedness.
Large Woody Material	**Functioning Appropriately**	Field observations conclude that LWM is present and functioning appropriately within the Marsh Creek watershed.
Large Pools or Pool Frequency and Quality	**Functioning Appropriately**	Field observations conclude that pool habitat quality and frequency is functioning appropriately within the Marsh Creek watershed.
Off-channel Habitat	**Functioning Appropriately**	Off-channel habitat has been observed within the Marsh Creek watershed.
Refugia	**Functioning Appropriately**	It appears that the Marsh Creek watershed contains areas of refugia for both adults and juvenile fish.
Channel Condition & Dynamics		
Width/Depth Ratio	**Functioning Appropriately**	Multiple Indicator Monitoring (MIM) sites within the Marsh Creek watershed contain the most recent data. - MIM: Cape Horn Creek = 16 This data value is fairly representative of larger perennial stream channels in the Marsh Creek watershed and is consistent with the Rosgen C channel types that are typical for this watershed.
Streambank Condition	**Functioning Appropriately**	Eleven Multiple Indicator Monitoring (MIM) sites occur within the Marsh Creek watershed. -Cape Horn Creek MIM: bank stability = 79% This data value is fairly representative of larger perennial stream channels in the Marsh Creek watershed. However, the standard is 80% stable banks. These conditions are indicative of the nature of the C channel type.
Floodplain Connectivity	**Functioning Appropriately**	The stream channels have access to floodplains in the Marsh Creek watershed.
Flow/Hydrology		

Change in Peak/base Flows	**Functioning at Risk**	There are two water diversions on Knapp Creek. These diversions have the potential to dewater Knapp Creek if the full water right is exercised.
Increase in Drainage Network	**?**	
Watershed Condition		
Road Density and Location	**Functioning Appropriately**	Road density in the Marsh Creek watershed is 1.06 miles/mile^2. The density of roads is concentrated around Marsh, Beaver, and Cape Horn Creek.
Disturbance History	**Functioning Appropriately**	The existence of roads is the most important aspect of disturbance history in the Marsh Creek watershed.
Riparian Conservation Areas	**Functioning Appropriately**	Two Multiple Indicator Monitoring (MIM) sites occur within the Cape Horn Allotment. Only one has been read multiple times. -Cape Horn Creek MIM: ecological status = 81 (late)
Disturbance Regime	**?**	
Integration of Species and Habitat Conditions		
Habitat Quality and Connectivity	**Functioning Appropriately**	See Habitat Elements and Channel Conditions/Dynamics

Matrix of Diagnostic Pathways and Indicators: Valley Creek Watershed Baseline

USDA Forest Service, Salmon-Challis National Forest	Hydrologic Unit Code and Name: 1706020104 – Valley Creek
Unit: Middle Fork Ranger District	Spatial Scale of Matrix: One 5th HUC
Fish Species Present: Chinook Salmon, Steelhead, Bull Trout	Designated Critical Habitat Present: Chinook Salmon, Steelhead, Bull Trout
Anadromous Species Population: N/A	Anadromous Species Subpopulation: Valley Creek
Bull Trout Core Area: Upper Salmon River	Local Population: Valley Creek
Management Actions: Livestock Grazing Allotment Administration	Updated: 4/1/2010

Pathways Indicators	Baseline	Discussion of Baseline – Current Condition
Subpopulation Characteristics		
Subpopulation Size	**Functioning Appropriately** BT, CK	Bull Trout - Bull Trout occur within the Valley Creek watershed where all life stages are known to be present. Ten individuals were sampled at two sites. These are the only sites that contained bull trout during sampling efforts. Chinook Salmon – Chinook salmon occur within the Valley Creek watershed where all life stages are present. The level at which Chinook salmon utilize Valley Creek within the Cape Horn Allotment is thought to be much less than what occurs in the Marsh Creek HUC5. Steelhead – The status of steelhead is largely unknown in this watershed. It appears that the Valley Creek watershed does not support a significant amount of steelhead activity at all.
Growth and Survival	**Functioning at Risk** BT **Functioning Appropriately** CK	Bull Trout – The growth and survival process is operating within this subpopulation of bull trout. Of the ten fish sampled at two sites, the average length in East Fork Valley Creek and Prospect Creek were 103mm. Growth and Survival may be compromised by the strong presence of brook trout in Valley Creek watershed. Chinook Salmon – Chinook salmon occur within the Valley Creek watershed where all life stages are present. The level at which Chinook salmon utilize Valley Creek within the Cape Horn Allotment is thought to be much less than what occurs in the Marsh Creek HUC5. Steelhead – The status of steelhead is largely unknown in this watershed. It appears that the Valley Creek watershed does not support a significant amount of activity at all.
Life History Diversity and Isolation	**Functioning at Risk** BT **Functioning Appropriately** CK	Bull Trout – Bull trout distribution within the Valley Creek portion of the Cape Horn Allotment appears to be isolated to the very top reaches of East Fork Valley Creek and Prospect Creek. Chinook Salmon – Chinook salmon occur within the Valley Creek watershed where all life stages are present. The level at which Chinook salmon utilize Valley Creek within the Cape Horn Allotment is thought to be much less than what occurs in the Marsh Creek HUC5. Steelhead – The status of steelhead is largely unknown in this watershed. It appears that the Valley Creek watershed does not support a significant amount of activity at all.
Persistence and Genetic Integrity	**Functioning at Risk** BT **Functioning at Risk** CK	Bull Trout – Survey data show the presence of non-native brook trout in the Valley Creek watershed and that hybridization in currently under way. The strong presence of brook trout directly threatens bull trout genetic integrity within the Valley Creek watershed. Chinook Salmon – The Upper Salmon River sub-basin population of Chinook salmon contains a considerable hatchery influence. Steelhead – The presence of steelhead is largely unknown in this watershed. The presence of non-native brook trout in the Valley Creek watershed puts steelhead at risk through predation of juveniles.

Water Quality		
Temperature 7-day average max	**Functioning Appropriately**	HOBO water temperature data was collected at five sites within the Cape Horn Allotment in 2009. • Valley Creek near Forest Boundary 7-day moving maximum = 15.9C
Sediment	**Functioning Appropriately**	McNeil core sampling data was collected in the Cape Horn Allotment from 1995 - 2009 yet not all years were sampled. Data has been collected at one site. • Valley Creek: 41.1, 26.4, 33.8, 35, 38.5, 37.8, 28.9, 29.8 The SCNF standard for fine sediment is 30%. Overall, the site is consistently near the standard. However, it is thought that this is a natural condition of the watershed.
Chemical Contaminants/Nutrients	**Functioning Appropriately**	The EPA lists that portion of Valley Creek (source to Trap Creek) as "Good".
Habitat Access		
Physical Barriers	**Functioning Appropriately**	There are no known physical barriers of perennial streams within the Valley Creek watershed.
Habitat Elements		
Substrate Embeddedness	**Functioning Appropriately**	Field observations during pebble count surveys at the Cape Horn Creek MIM sites indicate that substrate material is relatively free from fine sediment embeddedness.
Large Woody Material	**Functioning Appropriately**	Field observations conclude that LWM is present and functioning appropriately within the Valley Creek watershed.
Large Pools or Pool Frequency and Quality	**Functioning Appropriately**	Field observations conclude that pool habitat quality and frequency is functioning appropriately within the Valley Creek watershed.
Off-channel Habitat	**Functioning Appropriately**	Off-channel habitat has been observed within the Valley Creek watershed.
Refugia	**Functioning Appropriately**	It appears that the Valley Creek watershed contains areas of refugia for both adults and juvenile fish.
Channel Condition & Dynamics		
Width/Depth Ratio	**Functioning Appropriately**	Multiple Indicator Monitoring (MIM) sites within the Marsh Creek watershed contain the most recent data. - MIM: Valley Creek = 16.03 This data value is fairly representative of larger perennial stream channels in the Marsh Creek and Valley Creek watersheds and is consistent with the Rosgen C channel types that are typical for this watershed.
Streambank Condition	**Functioning Appropriately**	Eleven Multiple Indicator Monitoring (MIM) sites occur within the Marsh Creek watershed. -Cape Horn Creek MIM: bank stability = 84% This data value is fairly representative of larger perennial stream channels in the Marsh Creek and Valley Creek watersheds. However, the standard is 80% stable banks. These conditions are indicative of the nature of the C channel type.
Floodplain Connectivity	**Functioning Appropriately**	The stream channels have access to floodplains in the Valley Creek watershed.
Flow/Hydrology		

Change in Peak/base Flows	**Functioning Appropriately**	There are no water diversions or other man-made mechanisms that alter peak/base flows within the Valley Creek watershed.
Increase in Drainage Network	**?**	
Watershed Condition		
Road Density and Location	**Functioning Appropriately**	Road density in the Valley Creek watershed is very low where road location is not near stream channels.
Disturbance History	**Functioning Appropriately**	The existence of roads is the most important aspect of disturbance history in the Valley Creek and Valley Creek watersheds.
Riparian Conservation Areas	**Functioning Appropriately**	One Multiple Indicator Monitoring (MIM) site occurs within the Valley Creek watershed and has been conducted once. -Valley Creek MIM: ecological status = 84 (late)
Disturbance Regime	**?**	
Integration of Species and Habitat Conditions		
Habitat Quality and Connectivity	**Functioning Appropriately**	See Habitat Elements and Channel Conditions/Dynamics

APPENDIX C
MONITORING DATA AND SUMMARIES

FIGURE C1 – CAPE HORN ALLOTMENT MONITORING SITES

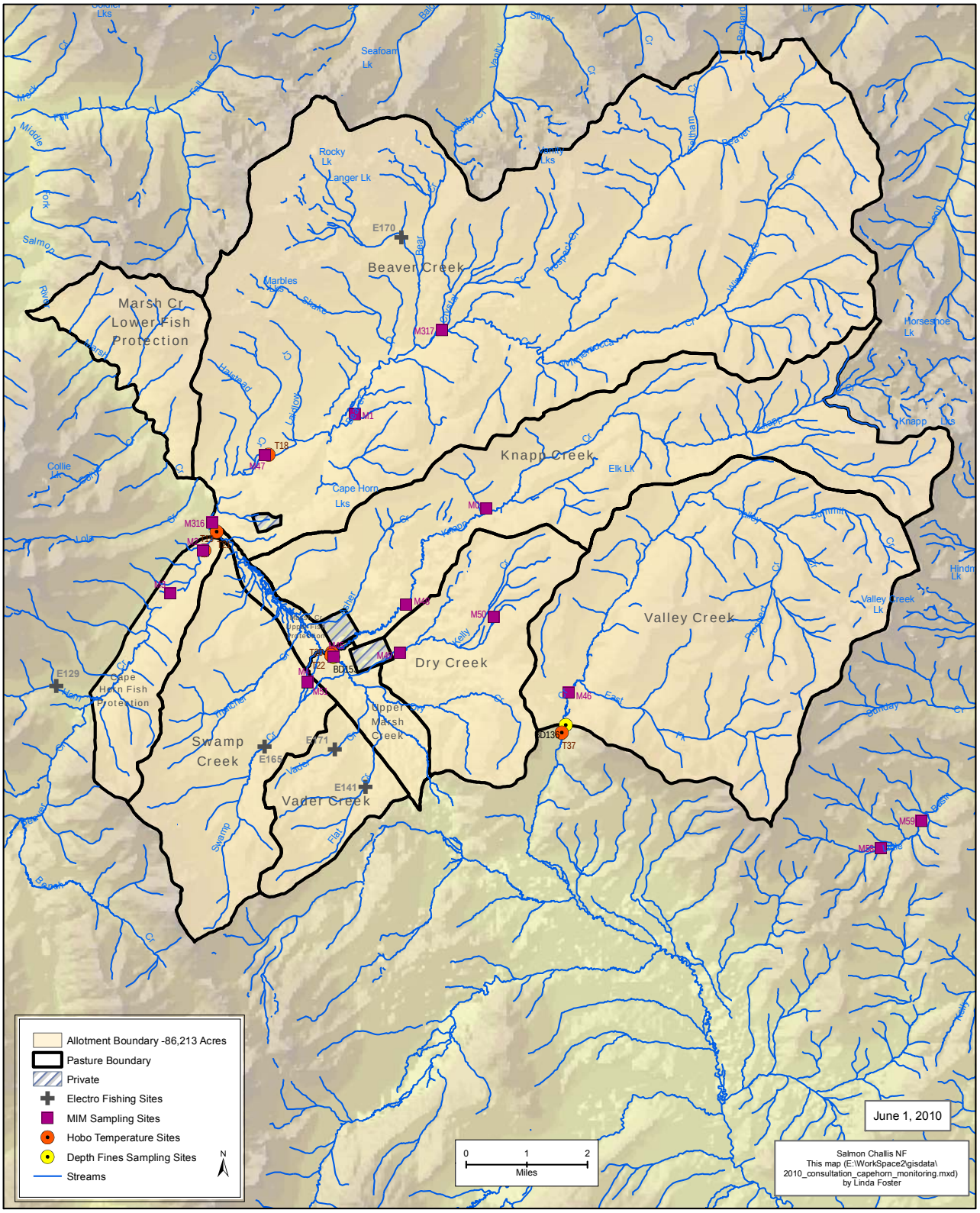


TABLE C1 FISH PRESENCE, SPAWNING, AND CRITICAL HABITAT IN THE MARSH CREEK WATERSHED

Stream	Chinook salmon Present (miles)	Chinook salmon Spawning (miles)	Chinook salmon Critical Habitat (miles)
Asher Creek	--	--	0.30
Banner Creek	0.20	0.20	0.20
Bear Creek	1.19	--	1.19
Beaver Creek	9.51	8.21	10.90
Cape Horn Creek	4.41	4.41	4.41
Knapp Creek	8.66	8.63	8.66
Marsh Creek	13.6	11.22	13.66
Swamp Creek	1.05	--	1.05
Winnemucca Creek	3.87	2.06	3.87
Valley Creek	3.00	3.00	6.12
East Fork Valley Creek	--	--	0.25

TABLE C2 FISH PRESENCE, SPAWNING, AND CRITICAL HABITAT IN THE MARSH CREEK WATERSHED

Stream	Steelhead Present (miles)	Steelhead Spawning (miles)	Steelhead Critical Habitat (miles)
Asher Creek	--	--	0.43
Bear Creek	1.19	--	4.13
Beaver Creek	11.10	11.09	14.74
Cape Horn Creek	4.41	4.41	4.41
Crystal Creek	1.81	--	--
Knapp Creek	9.79	9.79	13.09
Marsh Creek	11.22	11.22	13.70
Valley Creek	3.00	--	--
Winnemucca Creek	3.87	3.87	3.87

TABLE C3 FISH PRESENCE, SPAWNING, AND PROPOSED CRITICAL HABITAT IN THE MARSH CREEK WATERSHED

Stream	Bull Trout Present (miles)	Bull Trout Spawning (miles)	Bull Trout Proposed Critical Habitat (miles)
Banner Creek	0.20	--	0.20
Bear Creek	1.19	1.19	4.20
Beaver Creek	14.57	6.42	14.68
Cape Horn Creek	4.41	0.02	4.41
Crystal Creek	1.81	1.18	--
East Fork Valley Creek	3.41	3.41	3.41
Feltham Creek	1.74	1.74	--
Halstead Creek	0.80	0.80	--
Knapp Creek	13.09	4.43	13.09
Marsh Creek	9.99	0.03	13.59
Prospect Creek	2.15	2.15	2.46
Shake Creek	1.05	0.70	--
Swamp Creek	3.64	3.64	--
Thatcher Creek	2.33	2.33	--
Valley Creek	7.14	1.11	9.50
Winnemucca Creek	5.45	5.45	3.87

TABLE C4 FISH PRESENCE, SPAWNING, AND CRITICAL HABITAT BY ALLOTMENT UNIT

Unit-Stream	Chinook salmon Present (miles)	Chinook salmon Spawning (miles)	Chinook salmon Critical Habitat (miles)
Beaver Pasture			
Beaver Creek	9.51	8.21	10.90
Bear Creek	1.19	--	1.19
Marsh Creek	1.06	1.06	1.06
Winnemucca Creek	3.87	2.06	3.87

Knapp Pasture			
Knapp Creek	8.01	7.98	8.01
Valley Pasture			
Valley Creek	3.00	3.00	6.12
Upper Marsh			
Marsh Creek	3.62	1.24	3.62

TABLE C5 FISH PRESENCE, SPAWNING, AND CRITICAL HABITAT BY ALLOTMENT UNIT

Unit-Stream	Steelhead Present (miles)	Steelhead Spawning (miles)	Steelhead Critical Habitat (miles)
Beaver Pasture			
Beaver Creek	11.10	11.09	14.74
Bear Creek	1.19	--	4.13
Marsh Creek	1.06	1.06	1.01
Winnemucca Creek	3.87	3.87	3.87
Knapp Pasture			
Knapp Creek	9.14	9.14	12.44
Valley Pasture			
Valley Creek	3.00	--	
Upper Marsh			
Marsh Creek	1.24	1.24	3.62

TABLE C6 FISH PRESENCE, SPAWNING, AND PROPOSED CRITICAL HABITAT BY ALLOTMENT UNIT

Unit-Stream	Bull Trout Present (miles)	Bull Trout Spawning (miles)	Bull Trout Proposed Critical Habitat (miles)
Beaver Pasture			
Bear Creek	1.19	1.19	4.20
Beaver Creek	14.57	6.42	14.68

Crystal Creek	1.81	1.18	--
Feltham Creek	1.74	1.74	--
Halstead Creek	0.80	0.80	--
Prospect Creek	2.15	2.15	--
Shake Creek	1.05	0.70	--
Winnemucca Creek	5.45	5.45	3.87
Knapp Pasture			
Knapp Creek	13.09	4.43	12.44
Valley Pasture			
East Fork Valley Creek	3.41	3.41	3.41
Valley Creek	12.02	1.11	9.50
Prospect Creek		1.25	2.46
Dry Pasture	--	--	--
Swamp Pasture			
Swamp Creek	3.64	3.18	--
Thatcher Creek	2.33	1.74	--
Upper Marsh			
Marsh Creek			3.62

TABLE C7 SELECTED DATA FROM FISH POPULATION MONITORING SITES ON THE CAPE HORN ALLOTMENT

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
Unnamed Tributary to Bear Creek	8/20/2008	107	308	4.9	0.5	0.2	3.7	0	0.5
Unnamed Tributary to Bear Creek	8/7/2009	104	3.9	5.6	0.2	0	4.9	0.5	0

TABLE C8 SELECTED WATER TEMPERATURE DATA FROM THE CAPE HORN ALLOTMENT

Stream (Site ID)	Year	Maximum (°C)	7-day Moving Maximum (°C)	Mean (°C) (July 1-Sept 30)
Marsh Creek above Knapp Creek Logger# 37	2009	16.7	15.8	9.3
Beaver Creek above Marsh Creek Logger # 38	2009	18.5	17.9	10.5
Cape Horn Creek above Marsh Creek Logger# 39	2009	16.8	16.1	9.3
Knapp Creek above Marsh Creek Logger# 40	2009	20.4	19.5	12.6
Marsh Creek above Cape Horn Creek Logger # 36	2009	19.5	18.9	11.2

TABLE C9 DEPTH FINE (< 0.25 INCHES) DATA FROM THE CAPE HORN ALLOTMENT

Depth Fines (< 0.25 inches) (%)															
Stream (Site ID)	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Beaver Creek 1A															25.8
Marsh Creek 1A													26.8	23	23.9

TABLE C10 MULTIPLE INDICATOR MONITORING (MIM) DATA FROM THE CAPE HORN ALLOTMENT (ALL OTHER SITES ARE STUBBLE HEIGHT SITES ONLY)

Unit	Stream (Site ID)	Year	Width:Depth Ratio	Bank Stability (%)	Woody Species Regeneration (%)		GES[A]	Trend in GES[A]
					Seedling/Young	Mature/Dead		
Cape Horn Creek	Lower	2009	15.95	96	59	41	81	
Marsh Creek	Upper -sheep bridge	2007	14.77	75	38	63	77	
Knapp Creek	Lower - behind guard station	2007	18.45	100	65	35	106	
Valley Creek	Valley Creek	2007	16.03	84	64	36	84	
Beaver Creek	Upper	2007	28.6	81	44	56	83	

[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)

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.

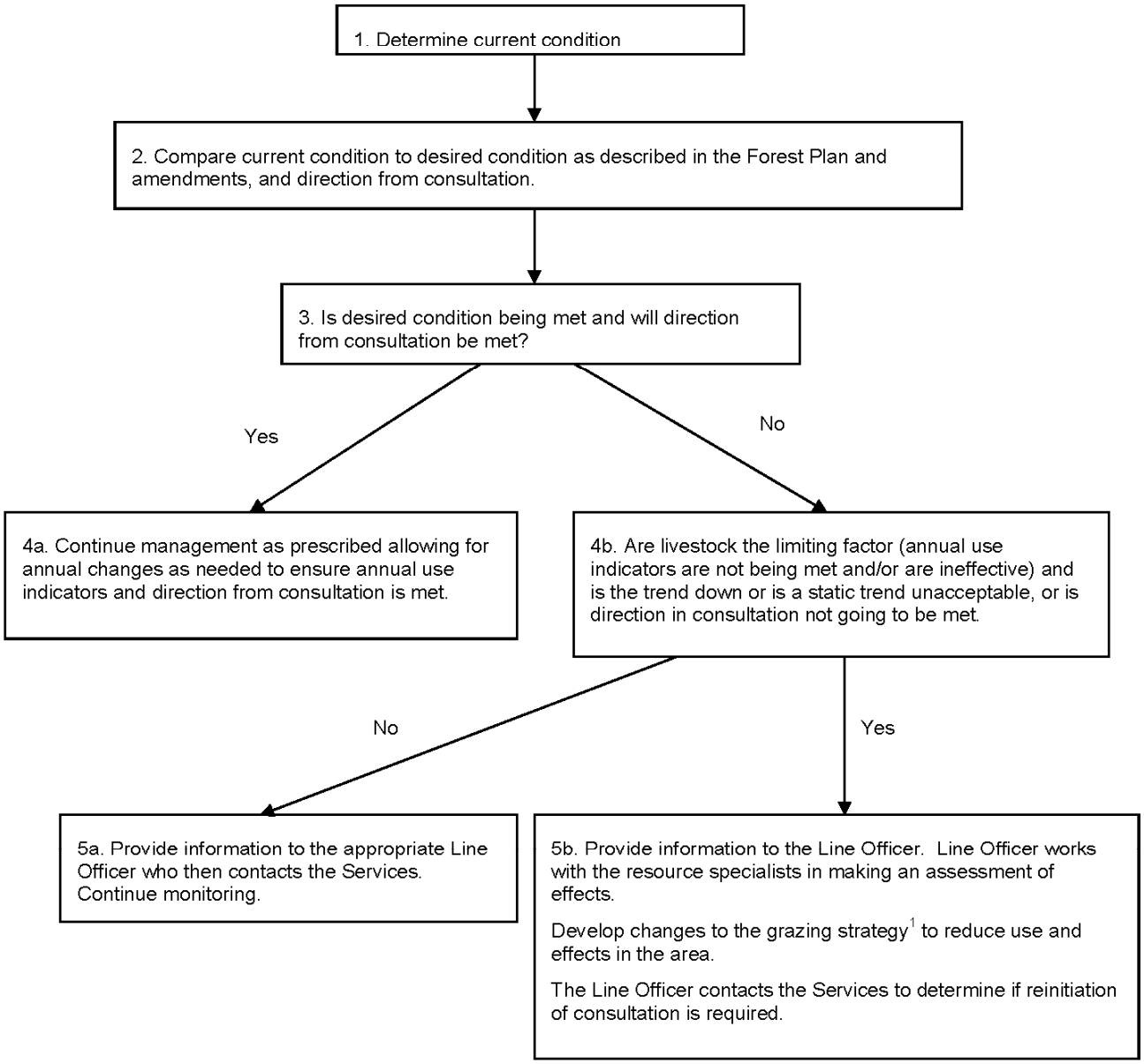
Primary Constituent Elements for Proposed Bull Trout Critical Habitat and Associated Habitat Indicators

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)

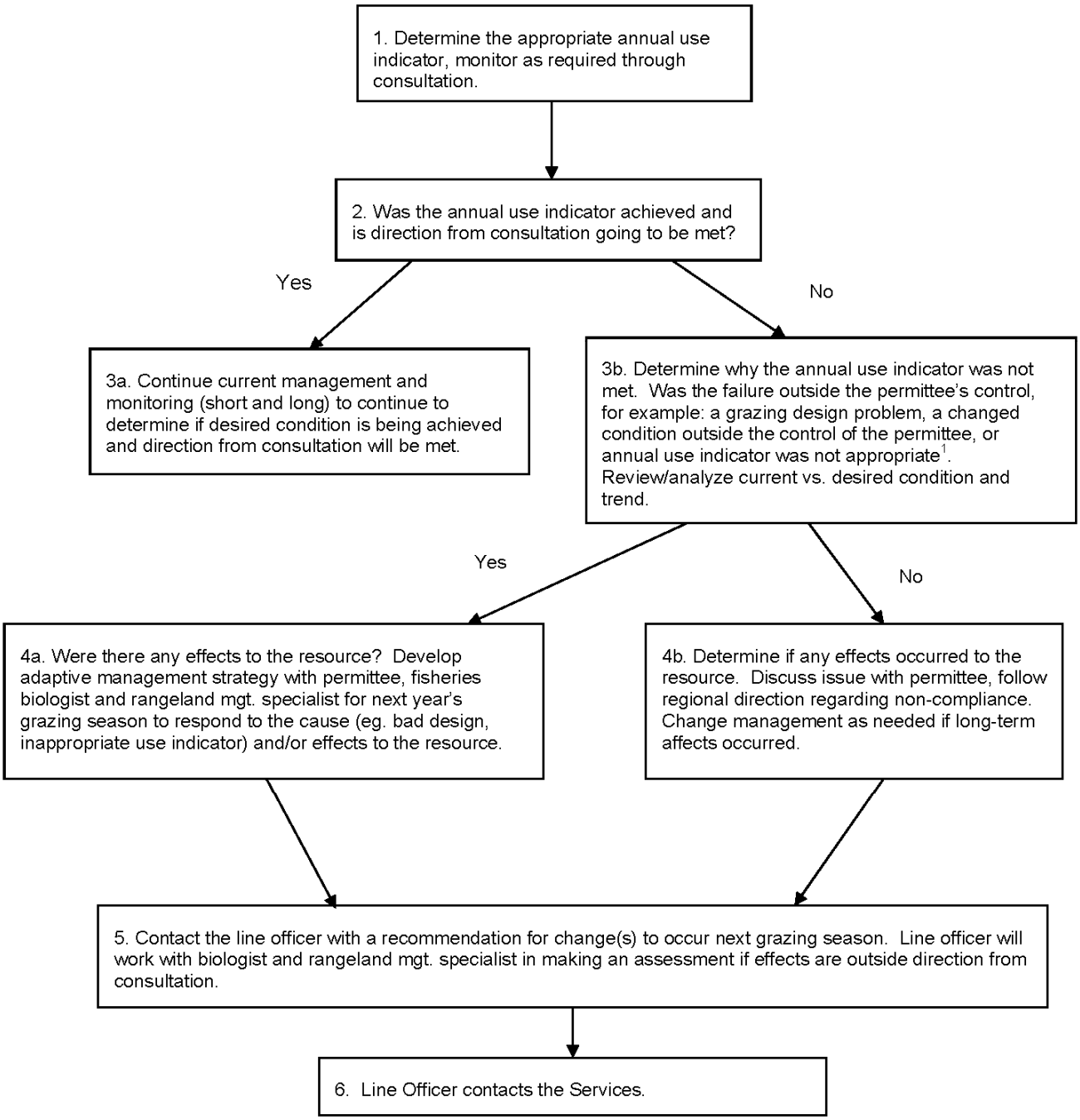
APPENDIX E
ADAPTIVE MANAGEMENT DIAGRAMS

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.