Aquatic Species Biological Assessment for the Challis Creek Cattle and Horse Allotment

CHALLIS-YANKEE FORK RANGER DISTRICT

SALMON-CHALLIS NATIONAL FOREST

CUSTER COUNTY, IDAHO

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TABLE OF CONTENTS

1 INTRODUCTION 1
2 BACKGROUND INFORMATION 1
3 PROPOSED ACTION 1
3.1 Project Area 1
3.2 Proposed Action 3
3.2.1 Current Permit 3
3.2.2 Grazing System 3
3.2.3 Resource Objectives and Standards 4
3.2.4 mangement standards and guidelines 5
3.2.5 Annual Grazing Use indicators 5
3.2.6 Improvements 6
3.2.7 Conservation Measures 6
3.2.8 Changes From Existing Management 7
3.3 Monitoring 7
3.4 Interdependent Actions 7
3.5 Interrelated Actions 8
3.6 Adaptive management 8
4 ESA ACTION AREA DESCRIPTION 8
5 LISTED SPECIES REVIEW 11
5.1 Species Occurrence 11
5.2 Critical Habitat 11
5.2.1 Snake River Spring/Summer Chinook Salmon 11
5.2.2 Sockeye Salmon 11
5.2.3 Snake River Basin Steelhead 11
5.2.4 Columbia River Bull Trout 11
6 ENVIRONMENTAL BASELINE DESCRIPTION 16
6.1 General Description of Listed Fish Populations 16
6.1.1 Chinook Salmon 16
6.1.2 Steelhead 16
6.1.3 Bull Trout 16
6.2 General Description of Habitat Conditions 17
6.2.1 Challis Creek drainage 17
6.3 Major Limiting Factors 17
6.4 Grazing Focus Indicators 18

6.4.1 Spawning and Incubation 18
6.4.1.1 Chinook Salmon Spawning and incubation 18
6.4.1.2 Steelhead spawning and incubation 18
6.4.1.3 Bull Trout spawning and incubation 18
6.4.2 Water Temperature 19
6.4.3 Sediment 19
6.4.4 Width:Depth Ratio 19
6.4.5 Streambank Condition 19
6.4.6 Riparian Conservation Areas 20
6.4.7 Annual Use Indicators and Objectives and their Relationship to Focus Indicators 20
7 ANALYSIS OF EFFECTS 23
7.1 Direct and Indirect Effects 23
7.1.1 Spawning and Incubation 24
7.1.1.1 Chinook Salmon 24
7.1.1.2 Steelhead 24
7.1.1.3 Bull Trout 24
7.1.2 Water Temperature 25
7.1.3 Sediment 25
7.1.4 Width:Depth Ratio 26
7.1.5 Streambank Condition 27
7.1.6 Riparian Conservation Areas 28
7.2 Cumulative Effects 28
7.3 Summary of Effects 28
8 EFFECTS DETERMINATION 31
8.1 Snake River Spring/Summer Chinook Salmon 31
8.2 Snake River Steelhead 31
8.3 Columbia River Bull Trout 31
8.4 Snake River Sockeye Salmon 32
8.5 Essential Fish Habitat 32
APPENDIX A REFERENCES A1
APPENDIX B WATERSHED BASELINES B1
APPENDIX C MONITORING DATA AND SUMMARIES C1
APPENDIX D PROTOCOL FOR MAPPING CHINOOK SALMON CRITICAL HABITAT D1
APPENDIX E BULL TROUT CONSTITUENT ELEMENTS OF CRITICAL HABITAT E1
APPENDIX F ADAPTIVE MANAGEMENT DIAGRAMS F1

FIGURES

Figure 1 – Challis Creek Allotment Vicinity Map 2
Figure 2 – Challis Creek Allotment Action Area Map 9
Figure 3 – Challis Creek Allotment Priority Watersheds Map and HUCs 10
Figure 4 – Chinook Salmon Distribution, Spawning Habitat and Designated Critical Habitat within the Challis Creek Allotment Action Area 13
Figure 5 – Steelhead Distribution, Spawning Habitat and Designated Critical Habitat within the Challis Creek Allotment Action Area 14
Figure 6 – Bull Trout Distribution, Spawning Habitat and Proposed Critical Habitat within the Challis Creek Allotment Action Area 15
Figure C1 – Challis Creek Allotment Monitoring Sites C1
Figure C2 – Falls on Challis Creek Below Mosquito Flat Reservoir September 17, 2002 ..... C5
Figure C3 – Falls on Challis Creek Below Mosquito Flat Reservoir September 17, 2002 ..... C5
Figure C4 – MIM 286 looking downstream from top of reach July 7, 2009 ..... C9
Figure C5 – MIM 286 looking upstream from top of reach July 7, 2009 ..... C10
Figure C6 – MIM 286 looking upstream from bottom of reach July 7, 2009 ..... C11
Figure C7 – MIM 286 looking downstream from bottom of reach July 7, 2009 ..... C11
Figure C8 – MIM 287 looking downstream from top of reach July 16, 2009 ..... C12
Figure C9 – MIM 287 looking upstream from top of reach July 16, 2009 ..... C12
Figure C10 – MIM 287 looking upstream from bottom of reach July 16, 2009 ..... C13
Figure C11 – MIM 287 looking downstream from bottom of reach July 16, 2009 ..... C13

TABLES

Table 1 – Challis Creek Allotment Unit Rotations 3
Table 2 – The annual use indicators 6
Table 3 – Relationship Matrix 20
Table 4 – Effects Summary for the challis Creek Allotment Grazing Activities 30
Table 5 – Effects Determination Summary for Challis Creek Allotment Grazing Activities 32
Table C1 – Selected data from fish population monitoring sites on the Challis Creek Allotment C2
Table C2 – Bull Trout presence, spawning, and proposed critical habitat by stream C3
Table C3 – Bull Trout presence, spawning, and proposed critical habitat by unit C3
Table C4 – Steelhead presence, spawning, and Designated critical habitat by stream C3
Table C5 – Steelhead presence, spawning, and Designated critical habitat by unit C4
Table C6 – Chinook salmon presence, spawning, and Designated critical habitat by stream C4
Table C7 – Chinook salmon presence, spawning, and Designated critical habitat by unit c4
Table C8 - Selected stream temperature data from the Challis Creek Allotment C6
Table C9 – Depth fine (< 0.25 inches) data from the Challis Creek Allotment C7
Table C10 – Bank stability data from the Challis Creek Allotment (see Table 11 for additional bank stability data) C7
Table C11 – Multiple Indicator Monitoring (MIM) data from the Challis Creek Allotment C8
Table C12 Idaho Department of Environmental Quality BURP DATA – Challis Creek Allotment .. C9

1 INTRODUCTION

The Challis-Yankee Fork Ranger District of the Salmon-Challis National Forest is proposing to authorize livestock grazing activities associated with the Challis Creek Allotment. This biological assessment describes the proposed action, discusses the probable impacts of that action on listed species and makes an effect determination for any listed species that may be affected by the proposed action. And this biological assessment forms the basis for any necessary consultation with the Fish and Wildlife Service and the National Marine Fisheries Service (Services) pursuant to section 7 of the Endangered Species Act 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, will assess the changes and any potential impacts to listed species, review the re-initiation triggers, coordinate with Services for advice (if needed) and arrive at a determination whether re-initiation of consultation is necessary.

2 BACKGROUND INFORMATION

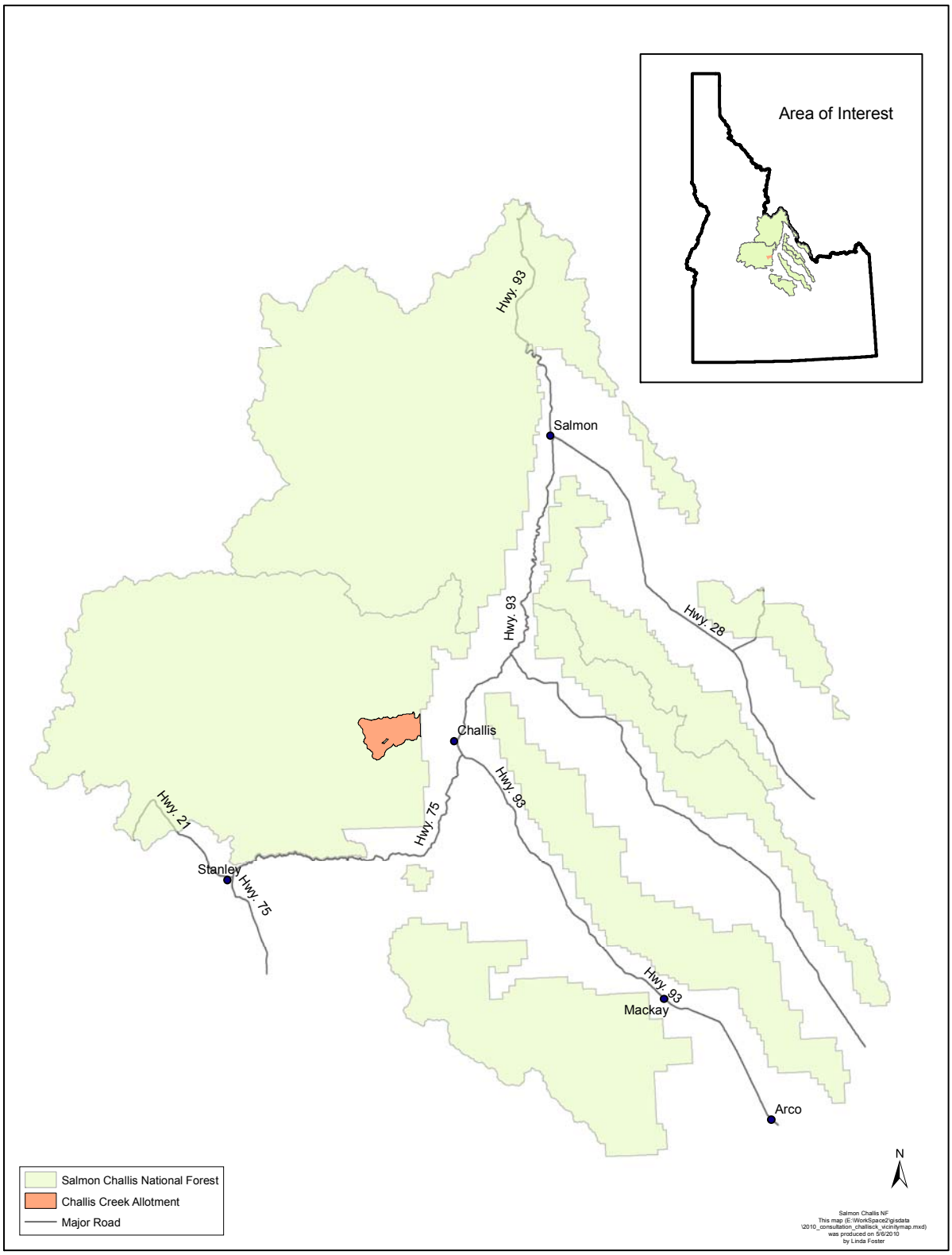
The Challis Creek Allotment is entirely within the Challis Creek 5th Field HUC (5th Field HUC: 1706020117). Elevations within this sub-watershed range from 4,839 feet at the confluence of Challis Creek and the Salmon River to over 10,400 feet at the summit of unnamed peak in the Bear Creek drainage. The geology of the sub-watershed is primarily tertiary volcanic rock. The physiography of the sub-watersheds includes high relief mountains and associated canyons, alluvial fans, and floodplains. The primary natural vegetation types are sagebrush steppe, coniferous forests, deciduous riparian communities, coniferous riparian, sub-alpine, and alpine communities. There is also a considerable amount of developed agriculture and residential land within the lower portion of the sub-watershed. The sub-watershed has a snowmelt dominated stream flow pattern with peak flows typically occurring in early summer and low flows occurring during the winter months although these patterns are altered in Challis Creek by Mosquito Flat Reservoir. The sub-watershed includes Forest Service, Bureau of Land Management, and private lands. Significant management actions within these sub-watersheds have included livestock grazing, road construction, timber harvest, fire suppression, the introduction of non-native fish, stream diversion, recreation, developments associated with agriculture, and the construction and operation of the Mosquito Flat Dam and a dam on one of the Challis Creek Lakes.

3 PROPOSED ACTION

3.1 PROJECT AREA

The Challis Creek Allotment is a 26,131 acre allotment located west of the town of Challis in the Upper Salmon River basin (Figure 1). The allotment is entirely within the Challis Creek 5th Field HUC (5th Field HUC: 1706020117) (Figures 2 and 3).

FIGURE 1 – CHALLIS CREEK ALLOTMENT VICINITY MAP



3.2 PROPOSED ACTION

3.2.1 CURRENT PERMIT

Grazing permits are held by two permittees as follows:

Permit Number	Expiration Date
20047	12/31/2015
20009	12/31/2014

3.2.2 GRAZING SYSTEM

Grazing on this allotment will involve grazing up to 226 cow/calf pairs (691 head months) under a rest-rotation grazing system with grazing occurring anytime between June 15 and September 14. The allotment consists of the Jeffs Flat North, Mosquito Flat, Jeffs Flat South, and Slab Barn units. There are two rotations that will generally be used on this allotment (Table 1). This grazing system will result in each unit being rested every other year. Some adjustments may be made to the rotation as conditions arise but livestock must be out of the units on the date specified for a specific year.

TABLE 1 – CHALLIS CREEK ALLOTMENT UNIT ROTATIONS

Year 1	Year 2
Jeffs Flat North Unit	Jeffs Flat South Unit
Mosquito Flat Unit	Slab Barn Unit

Jeffs Flat North Unit:

- Bull Trout: Bull trout spawn in this unit. Livestock will not graze in this unit after August 15.
- Steelhead: Steelhead do not spawn in this unit.
- Chinook: Chinook salmon do not spawn in this unit.

Mosquito Flat Unit:

- Bull Trout: Bull trout spawn in this unit. Livestock will graze in this unit after up to four weeks August 15 every other year.
- Steelhead: Steelhead do not spawn in this unit.
- Chinook: Chinook salmon do not spawn in this unit.

Jeffs Flat South Unit:

- There are no ESA fish streams within this unit.

Slab Barn Unit:

- There are no ESA fish streams within this unit.

Entry: Livestock enter the allotment on June 15 by trailing from the BLM Unit every year. When livestock are scheduled to graze the Jeff's Flat South Unit they are trailed from the BLM's Jeff's Flat South Unit. Entry in one of these two units is rotated every other year. The following year livestock are trailed from the BLM's Jeff's Flat North Unit to the National Forest's s Jeff's Flat North Unit.

Exit: Livestock are trailed from both the Mosquito Flat Unit and the Slab Barn Unit over Cork Screw Road (FS Road 079) onto the BLM then to the home ranch. The duration of this move is one day. The trailing goes through the Slab Barn and Jeffs Flat South Units out to the BLM.

3.2.3 RESOURCE OBJECTIVES AND STANDARDS

Resource Objectives and Effectiveness Monitoring: 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).

The allotment is being managed to achieve the following resource conditions in riparian areas:

Greenline Successional Status: A greenline successional status value of at least 61 (late seral) or the current value, whichever is greatest (Winward 2000, Burton et al. 2008)

Woody Species Regeneration: Sufficient woody recruitment to develop and maintain healthy woody plant populations (Winward 2000, Burton et al. 2008)

Bank Stability RMO (PACFISH): A bank stability of at least 80%[1] or the current value, whichever is greatest.

Water Temperature RMO (PACFISH): No measureable increase in maximum temperature.[2] For steelhead and Chinook salmon, <64°F in migration and rearing areas and <60°F in spawning areas except in steelhead priority watersheds where RMO is <45°F in steelhead spawning areas (PACFISH BO, U.S Department of Commerce, National Marine Fisheries Service, 1998). For bull trout, maximum water temperatures below 59° F within adult holding habitat and below 48° F within spawning and rearing habitats. (INFISH BO; - U.S. Department of the Interior, U.S. Fish and Wildlife Service, 1998).

Width:Depth Ratio RMO (PACFISH): <10 or by channel type as follows[3]:

A Channel: 21

B Channel: 27

C Channel: 28

Sediment RMO (PACFISH): none[4]

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

3.2.4 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:

PACFISH

- GM-1 - Modify grazing practices (e.g., accessibility of riparian area to livestock, length of grazing season, stocking levels, timing of grazing, etc.) that retard or prevent attainment of Riparian Management Objectives or are likely to adversely affect listed anadromous fish. Suspend grazing if adjusting practices is not effective in meeting Riparian Management Objectives and avoiding adverse effects on listed anadromous fish (PACFISH).
- GM-2 – Locate new livestock handling and/or management facilities outside of Riparian Habitat Conservation Areas. For existing livestock handling facilities inside the Riparian Habitat Conservation Areas, assure that facilities do not prevent attainment of Riparian Management Objectives or adversely affect listed anadromous fish. Relocate or close facilities where these objectives cannot be met.
- GM-3 – Limit livestock trailing, bedding, watering, salting, loading, and other handling efforts to those areas and times that 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

- none

3.2.5 ANNUAL GRAZING 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.

The annual use indicators and triggers for grazing use in Table 2 below will be used until the next trend reading is completed to determine which annual use indicators address attaining the resource objectives.

Annual Indicator will be adjusted if resource objectives are not being met.

TABLE 2 – THE ANNUAL USE INDICATORS

Unit	End of Season Indicators			
	Median Greenline Stubble Height	**Bank Alteration**	**Woody Browse**	**Upland Utilization**
Mosquito Flat	≥ 6 inches	≤ 20%	≤ 30%	≤ 50%
Jeffs Flat North	≥ 4 inches	≤ 20%	≤ 30%	≤ 50%
Jeffs Flat South	none[1]	none[1]	none[1]	≤ 50%
Slab Barn	none[1]	none[1]	none[1]	≤ 50%

[1] No significant perennial streams within this unit

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).

3.2.6 IMPROVEMENTS

New Improvements: There are no new improvements being proposed as part of this consultation

Existing Improvements: The allotment contains several existing improvements (Figure 2) which will be maintained in accordance with the term grazing permit.

Potential Future Improvements: There are potential new improvements that were identified as part of this consultation

3.2.7 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:

- Challis Creek Allotment is a rest-rotation allotment and all ESA streams will be rested every other year.

- Livestock will only be permitted to graze in bull trout spawning areas during the spawning and incubation period every other year.
- Livestock will be intensively herded to keep them out of Challis Creek and Lodgepole Creek after August 15.
- Salt will be place at least ¼ mile from riparian areas.
- A bank alteration standard of 20% is being added to the Mosquito Flat and Jeffs Flat North units to protect bank stability in the Mosquito Flat Unit and improve bank stability in the Jeffs Flat North Unit.
- The woody browse indicator is being reduced from 50% to 30% in the Mosquito Flat and Jeffs Flat North units to protect woody species recruitment and densities of woody species in these two units.

3.2.8 CHANGES FROM EXISTING MANAGEMENT

The proposed action includes the following changes from existing management:

- Stubble height: The indicators for stubble height are not changing from the existing values
- Bank alteration: A bank alteration standard of 20% is being added to the Mosquito Flat and Jeffs Flat North units to protect bank stability in the Mosquito Flat Unit and improve bank stability in the Jeffs Flat North Unit.
- Woody browse: The current woody browse indicator is 50% for the entire allotment. The woody browse indicator is being reduced to 30% in the Mosquito Flat and Jeffs Flat North units to protect woody species recruitment and densities of woody species in these two units.

3.3 MONITORING

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

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

Effectiveness Monitoring: The condition of the resource objectives will be evaluated in the following manner. Within the Jeffs Flat South and Mosquito Flat units, greenline successional status, woody species regeneration, bank stability, and width: depth ratio will be monitored at the DMA's every three to five years. Sediment and temperature will be monitored at established long-term monitoring sites every three to five years. These sites are established long-term monitoring sites are not necessarily located at the DMA's. There are no perennial streams of significance within the Jeff's Flat South and Slab Barn units so effectiveness monitoring will not occur in these two units.

3.4 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.

3.5 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.

3.6 ADAPTIVE MANAGEMENT

The adaptive management strategy described below and depicted in Appendix F diagrams 1.0 (Long-term) and 2.0 (Annual) is intended for allotments requiring consultation. It will be used to ensure: 1) sites at desired condition remain in desired condition; 2) sites not in desired condition have an upward trend or an acceptable static trend to be agreed upon with the Services and the Forest Service; and 3) direction from consultation with the Services is met. The overall strategy consists of a long-term adaptive management strategy and an annual adaptive management strategy. The long-term strategy describes how adaptive management will be used to ensure the three objectives previously stated are achieved and to maintain consistency with Forest Plan level direction. The annual adaptive management strategy describes how adjustments will be made within the grazing season to ensure annual use indicators and other direction from consultation is met. Both strategies describe when and how regulatory agencies will be contacted in the event direction from consultation is not going to be met.

Ideally, the value associated with the annual use indicator is customized to the specific circumstances in each unit. 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 non-priority watersheds, when bank stability is 80% or greater the bank alteration indicator will be 20%
- In non-priority watersheds, when bank stability is 60-79% the bank alteration indicator will be 10% - 20% depending on the circumstances specific to that unit
- In non-priority watersheds, when bank stability is less than 60% the bank alteration indicator 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). In other words, this is the area where the action and any interdependent and interrelated actions will result in direct or indirect effects 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 on National Forest System lands within the boundaries of the Challis Creek Allotment (Figure 2).

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. The action area is not within a priority watershed. Management direction for Non-priority Watersheds is identified in section 3.6.

FIGURE 2 – CHALLIS CREEK ALLOTMENT ACTION AREA MAP

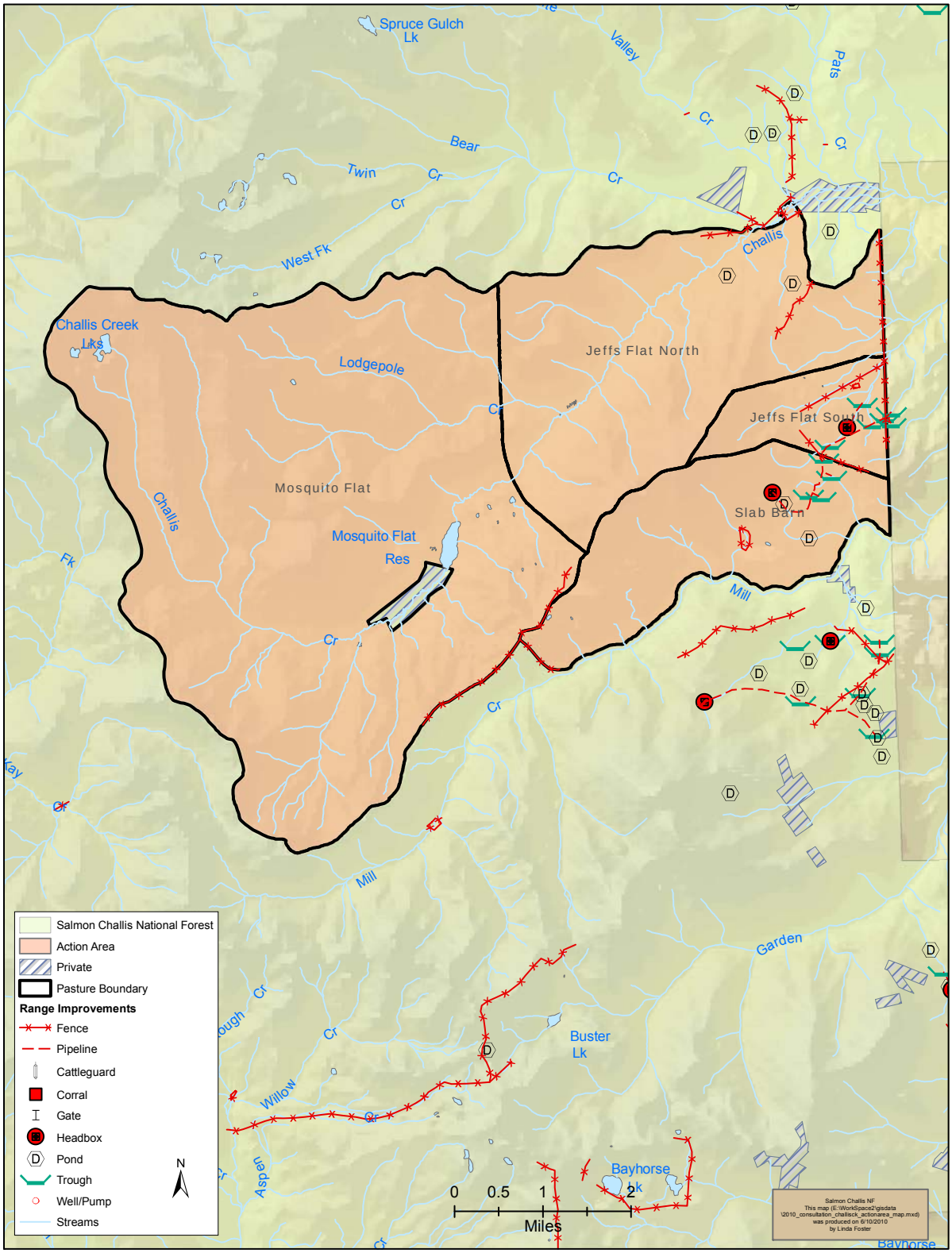
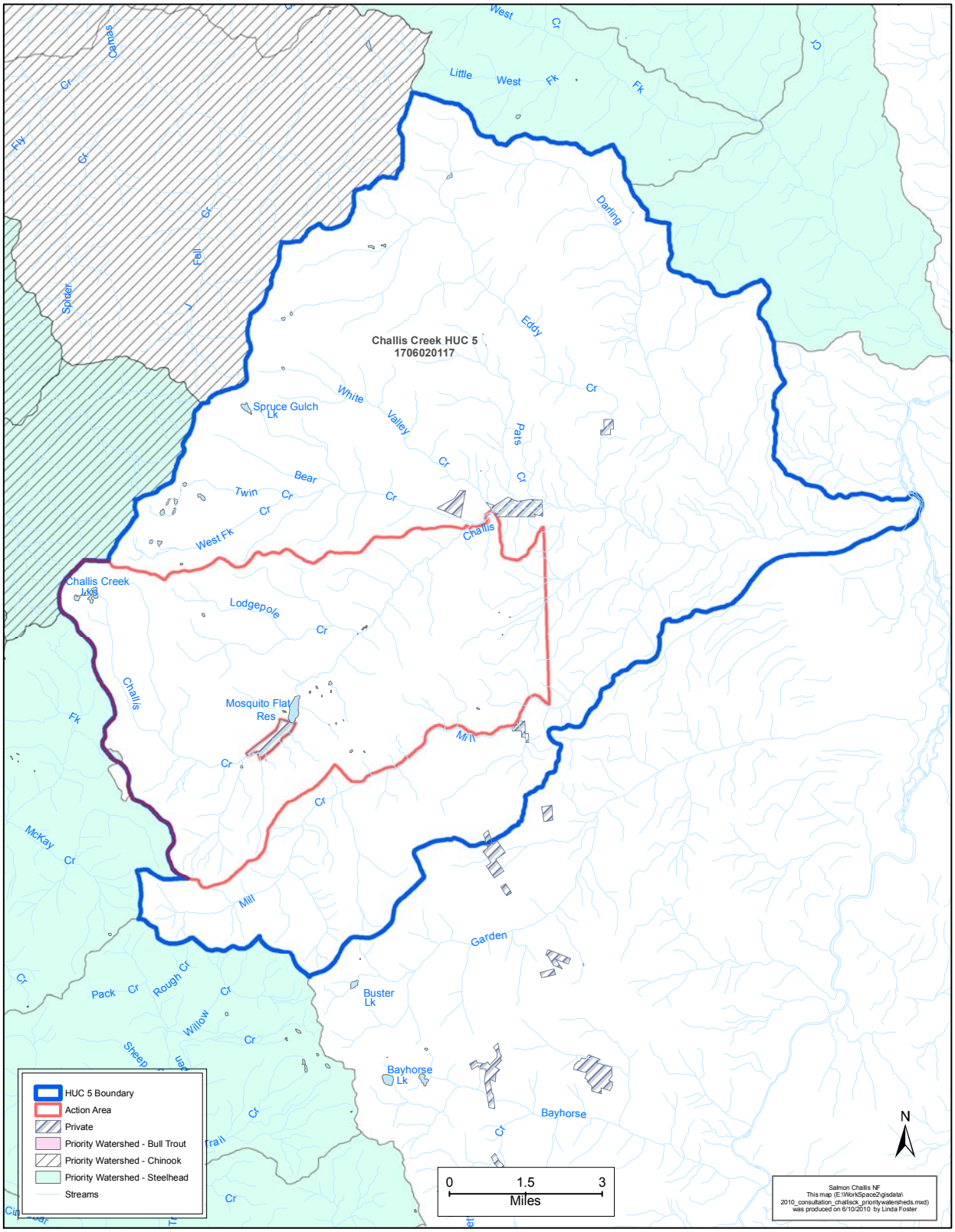


FIGURE 3 – CHALLIS CREEK ALLOTMENT PRIORITY WATERSHEDS MAP AND HUCS



5 LISTED SPECIES REVIEW

5.1 SPECIES OCCURRENCE

The current semi-annual Species List issued by the U.S. Fish and Wildlife Service (List #14420-2010-SL-0089, issued December 30, 2009) identifies 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 bull trout occurs within the action area. Chinook salmon do not utilize any stream reaches within this allotment. Steelhead are found in the lower reaches of Challis Creek within the allotment. A study conducted by the Idaho Department of Fish and Game indicates that steelhead likely do not spawn in Challis Creek above Eddy Creek which is located below the analysis area. Bull trout utilize Challis Creek and Lodgepole Creek within the action area. Sockeye salmon utilize the mainstem Salmon River as a migration corridor to and from spawning and juvenile rearing areas within lakes of the Salmon River headwaters, but do not occupy or use waters within the Analysis Area (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. Utilizing this process, the Forest has identified mainstem reaches of Challis Creek within the action area as supporting Chinook salmon critical habitat (Figure 4). A natural falls located on Challis Creek below Mosquito Flat Reservoir (Figures 4, C2, and C3) is believed to be a migration barrier to Chinook. It is believed that juvenile Chinook salmon cannot get over the upper portion of the falls, and adult Chinook salmon cannot get over the falls in the late summer-early fall due to the lack of a sufficient plunge pool and the low flow conditions that would have naturally existed in the late summer-early fall. Critical habitat was stopped at the natural falls.

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). The Challis Creek Allotment action area does not contain any designated critical habitat for steelhead (Figure 5).

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 Challis Creek Allotment action area does not contain any

currently designated critical habitat for bull trout, it does contain proposed critical habitat. Proposed bull trout critical habitat within the Challis Creek Allotment action area includes mainstem reaches of Challis Creek and Lodgepole 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 DISTRIBUTION, SPAWNING HABITAT AND DESIGNATED CRITICAL HABITAT WITHIN THE CHALLIS CREEK ALLOTMENT ACTION AREA

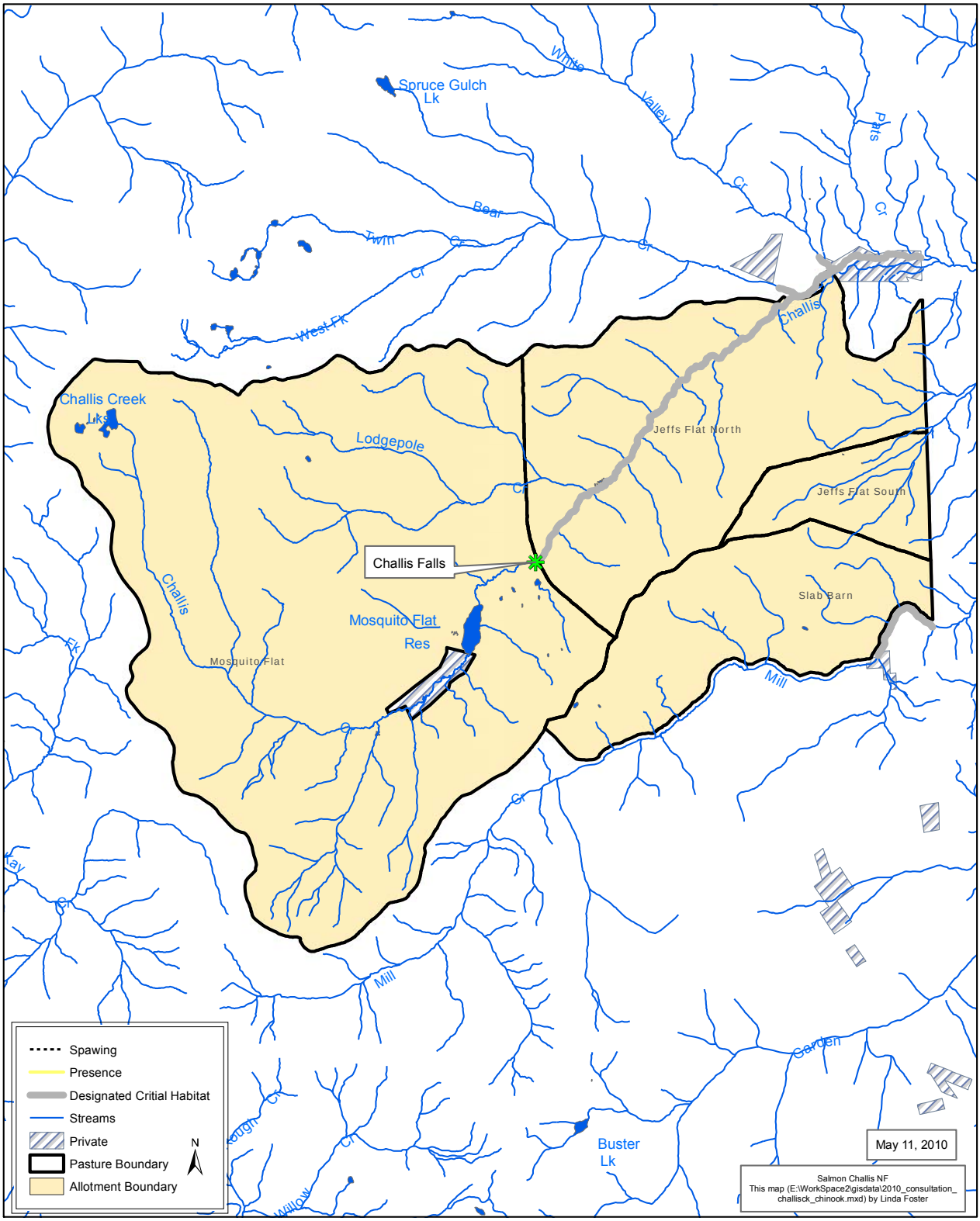


FIGURE 5 – STEELHEAD DISTRIBUTION, SPAWNING HABITAT AND DESIGNATED CRITICAL HABITAT WITHIN THE CHALLIS CREEK ALLOTMENT ACTION AREA

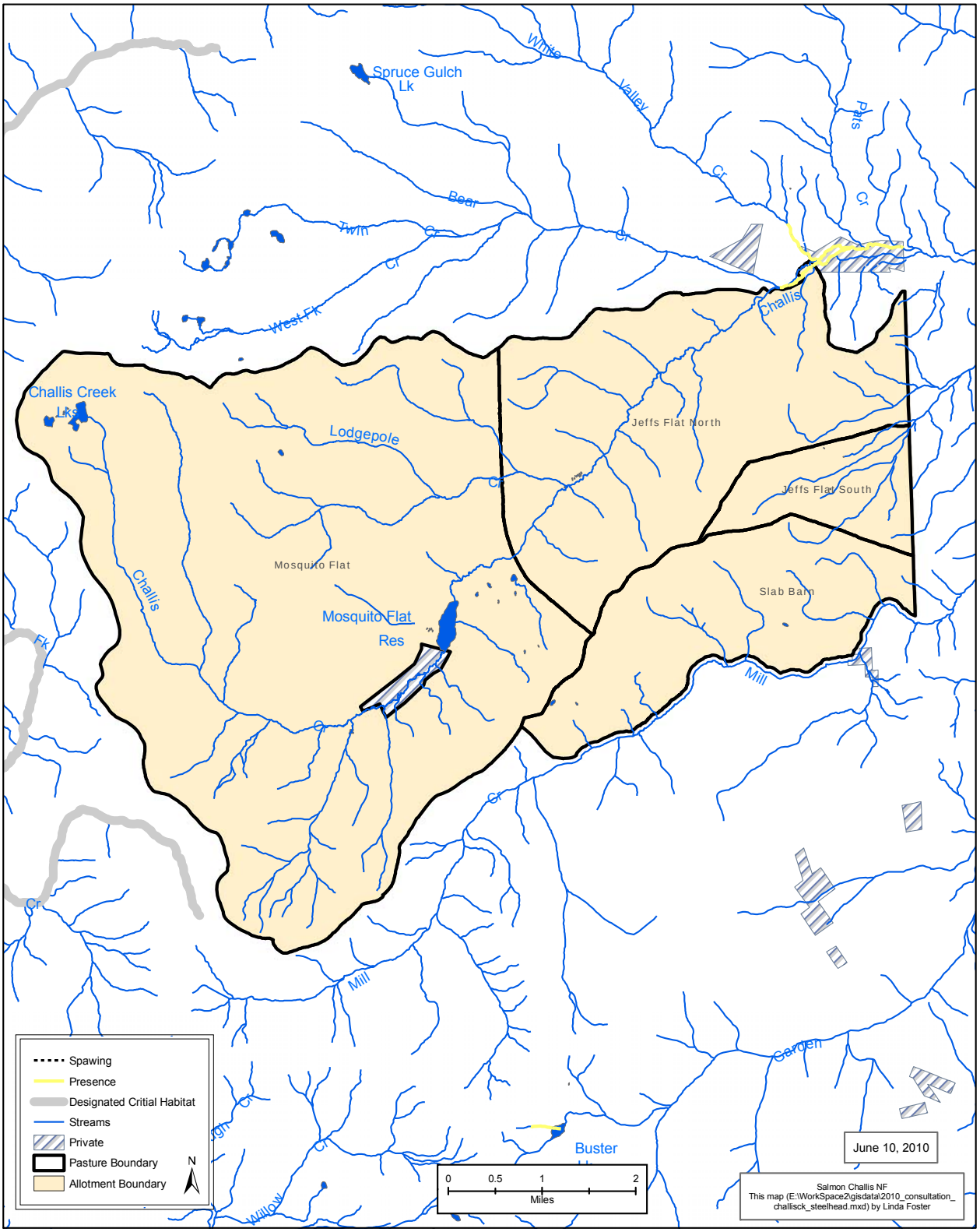
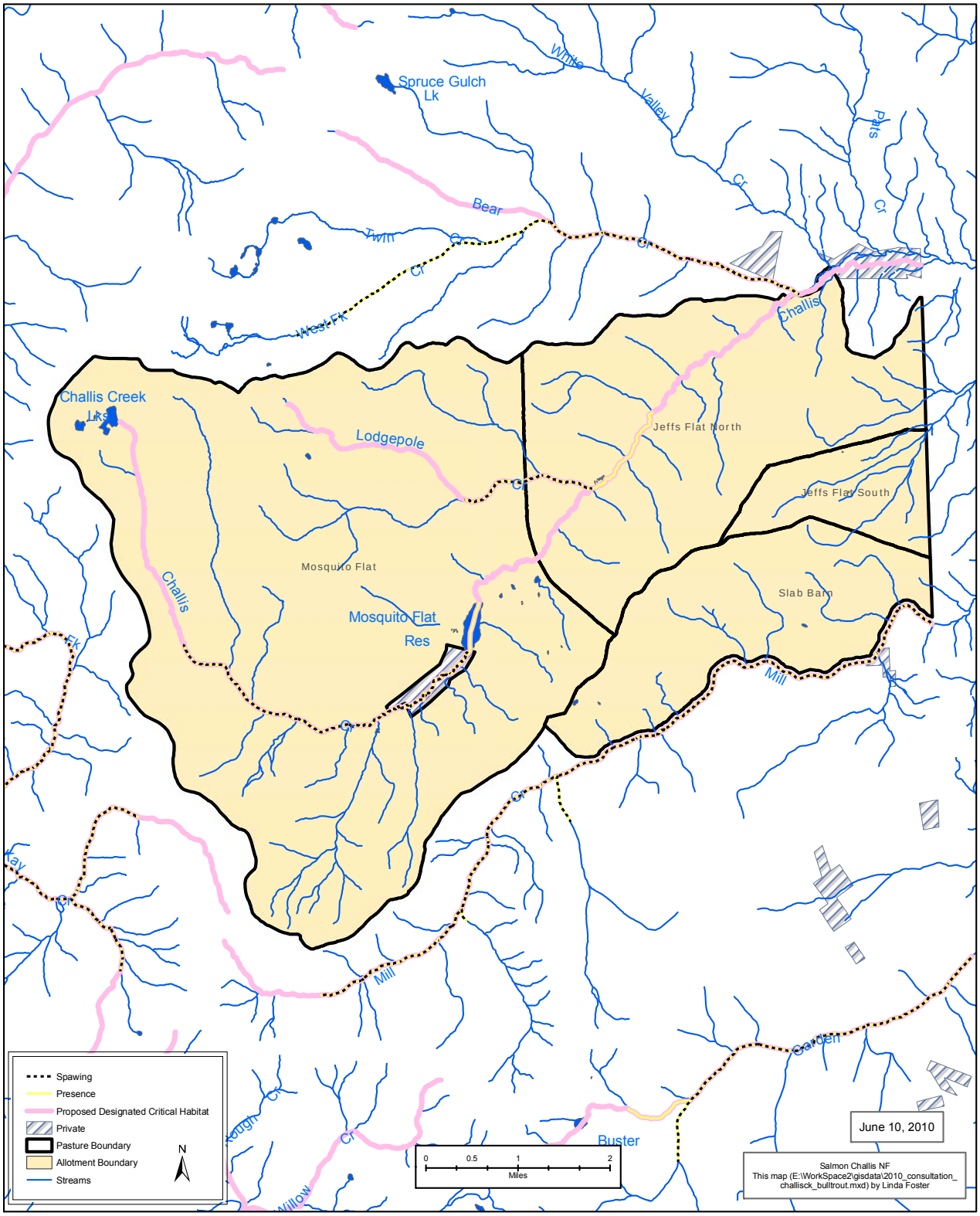


FIGURE 6 – BULL TROUT DISTRIBUTION, SPAWNING HABITAT AND PROPOSED CRITICAL HABITAT WITHIN THE CHALLIS CREEK ALLOTMENT ACTION AREA



6 ENVIRONMENTAL BASELINE DESCRIPTION

The action area lies entirely within the Challis Creek Watershed (HUC 1706020117). The Baseline Matrix of Diagnostic Pathways and Indicators for this watershed 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. As these characterizations reflect the more localized site-specific conditions of the action area, identified condition and/or functionality assessments may vary from those identified for the larger watershed-scale baseline (Appendix B).

6.1 GENERAL DESCRIPTION OF LISTED FISH POPULATIONS

This section provides a general description of the distribution, status and trend of listed fish populations within the action area.

The Challis Creek Allotment encompasses two streams which support populations of, and/or designated or proposed critical habitat for listed fish species. These include mainstem reaches of Challis Creek and Lodgepole Creek. All other streams (unnamed) within areas that will be grazed do not contain listed fish or support designated or proposed critical habitat. Mill Creek just south of the allotment is not within the action area.

Lower portions of the Challis Creek Watershed, outside of the analysis area, historically supported populations of steelhead trout and Chinook salmon. A study conducted by the Idaho Department of Fish and Game indicates that steelhead likely do not spawn in Challis Creek above Eddy Creek which is located below the analysis area. The Challis Creek Watershed supports a variety of resident native fish species. Wild populations of cutthroat trout, rainbow trout, bull trout, and whitefish are found throughout the watershed. Brook trout have been introduced in portions of the watershed (primarily the high lakes) and they have now established naturally reproducing populations in a variety of locations. Hybridization between brook trout and bull trout has been documented within Challis Creek.

6.1.1 CHINOOK SALMON

Chinook salmon are not currently found within the Challis Creek Allotment action area.

6.1.2 STEELHEAD

Steelhead are currently found within 0.21 miles of Challis Creek within the Challis Creek Allotment action area. This areas is currently fenced and not accessible to livestock.

6.1.3 BULL TROUT

Within the Challis Creek Allotment, bull trout populations are supported in mainstem Challis Creek and Lodgepole Creek. Bull trout in these two streams are of the Challis Creek local population of the Upper Salmon River Core Area. Fluvial (migratory) populations of bull trout may have existed in historic times, but there is no data to support this speculation. Trends appear to be stable for all native species with the exception of bull trout. They are probably in a slight to moderate downward trend, but still existing in viable numbers in headwater portions of the watershed. This could be caused from the Brook Trout/Bull Trout interactions.

Data available on population status and trend from the Salmon-Challis National Forest fisheries monitoring operations at the Forest's Challis Creek Management Indicator Species (MIS) monitoring site approximately 1.0 mile upstream of the Mosquito Flats Reservoir boundary three pass bull trout

electrofishing estimates of 3.5 fish/100 meters^2 during 2001 sampling and 0.5 fish/100 meters^2 during 2009 sampling (SCNF Fisheries Files, 2009).

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.

Livestock access within the analysis area consists within two pastures; the Jeffs Flat North and Mosquito Flat Pastures. This access determination is based on personal observations and obvious natural barriers that would prohibit cattle from grazing these areas.

- Jeffs Flat North Pasture
    - Challis Creek – .45 miles of habitat are not accessible to livestock
    - Lodgepole Creek – .65 miles of habitat are not accessible to livestock
- Mosquito Flat Pasture
    - Challis Creek – 5.24 miles are not accessible to livestock
    - Lodgepole Creek – 3.28 miles are not accessible to livestock

6.2.1 CHALLIS CREEK DRAINAGE

The Challis Creek Allotment encompasses portions of mainstem Challis Creek and a small tributary Lodgepole Creek. Fisheries habitats within the allotment are supported entirely within mainstem Challis Creek and Lodgepole Creek.

Challis Creek is listed by Idaho Department of Environmental Quality (IDEQ) as a 303d stream below the action area boundary. Segment Challis Creek – Darling Creek to mouth pollutants include low flow alterations, sedimentation/siltation, and water temperature. Segment Challis Creek – Bear Creek to Darling Creek pollutants include high flow regime, low flow alterations, other flow regime alterations, and sedimentation/siltation.

6.3 MAJOR LIMITING FACTORS

Brook trout are present within portions of this sub-watershed and bull trout x brook trout hybrids have been identified in Challis Creek above Mosquito Flat Reservoir (Challis Ranger District, unpublished data).

Mosquito Flat Dam is located on Challis Creek above Lodgepole Creek and is a complete barrier to upstream fish movement. However, the impact of this barrier on fish populations is limited since there is a natural falls located on Challis Creek approximately 0.5 km below the dam which is believed to be a complete barrier to upstream fish movement (Figures 4, C2, and C3).

Flow regimes have been impacted by a diversion and Mosquito Flat Reservoir. Mosquito Flat Reservoir has altered flow regimes in Challis Creek below the reservoir (B. Gamett, personal observation). Above the reservoir and diversion, which is located 3 km above the reservoir, flow regimes are likely at or near natural levels (B. Gamett, personal observation).

The primary source of sediment to Challis Creek Allotment has been identified as stream bank and road erosion. The DEQ conducted stream bank erosion inventories as part of the Beneficial Use Reconnaissance Project (BURP) from approximately 1 mile above the confluence of Lodgepole Creek to 1 mile above the confluence with the Salmon River to estimate the amount of sediment loading to Challis Creek from stream bank and road erosion.

More specific details on status and trends of habitat within the action area are provided below.

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

Chinook salmon are not currently present within the Challis Creek Allotment and no Chinook salmon spawning or incubation currently occurs within the allotment action area.

6.4.1.2 STEELHEAD SPAWNING AND INCUBATION

Steelhead are only present within 0.21 miles of Challis Creek within the action area. A study conducted by the Idaho Department of Fish and Game indicates that steelhead likely do not spawn in Challis Creek above Eddy Creek which is approximately 2.5 miles below the action area.

6.4.1.3 BULL TROUT SPAWNING AND INCUBATION

Challis Creek and Lodgepole Creek support bull trout populations within the Challis Creek Allotment action area. It is considered that both of these streams additionally support bull trout spawning. Within the Challis Creek Allotment, Figure 6 and Appendix C identify a total of approximately 3.45 miles of bull trout spawning habitat within Challis Creek and 1.57 miles within Lodgepole Creek. These lengths reflect continuous mapping reaches, and are likely a significant overestimate of actual quantity of bull trout spawning habitat within the allotment due to the discontinuous occurrence of suitable combinations of water depth, water velocity and stream substrate composition within stream reaches.

The Upper Salmon Basin Watershed Project Technical Team work window and fish periodicity document (Upper Salmon Basin Watershed Project Technical Team, 2005) does not identify a general bull trout

spawning periodicity for Challis Creek. The general spawning period for Challis Creek bull trout would be expected to be similar to other areas on the Forest spanning mid-August to mid October, with incubation extending through the third week of April of the following year.

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. PACFISH and INFISH additionally identify a 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). Overall, water temperature regimes across the Challis Creek Watershed are considered to be Functioning Appropriately. HOBO water temperature data was collected at three different sites within the Challis Creek watershed in 2009 (July 1 – September 30). The warmest maximum 7-day moving maximum recorded for these three sites was 15.9˚C (60.6˚F). This is within the PACFISH standard of 64˚F and just above the INFISH standard of 59.

There have been past exceedences for water temperature in the past. It is believed that these exceedences are reflective of yearly variations in seasonal air temperature regimes rather than due to any identifiable land management-related influences including the Mosquito Flat Reservoir.

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).

The resource objective for sediment defined by the Challis National Forest Land and resource management plan is to have less than 30% fines (< 0.25 inches in diameter). Sediment levels >20% is functioning at unacceptable risk as defined within the matrix definitions for ESA consultation. The Salmon-Challis National Forest maintains four sediment monitoring stations in Challis Creek (Table C9). Two of the sites have not been read for approximately five years. Sediment levels meet the resource objective on all monitoring sites on the allotment with sediment levels between 20.9 and 29.6, but indicate that Challis Creek within the allotment is functioning at unacceptable risk within the action area at one recent monitored site. Stream sediment levels have not been monitored in Lodgepole Creek.

6.4.4 WIDTH:DEPTH RATIO

Stream width: depth ratios influence available living space within stream habitats. Stream channel widening results in shallower depths which reduce habitat suitability (Platts and Nelson 1989).

The resource objective for width:depth is to have a width:depth ratio of less than 21 in A channel types, 27 in B channel types, and 28 in C channel types. Width:depth ratios meet the resource objective on most of the allotment. In 2009, the Forest Service evaluated width:depth ratios at two locations on this allotment using the MIM protocol (Figure C1, Table C11). Both sites M287 (C channel type) and M286 (B channel type) met the Forest objective 21.82 and 12.39 respectively.

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).

Bank stability has been monitored in the Challis Creek Allotment in association with MIMs monitoring and Forest sediment monitoring operations. Sites are located within the Jeffs Flat North Unit and the Mosquito Flat Unit on Challis Creek.

The Challis Creek Allotment is not within a priority watershed. PACFISH identifies a Riparian

Management Objective of 80 percent or greater bank stability for streams. Within the Challis Creek Allotment, the bank stability within the Jeffs Flat North Unit (M287) (Table C11, Figures C8-C11) is below the 80% bank stability objective at 72 percent. Bank Stability within the Mosquito Flat Unit (MIM286) (Table C11, Figures C4-C7) is at 79 percent just below the Forest Objective. Both of these sites are associated with MIMs monitoring sites that were established as baseline in 2009. Three of the four Forest monitoring sites (Table C10) have bank stability readings greater than 90 percent. These three sites are either in an upward or static trend. Site BD148 was last read in 2005 and had 74 percent bank stability, which has only had two years of readings in 2004 and 2005. The 2005 reading of 74 percent is down from the 2004 reading of 99 percent. This site is not a long term monitoring site and will probably not be read again in the future. It is believed that the low bank stability at the Forest site BD148 is due to beetle killed pine uprooting along the sides of the stream. All these sites are accessible to livestock and can represent livestock grazing on the allotment.

The Idaho Department of Environmental Quality has also inventoried areas within Challis Creek within the action area. The relevant data, taken from the DEQ Beneficial Use Reconnaissance Program (BURP) database, is located in Table C12. This data shows that surface fines and bank stability within Challis Creek are in good condition.

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).

The analysis of riparian conservation areas focuses on greenline ecological status and woody species recruitment. The resource objective for greenline ecological status is to have a greenline ecological status of 61 or greater. Monitoring sites were established on the Challis Creek Allotment during 2009. Sites were established in both the Jeffs Flat North and Mosquito Flat Units. The Jeffs Flat North site has a baseline greenline ecological statue of 73 which is above the resource objective, but the Mosquito Flat site has a baseline greenline ecological status of 51 which is below the resource objective (Table C11). Both of these sites were read for the first time in 2009 and are the baseline for future readings.

The Mosquito Flat North site is in a coniferous forest setting with the principle conifer species being lodgepole pine. This area has experienced a large epidemic outbreak of mountain pine beetle causing significant mortality in the lodgepole pine over the past seven years. This had caused the trees to fall and uproot along the bank contributing to sedimentation and bank erosion.

The resource objective for woody recruitment is to develop and maintain healthy woody plant populations. This objective can be evaluated by examining the total density of woody species, the density of seedlings and young, and the percentage of woody plants that are seedlings and young. In 2009, the Forest Service evaluated these parameters on this allotment using the MIM protocol (Table C11). Woody species densities exceed 7,000 plants/acre at both sites.

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 3 – Relationship Matrix

Focus Indicator	Riparian Resource Objective	Related Element Affected by Livestock Grazing	Related Annual Use Indicator

Streambank Condition	Greenline Successional Status	Greenline Status	Greenline Stubble
	Woody Species Regeneration	Woody Species Regeneration	Browse Use
	Bank Stability	Greenline Status, Woody Species Regeneration, Current Year Alteration	Stubble Height, Browse Use, Bank Alteration
Temperature	Water Temperature	Greenline Status, Woody Species Regeneration, Vegetation Overhang	Greenline Stubble, Browse Use, Bank Alteration
Width:Depth	Width:Depth Ratio	Greenline Status, Current Year Alteration	Greenline Stubble, Browse Use, Bank Alteration
Sediment	Sediment	Greenline Status, Bank Stability, Current Year Alteration	Greenline Stubble, Browse Use, Bank Alteration
Riparian Conservation Areas	Greenline Successional Status	Greenline Status	Greenline Stubble
	Woody Species Regeneration	Woody Species Regeneration	Browse Use
	Bank Stability	Greenline Status, Woody Species Regeneration, Current Year Alteration	Stubble Height, Browse Use, Bank Alteration
Spawning and Incubation	N/A	N/A	N/A

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

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

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

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

Stubble height on the greenline is directly related to the health of herbaceous plants (Burton et al 2008). Dense vegetation on the floodplain during spring flooding events to trap sediment plus vigorous plant

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

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

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

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

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

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

It is widely known that bank alteration by trampling, shearing, and exposure of bare soil can be an important source of stream channel and riparian area degradation (Clary and Webster, 1989, Belsky et

al., 1999). Impacts of bank alteration may include channel widening (and loss access to floodplains by peak flows), loss of riparian vegetation (which then makes banks more vulnerable to further erosion), localized lowering of water tables in riparian areas (and loss of water storage in floodplains and stream channels), and changes in sediment transport capacity of stream channels (Clary and Webster 1989).

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

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

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

7 ANALYSIS OF EFFECTS

This section contains the effects analysis. The effects of the proposed action are described below and summarized in Table 4. 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). During the early phases of their life cycle, juvenile salmonids have little or no capacity for mobility, and large numbers of embryos or young are concentrated in small areas.

Improperly managed grazing can additionally have adverse indirect effects to streams and riparian areas (Menke 1977; Meehan and Platts 1978; 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 can be implemented to minimize or eliminate potential grazing related effects to listed fish and their aquatic and riparian habitats. These include:

- Strategic Rotation: Unit rotation strategies designed to move livestock off streams during critical spawning periods can avoid direct impact to spawning fish or their incubating redds.
- Fencing: Fencing sensitive riparian areas can be an effective way of protecting riparian resources, fish habitat and fish populations. Platts (1991) found that, in 20 of 21 studies, stream and riparian habitats improved when grazing was prohibited in fenced riparian zones.
- Salting: Placing salt or mineral supplements in upland areas can decrease the amount of time livestock spend in riparian areas. Ehrhart and Hansen (1997) provide evidence that salt, when used in conjunction with alternate water sources, can help distribute livestock over open range
- Herding: Utilizing riders to keep livestock away from riparian areas can avoid direct impacts to spawning fish and incubating redds.

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

All of the five measures identified above have been integrated into the grazing strategy for the Challis Creek Allotment to reduce the potential for adverse effects to listed fish and aquatic and riparian habitats within the action area. Rotation strategies rest two of the four units every other year. With this rotation Chinook salmon and bull trout critical and proposed critical habitat and bull trout spawning areas are rested every other year. The allotment contains a fence in the lower portion of Challis Creek that keeps livestock out of the area where steelhead presence occurs. Salting is employed in the allotment to keep livestock off stream areas. Riders additionally keep livestock in upland areas and off stream channels and riparian areas. 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.

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). Factors which can lessen the degree of effects from grazing include active measures to keep cattle off stream channels such as fencing, off channel salting or employment of riders, or natural inaccessibility of streams channels due to topography or dense riparian vegetation.

Listed fish species spawn within a number of streams of the Challis Creek Allotment, and it is possible that livestock could trample redds in these streams if grazing occurs when fish are spawning or eggs are incubating within stream substrates. Effects to listed-species spawning and incubation within the Challis Creek Allotment are discussed individually below.

7.1.1.1 CHINOOK SALMON

Chinook salmon are not currently present within the Challis Creek Allotment action area. Grazing operations therefore have no current potential to effect Chinook salmon spawning or incubation.

7.1.1.2 STEELHEAD

Steelhead are only present within the Challis Creek Allotment action area in the lower reaches of Challis Creek. There is no steelhead spawning or incubation within this area of Challis Creek. Grazing operations therefore have no potential to affect steelhead spawning or incubation.

7.1.1.3 BULL TROUT

Challis Creek and Lodgepole Creek support bull trout populations within the Challis Creek Allotment. It is considered that these streams additionally support spawning habitat for the species.

Based upon proposed grazing rotations within the allotment, and spawning and incubation periodicities identified for Challis Creek Watershed streams, potential livestock impacts to spawning bull trout and or incubating bull trout redds exist in Challis Creek and Lodgepole stream reaches.

The Challis Creek Allotment is managed under a four unit rest-rotation system on a two year rotation cycle. Under the proposed rotation strategy, livestock are grazed within the Jeffs Flat North Unit and Mosquito Flat Unit every other year. Livestock are present within the Jeffs Flat Unit before bull trout spawning and are moved to the Mosquito Flat Unit before bull trout spawning occurs. Therefore there is

no chance for bull trout redd trampling within Jeffs Flat North Unit at any time. Livestock are in the Mosquito Flat Unit during bull trout spawning every other year from August 15 for up to four weeks.

Livestock are in the Jeffs Flat South and Slab Barn Units on the opposite year and no bull trout spawning and incubation takes place within these units.

There are 3.43 miles of potential spawning habitat within Challis Creek and 0.8 miles of potential spawning habitat within Lodgepole Creek within the Mosquito Flats Unit. These lengths reflect continuous mapping reaches, and are likely a significant overestimate of actual quantity of bull trout spawning habitat within the allotment due to the discontinuous occurrence of suitable combinations of water depth, water velocity and stream substrate composition within stream reaches.

In summary, the proposed grazing rotation strategy implements early season grazing of the Jeffs Flat North Unit in years of the rotation cycle, avoiding any impacts to spawning bull trout or incubating bull trout eggs in Lodgepole Creek. However, the proposed grazing strategy will result in potential exposure of livestock to bull trout spawning habitats within the Mosquito Flat Unit within stream reaches of Lodgepole Creek and Challis Creek for up to four weeks of the bull trout spawning period during every other year.

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 streambanks, 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.

Available monitoring data indicate that water temperatures within the Challis Creek Allotment are meeting all applicable PACFISH and INFISH water temperature criteria in most years but may exceed seasonal maxima for bull trout in mainstem reaches of Challis Creek during warm years and below the Mosquito Flat Reservoir.

In the absence of observed impacts to stream temperature influencing habitat parameters, it is concluded that recent and future livestock grazing within the Challis Creek Allotment has not and will not result in detectable effects to water temperatures or water temperature regimes within the streams of the action area. Conservation measures of the proposed action, including use of riders to keep livestock away from critical stream reaches, salting will further serve to reduce potential livestock impact on water temperatures by minimizing riparian vegetation use and livestock impact to streambanks within allotment streams. Because of the expected effectiveness of the project design and associated Conservation Measures in reducing near-stream livestock activity, grazing along these streams is not expected to generate any measurable increases in water temperatures which could be meaningfully measured, detected or evaluated. We, therefore, expect the impact of livestock grazing on stream temperatures within the Challis Creek Allotment action area to be insignificant, and expect that the proposed action will maintain the condition of the Water Temperature focus indicator.

Proposed ongoing MIM monitoring will be effective in identifying future trends of riparian vegetative status and trend within the action area. In combination with additional periodic water temperature monitoring within the watershed, these monitoring operations will be effective in identifying both the occurrence and causal mechanisms of any changed conditions which would initiate responsive modification of grazing management strategies for the allotment under the adaptive management strategy.

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. 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.

Livestock activity within the Challis Creek Allotment is not considered to be a significant factor influencing sediment levels in recent years. Supplemental monitoring data, including streambank stability and width:depth data, do not indicate or suggest any exacerbation of sediment levels due to cattle grazing within the drainage. Riparian monitoring sites within the action area are all at Late Seral and Mid Seral. Although sediment levels meet the Forest sediment objective of less than 30%, Challis Creek is functioning at unacceptable risk due to sediment levels being above 20%. It is believed that road erosion is the main contributor of sediment within the Challis Creek Allotment.

Conservation Measures associated with the proposed grazing action are considered to be effective in minimizing potential generation of sediment to stream channels of the Challis Creek Allotment and stream sediment conditions are expected to be maintained under the proposed grazing action. Measures including salting, fencing, use of range riders to keep livestock in upland areas and a rest-rotation grazing system all contribute to minimizing near stream livestock activity which could result in sediment generation to action area streams through direct streambank impact or reduction of stabilizing riparian vegetation.

There will likely be some generation of turbidity in association with incidental livestock crossing of stream channels within the allotment. Turbidities associated with incidental livestock crossing of these sites are expected to be limited to areas immediately below the crossing locations and short-term in nature. Direct and indirect effects of livestock disturbances associated with stream crossings is not expected to be of a magnitude or duration which could produce meaningfully measured, detected or evaluated effects to surface or at-depth substrate sediment levels in areas of existing or future salmonid redds.

Livestock will also graze along tributaries that are not occupied with listed fish but that flow into streams with listed fish. However, the grazing standards in place for these areas should limit grazing impacts to sediment levels in these streams. Furthermore, these streams are relatively small, generally less than 1.0 meter in width, and any increases in sediment levels in these streams resulting from grazing likely could not be meaningfully measured, detected, or evaluated in Challis or Lodgepole Creek.

In summary, livestock grazing activities within the Challis Creek Allotment action area are not expected to generate any measurable increases to sediment levels in streams containing listed fish or supporting designated critical habitat. Overall, it is believed that the impact of livestock grazing on sediment levels within the action area streams cannot be meaningfully measured, detected, or evaluated. Therefore, we expect the impact of livestock grazing on sediment levels to be insignificant. Because of the expected effectiveness of the project design and associated conservation measures in reducing livestock presence near streams, we believe any livestock related impacts to sediment would be widely distributed across the landscape, individually minor in nature, and cumulatively immeasurable at the watershed scale. The proposed action is expected to maintain the condition of the Sediment Focus Indicator.

Ongoing sediment monitoring will be employed to continue to identify trends of stream substrate conditions within the Challis Creek Allotment. These monitoring operations, supplemented by ongoing MIM monitoring, will be effective in identifying both the occurrence and causal mechanisms of any significant change in substrate conditions which would initiate responsive modification of grazing management strategies for the allotment under the adaptive management strategy.

7.1.4 WIDTH:DEPTH RATIO

Width:depth ratios can have important effects on fish populations and livestock grazing can impact width:depth ratios. Livestock impact width:depth ratios by altering bank stability. 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.

Streams within the Challis Creek Allotment are considered to be functioning appropriately with respect to width:depth ratios. While both the sites on Challis Creek are higher than the PACFISH width:depth RMO of 10, but both streams have remained below mean width:depth ratios identified for their respective channel types, as identified within the Natural Condition Database. Baseline monitoring of Challis Creek

within the action area suggest that grazing activities have not produced any observable increases in width:depth ratios in Challis Creek, and most recent streambank stability data indicate a high level of bank integrity.

Considering both observed width:depth ratios and supplemental streambank stability data and trend, it is concluded that livestock grazing activities have not directly produced or contributed to any significant impacts on width:depth ratios of streams within the Challis Creek Allotment which can be meaningfully measured, detected or evaluated. The grazing strategies and Conservation Measures of the proposed action serve to minimize potential livestock impacts to channel morphology of action area streams. Use of range riders to keep livestock in upland areas and salting contribute to minimizing near stream livestock activity and the potential for direct streambank impacts which could affect channel morphology.

In summary, it is concluded that direct and indirect effects of the proposed livestock grazing action on channel morphology of allotment area streams are insignificant, and are not expected to have any meaningfully measureable or discernable influence on stream channel width: depth ratios within the action area. We recognize there could be localized impacts to both streambanks and stream sediment levels when livestock occasionally step on streambanks and introduce minor qualities of sediment to the stream. However, because of the expected effectiveness of the project design and associated conservation measures in reducing livestock presence near streams, we believe those impacts will be widely distributed across the landscape, individually minor in nature, and cumulatively immeasurable at the watershed scale. The proposed action is therefore expected to maintain the condition of the Width:Depth focus indicator.

Proposed ongoing MIM monitoring will be effective in identifying both the occurrence and causal mechanisms of any significant changes in width: depth ratios of action area streams which would initiate responsive modification of grazing management strategies for the allotment under the Adaptive Management Strategy.

7.1.5 STREAMBANK CONDITION

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

Livestock activity within the Challis Creek Allotment is not currently considered to be a significant factor influencing streambank stability. Supplemental monitoring data from within the action area, including stream sediment and width:depth data, and bank stability data do not indicate or suggest impacts to stream stabilities due to cattle grazing within the drainage.

The grazing strategies and Conservation Measures associated with the proposed grazing action are considered to be effective in minimizing potential generation of sediment to stream channels of the allotment action area, and streambank conditions are expected to be maintained under the proposed grazing action. Measures including use of range riders to keep livestock in upland areas, salting and fencing all contribute to minimizing near-stream livestock activity which could result in impacts to streambank stability of action area streams.

Given consideration of streambank stability condition and trends and the effectiveness of the identified conservation measures in preventing or minimizing livestock access to allotment stream channels, it is concluded that direct and indirect effects of the proposed livestock grazing actions on streambank conditions within streams of the Challis Creek Allotment are insignificant, and not expected to have any meaningfully measureable or discernable influence on streambank stability levels within the action area. The proposed action is therefore expected to maintain the condition of the Streambank Condition focus indicator. We recognize there could be localized impacts when livestock occasionally step on streambanks. However, because of the expected effectiveness of the project design and associated conservation measures in reducing livestock presence near streams, we believe those impacts will be widely distributed across the landscape, individually minor in nature, and cumulatively immeasurable at the watershed scale.

Future field data collections will continue to identify trends of streambank conditions within grazed portions of the Challis Creek Allotment. Monitoring operations will additionally employ assessments of streambank alteration to identify effectiveness of livestock movement triggers. These monitoring operations will be effective in identifying both the occurrence and causal mechanisms of any significant change in streambank conditions which would initiate responsive modification of grazing management strategies for the allotment under the Adaptive Management Strategy.

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.

Current livestock grazing activities are not considered to be negatively impacting riparian conditions within the Challis Creek Allotment ESA Action Area. Overall riparian conditions within the allotment are good, with one of MIM monitoring sites identifying Late Seral and the other site identifying Mid Seral. It is believed the Mid Seral site is due to conifers, dead from beetle kill, are falling and having an effect to bank stability and sedimentation in the stream. Data for other associated focus indicators, including streambank stability width: depth ratios and substrate sediment levels suggest healthy condition of riparian areas across the allotment. Conservation Measures associated with the proposed action, including salting, are designed to reduce potential impacts of livestock on allotment streams and their associated riparian areas.

Given consideration of overall condition of riparian condition and trends and the effectiveness of these identified conservation measures in preventing or minimizing livestock impacts to allotment stream channels, it is expected that the direct and indirect effects of the proposed actions on riparian conservation areas are not able to be meaningfully measured, detected or evaluated, and are therefore insignificant. The proposed action is expected to maintain the condition of the Riparian Conservation Area focus indicator. We recognize there could be localized impacts when livestock graze within riparian conservations areas. However, because of the expected effectiveness of the project design and associated conservation measures in reducing livestock presence within riparian areas, we believe those impacts will be widely distributed across the landscape, individually minor in nature, and cumulatively immeasurable at the watershed scale.

Future MIM monitoring will continue to identify trends of riparian vegetation conditions within the Challis Creek Allotment. These monitoring operations will be effective in identifying any significant change in riparian conditions which would initiate responsive modification of grazing management strategies for the allotment under the Adaptive Management Strategy.

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.

No potential new State or private activities have been identified within the action area.

7.3 SUMMARY OF EFFECTS

The effects analysis identifies a non-discountable potential for direct impact of livestock on spawning 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 within designated or proposed critical habitat portions of the allotment, 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.

Livestock will also graze along tributaries that are not occupied with listed fish but that flow into streams with listed fish. However, the grazing standards in place for these areas should limit grazing impacts in these streams.

Table 4 summarizes effects of proposed Challis Creek grazing operations on aquatic/riparian Pathways and Indicators, including the six identified Focus Indicators (highlighted) addressed in the Effects section of this document.

TABLE 4 – EFFECTS SUMMARY FOR THE CHALLIS CREEK ALLOTMENT GRAZING ACTIVITIES

Pathway	Indicators	Functionality Of Baseline 1/	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	FA	NO	NO	YES	NO	NO	YES
	Growth and Survival (including incubation survival)	FA	NO	NO	YES	NO	NO	YES
	Life History Diversity and Isolation	FUR	NO	NO	NO	NO	NO	NO
	Persistence and Genetic Integrity	FR	NO	NO	YES	NO	NO	YES
Water Quality	Temperature	FR	NO	NO	NO	NO	NO	NO
	Sediment	FR	NO	NO	NO	NO	NO	NO
	Chemical Characteristics	FA	NO	NO	NO	NO	NO	NO
Habitat Access	Physical Barriers	FUR	NO	NO	NO	NO	NO	NO
Habitat Elements	Substrate Embed.	FA	N/A	N/A	N/A	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	FR	NO	NO	NO	NO	NO	NO
	Streambank Condition	FA	NO	NO	NO	NO	NO	NO
	Floodplain Connectivity	FA	NO	NO	NO	NO	NO	NO

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

Non-highlighted elements refer to overall conditions within the Timber Creek Watershed as identified in Matrix Table (Appendix B)

Highlighted elements refer to functionality conditions of Challis Creek Allotment action area Focus Indicators

8 EFFECTS DETERMINATION

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

8.1 SNAKE RIVER SPRING/SUMMER CHINOOK SALMON

The action area does not currently support Chinook salmon. Therefore, the proposed action results in a "NO EFFECT" determination for Chinook salmon. Designated critical habitat for Chinook salmon exists within the action area, however, and the effects analysis concluded that the proposed action may have some 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 action area does not currently support steelhead spawning habitat. Therefore, the proposed action results in a "NO EFFECT" determination for steelhead. The action area does not support Designated Critical Habitat for steelhead. Therefore the proposed action results in a NO EFFECT 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 within the action area which are not considered insignificant or discountable. Although proposed 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 "LIKELY TO ADVERSELY AFFECT" determination for bull trout.

The action area contains proposed critical habitat for bull trout and, and the effects analysis concluded that the proposed action may have some effects proposed bull trout critical habitat. However, these effects are expected to be insignificant or discountable. In addition, all vegetation pathway indicators, PCEs, and the grazing focus indicators are being met with current livestock management practices. 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 5 – EFFECTS DETERMINATION SUMMARY FOR CHALLIS CREEK ALLOTMENT GRAZING ACTIVITIES

	Chinook Salmon		**Steelhead**		**Bull Trout**	
	Species	**Designated Critical Habitat**	**Species**	**Designated Critical Habitat**	**Species**	**Proposed Critical Habitat**
Determination[1]	No Effect	Not Likely to Adversely Affect	Not Likely to Adversely Affect	No Effect	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
REFERENCES

References

Belsky, J., A. Matzke, and S. Uselman. 1997. Survey of livestock influences on stream and riparian ecosystems in the western United States. Oregon Natural Desert Association. 38 p.

Belsky, A.J., A. Matzke, and S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. J. of Soil and Water Conservation, Vol. 54. pp. 419-431.

Bengeyfield, P. 2006. Managing cows with streams in mind. Rangelands, 28(1). pp. 3-6.

Bjornn, T.C. and Reiser, D.W. 1991. Habitat Requirements of Salmonids in Streams IN Meehan, W.R. ed Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats, American Fisheries Society. Bethesda, Maryland.

Bjornn, T.C., C.A. Perry and L.M. Garmann, 1998 Deposition of fine sediments in substrates and their effects on survival of trout embyos. Idaho Cooperative Fish and Wildlife Research Unit Technical Report 98-1. University of Idaho. February 1998

Burton, T.A., S.J. Smith and E.R. Crowley. 2008. Monitoring Stream Channels and Riparian Vegetation Multiple Indicators. Interagency Technical Bulletin Version 5.0. USDA Forest Service, USDI Bureau of Land Management. April,2008.

Clary, Warren P. 1999. Stream channel and vegetation responses to late spring cattle grazing. Journal of Range Management, Vol. 52, No. 3 (May, 1999), pp. 218-227.

Clary, Warren P. and John W Kinney. 2000. Streambank Response to Simulated Grazing. USDA Forest Service Proceedings RMRS –P-13, USDA, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Clary, W. P. and B. F. Webster. 1989. Managing grazing of riparian areas in the Intermountain Region. General Technical Report INT-263, U.S. Dept. of Agriculture, USFS, Intermountain Research Station, Ogden, Utah. 11 p.

Edwards, Joshua. 2009. Upper Big Lost Grazing Effectiveness of Annual Indicators. Draft powerpoint available at the Lost River Ranger Station, Salmon-Challis NF, Mackay, ID.

Ehrhart, R.C. and P.L. Hansen. 1997. Effective cattle management in riparian zones: a field survey and literature review. USDI, Bureau of Land Management, Montana State Office. November.

Gamett, B, L. 2002 The relationship between water temperature and bull trout distribution and abuncance. Utah State University. Logan, Utah. 2002.

Gamett, Bart L., Bill Diage, Jennifer B. Purvine, Betsy Rieffenberger, and Glenn Seaberg. 2008. A strategy for managing livestock grazing within stream riparian communities on the Salmon-Challis National Forest. Unpublished paper on file at any Salmon-Challis Ranger District Office and the Forest Supervisor's Office, Salmon, ID. 41 pp.

Gregory, J.S. and B.L. Gamett. 2009. Cattle trampling of simulated bull trout redds. North American Journal of Fisheries Management 29:361.

Kovalchik, Bernard L., and Wayne Elmore. 1991. Effects of cattle grazing systems on willow dominated plant associations in central Oregon. In: Proceedings-Symposium on ecology and management of riparian shrub communities. Compiled by Warren P Clary, E. Durant McArthur, Don Bedunah, and Carl L.Wambolt. May 29-31 1991, Sun Valley, ID. USDA Forest Service General Technical Report INT-289, Intermountain Research Station, Ogden, UT. pp. 111-119.

Lee, D. C., J. R. Sedell, B. R. Rieman, R. F. Thurow, J. E. Williams, [and others]. 1997. In: Quigley, T.M.; S.J. Arbelbide, An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins: vol. 3, ch. 4. Gen. Tech. Rep. PNW-GTR-405. Portland, Oregon: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 1058–1496.

Menke, J. (ed.). 1977. Symposium on livestock interactions with wildlife, fish and the environment. Sparks, Nevada. USDA Forest Service Pacific Southwest Forest and Range Experiment Station. Berkeley, California.

Myers, Lewis H.1989. Grazing and riparian management in southwestern Montana. In: Practical approaches to riparian resource management: An educational workshop. Edited by Robert E. Gresswell, Bruce A. Barton, and Jeffrey L. Kershner, Editors). May 8-11, Billings, MT BLM-MT-PT-89-00l-4351. Bureau of Land Management, Washington, DC. pp. 117-120.

Overton, C.K., J.D McIntyre, R. Armstrong, S.L. Whitwell, and K.A. Duncan, 1995. User's Guide to Fish Habitat:: Descriptions that Represent Natural Conditions in the Salmon River Basin, Idaho. USDA Forest Service Intermountain Research Station General Technical Report INT-GTR-322. August 1995.

Platts. W.S. 1991. Livestock Grazing. IN Meehan, W.R. ed Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats, American Fisheries Society. Bethesda, Maryland..

Platts, W.S and R.L. Nelson, 1989. Stream Canopy and its relation to salmonid biomass in the Intermountain West. North American Journal of Fisheries Management 9:446-457

Salmon-Challis National Forest, 2009a. Hydrology Department Monitoring Files, 1992-2009.

Salmon-Challis National Forest, 2009b. Fisheries Department Monitoring Files, 1997-2009.

Upper Salmon Basin Watershed Project Technical Team, 2005. Upper Salmon River Recommended Instream Work Windows and Fish Periodicity. For River Reaches and Tributaries Above the Middle Fork Salmon River Including the Middle Fork Salmon River Drainage. Revised November 30, 2005.

U.S. Department of Commerce, National Marine Fisheries Service, 1998. Endangered Species Act Section 7 Biological Opinion for the Interim Strategies for Managing Anadromous Fish Producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH).

U.S. Department of the Interior, U.S Fish and Wildlife Service, 1998. Endangered Species Act Section 7 Biological Opinion for the Inland Native Fish Strategy (INFISH).

U.S. Department of the Interior, U.S. Fish and Wildlife Service. 2009. 90 Day Species List 14420-2010-SL-0089, issued December 30, 2009.

U.S. Office of the Federal Register. 1991. 56FR58619 - Endangered and Threatened Species; Endangered status for Snake River sockeye salmon. [See Fed Reg. November 20, 1991 (Vol.56, Number 225)]. Effective December 20, 1991.

U.S. Office of the Federal Register. 1992. 57FR14653 - Endangered and Threatened Species; Threatened status for Snake River spring and summer Chinook salmon. [See Fed Reg. April 22, 1992 (Vol.57, Number 78)]. Effective May 22, 1992.

U.S. Office of the Federal Register. 1993. 58FR68543 –Sockeye Salmon and Chinook Salmon Critical Habitat designation) [See Fed Reg. December 28, 1993 (Vol.58, Number 247)]. Effective January 27, 1994.

U.S. Office of the Federal Register. 1997. 62FR43937 - Endangered and Threatened Species; Threatened status for Snake River steelhead. [See 62 Fed Reg. August 18, 1997 (Vol.62, Number 159)]. Effective October 17, 1997.

U.S. Office of the Federal Register. 1998. 63FR31647 - Endangered and Threatened Species; Threatened status for bull trout. [See Fed Reg. June 10, 1998 (Vol.63, Number 111)]. Effective July 10, 1998.

U.S. Office of the Federal Register. 1999. 58FR68543 – Designated Critical Habitat: Revision of Critical Habitat for Snake River Spring/Summer Chinook Salmon) [See Fed Reg. October 25, 1999 (Vol.64, Number 205)]. Effective November 24, 1999.

U.S. Office of the Federal Register. 2002. 67FR2343 - Magnuson-Stevens Act Provisions; Essential Fish Habitat (EFH) [See Fed Reg. January 17, 2002 (Vol.67, Number 12)]. Effective February 19, 2002.

U.S. Office of the Federal Register. 2005. 70FR52630 – Endangered and Threatened Species; Designation of Critical Habitat for 12 Evolutionarily Significant Units of West Coast Salmon and Steelhead in Washington, Oregon, and Idaho [See Fed Reg. September 2, 2005 (Vol.70, Number 170)]. Effective January 2, 2006.

U.S. Office of the Federal Register. 2005. 70FR56212 –Bull Trout Critical Habitat designation) [See Fed Reg. September 26, 2005 (Vol.70, Number 185)]. Effective October 26, 2005.

U.S. Office of the Federal Register. 2006. 71FR834 - Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. [See Fed Reg. January 5, 2006 (Vol.71, Number 3)]. Effective February 6, 2006.

U.S. Office of the Federal Register. 2010. 75FR2269 Endangered and Threatened Wildlife and Plants; Revised designation of Critical Habitat for Bull Trout in the Coterminous United States. Proposed Rule. [See Fed Reg. January 14, 2010 (Vol.75, Number 9)]. Effective February 14, 201

Winward, A.H. 1995. Monitoring the Vegetation Resources in Riparian Areas. USDA Forest Service. Rocky Mountain Research Station. General Technical Report GTR-47 April, 2000.

APPENDIX B
WATERSHED BASELINES WITH
MATRICES OF DIAGNOSTIC PATHWAYS AND INDICATORS

Challis Creek Watershed Baseline

Agency: USDA Forest Service, Salmon-Challis National Forest	**HU Code and Name:** 1706020117 Challis Creek
Unit: Challis- Yankee Fork Ranger District	**Spatial Scale of Matrix:** One 5th HUC
Fish Species Present: Bull Trout	**Designated Critical Habitat Present:** Chinook Salmon, Bull trout (Proposed)
Anadromous Species Population: Upper Salmon River	**Anadromous Species Subpopulation:** Challis Creek
Bull Trout Core Area: Upper Salmon River	**Local Population:** Challis Creek
Management Actions: Ongoing	**Updated:** 05-05-2010

SUBPOPULATION CHARACTERISTICS		
Pathways Indicators	**Baseline**	**Discussion of Baseline – Current Condition**
Subpopulation Size	**FR**	Bull Trout - Bull Trout occur within the Challis Creek watershed where all life stages are present. Sampling efforts show that bull trout occur in Bear Creek, Challis Creek above Mosquito Flat Reservoir, Lodgepole Creek, and approximately 1.5 miles of Challis Creek below Lodgepole Creek.
Growth and Survival	**?**	Bull Trout – It is unclear how growth and survival operates in this subpopulation of bull trout. Lengths of fish sampled in Lodgepole Creek, for example, range from 184mm to 67mm.
Life History Diversity and Isolation	**FR**	Bull Trout – Bull trout distribution appears to be isolated to Bear Creek, Lodgepole Creek, and upper Challis Creek above the reservoir. Mosquito Flat reservoir is obviously a barrier to any downstream movement while water temperature differences between Lodgepole Creek and Challis could be a migration barrier as well.
Persistence and Genetic Integrity	**FR**	Bull Trout – The small local population above Mosquito Flat Reservoir is at risk due to isolation and hybridization with brook trout.
WATER QUALITY		
Pathways Indicators	**Baseline**	**Discussion of Baseline – Current Condition**
Temperature (7day average. Maximum, °C)	**FA**	Habitat characteristics that influence water temperature such as stream shading and width: depth ratios are at or near natural levels in most portions of the sub-watershed (B. Gamett, personal observation). However, flow regimes have been altered by Mosquito Flat Reservoir and several diversions (B. Gamett, personal observation). The extent of these modifications is currently being evaluated. Overall, it appears that temperatures are likely at or near historic levels with the possible exception of streams below the reservoir and diversions.

		HOBO water temperature data was collected at three different sites within the Challis Creek watershed in 2009 (July 1 – September 30). The warmest maximum 7-day moving maximum recorded for these three sites was approximately 17˚C (62.6˚F). This is within the PACFISH standard of 68˚F.
Sediment	**FR**	Habitat characteristics that influence sediment such as bank stability and health and vigor of riparian vegetation is at or near natural levels in much of the sub-watershed (B. Gamett, personal observation). This suggests that sediment levels are at or near historic levels in most streams. However, roads along portions of Challis Creek and Mill Creek encroach on riparian areas and may be resulting in increased sediment levels in those streams (B. Gamett, personal observation). Likewise, it is also possible that flow alterations associated with Mosquito Flat Reservoir and diversions may have modified this characteristic relative to natural levels in some streams (B. Gamett, personal observation). In the summer of 2003 an intense precipitation event resulted in large influxes of sediment into the streams above Mosquito Flat Reservoir (B. Gamett, personal observation).
Chemical Contaminants/Nutrients	**FR**	Six EPA watershed quality assessment sampling sites occur on Challis Creek. Three of those sites are listed as "Good" while the other three sites are listed as 303d "Impaired". These impairments are due to "flow alterations" and "sediment".
HABITAT ACCESS		
Pathways Indicators	**Baseline**	**Discussion of Baseline – Current Condition**
Physical Barriers	**FR**	Potential artificial barriers within the sub-watershed include culverts, diversions, altered flow regimes, and Mosquito Flat Dam. Several culverts within may limit the upstream movement of fish. There are also several diversion structures which may limit the upstream movement of fish. It is also possible that flow alterations associated with diversions may limit fish movement. All of these factors are currently being evaluated. Mosquito Flat Dam is located on Challis Creek above Lodgepole Creek and is a complete barrier to upstream fish movement. However, the impact of this barrier on fish populations is limited since there is a natural falls located on Challis Creek approximately 0.5 km below the dam which is also a complete barrier to upstream fish movement.
HABITAT ELEMENTS		
Pathways Indicators	**Baseline**	**Discussion of Baseline – Current Condition**
Substrate Embeddedness	**FR**	It is unclear how the dynamics of regulated flow from Mosquito Flat reservoir and extensive beaver dam complexes downstream of the dam affect substrate embeddedness. The assumption is that much of the sediment produced within the watershed is largely captured by these two features. The reaches between the reservoir and beaver dam complexes appear to be efficiently transporting sediment.
Large Woody Debris	**FA**	Willow, aspen, and cottonwood are the dominant woody riparian species in the lower and mid elevations of the watershed. The upper stream reaches are dominated by coniferous species. In these reaches LWD levels are likely at or near natural levels (B. Gamett, personal observation).
Large Pools or Pool Frequency and Quality	**FA**	Pool frequency and quality are likely at or near natural levels over most of this sub-watershed (B. Gamett, personal observation). However, flow alterations associated with Mosquito Flat Reservoir and diversions may have modified this characteristic relative to natural levels in some streams (B. Gamett, personal observation).

Off-channel Habitat	**FA**	Off-channel habitat and the connectivity between off-channel habitat and stream channels are likely at or near natural levels in most of this sub-watershed (B. Gamett, personal observation). However, flow alterations associated with Mosquito Flat Reservoir and diversions may have modified this characteristic relative to natural levels in some streams (B. Gamett, personal observation).
Refugia	**FA**	The amount and quality of refugia is likely at or near natural levels in most of this sub-watershed (B. Gamett, personal observation). However, flow alterations associated with Mosquito Flat Reservoir and diversions may have modified this characteristic relative to natural levels in some streams (B. Gamett, personal observation).
CHANNEL CONDITION & DYNAMICS		
Pathways Indicators	**Baseline**	**Discussion of Baseline – Current Condition**
Average Wetted Width/Maximum Depth Ratio	**FA**	Width:depth ratios are likely at or near natural levels in most of this sub-watershed (B. Gamett, personal observation). However, flow alterations associated with Mosquito Flat Reservoir and diversions may have modified this characteristic relative to natural levels in some streams (B. Gamett, personal observation).\ Multiple Indicator Monitoring (MIM) sites on Challis Creek contain the most recent data. -Upper Challis Creek w/d = 12.4: this ration is consistent with a Rosgen B channel type. -Lower Challis Creek w/d = 21. 8: this ratio is consistent with a Rosgen C channel type.
Streambank Condition	**FA**	Bank stability is likely at or near natural levels in most of this sub-watershed (B. Gamett, personal observation). However, flow alterations associated with Mosquito Flat Reservoir and diversions may have modified this characteristic relative to natural levels in some streams (B. Gamett, personal observation). Two Multiple Indicator Monitoring (MIM) sites occur on Challis Creek. -Upper Challis MIM: bank stability = 79% -Lower Challis MIM: bank stability = 72%
Floodplain Connectivity	**FA**	Overall, stream reaches within the Challis Creek watershed can access limited floodplains typical of a Rosgen B channel type, and more developed flood plains of the C channel type. However, specific points of confinement occur where FS road 080 is directly adjacent to Challis Creek.
FLOW/HYDROLOGY		
Pathways Indicators	**Baseline**	**Discussion of Baseline – Current Condition**
Change in Peak/base Flows	**FR**	Flow regimes have been impacted by diversions and Mosquito Flat Reservoir. Flow regimes have been altered by diversions located on Mill Creek, Challis Creek, Bear Creek, White Valley Creek, Pats Creek, and Eddy Creek (Challis Ranger District, unpublished data). Likewise, Mosquito Flat Reservoir has altered flow regimes in Challis Creek below the reservoir (B. Gamett, personal observation). Above the reservoir and diversions flow regimes are likely at or near natural levels (B. Gamett, personal observation).

Increase in Drainage Network	**FA**	There have been no known changes in drainage network (B. Gamett, personal observation).
WATERSHED CONDITION		
Pathways Indicators	**Baseline**	**Discussion of Baseline – Current Condition**
Road Density and Location	**FR**	Road densities are generally low but in some areas road location and maintenance practices have had some impacts on fish habitat (B. Gamett, personal observation).
Disturbance History	**FR**	Road construction and grazing are the most significant anthropogenic disturbances on national forest lands in the sub-watershed. Other anthropogenic disturbances include mining, timber harvest, and recreation. Mosquito Flat reservoir and FS road 080 are the most significant anthropogenic features on National Forest lands within the Challis Creek watershed.
Riparian Conservation Areas	**FA**	Riparian communities are likely at or near natural conditions in most of this sub-watershed (B. Gamett, personal observation). Two Multiple Indicator Monitoring (MIM) sites occur on Challis Creek. -Upper Challis MIM: ecological status = 51 (mid-seral). This low ecological status is due to a low stability rating. -Lower Challis MIM: ecological status = 73 (mid-seral)
Disturbance Regime	**FA**	The natural hydrologic and biological processes of the Lower Challis Creek watershed have been altered due to Mosquito Flat reservoir and FS road 080. However, it appears that these processes have adjusted and stabilized. Beaver dam complexes on National Forest lands continually change and adjust through time.
INTEGRATION OF SPECIES AND HABITAT CONDITIONS		
Pathways Indicators	**Baseline**	**Discussion of Baseline – Current Condition**
Habitat Quality and Connectivity	**FA**	Although there are some localized areas of disturbance, fish habitat conditions are likely at or near natural levels over much of this sub-watershed. Overall, this sub-watershed appears capable of supporting healthy fish populations that are capable of persisting over the next 100 years.

APPENDIX C
MONITORING DATA AND SUMMARIES

FIGURE C1 – CHALLIS CREEK ALLOTMENT MONITORING SITES

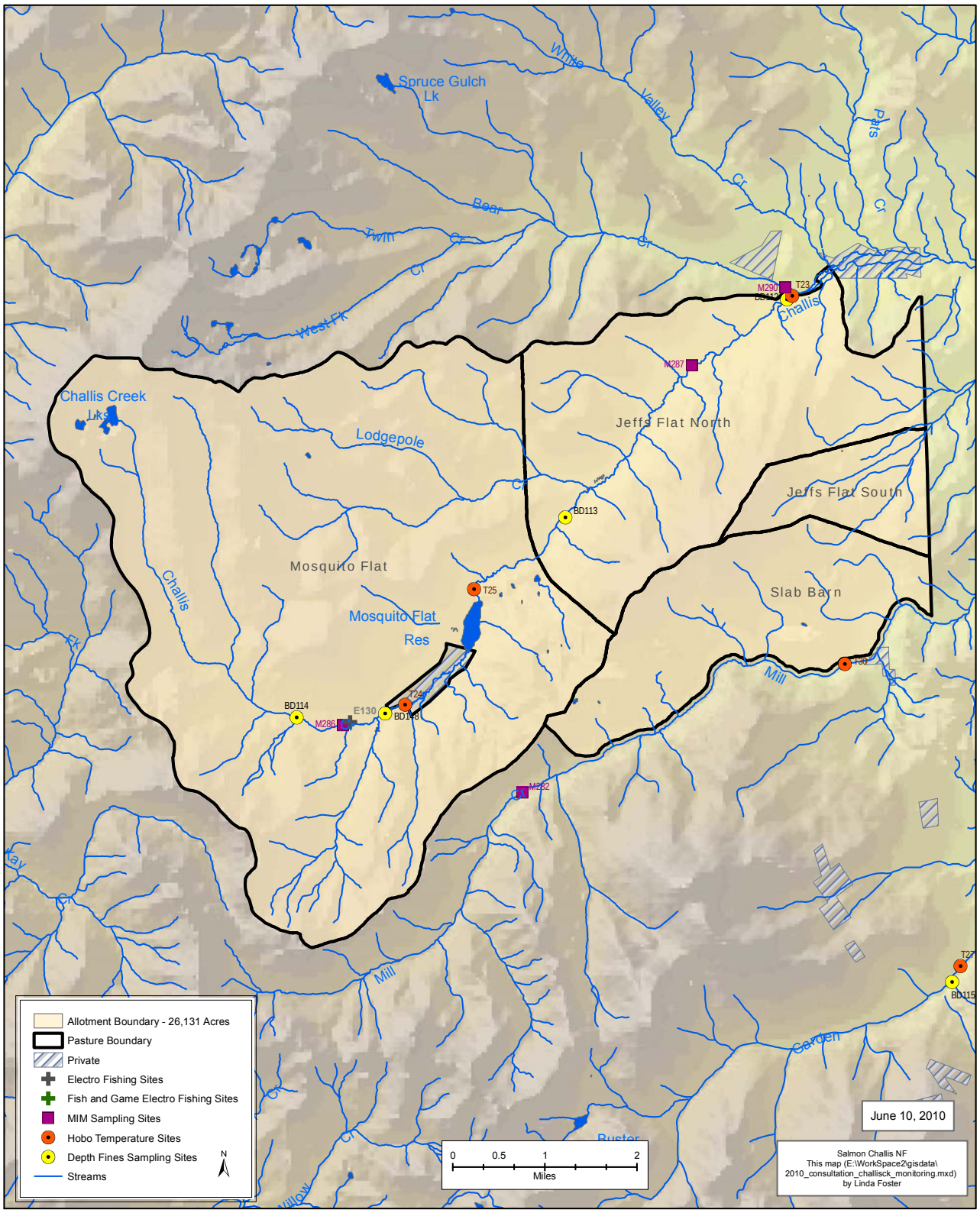


TABLE C1 – SELECTED DATA FROM FISH POPULATION MONITORING SITES ON THE CHALLIS CREEK ALLOTMENT

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
Challis Creek (E130)	7/22/2009	93	4.6	3.8	0	0.5	0.5	2.6	0.2[A]
	8/4/2008	93	4.0	12.2	0	4.6	0.3	6.2	1.1
	8/6/2007	93	4.2	5.2	0.3	1.0	0	2.6	1.3
	8/9/2004	93	3.6	1.5	0	0[B]	0	1.5	0
	7/25/2001	93	3.7	7.0	0	1.5	3.5	1.7	0.3

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

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

TABLE C2 – BULL TROUT PRESENCE, SPAWNING, AND PROPOSED CRITICAL HABITAT BY STREAM

Stream	Bull Trout Present (miles)	Bull Trout Spawning (miles)	Bull Trout Proposed Critical Habitat (miles)
Challis Creek	4.91	3.13	12.23
Lodgepole Creek	1.57	1.57	4.05
Total	**6.48**	**4.69**	**16.29**

TABLE C3 – BULL TROUT PRESENCE, SPAWNING, AND PROPOSED CRITICAL HABITAT BY UNIT

***Unit*-Stream**	Bull Trout Present (miles)	Bull Trout Spawning (miles)	Bull Trout Proposed Critical Habitat (miles)
Jeffs Flat North Unit	2.04	0.79	5.57
Challis Creek	1.27	0.02	4.80
Lodgepole Creek	0.77	0.77	0.77
Mosquito Flat Unit	4.44	3.90	10.72
Challis Creek	3.65	3.10	7.44
Lodgepole Creek	0.80	0.80	3.28
Total	**6.48**	**4.69**	**16.29**

TABLE C4 – STEELHEAD PRESENCE, SPAWNING, AND DESIGNATED CRITICAL HABITAT BY STREAM

Stream	Steelhead Present (miles)	Steelhead Spawning (miles)	Steelhead Designated Critical Habitat (miles)
Challis Creek	0.21	0.00	0.00
Total	**0.21**	**0.00**	**0.00**

TABLE C5 – STEELHEAD PRESENCE, SPAWNING, AND DESIGNATED CRITICAL HABITAT BY UNIT

***Unit*-Stream**	**Steelhead Present (miles)**	**Steelhead Spawning (miles)**	**Steelhead Designated Critical Habitat (miles)**
Jeffs Flat North Unit	0.21	0.00	0.00
Challis Creek	0.21	0.00	0.00
Mosquito Flat Unit	0.00	0.00	0.00
Challis Creek	0.00	0.00	0.00
Total	**0.21**	**0.00**	**0.00**

TABLE C6 – CHINOOK SALMON PRESENCE, SPAWNING, AND DESIGNATED CRITICAL HABITAT BY STREAM

Stream	Chinook Salmon Present (miles)	Chinook Salmon Spawning (miles)	Chinook Salmon Designated Critical Habitat (miles)
Challis Creek	0.00	0.00	4.85
Lodgepole Creek	0.00	0.00	0.00
Total	**0.00**	**0.00**	**4.85**

TABLE C7 – CHINOOK SALMON PRESENCE, SPAWNING, AND DESIGNATED CRITICAL HABITAT BY UNIT

Unit-Stream	Chinook Salmon Present (miles)	Chinook Salmon Spawning (miles)	Chinook Salmon Designated Critical Habitat (miles)
Jeffs Flat North Unit	0.00	0.00	4.80
Challis Creek	0.00	0.00	4.80
Mosquito Flat Unit	0.00	0.00	0.03
Challis Creek	0.00	0.00	0.03
Total	**0.00**	**0.00**	**4.85**

FIGURE C2 – FALLS ON CHALLIS CREEK BELOW MOSQUITO FLAT RESERVOIR SEPTEMBER 17, 2002

FIGURE C3 – FALLS ON CHALLIS CREEK BELOW MOSQUITO FLAT RESERVOIR SEPTEMBER 17, 2002

TABLE C8 - SELECTED STREAM TEMPERATURE DATA FROM THE CHALLIS CREEK ALLOTMENT

		Temperature		
Stream (Site ID)	**Year**	**Maximum (°C)**	**7-day Moving Maximum (°C)**	**Mean (°C) (July 1-Sept 30)**
Challis Creek (T23)	2009	16.9	15.9	11.3
	2002	21.0	19.8	11.7
	2001	21.0	19.6	12.6
Challis Creek (T25)	2009	13.9	13.5	12.2
	2006	19.8	19.1	13.1
	2003	16.8	16.3	13.1
	2002	18.3	17.1	12.7
	2001	17.9	17.3	12.8
Challis Creek (T24)	2009	13.5	12.5	8.0
	2006	14.9	13.9	7.4
	2003	15.6	14.9	8.7
	2002	15.6	14.3	8.1
	2001	16.4	15.2	9.1

TABLE C9 – DEPTH FINE (< 0.25 INCHES) DATA FROM THE CHALLIS CREEK ALLOTMENT

	Depth Fines (< 0.25 inches) (%)														
Stream (Site ID)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Challis Creek (BD112)	44.1	41.1	17.4	13.0	21.3	24.3	26.5	22.4	21.0	23.4	20.3	18.6	9.0	23.0	20.9
Challis Creek (BD113)			29.2		22.0	25.7	29.8	29.8	33.4	25.7					
Challis Creek (BD114)								24.2		20.1	13.62	21.3	10.8	14.5	29.6
Challis Creek (BD148)										18.2	26.96				

TABLE C10 – BANK STABILITY DATA FROM THE CHALLIS CREEK ALLOTMENT (SEE TABLE 11 FOR ADDITIONAL BANK STABILITY DATA)

	Bank Stability														
Stream (Site ID)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Challis Creek (BD112)	81.0	53.0	59.0	75.0	43.0	69.0	55.5	70.0	54.5	90.0	90.5		77.0	93.5	95.0
Challis Creek (BD113)			56.5		41.0	52.0	74.0	71.5	84.5	95.0					
Challis Creek (BD114)								79.0		94.0	94.5	89.0	95.0	74	96.5
Challis Creek (BD148)										99.0	74.0				

TABLE C11 – MULTIPLE INDICATOR MONITORING (MIM) DATA FROM THE CHALLIS CREEK ALLOTMENT

Unit	Stream (Site ID)	Year	Width:Depth Ratio	Bank Stability (%)	Woody Species Abundance			GES[A]	Trend in GES[B]
					Total (#/acre)	**Seedling Young (#/acre)**	**Seedling-Young (%)**		
Jeffs Flat North	Challis Creek (M287)	2009	21.82	72	7,778	4,553	59	73 (LS)	Baseline
Mosquito Flat	Challis Creek (M286)	2009	12.39	79	7,651	2,719	36	51 (MS)	Baseline

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

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

TABLE C12 IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY BURP DATA – CHALLIS CREEK ALLOTMENT

Mosquito Flat Pasture	
Stream: Challis Creek **Location:** Above Mosquito Flat Reservoir **Coordinates** (NAD1983): 44° 30' 19.23", 114° 28' 35.01" **Date:** 7-25-2006 **Mean Wetted Width:Depth Ratio:** 24.8 **Bank Stability:** 97% **Surface Fines:** 19%	**Stream:** Challis Creek **Location:** Above Mosquito Flat Reservoir **Coordinates (NAD1927):** 44° 30' 46.21", 114° 29' 19.82" **Date:** 8-10-1998 **Mean Wetted Width:Depth Ratio:** 14.5 **Bank Stability:** 100% **Surface Fines:** 11%
Jeffs Flat North Pasture	
Stream: Challis Creek **Location:** 100 m above Bear Creek (THIS SITE IS VERY CLOSE THE ALLOTMENT BOUNDARY AND MAY NOT BE IN THE ALLOTMENT) **Coordinates (NAD1927):** 44° 34' 7.75", 114° 21' 47.87" **Date:** 8-26-2002 **Mean Wetted Width:Depth Ratio:** 23.7 **Bank Stability:** 98% **Surface Fines:** 0%	**Stream:** Challis Creek **Location:** Below Mosquito Flat Reservoir **Coordinates (NAD1927):** 44° 32' 5.19", 114° 24' 52.67" **Date:** 8-10-1993 **Mean Wetted Width:Depth Ratio:** na **Bank Stability:** 100% **Surface Fines:** na
Stream: Challis Creek **Location:** 10 m above bridge below Mosquito Flat Reservoir **Coordinates (NAD1927):** 44° 31' 51.1", 114° 25' 4.69" **Date:** 6-26-1995 **Mean Wetted Width:Depth Ratio:** na **Bank Stability:** 95% **Surface Fines:** 9%	**Stream:** Challis Creek **Location:** Below Mosquito Flat Reservoir **Coordinates (NAD1927):** 44° 32' 5.19", 114° 24' 52.67" **Date:** 8-10-1993 **Mean Wetted Width:Depth Ratio:** na **Bank Stability:** 100% **Surface Fines:** na
Stream: Lodgepole Creek **Location:** Above road **Coordinates (NAD1927):** 44° 32' 27.81", 114° 24' 48.31" **Date:** 8-10-1998 **Mean Wetted Width:Depth Ratio:** 15.3 **Bank Stability:** 74% **Surface Fines:** 16%	

FIGURE C4 – MIM 286 LOOKING DOWNSTREAM FROM TOP OF REACH JULY 7, 2009

FIGURE C5 – MIM 286 LOOKING UPSTREAM FROM TOP OF REACH JULY 7, 2009

FIGURE C6 – MIM 286 LOOKING UPSTREAM FROM BOTTOM OF REACH JULY 7, 2009

FIGURE C7 – MIM 286 LOOKING DOWNSTREAM FROM BOTTOM OF REACH JULY 7, 2009

FIGURE C8 – MIM 287 LOOKING DOWNSTREAM FROM TOP OF REACH JULY 16, 2009

FIGURE C9 – MIM 287 LOOKING UPSTREAM FROM TOP OF REACH JULY 16, 2009

FIGURE C10 – MIM 287 LOOKING UPSTREAM FROM BOTTOM OF REACH JULY 16, 2009

FIGURE C11 – MIM 287 LOOKING DOWNSTREAM FROM BOTTOM OF REACH JULY 16, 2009

APPENDIX D

PROTOCOL FOR MAPPING CHINOOK SALMON CRITICAL HABITAT CURRENTLY DESIGNATED

ON THE SALMON-CHALLIS NATIONAL FOREST

PROTOCOL FOR MAPPING CHINOOK SALMON CRITICAL HABITAT CURRENTLY DESIGNATED

ON THE SALMON-CHALLIS NATIONAL FOREST

This document summarizes the process that will be used by the Salmon-Challis National Forest (SCNF) to map Chinook salmon critical habitat (CSCH) as currently designated by NOAA Fisheries on the SCNF. 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 58(247):68543-68554). However, this designation did not provide a detailed description of the specific areas included in the designation. Such a description is essential when completing site specific consultations to determine if CSCH is present within the action areas. The purpose of this project is to create a GIS layer that delineates the specific areas that are designated as CSCH in this rule. It should be emphasized that this process is not to "designate" CSCH but to portray the SCNFs interpretation, using the identified process, of those areas that have already been designated by the rule. For the purposes of the project, we assume CSCH to be all areas currently or historically occupied by Chinook salmon. This process includes only those areas within the administrative boundary of the SCNF.

The process will use the NHD stream layer as the base layer. By default, all streams will initially be considered to not be CSCH. The following steps will then be used to map designated CSCH.

Step 1: Add reaches identified by the Intrinsic Potential Model

An Intrinsic Potential Model (IPM) developed by the National Marine Fisheries Service (Cooney and Holzer 2006) has been used to model potential spawning and rearing habitat within the SCNF. All stream reaches identified by the IPM shall be mapped as CSCH.

Step 2: Remove reaches that were inappropriately identified by the IPM

The IPM has the potential to identify streams or portions of streams where Chinook salmon could not have occurred. This step involves identifying these reaches and removing them from the CSCH layer. Forest fish staff will review stream reaches selected by the IPM and identify those that were inappropriately included. This may include, but not be limited to, stream reaches that are a) ephemeral, b) above natural barriers, or c) too small to support Chinook salmon. Documentation supporting the removal of each stream reach must be provided.

Step 3: Add reaches where Chinook salmon have occurred based on redd data, but have not been identified in previous steps as CSCH

Chinook salmon redd surveys have been conducted by various organizations. These data will be reviewed by Forest fish staff and all sites where Chinook salmon redds have occurred that have not already been identified as CSCH shall be mapped. Documentation supporting the inclusion of each stream reach must be provided.

Step 4: Add reaches where Chinook salmon have been observed during SCNF fisheries assessments, but have not been identified in previous steps as CSCH

The SCNF has conducted various fisheries assessments and resulting data contain site-specific information regarding Chinook presence in streams. These data may include, but not be limited to, a) general fish population assessments, b) fish population monitoring, c) project specific monitoring, d)

observation by Forest Service personnel, and e) R1/R4 surveys. These data will be reviewed by Forest fish staff and all sites where Chinook salmon have occurred that have not already been identified as CSCH shall be mapped. Documentation supporting the inclusion of each stream reach must be provided.

Step 5: Add reaches where Chinook salmon have been observed during fisheries assessments conducted by external organizations, but have not been identified in previous steps as CSCH

Various organizations other than the SCNF have conducted fisheries assessments and resulting data are valuable for identifying areas where Chinook salmon have occurred within the SCNF. Such organizations may include, but not be limited to a) the Idaho Department of Fish and Game, b) the Department of Environmental Quality, and c) Native American Tribes. These data will be reviewed by Forest fish staff and all sites where Chinook salmon have occurred that have not already been identified as CSCH shall be mapped. Documentation supporting the inclusion of each stream reach must be provided.

Step 6: Add reaches that may provide or may have provided tributary refugia to Chinook salmon, but have not been identified in previous steps as CSCH

Chinook salmon may occupy portions of tributary streams that are not directly associated with spawning areas. Chinook salmon can encounter water temperature or turbidity conditions that are temporarily less than optimal or are lethal (Torgersen et al. 1999; Scrivener et al. 1993). When this occurs, the fish may move to tributary streams that have more suitable conditions but that the fish would not otherwise occupy. We refer to these areas as tributary refugia.

It is important to know how far Chinook salmon may move up tributary refugia. However, most of the information that we found (e.g. – Scrivener et al. 1994, Malsin et al. 1996-1999, Murray and Rosenau 1989) was not directly applicable to the set of conditions present on the SCNF in central Idaho. Those studies with data most closely representing conditions found in central Idaho show that fish seeking refugia primarily use confluence areas (Strange 2007; Torgersen et al. 1999). Since we were not able to locate information on use-patterns in tributary refugia, we used professional judgment to estimate how far up these tributaries Chinook salmon might move. Based on our review of fish population and stream habitat data from the Salmon River basin, we concluded that Chinook salmon likely do not move more than 0.25 miles up a tributary if the only reason they are in the stream is to seek refugia.

Although the previous steps in this process have likely identified most stream reaches that are tributary refugia, it is possible that some of these areas have still not yet been included. This step allows the addition of tributary refugia using the following set of criteria as a guideline for mapping. Professional judgment shall be used and documentation supporting the addition of each stream reach must be provided.

a) **Proximity to CSCH:** The tributary must connect to a stream or river currently included as CSCH.

b) **Watershed Size:** An evaluation of the smallest tributaries where Chinook salmon presence was confirmed within the SCNF can be useful in estimating the lower limits to watershed size constraining use of streams by Chinook. The average lower limit to watershed size where Chinook were present or presumed likely to use as refuge on the South Zone of the SCNF was approximately seven square miles. This value or a value that is appropriate for a given geographic area may be used to identify tributaries where it is reasonable to assume that Chinook salmon can access and use as refuge.

c) **Fish-Bearing Streams:** Streams accessible to other salmonids can reasonably be assumed to be accessible to Chinook. Tributaries that contain other salmonids and are not smaller that the lower limit to watershed size shall be considered for inclusion as CSCH for 0.25 miles upstream from the confluence. Tributaries meeting this criterion, but exhibiting barriers to migration at the confluence shall be considered for exclusion from CSCH.

d) **Non-Fish-Bearing Streams:** Streams inaccessible to other salmonids can reasonably be assumed to be inaccessible to Chinook and shall generally be considered for exclusion from CSCH.

***** Streams lacking fish occurrence data shall be evaluated for inclusion in or exclusion from CSCH based upon the watershed size and professional judgment.

Step 7: Add reaches that, based on professional judgment, may be currently or may have been historically occupied by Chinook salmon, but have not been identified in previous steps as CSCH

It is possible that the previous steps have not identified all reaches that either currently contain or historically contained Chinook salmon. This step allows Forest fish staff to use professional judgment to identify any additional CSCH that may have been missed in the previous steps. Documentation supporting the addition of each stream reach must be provided.

Step 8: Add reaches that are downstream from CSCH identified in the previous steps

Since Chinook salmon migrate to the Pacific Ocean, they will occur at least seasonally in all areas downstream of the stream reaches identified as CSCH in the previous steps. Therefore, all reaches downstream of areas identified in the previous steps as CSCH shall also be mapped as CSCH.

Literature Cited

Cooney, T. and D. Holzer. 2006. Appendix C: Interior Columbia basin stream type chinook salmon and steelhead populations: habitat intrinsic potential analysis. Preliminary Review Draft. NWFSC

Kahler, T. H. and T.P. Quinn. 1998. Juvenile and resident salmonid movement and passage through culverts. Washington State Department of Transportation Research Project T9903, Task 96. Transportation Building, Olympia, WA.

Maslin, P. E., W. R. McKinney and T. L. Moore. 1996a. Intermittent streams as rearing habitat for Sacramento River chinook salmon. http://www.csuchico.edu/~pmaslin/rsrch/Salmon/Abstrt.html

Maslin, P. E., W. R. McKinney and T. L. Moore. 1996b. Intermittent streams as rearing habitat for Sacramento River chinook salmon. 1996 Update. http://www.csuchico.edu/~pmaslin/rsrch/Salmon96/Abstrct.html

Maslin, P.E., J. Kindopp and M. Lennox. 1997. Intermittent streams as rearing habitat for Sacramento River chinook salmon. 1997 Update. http://www.csuchico.edu/~pmaslin/rsrch/Salmon97/Abstrct.html

Maslin, P.E., J. Kindopp and M. Lennox. 1998. Intermittent streams as rearing habitat for Sacramento River chinook salmon. 1998 Update. http://www.csuchico.edu/~pmaslin/rsrch/Salmon98/Abstrct.html

Maslin, P.E., J. Kindopp, M. Lennox, and C. Storm. 1997. Intermittent streams as rearing habitat for Sacramento River chinook salmon. 1997 Update. http://www.csuchico.edu/~pmaslin/rsrch/Salmon99/Abstrct.html

Murray, C.B. and M.L. Rosenau. 1989. Rearing of juvenile chinook in nonnatal tributaries of the lower Fraser River, British Columbia. Trans. Amer. Fish. Soc. 118(3): 284-289.

Scrivener, J.C., T.G. Brown, and B.C. Andersen. 1994. Juvenile chinook salmon (*Oncorhynchus tshawytscha*) utilization of Hawks Creek, a small nonnatal tributary of the upper Fraser River. Can. J. Fish. Aquat. Sci. 51: 1139-1146.

Torgersen, C.E., Price, D.M., Li, H.W. and McIntoch, B.A. 1999. Multiscale thermal refugia and stream habitat associations of Chinook salmon in northeastern Oregon. Ecological Applications 9: 301-319.

Yukon River Council. Chinook salmon (ONCORHYNCHUS TSHAWYTSCHA). http://yukonriverpanel.com/salmon/about/yukon-river-salmon/chinook/

APPENDIX E

BULL TROUT 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.

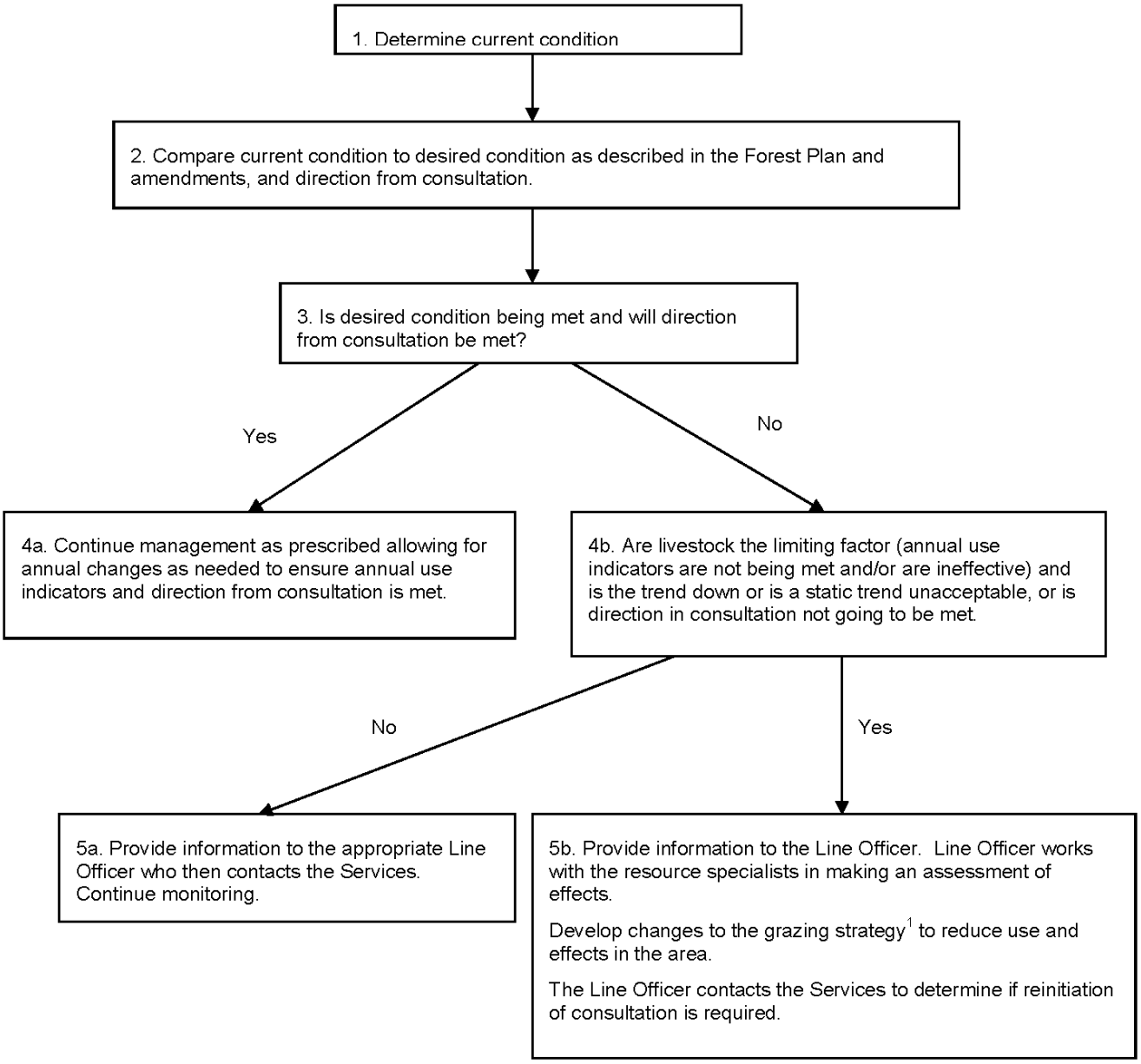
Primary Constituent Elements for Proposed Bull Trout Critical Habitat and Associated Habitat Indicators

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)

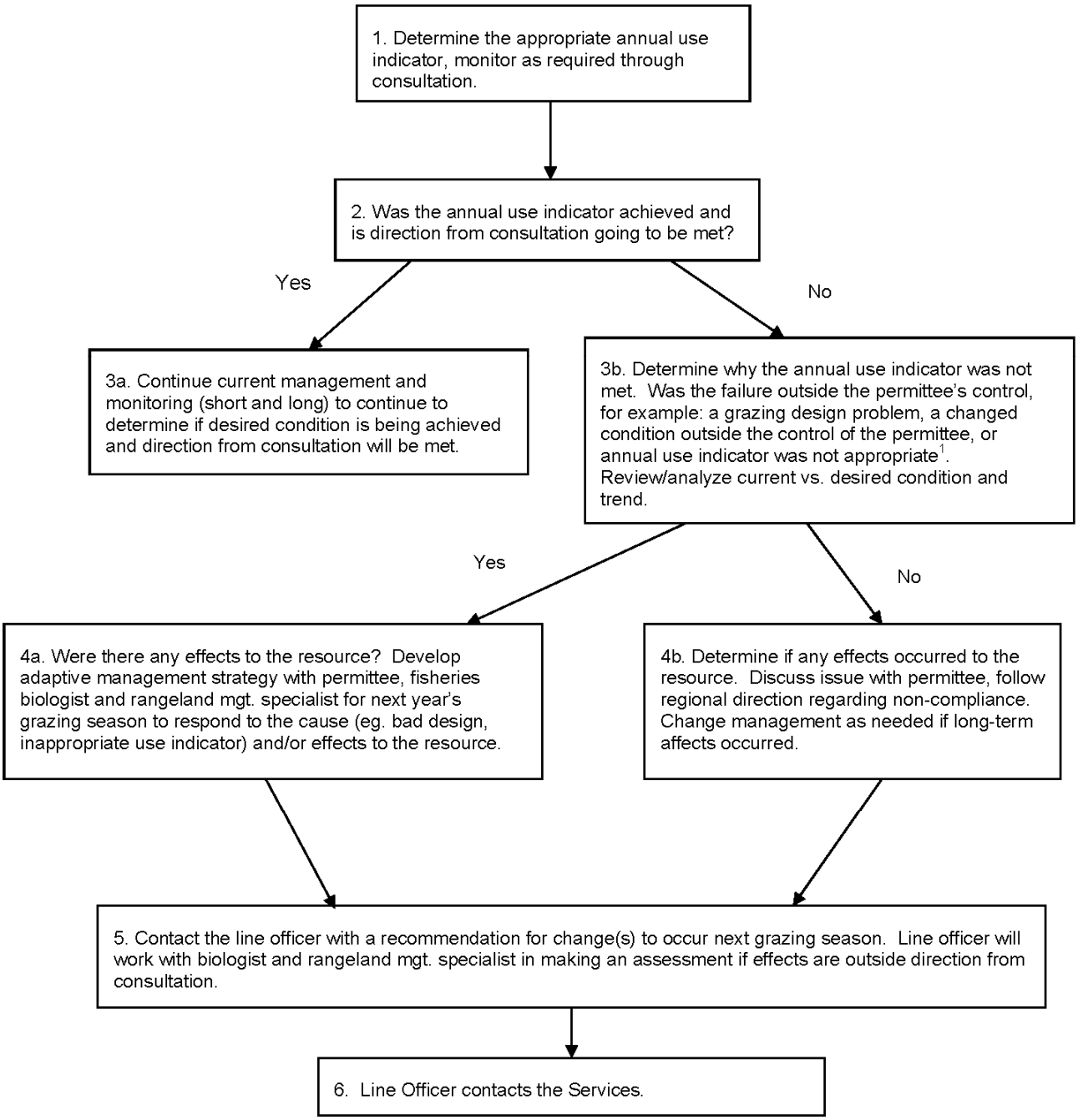
APPENDIX F
ADAPTIVE MANAGEMENT DIAGRAMS

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.