USDA United States Department of Agriculture | Forest Service | Salmon-Challis National Forest Supervisor's Office | 1206 S. Challis Salmon, ID 83467 208 756-5100

File Code: 2670
Date: March 24, 2010

Acting Supervisor – East Idaho Field Office
U.S. Fish and Wildlife Service
4425 Burley Dr. – Suite A
Chubbuck, ID 83201

Dear Acting Supervisor:

Enclosed you will find the *Aquatic Species Biological Assessment for the Indian Ridge Cattle and Horse Allotment.* The Biological Assessment (BA) evaluates all potential effects of livestock grazing on federally listed fishes for all streams included in the action area. This action received early coordination with the Salmon-Challis Level 1 Team. In addition, the enclosed Biological Assessment has been developed with ongoing participation and review by Level 1 Team members, and has now been deemed acceptable by them for initiation of Streamlined Consultation.

In this BA, the Salmon-Challis National Forest has analyzed and determined the effects of livestock grazing. We have analyzed the potential effects based on the best available information either published or unpublished. We are committed to working with the permittees and other partners to minimize effects where possible. As always we will continue to consult with you when appropriate regarding this permitted activity.

This Assessment's determinations of effects include 'May Affect' determinations for individual fish species within the action area, as well as determinations for each species and their Critical and/or Essential Habitats. Determinations have concluded there would likely be 'Adverse Effects' to steelhead and bull trout and a 'Not Likely to Adversely Affect' to Chinook salmon. Determinations have concluded there would be 'Not Likely to Adversely Affect' on Chinook salmon and steelhead designated critical habitat and 'Not Likely to Adversely Affect' on bull trout proposed critical habitat.

We believe that we have complied with the requirements and at this time would like to initiate formal consultation and request conference on bull trout Proposed Designated Critical Habitat on the *Aquatic Species Biological Assessment for the Indian Ridge Cattle and Horse Allotment* with the (U.S. Fish and Wildlife Service/National Marine Fisheries Service). If you have any questions please contact Stefani Melvin at (208) 756-5290.

Sincerely,

FRANK V. GUZMAN
Forest Supervisor

Encl. Aquatic Species Biological Assessment for the Indian Ridge Cattle and Horse Allotment
cc: Stefani Melvin, Karen E Dunlap, Dan Garcia

USDA United States Department of Agriculture | Forest Service | Salmon-Challis National Forest Supervisor's Office | 1206 S. Challis Salmon, ID 83467 208 756-5100

File Code: 2670
Date: March 24, 2010

David Mabe
State Director, Idaho State Habitat Office
National Marine Fisheries Service
10095 W. Emerald
Boise, ID 83704

Dear Dave:

Enclosed you will find the *Aquatic Species Biological Assessment for the Indian Ridge Cattle and Horse Allotment.* The Biological Assessment (BA) evaluates all potential effects of livestock grazing on federally listed fishes for all streams included in the action area. This action received early coordination with the Salmon-Challis Level 1 Team. In addition, the enclosed Biological Assessment has been developed with ongoing participation and review by Level 1 Team members, and has now been deemed acceptable by them for initiation of Streamlined Consultation.

In this BA, the Salmon-Challis National Forest has analyzed and determined the effects of livestock grazing. We have analyzed the potential effects based on the best available information either published or unpublished. We are committed to working with the permittees and other partners to minimize effects where possible. As always we will continue to consult with you when appropriate regarding this permitted activity.

This Assessment's determinations of effects include 'May Affect' determinations for individual fish species within the action area, as well as determinations for each species and their Critical and/or Essential Habitats. Determinations have concluded there would likely be 'Adverse Effects' to steelhead and bull trout and a 'Not Likely to Adversely Affect' to Chinook salmon. Determinations have concluded there would be 'Not Likely to Adversely Affect' on Chinook salmon and steelhead designated critical habitat and 'Not Likely to Adversely Affect' on bull trout proposed critical habitat.

We believe that we have complied with the requirements and at this time would like to initiate formal consultation and request conference on bull trout Proposed Designated Critical Habitat on the *Aquatic Species Biological Assessment for the Indian Ridge Cattle and Horse Allotment* with the (U.S. Fish and Wildlife Service/National Marine Fisheries Service). If you have any questions please contact Stefani Melvin at (208) 756-5290.

Sincerely,

FRANK V. GUZMAN
Forest Supervisor

Encl. Aquatic Species Biological Assessment for the Indian Ridge Cattle and Horse Allotment
cc: Stefani Melvin, Karen E Dunlap, Dan Garcia

Aquatic Species Biological Assessment for the Indian Ridge Cattle & Horse Allotment

NORTH FORK RANGER DISTRICT

SALMON-CHALLIS NATIONAL FOREST

LEMHI COUNTY, IDAHO

Prepared by: Daniel A. Garcia
North Zone District Fishery Biologist

Signature: Daniel A Garcia

Date: 3/19/2010

TABLE OF CONTENTS

TABLE OF CONTENTS

1 INTRODUCTION

The North Fork Ranger District of the Salmon-Challis National Forest (SCNF) authorizes livestock grazing activities within the Indian Ridge Cattle & Horse Allotment. This biological assessment describes the proposed action and discusses the probable impacts of that action on listed species and designated and proposed critical habitat that may be affected. This biological assessment forms the basis for any necessary consultation with the Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) (collectively the “Services”) pursuant to section 7 of the Endangered Species Act (ESA) of 1973 (as amended) and its implementing regulations. This biological assessment replaces all previous consultations associated with this allotment. The regulations for consultation require the action agency to re-initiate consultation if certain triggers are met (50 CFR 402.16). Occasionally during the implementation of a proposed action, changes in circumstances, situations or information can raise the question as to whether those re-initiation thresholds have been reached. Should that situation occur the Salmon-Challis National Forest, 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 Indian Ridge Allotment grazing activities are conducted within two 5th field hydrologic unit codes, the North Fork Salmon River (HUC 1706020306) and Indian Creek-Salmon River (HUC 1706020307).

The following is a general description of the Indian Ridge Allotment. The Indian Ridge Allotment is located approximately 20 miles north of Salmon, Idaho. In the North Fork Salmon River 5th field HUC the Indian Ridge Allotment is within the Hull Creek and Hughes Creek drainages. In the Indian Creek-Salmon River 5th field HUC the Indian Ridge Allotment is within the upper east side of the Indian Creek drainage. Within the Indian Ridge Allotment boundary there is private land but no State lands.

Natural Physical Characteristics

Hydrology

Hull Creek drainage: Hull Creek is the only major perennial stream within this drainage. Hull Creek is considered perennial for approximately the first 1.2 miles. Then the stream flow goes subsurface starting at about the South Fork of Hull Creek upstream to just below the private land dam and approximately 5 acre pond. In the first 1.2 miles of perennial flow approximately 0.4 miles are on private land.

Topography is very steep in this drainage and is reflected in the stream gradients. Stream gradients greater than 6% are the most common for all streams.

Hughes Creek drainage: Hughes Creek, Ditch Creek, Allen Creek, West Fork of Hughes Creek and Salzer Creek are the five major perennial streams within this drainage. Approximately the first 2.5 miles of Hughes Creek flows through private land.

Topography is very steep in this drainage and is reflected in the stream gradients. Stream gradients greater than 6% are the most common for all streams.

Indian Creek drainage: Indian Creek, West Fork of Indian Creek, Corral Creek and McConn Creek are the four major perennial streams within this drainage. Indian Creek from the mouth to the confluence with Corral Creek has approximately 3.5 miles of stream flow through private land.

Topography is very steep in this drainage and is reflected in the stream gradients. Stream gradients greater than 10% are the most common for all streams.

Land Description

Hull Creek drainage: This stream originates high in the mountains, dropping as much as 4200 feet in elevation toward the North Fork Salmon River. Most sources are found in high mountain springs which form intermittent stream channels that descend through densely forested slopes and open sagebrush/bunchgrass canyons to form the perennial stream.

Hughes Creek drainage: This stream originates high in the mountains, dropping as much as 5700 feet in elevation toward the North Fork Salmon River. Most sources are found in high mountain springs which form intermittent stream channels that descend through densely forested slopes and open sagebrush/bunchgrass canyons to form the perennial streams.

Indian Creek drainage: This stream originates high in the mountains, dropping as much as 6000 feet in elevation toward the Salmon River. Most sources are found in high mountain springs which form intermittent stream channels that descend through densely forested slopes and open sagebrush/bunchgrass canyons to form the perennial stream.

Soils and Geology

Hull Creek drainage: This drainage is dominated by fairly stable quartzite.

Hughes Creek drainage: This drainage is dominated by fairly stable quartzite.

Indian Creek drainage: This drainage is dominated by highly erosive granitics.

Vegetative Characteristics

Riparian Vegetation

Hull Creek drainage: All streams in this drainage are dominated by woody vegetation; with aspen predominate in the lower elevations and conifers in the higher elevations. Sedges dominate only in the very highest wet meadows where the streams arise. This vegetation is very healthy, with lots of regeneration apparent.

Hughes Creek drainage: All streams in this drainage are dominated by woody vegetation; with aspen predominate in the lower elevations and conifers in the higher elevations. Sedges dominate only in the very highest wet meadows where the streams arise. This vegetation is very healthy, with lots of regeneration apparent.

Indian Creek drainage: All streams in this drainage are dominated by woody vegetation; with aspen predominate in the lower elevations and conifers in the higher elevations.

Sedges dominate only in the very highest wet meadows where the streams arise. This vegetation is very healthy, with lots of regeneration apparent.

Upland Vegetation

The majority of this allotment is dominated by a forested overstory community.

Hull Creek drainage: Upland vegetation of the North Fork Salmon River 5th field HUC is dominated by coniferous forests with deciduous hardwoods interspersed along the riparian areas. Highly productive mixed conifer stands at low to middle elevations consist mainly of ponderosa pine, Douglas-fir, western larch, grand fir and lodgepole pine. At higher elevations, the moderately productive conifer species are Engelmann spruce, subalpine fire and lodgepole pine. Understory vegetation in the forested areas consists of various shrubs, forbs and grasses. Drier areas support grassland vegetation on sites where trees are scattered or absent. These lower elevation lands consist of a sagebrush/grass complex, Condition is felt to be predominately good, with a static to upward trend.

Hughes Creek drainage: Upland vegetation of the North Fork Salmon River 5th field HUC is dominated by coniferous forests with deciduous hardwoods interspersed along the riparian areas. Highly productive mixed conifer stands at low to middle elevations consist mainly of ponderosa pine, Douglas-fir, western larch, grand fir and lodgepole pine. At higher elevations, the moderately productive conifer species are Engelmann spruce, subalpine fire and lodgepole pine. Understory vegetation in the forested areas consists of various shrubs, forbs and grasses. Drier areas support grassland vegetation on sites where trees are scattered or absent. These lower elevation lands consist of a sagebrush/grass complex, Condition is felt to be predominately good, with a static to upward trend.

Indian Creek drainage: Upland vegetation of the Indian Creek-Salmon River 5th field HUC is dominated by coniferous forests with deciduous hardwoods interspersed along the riparian areas. Highly productive mixed conifer stands at low to middle elevations consist mainly of ponderosa pine, Douglas-fir, western larch, grand fir and lodgepole pine. At higher elevations, the moderately productive conifer species are Engelmann spruce, subalpine fire and lodgepole pine. Understory vegetation in the forested areas consists of various shrubs, forbs and grasses. Drier areas support grassland vegetation on sites where trees are scattered or absent. These lower elevation lands consist of a sagebrush/grass complex, Condition is felt to be predominately good, with a static to upward trend.

Human Uses

Recreational values in the three drainages are predominantly tied to unconfined, dispersed use. Big game hunting and associated camping along with trail riding and off highway vehicle riding are the most significant recreational activities within the three drainages. Use occurs primarily in the fall, coinciding with hunting seasons.

Impacts from recreational use at this time are most evident in and immediately adjacent to the riparian areas, and on numerous few, unmentioned "two-track" roads in the three drainages. Education of the recreating public through personal contact should be emphasized.

Hull Creek drainage: The human influences within this drainage are associated with existing roads, mining, private land, logging, firewood gathering and recreation. Access is fairly good throughout this drainage and is essentially tied to existing logging roads and trails.

Hughes Creek drainage: The human influences within this drainage are associated with existing roads, mining, private land, logging, firewood gathering and recreation. Access is fairly good throughout this drainage and is essentially tied to existing logging roads and trails.

Indian Creek drainage: The human influences within this drainage are associated with existing roads, mining, private land, logging, firewood gathering, recreation and wildland firefighting. Access is fairly good throughout this drainage and is essentially tied to existing logging roads and trails.

3 PROPOSED ACTION

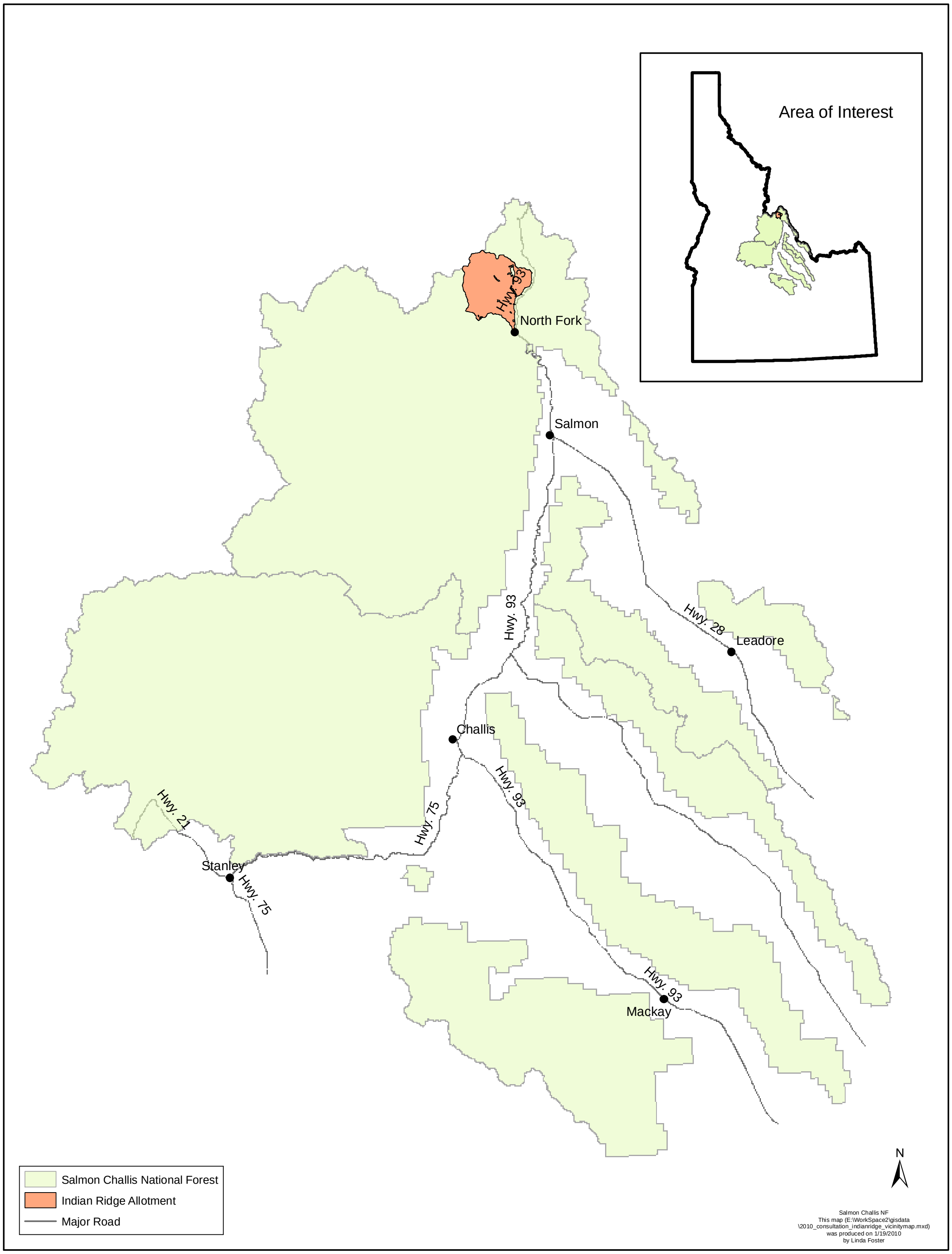
3.1 PROJECT AREA

The Indian Ridge Allotment is located approximately 20 air miles north of Salmon, Idaho on National Forest System lands within the Hughes Creek, Hull Creek, and Indian Creek drainage's (Figure 1). This allotment contains 50,313 acres of Forest Service Land. The proposed project area is located within the North Fork Salmon River (1706020306) and Indian Creek-Salmon River (1706020307) 5^{th} field HUCs of the Middle-Salmon Panther 4^{th} field HUC (17060203).

The allotment is divided into 3 units on National Forest System lands: Hull Creek Unit, Hughes Creek Unit and Indian Ridge Units.

This allotment contains ESA fishery habitat in Hughes Creek, Ditch Creek, Allen Creek, Salzer Creek and North Fork Salmon River (Hughes Creek unit), Hull Creek (Hull Creek unit) and Indian Creek, Corral Creek (Indian Ridge unit) (see Tables 15 – 20).

Figure 1 - Indian Ridge Allotment Vicinity Map



3.2 PROPOSED ACTION

3.2.1 CURRENT PERMIT

The Indian Ridge C&H Allotment is currently permitted for 140 cow/calf pairs (539 Head Months) from 5/23 to 10/30. Due to the timbered nature of the allotment, permittee uses staggered removal. Livestock removal begins in the middle of September and finishes by the end of October. The permit number is 20020 and expires on 12/31/2012.

3.2.2 GRAZING SYSTEM

The allotment is divided into 3 units: Hull Creek Unit, Hughes Creek Unit, and Indian Ridge Unit. The following rotations will be used on this allotment, with rest expected every other year for Hull Creek and Hughes Creek.

Table 1- Unit Rotations (see figure 2 for Unit locations)

Year 1	Year 2
Hull Creek Unit	Hughes Creek Unit
Indian Ridge Unit	Indian Ridge Unit
Hughes Creek Unit (Rest)	Hull Creek Unit (Rest)

Hull Creek Unit:

- Steelhead: Livestock will be in the unit during spawning and incubation up to 6 weeks one out of two years.
- Bull Trout: Livestock will be out of the unit by August 15th every year.
- Trailing: Trailing impacts to steelhead occur in the unit during trailing onto the allotment on Hull Creek one out of two years. Duration of move is 1 day.

Indian Ridge Unit:

- Bull Trout: Livestock do not have access to Indian Creek or Corral Creek and will not be using area near creek.
- Steelhead: Livestock not in the unit before July 7th.
- Trailing: No trailing impacts.

Hughes Creek Unit:

- Steelhead: Livestock will be in the unit during spawning and incubation up to 6 weeks one out of two years.
- Bull Trout: Livestock will be out of the unit by August 15th every year.
- Trailing: Trailing impacts to bull trout occur in the unit on Hughes Creek up to 8 weeks every year. Trailing will not occur above the West Fork of Hughes Creek.

Entry:

Livestock are trucked to permittees private land in lower Hughes Creek. From the private land, livestock are trailed onto the allotment two ways depending on which rotation year. In year 1, livestock are trailed down Hughes Creek on FS RD 60091 to Highway 93N. Then, they are trailed down Highway 93N to the Hull Creek road, FS RD 60005. Finally, they are trailed up the Hull Creek into the Hull Creek unit. In year 2, livestock are trailed from private land into the Hughes Creek unit on FS RD 60091.

Unit Movements:

Year 1: Livestock enter the allotment on the Hull Creek unit as described above. From the Hull Creek unit, livestock are trailed up FS RD 005 to FS RD 088 to the Tin Cup springs and Grindstone springs area of the Indian Ridge unit.

Year 2: Livestock enter the allotment on the Hughes Creek unit as described above. From the Hughes Creek unit, livestock are trailed up FS RD 088 to the Tin Cup springs and Grindstone springs area of the Indian Ridge unit.

Exit:

Due to the timbered nature of the allotment, permittee use staggered removal of livestock. Every year, livestock removal begins in the middle of September and finishes by the end of October. Livestock will be trailed from the Indian Ridge unit on FS RD 60088 and FS RD 60091 to permittee's private land in lower Hughes Creek.

Total Removal from NFS Lands:

All livestock will be removed from the allotment by 10/30.

3.2.3 CONSERVATION MEASURES

The following measures will be implemented as part of the Indian Ridge Allotment's annual operating instructions (AOI) to avoid and reduce potential impacts to ESA listed fish:

1. Hughes Creek Unit and Hull Creek Unit will only be used every other year.
2. A rest rotation grazing system will continue to be used. Resting a unit each year provides benefits to riparian vegetation. This will help meet our long term riparian resource objective for greenline successional status.
3. The on date will be varied so that livestock will be placed on the allotment at range readiness. This will reduce potential for bank alteration. This will help meet our long term riparian resource objective for bank stability.
4. Annual use indicators will dictate when livestock are moved between units or off the allotment within the terms of the term grazing permit including moves in response to fish

spawning. This will help us meet our long term riparian resource objectives. Annual use indicators will be monitored by Forest Service personnel.

5. Permittees will continue to salt at least ¼ mile away from creeks. This will continue to reduce potential impacts on spawning areas and designated critical habitat.
6. Permittees will continue to distribute livestock away from streams and associated riparian areas (ride) at least once every two weeks, reducing potential impacts on spawning areas and designated critical habitat.
7. Fences and water developments have been placed to reduce livestock use on streams and their associated riparian areas. This will continue to reduce impacts on spawning areas and designated critical habitat.

3.2.4 CHANGES FROM EXISTING MANAGEMENT

- All sites will have a monitoring attribute for bank alteration with an endpoint indicator not to exceed 20%.
- The monitoring attribute of browse use will be added to sites that are dominated by woody browse species. Greenline stubble will continue to be monitored at these sites.

3.2.5 RESOURCE OBJECTIVES AND STANDARDS

Resource Objectives and Effectiveness Monitoring: The allotment is being managed to achieve the following resource conditions in riparian areas. Resource objectives are the Forest's description of the desired land, plant, and water resource conditions within riparian areas in the allotments. Some resource objectives are Riparian Management Objectives (RMOs) from PACFISH (U.S Department of Commerce, National Marine Fisheries Service, 1998).

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).

Resource Objectives:

- 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: A stable trend at sites with desired condition and an upward trend at sites not at desired condition (Winward 2000, Burton et al. 2008).
- Bank Stability RMO: A bank stability of at least 80% or the current value, whichever is greatest outside of priority watersheds. Within priority watersheds a bank stability of at least 90% or the current value, whichever is greatest (U.S Department of Commerce, National Marine Fisheries Service, 1998).
- Water Temperature RMO: No measureable increase in maximum temperature; <64^{o}F in (Chinook, steelhead) migration and rearing areas and <60^{o}F in spawning areas except in steelhead priority watersheds with a <45^{o}F in spawning area (PACFISH BO)(U.S Department of Commerce, National Marine Fisheries Service, 1998). No measureable

increase in maximum water temperature (7 day moving average of daily maximum temperature measured as the average of the maximum daily temperature of the warmest consecutive 7-day period) Maximum water temperatures below 59^{o} F within (bull trout) adult holding habitat and below 48^{o} 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: <10 mean wetted width divided by mean depth by channel type (U.S Department of Commerce, National Marine Fisheries Service, 1998).
- Sediment RMO: <20% surface fine sediment which is substrate <0.25 in (6.4 mm) in diameter in spawning habitat or <30% cobble embeddedness in rearing habitat.

Resource Standards (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.

3.2.6 ANNUAL GRAZING USE INDICATORS

Annual Use Indicators and Implementation Monitoring: The purpose of annual use indicators are to ensure grazing effects do not limit attaining the riparian resource objectives. Livestock grazing on key herbaceous species, in key areas other than the greenline, will be limited to 50% use by weight, during the grazing season.

Other annual use indicators follow:

- When the relevant resource objectives are being met (section 3.2.5) annual use indicators, within riparian areas will be 50% browse on multi-stemmed species, 30% browse on single-stemmed species, and 4” residual stubble height.
- When the relevant resource objectives (see section 3.2.5) are not being met annual endpoint indicators, allowable use, will be 30% browse on multi-stemmed species, 20% browse on single-stemmed species, and 6” residual stubble height.
- When the bank stability objective (RMO) is being met the annual use indicator is 20% streambank alteration.
- When the bank stability is 75-99% of the RMO objective the annual use indicator is 15% streambank alteration.
- When the bank stability is <75% of the RMO objective the annual use indicator is 10% streambank alteration.

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.

Table 2 - Annual Use Indicators

Key Area Locations	Unit – Creek	Monitoring Attribute	Annual Use Indicator	Key Species	Trigger
MIM M244	Hughes Creek – West Fork Hughes	Browse use	30%	Alder	25%
		Greenline stubble[1]	4 in.	Hydric spp.	5 in.
		Bank alteration	20%	N/A	25%
MIM M308	Hull Creek – Hull	Browse Use	30%	Alder	25%
		Greenline stubble[1]	4 in.	Hydric spp.	5 in.
		Bank alteration	20%	N/A	25%
Upland Sites	All Units	Utilization	50%	Upland grass species	45%
Riparian Areas	All Units	Utilization by Key Species	50%	Riparian grass species	45%

[1] Browse use and greenline stubble will be used until next trend reading is completed to determine which attribute will be best suited to for attaining long term objectives.

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

3.2.7 IMPROVEMENTS

New Improvements: There are no new improvements proposed at this time.

Existing improvements: Existing improvements, as displayed in Figure 2, will be maintained in accordance with the term grazing permit. For example; 1) fences will be maintained to function as designed (ie. to keep livestock in or out of an area, 2) water troughs will be maintained to keep water within the trough (ie. no holes in the trough) and to have a functioning float system so water does not continuously over flow the trough.

Potential Future Improvements:

At this time there are no identified potential future improvements associated with this allotment that would benefit ESA listed fish.

3.3 GRAZING MONITORING

Two types of monitoring will be used, implementation and effectiveness monitoring. Both qualitative and quantitative monitoring methods will be used in accordance with the following:

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

2. Effectiveness monitoring: The condition of resource objectives will be evaluated in the following manner: greenline successional status, bank stability, width:depth ratio, water temperature, and woody recruitment will be monitored every three to five years to evaluate resource conditions.

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.

4 ESA ACTION AREA DESCRIPTION

The ESA Action Area is defined as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (50 CFR§402.02). This is the area where the action and any interdependent and interrelated actions will result in direct, indirect or cumulative affects to listed species or designated critical habitat. This project’s ESA Action Area is defined as the entire Indian Ridge Allotment (see Figure 2) and the trailing route through private land in lower Hughes Creek along the Hughes Creek road to Highway 93 down to Hull Creek and up the Hull Creek road to the allotment on National Forest System lands. Priority Watersheds within the ESA Action Area are identified in Figure 3.

The ESA fish bearing streams within the ESA Action Area include: Allen Creek, Corral Creek, Ditch Creek, Hughes Creek, Hull Creek, Indian Creek, North Fork Salmon River, Salzer Creek and West Fork Hughes Creek (see Tables 15 - 20).

Priority Watersheds within the ESA Action Area are identified in Figure 3. Within the Indian Ridge Allotment the Hull Creek and Hughes Creek drainages are within a priority watershed. Management direction for priority watershed is identified in section 3.2.5.

Figure 2 - Indian Ridge Allotment ESA Action Area

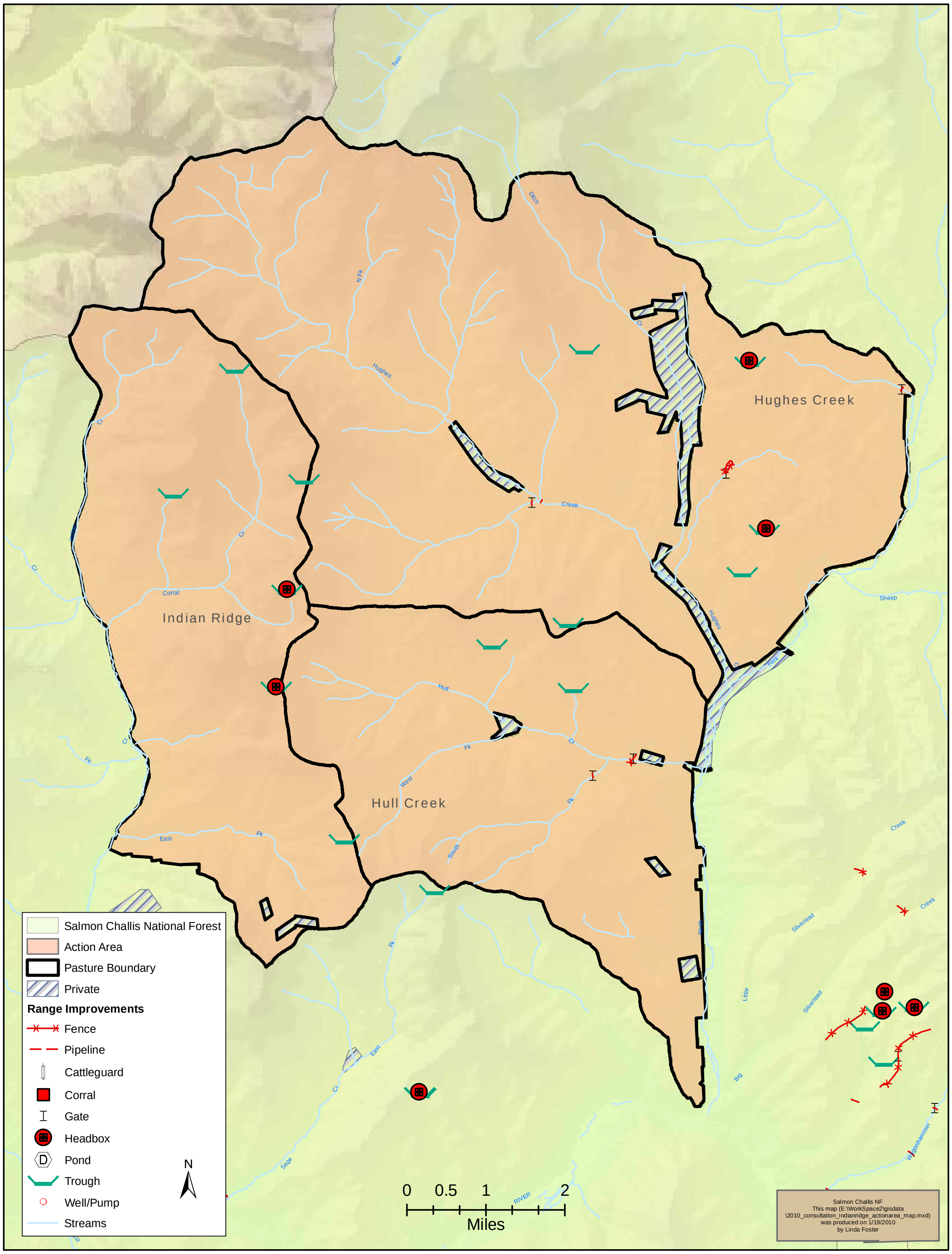
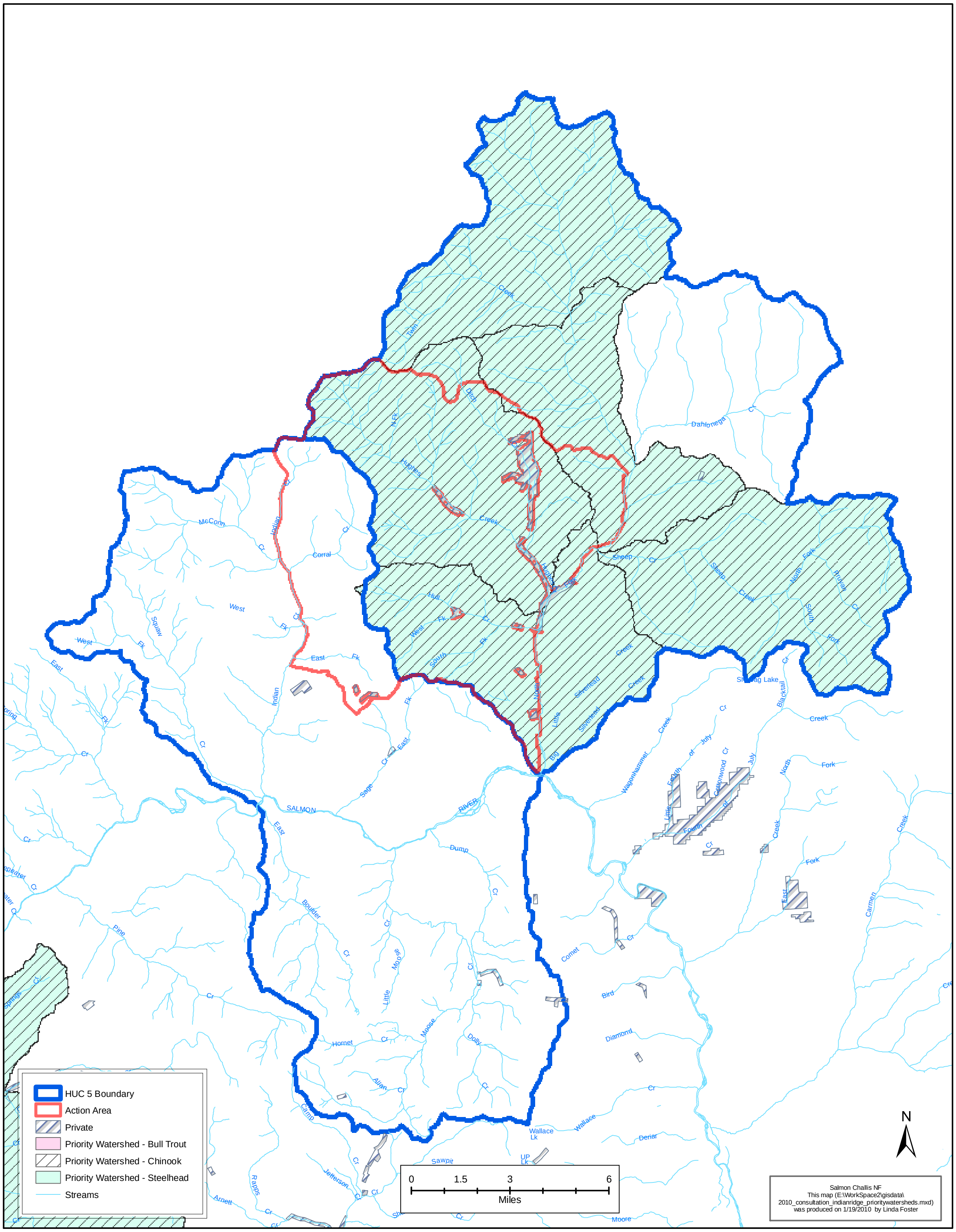


Figure 3 - North Fork Salmon River & Indian Creek - Salmon River HUC 5s and Priority Watersheds



5 LISTED SPECIES REVIEW

5.1 SPECIES OCCURRENCE

According to the U.S. Fish and Wildlife Service's (USFWS's) Semi-annual Species List Update Letter, 14420-2010-SL-0089 received December 30, 2009 to Harv Forsgren, R4 - Regional Forester, the federally listed or proposed listed fish species occurring within the Salmon-Challis NF administered boundaries include;

- Snake River sockeye salmon (Oncorhynchus nerka) (Endangered) (Federal Register 56FR58619)
- Snake River spring/summer Chinook salmon (Oncorhynchus tshawytscha) (Threatened) (Federal Register 57FR14653)
- Snake River steelhead (Oncorhynchus mykiss) (Threatened) (Federal Register 62FR43937)
- Columbia River bull trout (Salvelinus confluentus) (Threatened) (Federal Register 63FR31647)

Salmon-Challis National Forest and Idaho Department of Fish and Game fish surveys indicate that three of these species occur within the ESA Action Area. These species are Chinook salmon (Figure 4), steelhead (Figure 5), and bull trout (Figure 6). Sockeye salmon do not occur within the ESA Action Area, the North Fork Salmon River 5th field HUC (17060206) or the Indian Creek drainage.

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 as identified in Appendix D. Using this process, the Forest has identified the North Fork Salmon River, Hughes Creek and Indian Creek as ESA Action Area streams supporting critical habitat for Chinook salmon (Figure 4).

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 ESA Action Area.

5.2.3 SNAKE RIVER BASIN STEELHEAD

Critical habitat has been designated for Snake River Basin steelhead (Federal Register 70FR52630). Steelhead designated critical habitat is present within the ESA Action Area and includes the North Fork Salmon River, Hughes Creek, Ditch Creek, Allen Creek, Hull Creek and Indian Creek(Figure 5).

5.2.4 COLUMBIA RIVER BULL TROUT

Critical habitat has been proposed for designation (Federal Register75FR2270). Proposed bull trout critical habitat is present within the ESA Action Area and includes the North Fork Salmon River, Hughes Creek, Hull Creek and Indian Creek and Corral Creek (Figure 6). This Biological Assessment will assess the potential impact to the Primary Constituent Elements (PCEs) of bull trout proposed critical habitat. These are defined on page 56266 of the referenced Federal register notice.

Because these elements are important to the analysis determination for bull trout this Biological Assessment analyzes the potential impacts to the PCEs as they relate to the ESA Action Area (Appendix E).

Figure 4 - Indian Ridge Allotment Chinook salmon Map

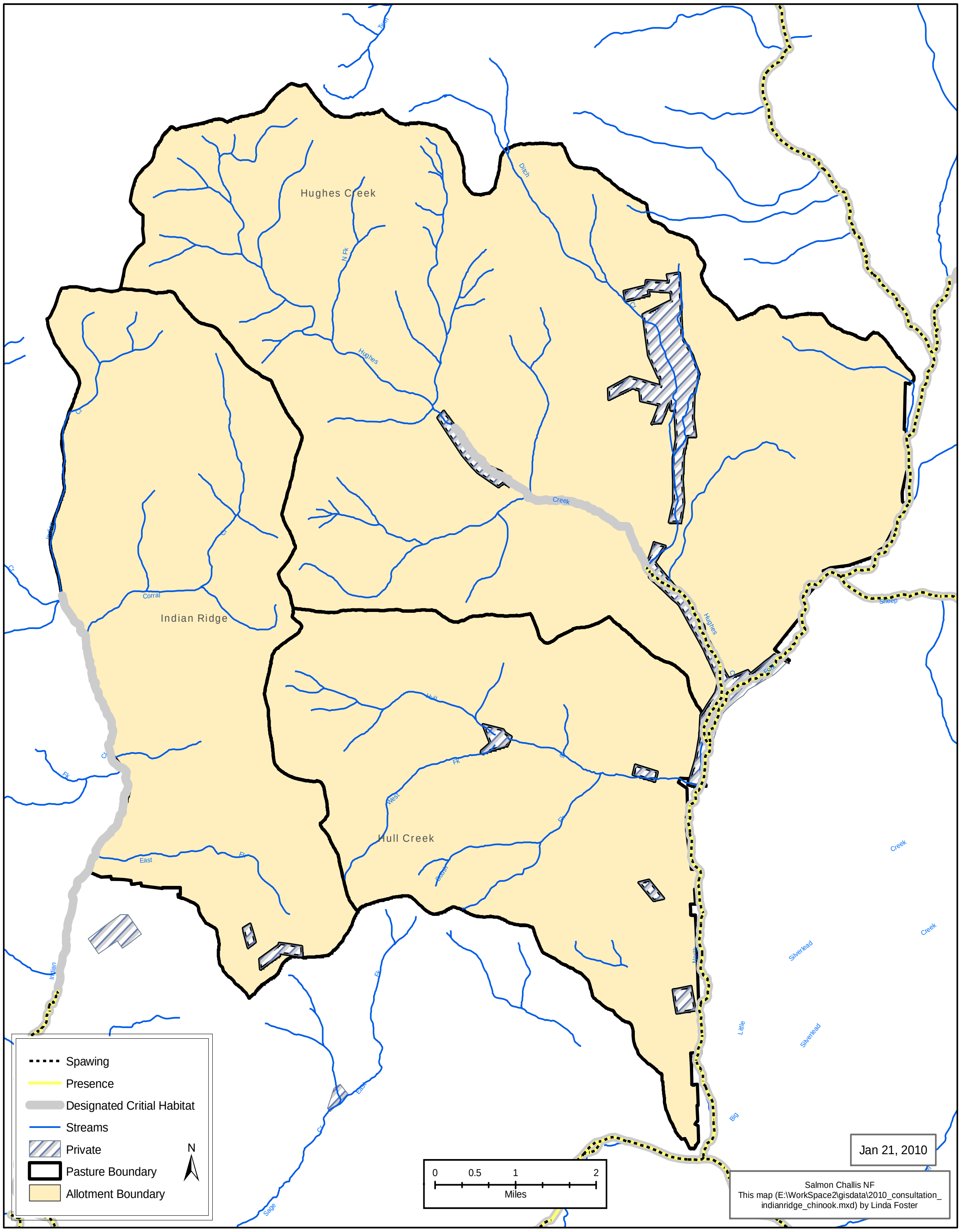


Figure 5 - Indian Ridge Allotment Steelhead Map

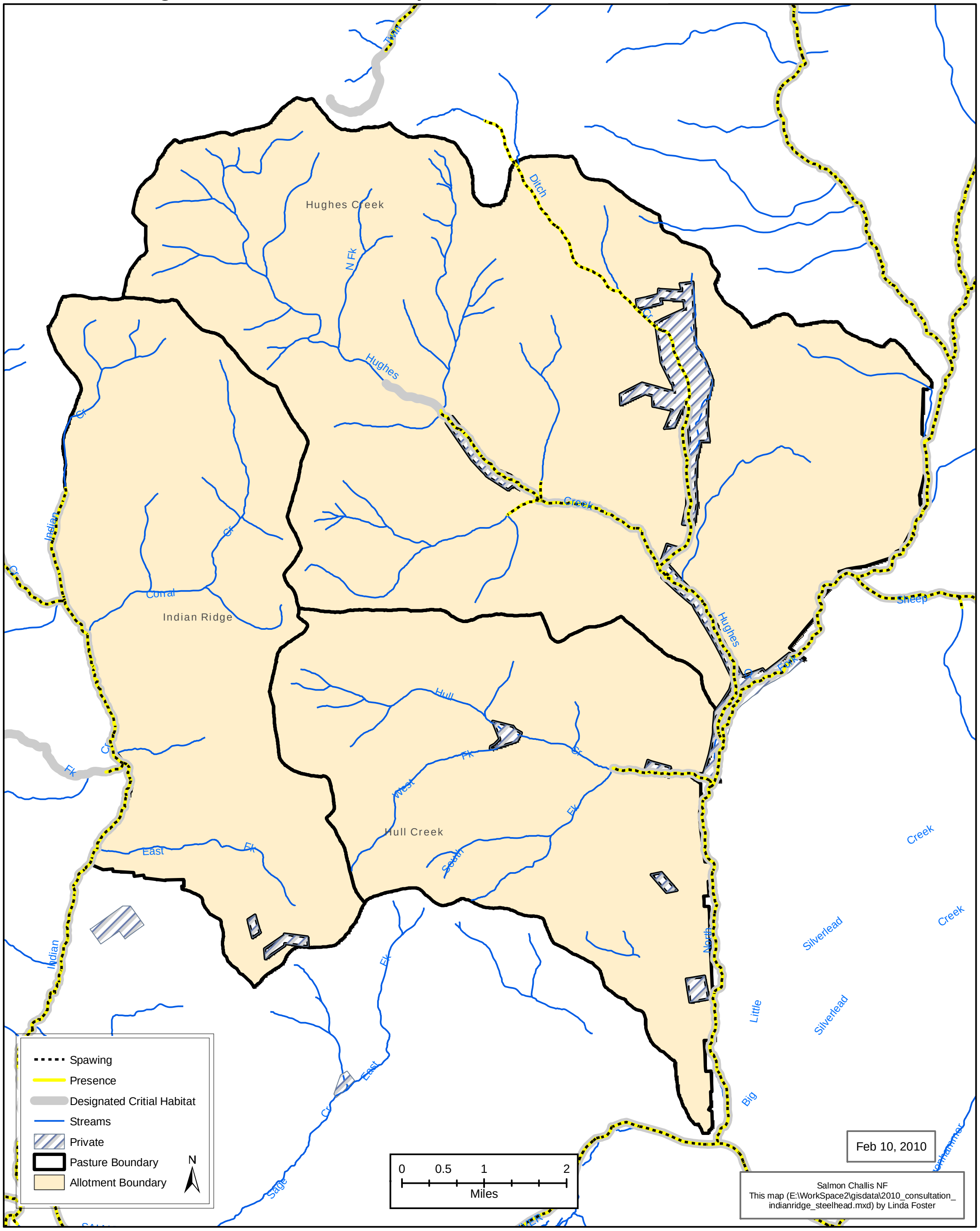
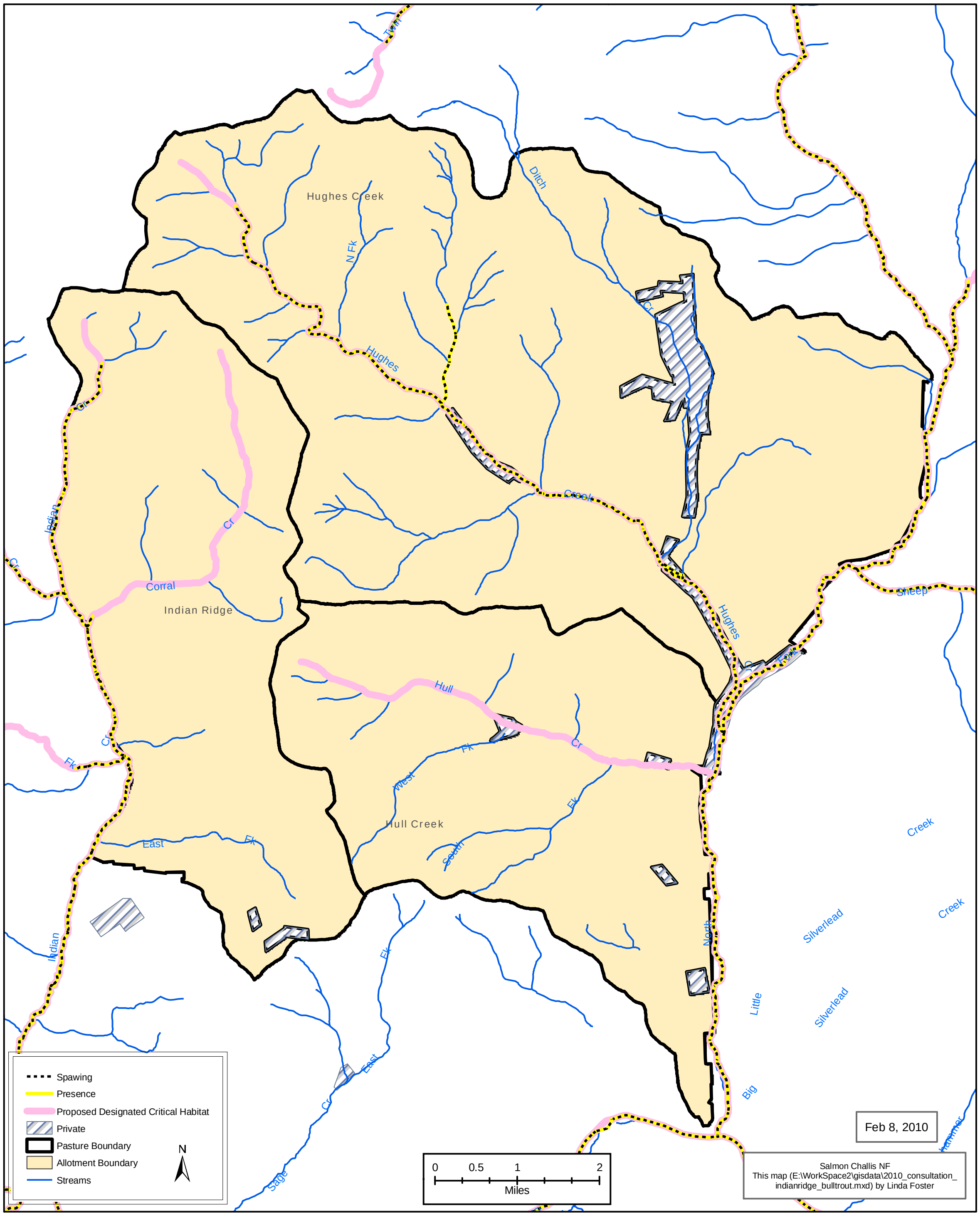


Figure 6 - Indian Ridge Allotment Bull Trout Map



6 ENVIRONMENTAL BASELINE DESCRIPTION

The ESA Action Area is within two 5th field hydrologic unit codes, the North Fork Salmon River (HUC 1706020306) and Indian Creek-Salmon River (HUC 1706020307). Baseline Matrices of Diagnostic Pathways and Indicators for these two 5th field HUCs are provided in Appendix B.

Below is a general summary of baseline conditions within the ESA Action Area. While the baseline matrix included in Appendix B reflects aquatic/riparian condition and trend at the 5th field HUC scale, the baseline descriptions provided below focus only on baseline conditions within the ESA Action Area. This is done to focus analysis emphasis on those habitat parameters most likely to be influenced by grazing activities and set the context for analyzing the effects of the proposed action on these conditions.

6.1 GENERAL DESCRIPTION OF LISTED FISH POPULATIONS

This section provides a general description of the distribution, status and trend of listed fish populations within the ESA Action Area.

The Indian Ridge Allotment encompasses nine streams which support populations of, and/ or habitat for, ESA listed fish species. These include the North Fork Salmon River, Hughes Creek, Ditch Creek, Allen Creek, Salzer Creek, West Fork Hughes Creek, Hull Creek, Indian Creek and Corral Creek. All other streams within areas that will be grazed do not contain ESA listed fish or support designated critical habitat. However, livestock grazing in these areas may indirectly affect ESA listed fish and designated critical habitat in other streams within the allotment.

6.1.1 CHINOOK SALMON

Within the ESA Action Area, since the 1997 electrofishing program began, the only documented Chinook salmon, juvenile or adult, presence is in the North Fork Salmon River. The North Fork Salmon River is an allotment boundary line but the reality is, because of topography and steep terrain permitted livestock are never anywhere near the North Fork Salmon River. Counting the North Fork Salmon River there is an estimated 6.71 miles of Chinook salmon presence and spawning habitat within the ESA Action Area. There is also an estimated 12.88 miles of Designated Critical Habitat within the ESA Action Area which includes the North Fork Salmon River, Hughes Creek, and Indian Creek (see Table 19-20).

It is my professional judgment that Chinook salmon populations within the ESA Action Area are depressed from historic numbers in part because they are listed as “Threatened” under the Endangered Species Act and also because IDFG Chinook salmon redds counts are a small subset compared to historic numbers in the Upper Salmon Basin and specifically in the North Fork of the Salmon River (see Table 3).

Table 3 - Idaho Fish and Game's North Fork of the Salmon River Chinook salmon Redd Counts

YEAR	REDD COUNT		YEAR	REDD COUNT
			1978	29
			1977	31
			1976	6
2009	40		1975	14
2008	22		1974	18
2007	21		1973	55
2006	21		1972	31
2005	20		1971	53
2004	42		1970	95
2003	36		1969	155
2002	36		1968	145
2001	102		1967	66
2000	111		1966	70
1999	2		1965	5
1998	3		1964	86
1997	10		1963	71
1996	5		1962	84
1995	1		1961	144
1994	3		1960	91
1993	17		1959	121
1992	12		1958	322
1991	8		1957	2533

6.1.2 STEELHEAD

Within the ESA Action Area, steelhead or juvenile O.mykiss are currently present in the North Fork Salmon River, Hughes Creek, Ditch Creek, Allen Creek, West Fork of Hughes Creek, Hull Creek and Indian Creek. There is an estimated 19.27 miles of steelhead presence and spawning habitat and 12.88 miles of Designated Critical Habitat within the ESA Action Area (see Tables 15-16).

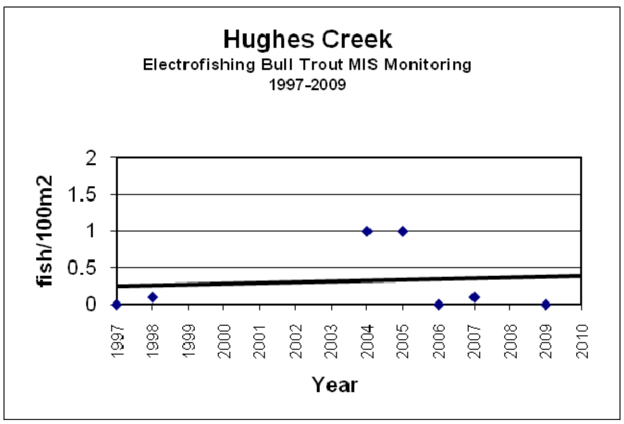
At present, relatively little is known of the status or trend of adult steelhead populations within the ESA Action Area. It is my professional judgment that steelhead populations within the ESA Action Area are depressed from historic numbers in part because they are listed as "Threatened" under the Endangered Species Act.

6.1.3 BULL TROUT

Within the ESA Action Area, bull trout are currently present in the North Fork Salmon River, Hughes Creek, Salzer Creek, Indian Creek and Corral Creek. There is an estimated 21.65 miles of bull trout presence and spawning habitat and 25.64 miles of proposed Critical Habitat within the ESA Action Area (see Table 17-18).

The Salmon-Challis National Forest completed a Forest Plan Amendment for its Management Indicator Species (MIS) in 2004. In this Forest Plan Amendment the bull trout is the MIS fish species on the Salmon-Challis Forest. There is one stream within the ESA Action Area which the Forest monitors long term population trends for bull trout. This one bull trout MIS monitoring site, within the ESA Action Area, shows bull trout populations of less than 1 fish/100 m^2.

It is my professional judgment that bull trout populations within the ESA Action Area are depressed from historic numbers in part because of private land migration barriers associated with irrigation practices. Fluvial forms are known to use the North Fork Salmon River and suspected to use Hughes Creek and Indian Creek within the ESA Action Area. Fluvial bull trout begin to move into tributaries as the high water spring runoff flows begin to decrease, but the stream flows are still above base flows. Migratory corridors and rearing habitat are considered to be in good to excellent condition in Indian Creek but the Hughes Creek drainage has migration problems associated with private land irrigation practices in lower Hughes Creek and road crossing passage barrier problems in Hughes Creek. The Hughes Creek culvert is in the engineering design phase for fish passage restoration. Depending upon funding this culvert could be replaced within the next year or two.



6.2 GENERAL DESCRIPTION OF HABITAT CONDITIONS

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

The Indian Ridge Allotment encompasses nine streams which support populations of, and/ or habitat for, ESA listed fish species. These include Allen Creek, Corral Creek, Ditch Creek, Hughes Creek, Hull Creek, Indian Creek, North Fork Salmon River and West Fork Hughes Creek. All other streams within areas that will be grazed do not contain ESA listed fish or support designated critical habitat. However, livestock grazing in these areas may indirectly affect ESA listed fish and designated critical habitat in other streams within the allotment.

Table 4 - Mean Annual Monthly Flows

Snake River Adjudication Sites

Station	DA (sq. mi.) (drainage area)	QA (cfs) Yearly Average Discharge	QB (cfs) Bankfull Discharge (flood stage)	Mean Monthly Flows JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	Bankfull Channel Slope	Bankfull Width	X-Sectional Area	Bankfull Depth	Width/ Depth Ratio
Ditch Creek 1R (core site)	8.35	7.63	40.80	2.4	2.4	2.7	5.5	22.3	30.6	9.6	4.1	3.3	3.2	2.9	2.6	0.049	17.60	14.58	0.83	21.2
Hughes Creek (core site)	26.29	22.27	134.36	7.0	7.0	7.7	16.0	65.0	89.4	27.9	12.0	9.6	9.2	8.4	7.6	0.009	12.75	13.22	1.04	12.3
Hull Creek 1R (core site)	13.16	3.50	21.00	1.1	1.1	1.2	2.5	10.2	14.0	4.4	1.9	1.5	1.4	1.3	1.2	0.036	10.70	6.32	0.59	18.1
Indian Creek 1 (core site)	54.10	27.45	116.80	8.7	8.6	9.6	19.8	80.3	110.0	34.5	14.9	11.8	11.4	10.4	9.4	0.012	21.00	15.34	0.73	28.7
Indian Creek 2 abv. pvt. (core site)	41.59	22.00	90.40	7.0	6.9	7.7	15.8	64.2	88.3	27.6	11.9	9.4	9.1	8.3	7.5	0.033	18.10	15.59	0.86	21.0
NF Salmon River 1A (@ Crone Gulch)	44.56	35.04	233.80	11.1	11.0	12.2	25.2	102.3	140.6	44.0	19.0	15.0	14.5	13.3	12.0	0.003	22.30	39.23	1.76	12.7

Stream Stats Calculations

Station	DA (sq. mi.) (drainage area)	QA (cfs) Yearly Average Discharge	QB (cfs) Bankfull Discharge (flood stage)	Mean Monthly Flows JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	Bankfull Channel Slope	Bankfull Width	X-Sectional Area	Bankfull Depth	Width/ Depth Ratio
Allen Creek	1.53	0.27	11.3	0.19	0.18	0.23	0.56	0.84	0.36	0.09	0.06	0.05	0.28	0.24	0.21	unknown	unknown	unknown	unknown	unknown
Corral Creek	6.8	2	46.5	0.97	0.95	1.14	2.47	7.41	5.62	1.34	0.77	0.66	1.4	1.23	1.06	unknown	unknown	unknown	unknown	unknown
Salzer Creek	3.67	1.19	35	0.48	0.47	0.58	1.36	4.32	3.93	0.62	0.37	0.31	0.7	0.62	0.53	unknown	unknown	unknown	unknown	unknown
West Fork of Hughes Creek	4.77	2.57	18.5	0.78	0.76	0.88	1.79	2.92	1.35	0.39	0.25	0.24	1.17	0.98	0.86	unknown	unknown	unknown	unknown	unknown

6.2.1 HUGHES CREEK

Fish habitat conditions of Hughes Creek within the ESA Action Area are in generally good condition. Overall physical habitat quality, including the elements of water quality, flow/hydrology, channel conditions and structural habitat elements is considered fair to good. There are some connectivity problems associated with private land irrigation practices in lower Hughes Creek and one road crossing passage barrier problems on mainstem Hughes Creek just upstream of the West Fork of Hughes Creek. Mainstem Hughes Creek supports quality spawning and rearing habitat for both resident and anadromous fish.

6.2.2 HUGHES CREEK TRIBUTARIES

Fish habitat conditions of Hughes Creek tributaries within the ESA Action Area are in generally good condition. Overall physical habitat quality, including the elements of water quality, flow/hydrology, channel conditions and structural habitat elements is considered good, with some connectivity problems associated with two road crossing passage barrier problems on the West Fork of Hughes Creek and Ditch Creek. The Hughes Creek tributaries are smaller high gradient streams that support limited anadromous spawning habitat with better rearing and spawning habitat for smaller resident fish.

6.2.3 HULL CREEK

Fish habitat conditions of approximately the lower 1.2 miles of Hull Creek, up to the South Fork of Hull Creek, within the ESA Action Area provide limited spawning opportunities and marginal rearing habitat for anadromous and resident fish. Hull Creek flows are intermittent to subsurface between the South Fork of Hull Creek and the private land dam for approximately 1.2 miles. The private land dam is a total migration barrier to upstream fish passage. It is my professional judgment that the overall physical habitat quality, including the elements of water quality, flow/hydrology, channel conditions and structural habitat elements would be considered poor to fair for cold water salmonids in the lower 1.2 miles of Hull Creek. There is one partial migration barrier culvert in lower Hull Creek. This culvert may not be a total barrier to fish passage but it would impede upstream fish migration during low flows for juvenile fish. At high flows, like spring runoff, the culvert could also impede upstream fish passage for adult salmonids.

6.2.4 INDIAN CREEK

Fish habitat conditions of Indian Creek, within the ESA Action Area are in generally good condition. Overall physical habitat quality, including the elements of water quality, flow/hydrology, channel conditions and structural habitat elements is considered good, and connectivity is excellent, with no mainstem passage barriers. Indian Creek within the ESA Action Area supports quality spawning and rearing habitat for anadromous and resident fish.

6.2.5 CORRAL CREEK

Corral Creek is a small high gradient tributary to upper Indian Creek. Fish habitat conditions, within the ESA Action Area, provide limited spawning for bull trout and limited rearing habitat for anadromous and resident fish. Professional judgment says the overall physical habitat quality, including the elements of water quality, flow/hydrology, channel conditions and structural habitat elements would be considered fair to good for smaller cold water salmonids. There are no human caused migration barriers but Corral Creek is small high gradient mountain stream with limited fish habitat.

6.3 MAJOR LIMITING FACTORS

Factors most likely to be limiting ESA listed fisheries resources, within the ESA Action Area, from achieving full carrying capacity are:

- Year to year stream flow conditions associated with good or bad snowpack levels.
- Nutrient deficiencies associated with high mountain, high gradient streams. Some of these nutrient deficiencies can be attributed to the decline in the number of anadromous fish, both steelhead and Chinook salmon, returning to streams within the ESA Action Area to spawn, die and decay in the stream.
- Hughes Creek, Ditch Creek and the West Fork of Hughes Creek have a fish migration barrier culvert preventing connectivity of ESA listed fish streams within the Hughes Creek drainage.
- Hull Creek has a partial fish migration barrier culvert approximately 0.5 miles upstream from the confluence with the North Fork Salmon River preventing connectivity of an ESA listed fish stream to the North Fork Salmon River.
- Hull Creek has a private land dam and lake that limits fish habitat capability by reducing stream flows and totally blocking upstream fish migration passage.

- Hull Creek stream flows go subsurface above the South Fork of Hull Creek preventing fish migration upstream and downstream.
- Historic grazing activities may have contributed to past habitat capability limitations within the Indian Ridge Allotment and the ESA Action Area, but it is my professional judgment that improvements in grazing management strategies implemented on this allotment within recent years, since the mid 1990's, have greatly reduced any continuing contribution of impacts to fish and fish habitat parameters within the ESA Action Area.

More specific details on status and trends of habitat within the ESA Action Area are provided below.

6.4 GRAZING FOCUS INDICATORS

This analysis will analyze six grazing focus indicators to assess livestock impacts to ESA listed fish and designated critical habitat. These indicators are 1) spawning and incubation, 2) temperature, 3) sediment, 4) width:depth ratio, 5) streambank condition and 6) riparian conservation areas. These six indicators are referred to as the grazing focus indicators and reflect aquatic/riparian baseline pathway and indicator elements considered most likely to be impacted by grazing activities within a watershed.

A description of the condition of these indicators within the action area is provided below.

6.4.1 SPAWNING AND INCUBATION:

6.4.1.1 CHINOOK SALMON SPAWNING AND INCUBATION

Spawning periodicity data developed by the Upper Salmon Basin Watershed Project Technical Team (Upper Salmon Basin Watershed Project Technical Team, 2005) identify a general initiation date for Chinook salmon spawning activity in the Hughes Creek and Indian Creek drainages and the North Fork Salmon River in the fourth week of August. Incubation of eggs can occur through the end of April (Upper Salmon Basin Watershed Project Technical Team, 2005).

Chinook salmon are currently documented to be spawning in the North Fork Salmon River. Other than the North Fork Salmon River no Chinook salmon have been documented spawning within the ESA Action Area in the past 20 years. Historically there would have also been Chinook salmon spawning in Hughes Creek and Indian Creek within the ESA Action Area.

Table 5 – Chinook salmon Spawning Stream Miles within ESA Action Area

North Fork Salmon River	**6.46 miles**
Hughes Creek	**0.25 miles**

Although the North Fork Salmon River is considered to be within the ESA Action Area, because it is mapped as an allotment boundary, permitted livestock grazing never occurs anywhere near the North Fork Salmon River because of topography and steep terrain.

6.4.1.2 STEELHEAD SPAWNING AND INCUBATION

Data developed by the Upper Salmon Basin Watershed Project Technical Team (Upper Salmon Basin Watershed Project Technical Team, 2005) identify a general spawning periodicity for steelhead in the Hughes Creek and Indian Creek drainages and the North Fork Salmon River ranging from the second week of March through the second week of June, with egg incubation through the first week of July.

Table 6 - Steelhead Spawning Streams and Miles within ESA Action Area

Allen Creek	**0.23 miles**
Ditch Creek	**3.77 miles**
Hughes Creek	**2.74 miles**
Hull Creek	**0.46 miles**
Indian Creek	**5.19 miles**
North Fork Salmon River	**6.46 miles**
West Fork Hughes Creek	**0.43 miles**

Steelhead have the potential to spawn in seven streams within the ESA Action Area (see Table 6). These lengths reflect continuous mapping reaches and are likely a significant overestimate of actual spawnable area within the allotment's streams. Information on steelhead spawning within the Indian Ridge Allotment's ESA Action Area is largely lacking due to the difficulty in conducting redd surveys while stream flows are high, turbid and unsafe to walk in during spring runoff.

As mentioned above, although the North Fork Salmon River is considered to be within the ESA Action Area, because it is mapped as an allotment boundary, permitted livestock grazing never occurs anywhere near the North Fork Salmon River because of topography and steep terrain. This is also true for Indian Creek. Permitted livestock grazing rarely if ever occurs along Indian Creek within the ESA Action Area because of topography and steep terrain. If in that rare instance livestock drift down off the steep terrain to Indian Creek the permittee will herd them along the Indian Creek road to a point where he can load them into a trailer and drive them back up to the high country in the Indian Ridge unit or if it is late enough in the season he will just take the livestock home to his private land.

Hull Creek is mapped as having 0.88 miles of steelhead spawning habitat because the Forest's electrofishing program has documented juvenile rainbow trout/steelhead in the lower reaches of Hull Creek below the South Fork of Hull Creek and below private land and the cattle guard. Permitted livestock only have access to the potential 0.88 miles of steelhead spawning habitat every other year when the Hull Creek unit is grazed. The potential steelhead spawning habitat in Hull Creek is marginal at best because of the small stream size and limited stream flows. There hasn't been any documentation of steelhead spawning in Hull Creek but in 2009 the Forest did document, in a 100 meter electrofishing transect, six rainbow trout between 85mm and 100mm in length just above the first culvert. The Forest is using a protocol that identifies spawning habitat when ever juvenile salmonids less than or equal to 100mm are surveyed. Therefore it is my professional judgment that there is the potential, be it limited, for steelhead to spawn in approximately 0.88 miles of Hull Creek. It is also my professional judgment that every other year when livestock graze the Hull Creek unit there is some potential, be it very limited, for livestock to disturb or harass spawning adult steelhead or trample redds.

6.4.1.3 BULL TROUT SPAWNING AND INCUBATION

Data developed by the Upper Salmon Basin Watershed Project Technical Team (Upper Salmon Basin Watershed Project Technical Team, 2005) identify a general spawning periodicity for bull trout in the Hughes Creek and Indian Creek drainages and the North Fork Salmon River ranging from the second week of August through the second week of October, with egg incubation through the third and fourth week of April. For the purpose of this analysis August 15th will be used for the start of bull trout spawning.

Table 7 - Bull Trout Spawning Streams and Miles

Corral Creek	**0.14 miles**
Hughes Creek	**6.92 miles**
Indian Creek	**6.86 miles**
North Fork Salmon River	**6.46 miles**
Salzer Creek	**1.27 miles**

Bull trout have the potential to spawn in five streams within the ESA Action Area (see Table 7). These lengths reflect continuous mapping reaches and are likely a significant overestimate of actual spawnable area within the allotment’s streams.

Information on bull trout spawning within the ESA Action Area is limited. This analysis basis potential bull trout spawning streams on known or suspected presence of bull trout through electrofishing surveys. Idaho Fish and Game considers the North Fork Salmon River to support fluvial bull trout spawning and Hughes Creek and Indian Creek as having the potential to support fluvial bull trout spawning within the ESA Action Area.

As mentioned above, although the North Fork Salmon River is considered to be within the ESA Action Area, because it is mapped as an allotment boundary, permitted livestock grazing never occurs anywhere near the North Fork Salmon River because of topography and steep terrain. This is also true for Indian Creek and lower Corral Creek. Permitted livestock grazing rarely if ever occurs along Indian Creek or lower Corral Creek within the ESA Action Area because of topography and steep terrain. If in that rare instance livestock drift down off the steep terrain to Indian Creek or lower Corral Creek the permittee will herd them along the Indian Creek road to a point where he can load them into a trailer and drive them back up to the high country in the Indian Ridge unit or if it is late enough in the season he will just take the livestock home to his private land.

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/INFISH identifies a rearing temperature criteria of less than 64 degrees F (17.8 degrees C) and a spawning temperature criteria of less than 60 degrees F (15.6 degrees C) as components of its suite of Riparian Management Objectives. Water temperature conditions within the ESA Action Area are considered to be Functioning Appropriately for rearing, spawning and incubation relative to these criteria.

Seasonal water temperature regimes have been monitored on eight streams within the ESA Action Area. The stream temperature graphs for those streams can be seen in Appendix G. The streams, with the years water temperature data was collected include the following: Allen Creek (1999-2002, 2005-2007, 2009), Corral Creek (1997-2002, 2009), Ditch Creek (1993-1996, 1998, 2000, 2002-2007, 2009), Hughes Creek (1993-2003, 2005-2007, 2009), Hull Creek (1995, 1997-2006, 2009), Indian Creek (1993-2006, 2009), Salzer Creek (2001, 2002) and West Fork of Hughes Creek (2001-2003, 2005-2007, 2009).

Overall, observed water temperature regimes within the Indian Ridge Allotment have all fallen within the PACFISH water temperature criteria. There are no streams within the ESA Action Area that are listed as an IDEQ 303(d) streams with a pollutant, which includes water temperature (IDEQ, 2008). Bull trout are not present when an observed mean water temperature is greater than 12.0^{o}C (Gamett, 2002). Water temperature is not considered a limiting factor to fish production within the ESA Action Area.

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 Salmon-Challis National Forest's Watershed Program has collected stream sediment data, using the core sampling methodology, since 1993.

Analysis of core sampling data correlates measured levels of depth fines in spawning habitats to predicted egg incubation success values determined by Stowell, et al (1983). Results of all assessments are expressed as percent fines less than ¼ inch in diameter. Analysis of depth fines additionally considers drainage geology. As agreed to with the Salmon-Challis National Forest, National Marine Fisheries Service and the US Fish and Wildlife Service during ESA informal consultation on steelhead and bull trout Watershed Biological Assessments for Ongoing Activities, the following are evaluation criteria for stream sediment based wholly or primarily in quartzite geology:

20% depth fines (<1/4" diameter) = Properly Functioning
21-25% depth fines (<1/4" diameter) = Functioning at Risk
>25% depth fines (<1/4" diameter) = Not Properly Functioning

The following are evaluation criteria for stream sediment based wholly or primarily in granitic, volcanic or sedimentary geology:

25% depth fines (<1/4" diameter) = Properly Functioning
26-29% depth fines (<1/4" diameter) = Functioning at Risk
>30% depth fines (<1/4" diameter) = Not Properly Functioning

Within the ESA Action Area there are four core sampling monitoring sites. Core sampling is used in trend monitoring to determine the amount of percent fines within the stream's substrate. Anadromous streams receive a 6-inch dig and resident fish streams receive a 4-inch dig. The amount of percent fines is used in determining the stream's biotic potential (Stowell, et al. 1983). Biotic potential is the condition of spawning substrate quality, which maximizes survival and emergence of fish embryos.

Forest wide analysis of data collected since 1993 shows a wide range of variability for stream sediment. Stream sediment data is highly influenced by natural processes such as geology, stream gradient, winter snow pack, springtime runoff, summer time high intensity storms and human impacts associated with roads. The variability in stream sediment data shows in some years at some stations streams may naturally fluctuate between Properly Functioning, Functioning at Risk, and Not Properly Functioning.

Table 8 - Core Sampling Mean % Fines by Depth

Summary of Depth Fines Measurements Recorded on the Salmon-Challis National Forest from 1993 through 2009.

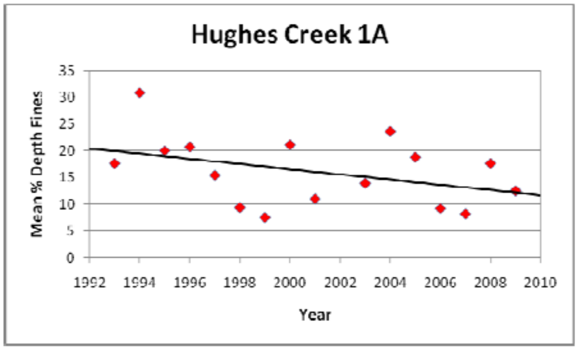
Mean Percent Fines <.25" at Depth

Station	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Ditch Creek 1R			14.9	13.7											22.9		
Ditch Creek 2R			15.5														
Hughes Creek 1A	17.6	30.8	20.0	20.7	15.4	9.4	7.5	21.1	11.0		13.9	23.6	18.8	9.2	8.2	17.6	12.5
Hull Creek 1R	17.9	14.4	26.8	23.7		18.6					27.3	28.2	18.5				31.7
Indian Creek 1A	16.6	15.5	20.6	20.6	31.6	14.6	18.8	23.0	14.2	19.5	11.6	17.5	7.6	22.5	11.3	21.5	
Indian Creek 2A	7.5	14.2	17.2	21.5					12.0		17.0	22.0	13.9				21.9

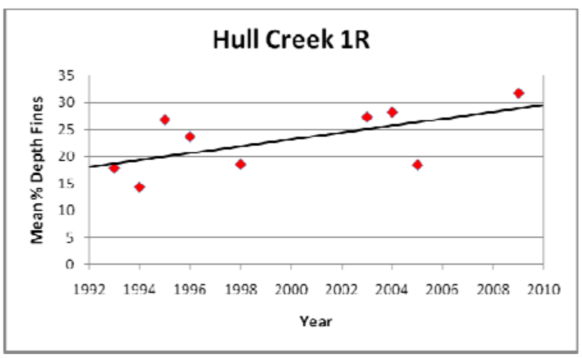
A = Anadromous fish spawning site
R = Resident fish spawning site

Ditch Creek has one site that has been monitored three years in the last seventeen years. Using nineteen years of local knowledge of Ditch Creek and three years of actual data it is my professional judgment that Ditch Creek is “Functioning Appropriately”. This data and local knowledge of the stream indicate stream sediment is not a limiting factor for fish production in Ditch Creek.

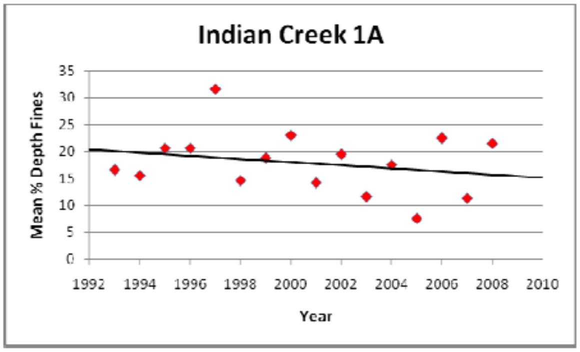
Hughes Creek has one site that has been monitored sixteen years in the last seventeen years. Using nineteen years of local knowledge of Hughes Creek and sixteen years of actual data, it is my professional judgment that Hughes Creek is “Functioning Appropriately”. This data and its trend graph indicate stream sediment is not a limiting factor for fish production in Hughes Creek.

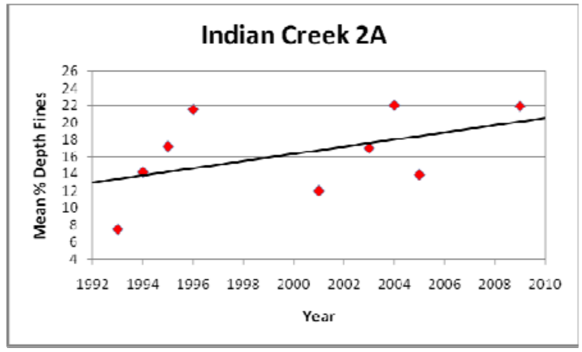


Hull Creek has one site that has been monitored nine years in the last seventeen years. Using nineteen years of local knowledge of Hull Creek and nine years of actual data, it is my professional judgment that Hull Creek is “Functioning at Risk”. This data and its trend graph indicate stream sediment could be a limiting factor for fish production in Hull Creek. Approximately 2.5 miles of Hull Creek, below the private land dam down to the North Fork Salmon River, is adjacent to and within 50 meters of the main Hull Creek road. Sediment runoff from the Hull Creek road and a lack of sediment flushing flows, because the stream goes subsurface below the private land dam, is believed to be the major contributing factor to the higher than desired stream sediment levels in Hull Creek.



Indian Creek has one site that has been monitored sixteen years and another site that has been monitored nine years in the last seventeen years. Using nineteen years of local knowledge of Indian Creek and sixteen years and nine years of actual data, it is my professional judgment that Indian Creek is considered “Functioning Appropriately”. This data and its trend graphs indicate stream sediment is not a limiting factor for fish production in Indian Creek.





There are no streams within the ESA Action Area that are listed as an IDEQ 303(d) streams with a pollutant, which includes water temperature (IDEQ, 2008). It is my professional judgment that stream sediment conditions are not considered a major limiting factor to fish production within the ESA Action Area.

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 reduces habitat suitability (Platts and Nelson, 1989).

Data is limited for average wetted width/maximum depth ratio on streams within the ESA Action Area. There are only two ESA fish streams within the ESA Action Area with Range program MIM monitoring data, Hull Creek and the West Fork of Hughes Creek (see Appendix C Table 22). But there is no wetted width:depth ratio data on these streams within the ESA Action Area. PACFISH and Range MIM width:depth ratio is measured using the mean wetted width divided by depth. When measuring using mean wetted width there can be a great variance in your calculated width:depth ratio because of different stream flows from year to year and from the beginning of your summer field monitoring season to the end of your summer field monitoring season.

A more accurate monitoring methodology for calculating width:depth ratios would be using bankfull widths divide by bankfull depths where your monitoring site's bankfull width is determined by an experienced hydrologist who permanently marks the location of bankfull using a permanent monument marker like rebar. This will ensure the year to year measurements recorded are more reflective of the width:depth ratio change or lack of change that is taking place at the monitoring site. This will not only give you a more accurate description of the current stream's width:depth ratio at your monitoring site it will also make a more accurate comparison of the change and trend taking place with width:depth ratios at the monitoring site over the years.

There are no current width:depth ratios, using bankfull width, on streams within the ESA Action Area, but there is historic stream habitat data collected, within the ESA Action Area, for the Snake River Adjudication process that includes five sites that have been permanently marked on four streams within the ESA Acton Area (see Table 9). This stream habitat data was collected between 1988 and 1990 and measured and located bankfull width and bankfull depths. The *User's Guide to Fish Habitat: Descriptions that Represent Natural Conditions in the Salmon River Basin, Idaho* (Overton, 1995) shows a mean width to depth ratio of 24 for "B" channel types and 28 for Rosgen "C" channel types (Rosgen, 1994).

Table 9 - Width:Depth Ratio

Station	Bankfull Width	X-Sectional Area	Bankfull Depth	Width/Depth Ratio	Rosgen Channel Type	Natural Condition Database Width:depth Ratio
Ditch Creek 1R	17.60	14.58	0.83	21.25	"C"	28
Hughes Creek	12.75	13.22	1.04	12.30	"C"	28
Hull Creek 1R	10.70	6.32	0.59	18.12	"C"	28
Indian Creek 1	21.00	15.34	0.73	28.75	"B"	24
Indian Creek 2	18.10	15.59	0.86	21.01	"B"	24

The past and current effects of the proposed project could have played a role in decreasing or increasing average wetted width/maximum depth ratio within the ESA Action Area. The direct correlation between the proposed project's past and current activities and a negative increase in average wetted width/maximum depth ratio would be if livestock grazing activities were allowed to break down streambanks and significantly decrease the stability of streambanks. Range improvements such as fences and water developments that helped to minimize and keep livestock grazing activities away from riparian areas and streambanks can also help to restore degraded stream reaches where the average wetted width/maximum depth ratio is greater than 10. Recent past and current livestock grazing activities were and are being managed so as not to degrade riparian areas and bank stability which could have increased average wetted width/maximum depth ratio. Current streambank conditions at the three long term trend monitoring sites show high bank stability.

The Ditch Creek high width:depth ratio is heavily influenced by placer mining that occurred in the early to mid 1900's. Placer mining is the mining of alluvial deposits for minerals. Placer mining includes ground sluicing, panning, shoveling gravel into a sluice, scraping by power scraper and excavation by dragline, dredge or other mechanized equipment. The Hull Creek monitoring site is located downstream below the cattle guard and private land where permitted livestock have limited access to Hull Creek every other year during supervised trailing on to the allotment. The Indian Creek 1 site is located downstream below the ESA Action Area. Because of topography livestock rarely if ever get down to Indian Creek within the ESA Action Area. Since the current permittee has managed this allotment, from 1999 to present, there was one time four cows drifted down to Indian Creek from the high country. The permittee immediately gathered up the four cows and trucked them home to private land. Although stream width:depth ratios are higher than the PACFISH RMO of <10, it is my professional judgment that livestock grazing is not the contributing factor to the width:depth ratios being greater than 10 because streambanks are not considered unstable from livestock grazing activities .

Stream width:depth ratios are not considered a major limiting factor to fish production within the ESA Action Area. Based on nineteen years of local knowledge of the nine ESA fish bearing streams within the ESA Action Area and the bankfull width:depth ratios at the five Snake River Adjudication sites in Table 7 it is my professional judgment that stream width:depth ratios are considered to be Functioning Appropriately and are not a limiting factor to fish production..

6.4.5 STREAMBANK CONDITION

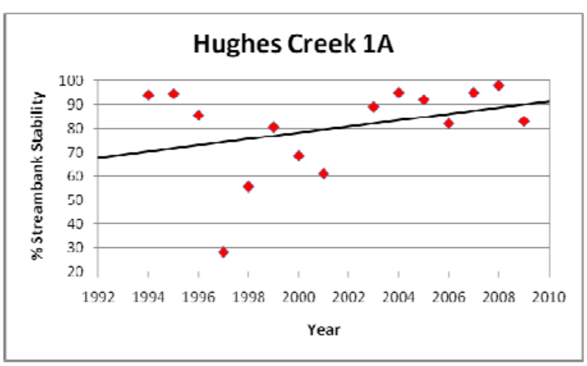
Streambank condition can influence the overall stability and resilience of stream channels. Reduced streambank stability can result in reduced structural stability of the stream channel resulting in negative impacts on fish productivity (Platts,1991).

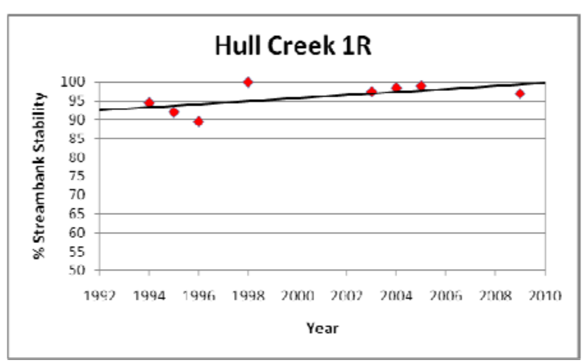
The Hull Creek and Hughes Creek drainages are considered to be a PACFISH priority watershed, with an identified Riparian Management Objective (RMO) of 90 percent or greater bank stability. Streambank stability was monitored by the Forest's Watershed Program at their core sampling locations. Based upon the Matrix of Pathway and Indicator functionality criteria of 90 percent or greater streambank stability, streambank conditions are considered to be "Functioning Appropriately" within Ditch Creek, Hughes Creek, Hull Creek and Indian Creek. This call is based on using the streambank stability monitoring by the Forest's Watershed crew at their core sampling locations.

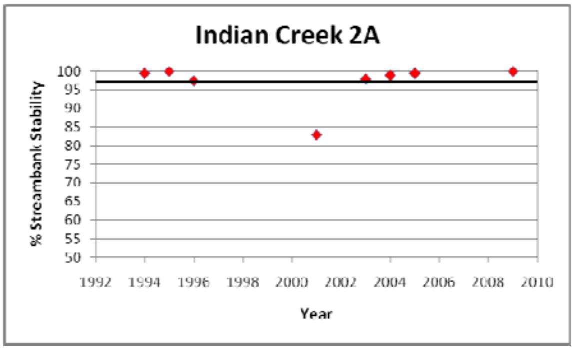
Table 10 - Percent Bank Stability

	Percent Bank Stability																
Station	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Ditch Creek 1R															100.0		
Hughes Creek 1A		94.0	94.5	85.5	28.0	55.5	80.5	68.5	61.0		89.0	95.0	92.0	82.0	95.0	98.0	83.0
Hull Creek 1R		94.5	92.0	89.5		100.0					97.5	98.5	99.0				97.0
Indian Creek 2A		99.5	100.0	97.5					83.0		98.0	99.0	99.5				100.0

Streambank conditions within the ESA Action Area have been monitored in association with sediment monitoring operations since 1994. Bank stability data in Hull Creek and Indian Creek are above 90%. Their trend lines are increasing or stable. In Hughes Creek the bank stability trend line is increasing at about 90%. In the last seven years there have been two reading above 80% but below the desired 90%. In discussions with Dave Deschaine a Forest hydrologist this slight variability likely attributed to natural flood events over the last seven years. The data and its trend graph indicate bank stability is not a major limiting factor for fish production in Hull Creek, Indian Creek and Hughes Creek.







The ESA fish bearing streams with Range program MIM monitoring of stream bank stability (see Appendix C Table 22) in general show good bank stability. The MIM monitoring of bank stability, last read on this allotment in 2004, shows Hull Creek had a reading of 89%, West Fork of Hughes Creek had a reading of 93%, and Ransack Creek, which is inside a livestock exclosure but not a deer and elk exclosure had a reading of 89%. Using the limited MIM bank stability data from the Range program and the bank stability readings from the Watershed Program it is my professional judgment that streams bank stability conditions are not considered a major limiting factor to fish production within the ESA Action Area.

6.4.6 RIPARIAN CONSERVATION AREAS

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

Riparian areas are considered to be Functioning Appropriately within the ESA Action Area. The riparian habitat conservation areas (RHCA), within the ESA Action Area, for Indian Creek, lower Corral Creek and lower Hull Creek below the cattle guard are largely untouched by permitted livestock grazing. These conservation areas provide adequate shade, large woody debris, habitat protection, and connectivity.

One RHCA location on Hughes Creek between Ditch Creek and the West Fork of Hughes Creek is largely influenced by past mining activity as recently as the mid 1990s. The Ditch Creek RHCA is also largely influenced by past placer mining activities through the mid 1990s and past logging activities through the 1980’s.

Monitoring operations within the ESA Action Area indicate that two of the three sites monitored since 1993, 1994, are static and at a Greenline Ecological Status (GES) of Potential Natural Community (PNC).

Monitoring sites were established and subsequent monitoring has occurred on the Indian Ridge Allotment since the early 90's. Since that time, grazing management has evolved based upon management in reference to listed fish species which occur within the allotment. Greenline Ecological Status (GES) typically is the element in which interpretations of ecological status and trend will be discussed in the following:

Generally, of the three sites monitored since the early 90's, 2 are in upward trend or at Late Seral/ PNC. The monitoring site on Ransack Creek (M222) is Down at Early Seral.

All sites will have a bank alteration monitoring attribute with a endpoint indicator of 20%.

Hull Creek: GES is static at PNC. Site is dominated by Alder with a mesic grass understory. Woody dominance affords very limited access to livestock. Noxious weeds have been encroaching on the site since 1993. The best monitoring attribute to manage the site is browse use with an endpoint indicator not to exceed 30% on Alder. The monitoring attribute of greenline stubble with an endpoint indicator no less than 4 inches or not to exceed 50% will also be used.

West Fork Hughes Creek: GES is static at PNC. Site is dominated by Alder with a mesic grass understory. Woody dominance affords very limited access to livestock. The best monitoring attribute to manage site is browse use with an endpoint indicator not to exceed 30% on Alder. The monitoring attribute of greenline stubble with an endpoint indicator no less than 4 inches or not to exceed 50% will also be used.

Ransack Creek: Ransack Creek is a non-fish bearing stream with perennial and intermittent streamflows. GES is in a downward trend at Early Seral. Site is inside a two stage exclosure. First stage fence excludes livestock but not wildlife. Second stage excludes all ungulates. Site is dominated by Spikerush with some Alder. Since area is excluded from livestock the downward trend is attributed to wildlife, not livestock. No monitoring attributes or endpoint indicators will be used because the site is inside an exclosure. This monitoring site demonstrates you can have downward trend in your GES when livestock can't access a stream channel or riparian area.

Stream Riparian Conservation Areas are not considered a major limiting factor to fish production within the ESA Action Area.

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 11 - 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 units were grazed to four inches of graminoid stubble height; virtually all measurements improved when units were grazed to six inches stubble height, or when units 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, Schultz 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 1991). 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 12. 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; 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.

- Off-Stream Water Development: McInnis and McIver (2001) found that off-stream water and salt can attract livestock to the uplands enough to significantly reduce uncovered and unstable streambanks.

- Herding: Using 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.

The Forest has integrated each of these measures into its grazing strategy for the Indian Ridge Allotment to reduce the potential for adverse effects to listed fish and aquatic and riparian habitats within the ESA Action Area. Rotation schedules have been refined to best avoid direct impact to spawning fish and incubating redds. All of the existing fence range improvements (one), displayed in Figure 2, will help keep livestock in areas where they are suppose to be and keep livestock out of areas they are not suppose to be grazing as directed by the signed Annual Operating Instructions. All of the existing water developments improvements, displayed in Figure 2, will help distribute livestock throughout a given unit to minimize the time livestock need to spend down in a given stream's riparian area.

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 livestock 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.

Chinook salmon, steelhead and bull trout all spawn within certain stream reaches of the Indian Ridge Allotment (see Figures 4, 5 & 6) 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 ESA listed fish species spawning and incubation within the Indian Ridge Allotment are discussed individually below.

7.1.1.1 CHINOOK SALMON

There is currently Chinook salmon spawning in two streams within the ESA Action Area (see Figure 4). Chinook salmon spawning currently occurs in the North Fork Salmon River and the lower reaches of Hughes Creek (Appendix C Tables 19-20).

Analysis Assumptions:

- Chinook salmon begin spawning within the allotment in the fourth week of August.
- Chinook salmon eggs are incubating in the stream through the end of April.
- Indian Ridge Allotment permitted livestock never graze along the North Fork Salmon River because of topography and steep terrain. Therefore permitted livestock will never have the opportunity to step on Chinook salmon redds or disturb or harass spawning adults in the North Fork Salmon River.
- Indian Ridge Allotment permitted livestock never graze along the lower reaches of Hughes Creek where the GIS mapping shows Chinook salmon spawning habitat. Therefore permitted livestock will never have the opportunity to step on Chinook salmon redds or disturb or harass spawning adults in Hughes Creek.

North Fork Salmon River:

Chinook salmon are currently spawning in the North Fork Salmon River within the ESA Action Area. The Indian Ridge Allotment boundary includes stream reaches of the North Fork Salmon River, but because of topography and steep terrain permitted livestock grazing never occurs along the North Fork Salmon River.

Hughes Creek:

Chinook salmon are believed to be currently spawning in the lower reaches of Hughes Creek because the fish have access from the North Fork Salmon River and there is suitable Chinook salmon spawning habitat. It is unknown how far up stream Chinook salmon may be spawning in the lower reaches of Hughes Creek. It is known that for more than the last 19 nears no Chinook salmon have been documented spawning or juvenile rearing on National Forest System lands in the Hughes Creek drainage. Permitted livestock never graze along the lower reaches of Hughes Creek where there is the potential to step on Chinook salmon redds or disturb or harass spawning adults in Hughes Creek

Potential Spawning within Units

Hughes Creek Unit:

- There are no adult Chinook salmon spawning or redds being constructed within the ESA Action Area where livestock may have the potential to access the stream. Therefore there are no active trailing concerns.

Hull Creek Unit:

- There are no adult Chinook salmon spawning or redds being constructed within the ESA Action Area where livestock may have the potential to access the stream. Therefore there are no active trailing concerns.

Indian Ridge Unit:

- There are no adult Chinook salmon spawning or redds being constructed within the ESA Action Area where livestock may have the potential to access the stream. Therefore there are no active trailing concerns.

Conclusion:

Indian Ridge Allotment livestock have no potential to access the North Fork Salmon River or the lower reaches of Hughes Creek where there may be adult Chinook salmon spawning or their redds. Therefore it is my professional judgment that the Indian Ridge Allotment's livestock grazing activities have insignificant and discountable effects to Chinook salmon spawning and incubation in streams within the ESA Action Area.

7.1.1.2 STEELHEAD

Steelhead spawning is known to occur in Hughes Creek, Indian Creek and the North Fork Salmon River within the ESA Action Area. Steelhead spawning is believed to occur in Allen Creek, Ditch Creek, Hull Creek and the West Fork of Hughes Creek within the ESA Action Area because the Forest's electrofishing program has documented juvenile *O.mykiss* in the stream. Very little is known about steelhead spawning within the ESA Action Area. Steelhead spawning surveys are very difficult to effectively or safely accomplish because of the time of the year steelhead spawn. Steelhead spawn at a time when higher elevation streams on National Forest System lands are difficult to get to because of snow and ice conditions both on the roads and in the riparian areas. When steelhead are spawning, streams are on the rise and most of the time turbid making it difficult to see redds. There is suitable steelhead spawning habitat on seven streams within the ESA Action Area (see Figure 5).

Analysis Assumptions:

- Steelhead begin spawning within the allotment in the second week in March.
- Steelhead eggs are incubating in the stream through the first week of July.
- A steelhead stream does not have 100% available spawning habitat.
- When livestock step on a redd not every egg within the redd will be destroyed. There may be some eggs within a trampled redd that can survive and become juvenile steelhead.
- Through the steelhead incubation period when livestock are on the allotment there is plenty of quality upland forage for livestock. The air temperatures are not extremely high which might have forced livestock down to cooler riparian areas. There are ample water supplies for livestock this time of year. The steelhead spawning streams in early July usually have higher stream flows which tend to discourage livestock from walking in the stream as they would later in the summer when the air temperatures are hotter and the stream flows are lower. All of this assumes there is very little potential for livestock to trample a steelhead redd within the ESA Action Area. Although there is very little potential for livestock to step on a steelhead redd one can't say there is no potential for livestock to step on a steelhead redd.
- Mapped range improvements will help minimize and/or eliminate potential livestock impacts to steelhead.

When livestock are put on the allotment May 23 in the Hull Creek unit there could be the potential for livestock to disturb or harass potential spawning adult steelhead or trample steelhead redds in Hull Creek, within the ESA Action Area, until about July 8th or approximately 47 days. When livestock are put on the allotment May 23 in the Hughes Creek unit there could be the potential for livestock to disturb or harass potential spawning adult steelhead or trample steelhead redds in Allen Creek, Ditch Creek, Hughes Creek and the West Fork of Hughes Creek, within the ESA Action Area, until about July 8th or approximately 47 days.

Allen Creek is a small stream with limited stream flows. Because of the size of the stream and the stream flows it is my professional judgment that there are no steelhead spawning in the stream, but there are no surveys to confirm. It is also my professional judgment that there are insignificant and discountable effects to steelhead spawning and incubation in Allen Creek from permitted livestock grazing.

Ditch Creek substrates have been heavily altered by past mining activities. The substrates are dominated by large cobbles and boulders. There is marginal, at best, steelhead spawning habitat in Ditch Creek. Because of the limited spawning habitat it is my professional judgment that there are probably very few if any steelhead spawning in the stream, but there are no surveys to confirm if and how many steelhead might spawn in Ditch Creek. It is also my professional judgment that there are insignificant and discountable effects to steelhead spawning and incubation in Ditch Creek from permitted livestock grazing.

Hughes Creek has no steelhead survey data within the ESA Action Area but has the best spawning habitat of all the steelhead streams in the Hughes Creek drainage. It is my professional judgment that Hughes Creek supports spawning steelhead. In 2009 IDFG ran a steelhead weir approximately 0.5 miles upstream from the confluence with the North Fork Salmon River. They recorded only one male steelhead passing through the weir. It is my professional judgment, based on suitable spawning habitat and the know presence of adult steelhead in Hughes Creek that there could be the potential, be it very limited, for livestock to disturb or harass spawning adult steelhead or trample redds in the years the Hughes Creek Unit is used first.

Hull Creek is a small stream with limited stream flows. The potential steelhead spawning habitat in Hull Creek is marginal at best because of the small stream size and limited stream flows. There hasn’t been any documentation of steelhead spawning in Hull Creek but in 2009 the Forest did document, in a 100 meter electrofishing transect, six rainbow trout between 85mm and 100mm in length just above the first culvert. The Forest is using a protocol that identifies spawning habitat when ever juvenile salmonids less than or equal to 100mm are surveyed. Therefore it is my professional judgment that there is the potential, be it limited, for steelhead to spawn in approximately 0.88 miles of Hull Creek. It is also my professional judgment that every other year when livestock graze the Hull Creek unit there is some potential, be it very limited, for livestock to disturb or harass spawning adult steelhead or trample redds.

Indian Creek has known steelhead spawning in the lower three miles. There is no steelhead spawning surveys on Indian Creek within the ESA Action Area. Indian Creek within the ESA Action Area has quality steelhead spawning habitat. It is my professional judgment that Indian Creek supports spawning steelhead. In 2009 IDFG ran a steelhead weir approximately 100 yards upstream from the confluence with the Salmon River. They recorded 19 steelhead passing through the weir. Livestock go into the Indian Ridge unit’s higher elevations after steelhead incubation is completed the first week of July. Steelhead eggs are in the stream incubating through the first week of July. Because permitted livestock rarely if ever graze along Indian Creek and would never have the opportunity to graze along Indian Creek while steelhead eggs are incubating in the gravels it is my professional judgment that there are insignificant and discountable effects to steelhead spawning and incubation in Indian Creek from permitted livestock grazing.

North Fork Salmon River is a known steelhead spawning stream. Indian Ridge Allotment permitted livestock never graze along the North Fork Salmon River because of topography and steep terrain. Every other year livestock are actively trailed (by people and dogs) from private land, in lower Hughes Creek, down the Hughes Creek road to Highway 93. Then the livestock are trailed down Highway 93 to the Hull Creek road. Livestock are then trailed up the Hull Creek road to allotment. During active trailing livestock may have the opportunity to access the North Fork Salmon River while crossing the Hughes Creek bridge and Hull Creek bridge. Although livestock may have the opportunity to access the North Fork Salmon River while crossing the two bridges the reality is they do not because the active trailing keeps the livestock together on the roads prisms. Therefore it is my professional judgment that there are insignificant and discountable effects to steelhead spawning and incubation in the North Fork Salmon River from permitted livestock grazing.

West Fork of Hughes Creek is a small stream with limited stream flows. Because of the size of the stream and the stream flows it is my professional judgment that there are probably no steelhead spawning in the stream, but there are no surveys to confirm. It is also my professional judgment that there are insignificant and discountable effects to steelhead spawning and incubation in the West Fork of Hughes Creek from permitted livestock grazing.

Potential Spawning within Units

Hughes Creek Unit:

- There are adult steelhead spawning or redds being constructed within the ESA Action Area (Hughes Creek) where livestock may have the potential to access the stream. Livestock are not actively trailed across a stream with steelhead redds. Therefore there are no active trailing concerns.

Hull Creek Unit:

- It is my professional judgment that there is no steelhead spawning or redds being constructed in Hull Creek where livestock may have the potential to access the stream. Therefore there are no active trailing concerns.

Indian Ridge Unit:

- Because permitted livestock rarely if ever graze along Indian Creek and would never have the opportunity to graze along Indian Creek while steelhead eggs are incubating in the gravels it is my professional judgment that there are insignificant and discountable effects to steelhead spawning and incubation in Indian Creek from permitted livestock grazing. Therefore there are no active trailing concerns.

Conclusion:

There is the potential for livestock to disturb or harass spawning adult steelhead within the ESA Action Area because of the time steelhead are spawning and the time when the livestock are moved on to the allotment. There is approximately 47 days, of opportunity for livestock to step on a steelhead redd within the ESA Action Area. The steelhead spawning streams, within the ESA Action Area, in early July usually have higher stream flows which tend to discourage livestock from walking in the stream as they would later in the summer when the air temperatures are hotter and the stream flows are lower. This factor greatly reduces the potential for livestock to step on a steelhead redd within the ESA Action Area.

It is my professional judgment that there is some potential for livestock to disturb or harass potential spawning adult steelhead within the ESA Action Area and there is some potential for livestock to step on steelhead redds within the ESA Action Area in Hughes Creek.

7.1.1.3 BULL TROUT

Bull trout spawning is known to occur in Hughes Creek, Indian Creek and the North Fork Salmon River within the ESA Action Area. Bull trout spawning is believed to occur in Corral Creek and Salzer within the ESA Action Area because the Forest's electrofishing program has documented juvenile bull trout in the stream. There is known or suspected bull trout spawning habitat on five streams within the ESA Action Area (see Figure 6).

Analysis Assumptions:

- Bull trout begin spawning within the allotment on August 15th.
- If livestock are grazing in a unit past August 15th that has a bull trout stream there is the potential for livestock to step on bull trout redds and/or disturb/harass spawning

adults unless there is a natural physical barrier or a human constructed physical barrier, like a fence, between the stream and where the livestock can graze.

- A bull trout stream does not have 100% available spawning habitat.
- When livestock step on a bull trout redd not every egg within the redd will be destroyed. There may be some eggs within a trampled redd that can survive and become juvenile bull trout.

The Hull Creek unit is the only unit on the allotment that does not have a bull trout stream.

The Indian Ridge unit has Indian Creek and lower Corral Creek as known or suspected bull trout spawning streams. As mentioned above in section 6.4.1.3, although Indian Creek is considered to be within the ESA Action Area, because it is mapped as an allotment boundary, permitted livestock grazing rarely if ever occurs anywhere near Indian Creek within the ESA Action Area because of topography and steep terrain. Since the current permittee has managed this allotment, from 1999 to present, there was one time four cows drifted down to Indian Creek from the high country. The permittee immediately gathered up the four cows and trucked them home to private land. If in that rare instance livestock drift down off the steep terrain to Indian Creek or lower Corral Creek the permittee will herd them along the Indian Creek road to a point where he can load them into a trailer and drive them back up to the high country in the Indian Ridge unit or if it is late enough in the season he will just take the livestock home to his private land.

The Hughes Creek unit has three known or suspected bull trout spawning streams. On years when livestock graze this unit first they are always moved to the Indian Ridge unit before the August 15th date. Every year, livestock are trailed from the Indian Ridge unit back down through the Hughes Creek unit along the West Fork of Hughes Creek road and the Hughes Creek road below the West Fork of Hughes Creek down to private land in lower Hughes Creek. Each year this trailing starts out as passive drifting where the livestock, on their own, start to drift back down the West Fork of Hughes Creek road towards private land in lower Hughes Creek. Active trailing, where the permittee goes onto the allotment and actively herds the livestock home towards private land, begins each year in the middle of September and finishes by the end of October. Active trailing or passive drifting will not occur upstream of the West Fork of Hughes Creek. Every year there will be the potential for livestock to trample bull trout redds and/or disturb or harass spawning adult bull trout from August 15th through October 30th in approximately two miles of Hughes Creek between private land parcels.

The North Fork Salmon River is a known bull trout spawning stream. Indian Ridge Allotment permitted livestock never graze along the North Fork Salmon River because of topography and steep terrain. Therefore permitted livestock will never have the opportunity to step on bull trout redds or disturb or harass spawning adults in the North Fork Salmon River.

Salzer Creek is a small high gradient stream. Juvenile bull trout have been documented in this stream by IDFG. This stream is suspected to have bull trout spawning. There are no livestock grazing in this unit around Salzer Creek past mid July. Therefore permitted livestock will never have the opportunity to step on bull trout redds or disturb or harass spawning adults in Salzer Creek.

Potential Spawning within Units

Hughes Creek Unit:

- Every year Hughes Creek is the only stream within this unit where livestock would have the potential to access the stream where adult bull trout are spawning and/or there are redds. Livestock are not actively trailed across any stream with bull trout redds. Therefore there are no active trailing concerns.

Hull Creek Unit:

- There are no adult bull trout spawning or redds being constructed within the ESA Action Area where livestock may have the potential to access the stream. Therefore there are no active trailing concerns.

Indian Ridge Unit:

- Because permitted livestock rarely if ever graze along Indian Creek or lower Corral Creek it is my professional judgment that there are insignificant and discountable effects to bull trout spawning and incubation in Indian Creek or Corral Creek from permitted livestock grazing. Therefore there are no active trailing concerns.

Conclusion:

There is the potential for livestock to disturb or harass spawning adult bull trout within the ESA Action Area because of the time bull trout are suspected to begin spawning in Hughes Creek and the time when livestock begin passively drifting or actively being trailed home after mid September past Hughes Creek. This provides the opportunity, be it limited, to step down off the Hughes Creek road and into Hughes Creek potentially trampling a bull trout redd or disturbing or harassing an adult spawning bull trout. Spawning adult bull trout and their redds will be at risk between mid September and October 30th every year. Therefore it is my professional judgment that there is some potential, but it is difficult to quantify, for livestock to step on bull trout redd(s) and/or disturb/harass spawning adults within the ESA Action Area.

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 (see section 6.4.7).

While some streams within the Indian Ridge Allotment's ESA Action Area display short periodic exceedences of salmonid spawning temperature criteria, monitoring data does not suggest any significant contribution of temperature impacts as a result of livestock grazing. Monitoring data indicates that riparian conditions are generally in static to upward trend, and width:depth ratios are within the natural range of variability. Both of those focus indicators can play a part in stream temperatures.

The proposed action includes conservation measures that will help minimize or eliminate livestock grazing away from some stream reaches, which will result in livestock having even less potential impact on stream temperatures than has occurred in the past (see Section 3.2.4). Those conservation measures designed in part to avoid livestock exposure to spawning areas will additionally serve to reduce potential livestock impact on water temperatures by minimizing riparian vegetation use and livestock impact to streambanks within the ESA fish bearing streams. Maintaining existing fences and water developments are an important conservation measure that will continue to help distribute livestock use across a larger area to minimize or eliminate livestock grazing impacts on riparian vegetation that directly or indirect help keep stream temperatures cooler.

Conclusion:

While short periodic exceedences of salmonid spawning temperature criteria may exist along some stream reaches on some streams in some years, contributing impacts on water temperature related to grazing activities are considered to be insignificant, and are not expected to be, in and of themselves, generating any additional measureable increases in water temperatures. We recognize there could be localized impacts to stream temperatures when livestock graze riparian shrubs that provide localized streamside shading. However, because of the expected effectiveness of the project design and associated conservation measures in reducing livestock presence near streams, it is my professional judgment those impacts will 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 Water Temperature Focus Indicator both within the ESA Action Area and at the 5th field HUC scale.

In the absence of observed impacts to stream temperature influencing habitat parameters, it is concluded that current and future livestock grazing within the Indian Ridge Allotment is not and will not result in detectable effects to water temperatures or water temperature regimes within the streams of the ESA Action Area.

7.1.3 SEDIMENT

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

Livestock activity within the Indian Ridge Allotment is not currently considered to be a significant factor influencing sediment levels. Large stretches of many streams within the ESA Action Area are excluded from livestock use because access to these streams and riparian areas are limited and undesirable because of steep channel topography, riparian areas that have dense overstory conifer riparian areas with blow down making livestock movement difficult to impossible and generally unsuitable forage conditions.

Strategies and Conservation Measures of the proposed action, while designed in part to avoid livestock presence within stream channels during critical spawning periods; additionally serve to minimize potential sediment generation to allotment streams from near-stream livestock activity.

Turbidities associated with active or passive trailing at a stream crossing site are expected to be limited to areas immediately below the crossing locations and short-term in nature. Associated suspended sediment 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.

Periodic elevated sediment levels observed within the Hughes Creek monitoring site are considered attributable to adjacent road surface runoff and high flow impacts to depositional areas of the stream.

Conclusion:

The Conservation Measures associated with the proposed grazing action are considered to be effective in minimizing potential generation of sediment to stream channels within the ESA Action Area. While elevated stream sediment levels have periodically occurred at locations within the Indian Ridge Allotment in response to high flow events, contributing impacts on stream sediment from grazing activities under the proposed action are considered to be insignificant, and are not expected to be, in and of themselves, generating any additional measureable increases in sediment levels. We recognize there could be localized impacts to streambanks when livestock occasionally step on streambanks and introduce minor quantities 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, it is my professional judgment those impacts will 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 both within the ESA Action Area and at the 5th field HUC scale. The proposed action is expected to maintain the condition of the Sediment Focus Indicator.

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

Conclusion:

The 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 ESA Action Area. Considering width: depth ratios, stream sediment and streambank stability data and their trends, it is concluded that livestock grazing activities is not expected to produce or contribute to any significant impacts on width:depth ratios of streams within the Indian Ridge Allotment which can be meaningfully measured, detected or evaluated.

Low streambank stability and high stream sediment levels can have a negative impact in a stream's width:depth ratio. The Grazing Strategies and Conservation Measures associated with the proposed grazing action are considered to be effective in minimizing potential streambank impacts and in reducing sediment impacts to stream channels within the ESA 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 quantities 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, it is my professional judgment those impacts will 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 Width:Depth Focus Indicator both within the ESA Action Area and at the 5th field HUC scale.

7.1.5 STREAMBANK CONDITION

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

Streambank stability monitoring on three ESA fish streams within the Indian Ridge Allotment indicate percent streambank stability data shows that two stream stations are in an upward trend above 90% with a static trend line over 95%.

Conclusion:

Considering both observed width: depth ratios and streambank stability data and trends, it is concluded that livestock grazing activities have not directly produced or contributed to any significant impacts on streambank conditions of streams within the Indian Ridge Allotment which can be meaningfully measured, detected or evaluated.

The Grazing Strategies and Conservation Measures of the proposed action, designed in part to avoid livestock presence within stream channels during critical spawning periods, additionally serve to minimize potential livestock impacts to streambanks of ESA Action Area streams. Measures including alternating unit rotations, rapid movement of livestock through trailing areas, salting, use of range improvements such as fencing and water developments all contribute to minimizing near stream livestock activity and the potential for direct streambank impacts on ESA Action Area streams. The Grazing Strategies and Conservation Measures associated with the proposed grazing action are considered to be effective in minimizing potential degradation of streambank stability on stream channels within the ESA Action Area.

The direct and indirect effects of the proposed livestock grazing actions on streambank conditions within the Indian Ridge Allotment streams are insignificant, and not expected to have any meaningfully measureable or discernable influence on streambank stability levels within the ESA Action Area. We recognize there could be localized impacts to streambanks 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, it is my professional judgment those impacts will 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 Streambank Focus Indicator both within the ESA Action Area and at the 5th field HUC scale.

7.1.6 RIPARIAN CONSERVATION AREAS

The condition of riparian areas can have important affects on fish populations. Livestock grazing can impact riparian areas (see section 6.4.7) 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 within the ESA Action Area are not considered to be negatively impacting riparian conditions.

Conclusion:

Stream Riparian Conservation Areas are not considered a major limiting factor to fish production within the ESA Action Area.

Generally, of the three sites monitored since the early 90's, 2 are in upward trend or at Late Seral/ PNC. The monitoring site on Ransack Creek is in a downward trend at an Early Seral. This site is inside a two stage exclosure. First stage fence excludes livestock but not wildlife.

Second stage excludes all ungulates. Since the monitoring site is excluded from livestock grazing, the downward trend is attributed to wildlife, not livestock.

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. We recognize there could be localized impacts to riparian conservation areas when livestock graze within a riparian conservation area. However, because of the expected effectiveness of the project design and associated conservation measures in reducing livestock presence near streams, it is my professional judgment those impacts will 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 Riparian Focus Indicator both within the ESA Action Area and at the 5th field HUC scale.

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 ESA Action Area” (50 CFR§402.02, emphasis added). This definition should not be confused with the definition that is used for the National Environmental Policy Act and other environmental laws. In this context, cumulative effects apply only to future state and private activities that are reasonably certain to occur. Furthermore, if an activity is currently occurring and will likely continue to occur in the future with similar effects, it is not considered under cumulative effects because it has already been considered in the description of baseline conditions.

There are no State lands within the ESA Action Area. When considered cumulatively with future private land activities the Indian Ridge Allotment and its activities maintain fish populations and the environmental baseline conditions. There is no risk of adverse cumulative effects to the fisheries resource because of the design features and standard and guides associated with the Indian Ridge Allotment and its activities.

7.3 SUMMARY OF EFFECTS

The effects analysis identifies a non-discountable potential for direct impact of livestock on spawning Chinook salmon, steelhead and bull trout and their incubating eggs. These potential impacts could directly affect the Growth and Survival Indicator of the Subpopulation Characteristics Pathway, which could produce related indirect effects to the Subpopulation Size and Persistence and Genetic Integrity Indicators. Impacts of proposed grazing activities to aquatic and riparian habitat focus indicators, including water temperature, sediment, width;depth ratio, streambank condition and riparian habitat conservation areas are all identified as insignificant or discountable. The proposed action would maintain these indicators at their current levels of functionality.

Table 12 summarizes the effects of the proposed Indian Ridge Allotment’s grazing operations on aquatic/riparian Pathways and Indicators, including the six identified Focus Indicators (highlighted) addressed in the Effects section of this document.

The Matrix of Diagnostic Pathways and Indicators (Appendix B) and Table 11 below are completed following two documents, the NMFS August 1996 *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (NMFS, 1996) and the USFWS February 1998 *A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale (USFWS, 1998).*

Table 12 - Effects Summary for the Indian Ridge Allotment's Grazing Activities

Pathway	Indicators	Functionality Of Baseline	Response Column A Will the proposed action or any interrelated or interdependent actions likely generate any direct or indirect effects to this indicator?			Response Column B Are these effects expected to exceed beneficial, insignificant, or discountable?		
			CH	SH	BT	CH	SH	BT
Subpopulation Characteristics (bull trout only)	Subpopulation Size	FR	NA	NA	YES	NA	NA	YES
	Growth and Survival (including incubation survival)	FA	NA	NA	YES	NA	NA	YES
	Life History Diversity and Isolation	FA	NA	NA	NO	NA	NA	NO
	Persistence and Genetic Integrity	FA	NA	NA	NO	NA	NA	NO
Water Quality	Temperature	FA	YES	YES	YES	NO	NO	NO
	Sediment	FA to FUR	YES	YES	YES	NO	NO	NO
	Chemical Characteristics	1/ FA 2/ FR	NO	NO	NO	NO	NO	NO
Habitat Access	Physical Barriers	1/ FR 2/ FA	NO	NO	NO	NO	NO	NO
Habitat Elements	Substrate Embed.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	LWD	FA to FR	NO	NO	NO	NO	NO	NO
	Pool Frequency and Quality	FA to FR	NO	NO	NO	NO	NO	NO
	Off-channel Habitat	FA	NO	NO	NO	NO	NO	NO
	Refugia	FA	NO	NO	NO	NO	NO	NO

Pathway	Indicators	Functionality Of Baseline	**Response Column A** Will the proposed action or any interrelated or interdependent actions likely generate any direct or indirect effects to this indicator?			**Response Column B** Are these effects expected to exceed beneficial, insignificant, or discountable?		
			CH	SH	BT	CH	SH	BT
Channel Condition and Dynamics	Width:Depth Ratio	FA to FR	YES	YES	YES	NO	NO	NO
	Streambank Condition	FA	YES	YES	YES	NO	NO	NO
	Floodplain Connectivity	FA	NO	NO	NO	NO	NO	NO
Flow/Hydrology	Change in Peak/Base Flows	FR	NO	NO	NO	NO	NO	NO
	Increase in Drainage Networks	FA	NO	NO	NO	NO	NO	NO
Watershed Conditions	Road Density and Location	FUR	NO	NO	NO	NO	NO	NO
	Disturbance History	FA	NO	NO	NO	NO	NO	NO
	Riparian Conservation Areas	FA	YES	YES	YES	NO	NO	NO
	Disturbance Regime (bull trout only)	FA	NA	NA	Yes	NA	NA	NO
Integration of Species and Habitat Conditions	Habitat Quality and Connectivity (bull trout only)	FA	NA	NA	Yes	NO	NO	NO

1/ North Fork Salmon River 5th field HUC

2/ Indian Creek-Salmon River 5th field HUC

Status of Baseline: Functioning Appropriately – **FA** Functioning at Risk – **FR** Functioning at Unacceptable Risk – **FUR**

8 EFFECTS DETERMINATION

The effects determination for each species was made using the above analysis and the effects determination key (Table 12). The specific determinations are identified below and summarized in Table 13.

8.1 SNAKE RIVER SPRING/SUMMER CHINOOK SALMON

The effects analysis concluded that the proposed action may have indirect effects on Chinook salmon or Chinook salmon habitat which are expected to be insignificant or discountable. Therefore, it is my determination the proposed action results in a “MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT” determination for Chinook salmon.

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

8.2 SNAKE RIVER STEELHEAD

The effects analysis concluded that the proposed action may have direct effects on incubating steelhead redds which are not considered insignificant or discountable. Although proposed conservation measures limit the adverse effects of grazing activities, there exists a remaining potential for direct trampling of steelhead redds and/or the potential for livestock to disturb or harass potential spawning adult steelhead within one ESA Action Area stream. Therefore, it is my determination the proposed action results in a “MAY AFFECT, LIKELY TO ADVERSELY AFFECT” determination for steelhead.

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

8.3 COLUMBIA RIVER BULL TROUT

The effects analysis concluded that the proposed action may have direct effects to bull trout or bull trout redds which are not considered insignificant or discountable. Although proposed conservation measures limit the adverse effects of grazing activities, there exists a remaining potential for direct trampling of bull trout redds and/or the potential for livestock to disturb or harass potential spawning adult bull trout within one ESA Action Area stream. Therefore, it is my determination the proposed action results in a “MAY AFFECT, LIKELY TO ADVERSELY AFFECT” determination for bull trout.

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

8.4 SNAKE RIVER SOCKEYE SALMON

The ESA Action Area does not contain sockeye salmon or sockeye salmon designated critical habitat. Therefore, it is my determination 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 13 - Effects Determination Summary for the Indian Ridge Allotment's Grazing Activities

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

[1] The ‘Species’ column is for determining effects to the species. The ‘Habitat’ column is for determining effects to designated or proposed critical habitat.

All of the above effects determinations in Table 13 consider the Analysis of Effects in Section 7 of this BA. The species determinations are made as follows: No Effect (NE) if the species is not present in the ESA Action Area or the proposed action or any interrelated or interdependent actions will not effect on 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 ESA 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.

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 embryos. 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, 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.

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

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 abundance. 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.

Idaho Department of Environmental Quality. 2009. Department of Environmental Quality Working Principles and Policies for the 2008 Integrated (303[d]/305[b]) Report. State of Idaho Department of Environmental Quality. May 22, 2009

Hall, Frederick C., and Larry Bryant. 1995. Herbaceous stubble height as a warning of impending cattle grazing damage to riparian areas. Gen. Tech. Rep. PNW-GTR-362. Portland, OR. U.S. Department of agriculture, Forest Service, Pacific Northwest Research Station. 9 p.

Kauffman, J. B. and W. C. Krueger. 1984. Livestock impacts on riparian ecosystems and streamside management implications - a review. Journal of Range Management 37(5):430-438.

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.

McInnis, M.L. and J. McIver. 2001. Influence of off-stream supplements on streambanks of riparian pastures. Journal of Range Management 54(4). 4p**.**

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.

Mosley, J.C., P.S. Cook, A.J. Griffis, and J. O'Laughlin. 1997. Guidelines for managing cattle grazing in riparian areas to protect water quality: review of research and best management practices policy. Idaho Forest, Wildlife and Range Policy Analysis Group, Report No. 15. Idaho Forest, Wildlife and Range Experiment Station, University of Idaho. 67pp. Available at http://www.cnrhome.uidaho.edu/pag/.

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, K. et.al, 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 page 68

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

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

Rosgen, D.L., 1994. A classification of natural rivers. In: Catena. An interdisciplinary journal of soil science, hydrology, geomorphology focusing on geoecology and landscape evolution. Vol 22. No 3. June 1994.

Schultz, T. T. and W. C. Leininger. 1990. Differences in riparian vegetation structure between grazed areas and exclosures. Joumal of Range Management 43: 295-299.

Simon, Ronna. 2008. Streambank Alteration Measurement and Implementation, Final, Bridger-Teton National Forest. Unpublished paper on file at the Bridger-Teton NF Supervisor's Office, Jackson, WY. 19 pp.

Stowell, R. et.al. 1983. Guide for Predicting Salmonid Response to Sediment Yields in Idaho Batholith Watersheds. August 1983

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.

USDA, Forest Service, 1995. Goals, objectives, and standard/guidelines as described in the EA and subsequent FONSI and DN/DR for the Interim Strategies for Managing Anadromous Fish Producing Watersheds on Federal Lands in eastern Oregon, Washington, Idaho, and Portions of California, PACFISH (February 24, 1995).

USDC, National Marine Fisheries Service 1995. Endangered Species Act Section 7 Consultation Biological Opinion for Implementation of Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH). January 23, 1995

USDC, NMFS, 1996. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale - Attachment 3

USDI, Bureau of Land Management, 2009. Challis Field Office Biological Assessment and Consultation Request on Rock Creek. Cited in NOAA/NFMS January 26, 2010 letter of concurrence on file at Public Lands Office, Salmon, ID.

USDI, USFWS, 1998. A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale (February 1998)

USDI, USFWS, 2009. US Fish and Wildlife Service Semi Annual Species List Update 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. 75FR2270 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, 2010.

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

1 NORTH FORK SALMON RIVER (5TH FIELD HUC) WATERSHED BASELINE

1.1 MATRIX OF DIAGNOSTIC PATHWAYS AND INDICATORS

Agency: USDA Forest Service, Salmon-Challis National Forest	**Watershed 5th field HUC: North Fork Salmon River 1706020306**
Unit: North Fork Ranger District	**Spatial Scale of Matrix:** One 5th field HUC
Fish Species Present: Chinook Salmon, Steelhead, Bull Trout	**Designated or Proposed Critical Habitat Present:** Chinook Salmon, Steelhead, Bull Trout
Anadromous Species Population: Salmon River	**Anadromous Species Subpopulation:** North Fork Salmon River
Bull Trout Recovery Unit: Upper Snake	**Bull Trout Critical Habitat Unit:** Salmon River Basin
Bull Trout Core Area: Middle Salmon River Panther	**Bull Trout Local Population:** North Fork Salmon River
Management Actions: Range (Ongoing) - Indian Ridge Allotment	**Updated:** 3/18/2010

Pathway - Subpopulation Characteristics (Bull Trout Only)		
Pathways Indicators	**Status of Baseline**	**Discussion of Baseline – Current Condition**
Subpopulation Size	**FR $_{BT}$**	**Bull Trout -Bull Trout are distributed throughout the North Fork Salmon River 5th field HUC and in five streams within the ESA Action Area. All life stages are present within those five streams. Fluvial individuals are present in the North Fork Salmon River and suspected in Hughes Creek within the ESA Action Area. Bull trout is currently listed as "Threatened" under ESA.** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *Functioning at Risk*. The effects of the proposed project is likely to impact individuals but may not have a trend in decreasing or increasing the bull trout population in the 5th field HUC or the ESA Action Area because the project's activities will not restore nor degrade stream habitat elements within the next 5 to 10 years. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Growth and Survival	**FA $_{BT}$**	**<u>Bull Trout</u> - The sub population, within the North Fork Salmon River 5th field HUC, has the resilience to recover from short term disturbances or subpopulation declines within one to two generations (5 to 10 years). The subpopulation is characterized as increasing or stable. Bull trout streams within the ESA Action Area have good connectivity to the North Fork Salmon River and the Salmon River. These five bull trout streams: 1) Conserve opportunity for diverse life-history expression, 2) Conserve opportunity for genetic diversity, 3) Ensure bull trout are distributed across representative habitats, 4) Ensure sufficient connectivity among populations, and 5) Ensure sufficient habitat to support population viability (e.g., abundance, trend indices).** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *<u>Functioning Appropriately</u>*. The effects of the proposed project is likely to impact individuals but may not have a trend in decreasing or increasing the bull trout growth and survival in the ESA Action Area because the project's activities will not measurably restore nor degrade stream habitat elements or population size within the next 5 to 10 years. Therefore the effects of this action will *<u>Maintain</u>* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Life History Diversity and Isolation	**FA $_{BT}$**	**<u>Bull Trout</u> - The migratory form of bull trout, within the North Fork Salmon River 5th field HUC, is present and local populations are in close proximity to others spawning and rearing groups. Migratory corridors and rearing habitat are in good to excellent condition for the species.** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *<u>Functioning Appropriately</u>*. The effects of the proposed project is likely to impact individuals but may not have a trend in decreasing or increasing the bull trout life history diversity and Isolation in the ESA Action Area because the project's activities will not measurably restore nor degrade stream habitat elements or population size within the next 5 to 10 years. Therefore the effects of this action will *<u>Maintain</u>* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Persistence and Genetic Integrity	**FA $_{BT,}$**	**<u>Bull Trout</u> – Bull Trout stream connectivity is high within the North Fork Salmon River 5th field HUC. Each of the relevant subpopulations has a low risk of extinction. The probability of hybridization or displacement by competitive species is low to nonexistent.** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *<u>Functioning Appropriately</u>*. The effects of the proposed project is likely to impact individuals but may not have a trend in decreasing or increasing the bull trout persistence and genetic integrity in the ESA Action Area because the project's activities will not measurably restore nor degrade stream habitat elements, population size or the probability of hybridization with eastern brook trout within the next 5 to 10 years. Therefore the effects of this action will *<u>Maintain</u>* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Pathway - Water Quality		
Pathway Indicators	**Status of Baseline**	**Discussion of Baseline – Current Condition**
Temperature (7day average. Maximum, °C)	**FA** $_{BT, CK, SH}$	**Since 1993 stream temperature data has been collected on numerous streams within the North Fork Salmon River 5th field HUC. Within the ESA Action Area there are eight streams with stream temperature data between 1993 and 2009. Data indicates that stream temperatures are not a limiting factor for fish production and meets PACFISH spawning and rearing criteria. PACFISH page C-6. Water temperatures are below 64°F within migration and rearing habitats and below 60°F within spawning habitats. There is no measurable increase in maximum water temperature using 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.** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *Functioning Appropriately*. The effects of the proposed project will not play a role in decreasing or increasing steam temperatures within the ESA Action Area because the project's activities will not measurably restore nor degrade stream habitat elements that effect stream temperatures. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Sediment	**Hughes Creek** **FA** $_{BT, CK, SH}$ **Ditch Creek** **FR** $_{SH}$ **Hull Creek** **FUR**$_{, SH}$	**Salmon-Challis National Forest Watershed program uses McNeil core sampling methodologies to monitor substrate % depth fines annually on selected streams. Analysis of core sampling data correlates measured levels of depth fines in spawning habitats to predicted egg incubation success values determined by Stowell, et al (1983).** **Since 1993 stream sediment data has been collected on numerous streams within the North Fork Salmon River 5th field HUC. Within the ESA Action Area there are three streams with sediment data between 1993 and 2009. The uplands within the ESA Action Area are primarily quartzite geology. In quartzite geology baseline conditions are rated as follows:** ▪ **< 20 % depth fines (<1/4" diameter) = Functioning Appropriately;** ▪ **21-25% depth fines = Functioning at Risk;** ▪ **>25% depth fines = Functioning at Unacceptable Risk** **Therefore it is my professional judgment that the Environmental Baseline for this indicator within the ESA Action Area is *Functioning Appropriately* for one stream, *Functioning at Risk* for one stream and *Functioning at Unacceptable Risk* for one stream. The effects of the proposed project will not play a role in decreasing or increasing steam sediment within the North Fork Salmon River 5th field HUC and the ESA Action Area because the project's activities will not measurably restore nor degrade upland and riparian habitats that influence overland sediment flow into the stream. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Chemical Contaminants/Nutrients	**FA $_{BT, CK, SH}$**	**There are no 303d streams listed for chemical contaminants within the North Fork Salmon River 5th field HUC or the ESA Action Area.** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *Functioning Appropriately*. The effects of the proposed project will not play a role in decreasing or increasing chemical contaminants/nutrients within the North Fork Salmon River 5th field HUC and the ESA Action Area because the project's activities will not measurably add any chemical contaminants/nutrients into the stream. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Pathway - Habitat Access		
Pathway Indicator	**Status of Baseline**	**Discussion of Baseline – Current Condition**
Physical Barriers	**FR $_{BT, CK, SH}$**	**There are man-made physical barriers (culverts and diversion dams) within the North Fork Salmon River 5th field HUC on both public and private lands. There are four fish migration barrier culverts in the Hughes Creek drainage. Three of those culverts are in the engineering design phase and scheduled to be replaced with fish passable structures within the next five years depending upon funding.** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *Functioning at Risk*. The effects of the proposed project will not play a role in decreasing or increasing man made barriers within the North Fork Salmon River 5th field HUC and the ESA Action Area because the project's activities will not create any man made barriers within any ESA fish bearing streams. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Habitat Elements		
Pathway Indicators	**Baseline**	**Discussion of Baseline – Current Condition**
Substrate Embeddedness	**NA**	**The Salmon-Challis National Forest does not collect substrate embeddedness data. Refer to Sediment.**

Large Woody Debris	**FA to FR** **BT, CK, SH**	**Data is limited for large woody debris within the North Fork Salmon River 5th field HUC and within the ESA Action Area.** **It is my professional judgment that large woody debris is *Functioning Appropriately* to *Functioning at Risk*. For those streams adjacent to motorized road corridors there is some amount of unauthorized fuelwood gathering that takes place. Some of those trees removed for personal fuelwood could have made it to the stream channel as large woody debris. Those are the stream reaches that would have a *Functioning at Risk* call. The effects of the proposed project will not play a role in decreasing or increasing large woody debris within the North Fork Salmon River 5th field HUC and the ESA Action Area because the project's activities will not remove any overstory trees that could create large woody debris in any ESA fish bearing stream within the ESA Action Area. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Pool Frequency and Quality	**FA to FR** **BT, CK, SH**	**Data is limited for pool frequency and quality within the North Fork Salmon River 5th field HUC and within the ESA Action Area.** **It is my professional judgment that pool frequency and quality is *Functioning Appropriately* to *Functioning at Risk*. For those streams adjacent to motorized road corridors there is some amount of unauthorized fuelwood gathering that takes place. Some of those trees removed for personal fuelwood could have made it to the stream channel as large woody debris and created more quality pools. Those are the stream reaches that would have a *Functioning at Risk* call. The effects of the proposed project will not play a role in decreasing or increasing pool frequency and quality within the North Fork Salmon River 5th field HUC and the ESA Action Area because the project's activities will not remove any overstory trees that could create quality pools in any ESA fish bearing stream within the ESA Action Area. Also, livestock grazing is being managed so as not to degrade bank stability which could degrade quality pool habitat. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Off-channel Habitat	**FA $_{BT, CK, SH}$**	**Data is limited for off-channel habitat within the North Fork Salmon River 5th field HUC and within the ESA Action Area. On non confined stream channel reaches where there should be off-channel habitat (ie. North Fork Salmon River, Sheep Creek, Dahlonega Creek, Hughes Creek and Twin Creek there are backwaters with cover and low energy off channel areas.** **It is my professional judgment that off-channel habitats are *Functioning Appropriately* and naturally. The effects of the proposed project will not play a role in decreasing or increasing off channel habitat within the North Fork Salmon River 5th field HUC and the ESA Action Area because the project's activities will not measurably restore nor degrade stream habitat elements that create and maintain off channel habitats. Also, livestock grazing is being managed so as not to degrade bank stability which could degrade off channel habitat. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Refugia	**FA $_{BT, CK, SH}$**	**Quantifiable data is limited for refugia habitat within the North Fork Salmon River 5th field HUC and within the ESA Action Area. Professional judgment states Refugia Habitat (important remnant habitat for sensitive aquatic species) does exist and are adequately buffered with intact riparian areas. Existing refugia are sufficient in size, number and connectivity to maintain viable populations or sub-populations.** **It is my professional judgment that refugia habitat is *Functioning Appropriately* and naturally. The effects of the proposed project will not play a role in decreasing or increasing Refugia Habitat within the North Fork Salmon River 5th field HUC and the ESA Action Area because the project's activities will not measurably restore nor degrade stream habitat elements or riparian areas that create and maintain Refugia Habitat. Also, livestock grazing is being managed so as not to degrade riparian areas and bank stability which could create and maintain Refugia Habitat. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Channel Condition & Dynamics		
Pathways Indicators	**Status of Baseline**	**Discussion of Baseline – Current Condition**
Average Wetted Width/Maximum Depth Ratio	**FA to FR** **BT, CK, SH**	**Data is limited for average wetted width/maximum depth ratio within the North Fork Salmon River 5th field HUC and within the ESA Action Area (see sections 6.4.4 & 7.1.4 above).** **It is my professional judgment that average wetted width/maximum depth ratio is *Functioning Appropriately* to *Functioning at Risk* on ESA stream reaches within the North Fork Salmon River 5th field HUC and the ESA Action Area. The effects of the proposed project could play a role in decreasing or increasing average wetted width/maximum depth ratio within the North Fork Salmon River 5th field HUC and the ESA Action Area. The direct correlation between the proposed project's activities and a negative increase in average wetted width/maximum depth ratio would be if livestock grazing activities are allowed to break down streambanks and significantly decrease the stability of streambanks. Range improvements such as fences and water developments that help to minimize and keep livestock grazing activities away from riparian areas and streambanks can help to restore degraded stream reaches where the average wetted width/maximum depth ratio is greater than 10. Current and future livestock grazing activities are being managed so as not to degrade riparian areas and bank stability which would increase average wetted width/maximum depth ratio. Current streambank conditions at the two monitored sites show high bank stability. Therefore the effects of this action will *Maintain or Restore* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Streambank Condition	**FA BT, CK, SH**	**Data is limited for streambank condition within the North Fork Salmon River 5th field HUC and within the ESA Action Area (see sections 6.4.5 & 7.1.5 above).** **It is my professional judgment that streambank condition is *Functioning Appropriately* on ESA stream reaches within the North Fork Salmon River 5th field HUC and the ESA Action Area. The effects of the proposed project's activities could play a role in decreasing streambank conditions within the ESA Action Area. The direct correlation between the proposed project's activities and a negative decrease in streambank conditions would be if livestock grazing activities are allowed to break down streambanks and significantly decrease the stability of streambanks. Range improvements such as fences and water developments that help to minimize and keep livestock grazing activities away from riparian areas and streambanks can help to maintain and restore degraded stream reaches where the percent stabile streambanks area higher than desired. Current and future livestock grazing activities are being managed so as not to degrade riparian areas and bank stability. Current streambank conditions at the two monitored sites show high bank stability. Therefore the effects of this action will *Maintain or Restore* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Floodplain Connectivity	**FA BT, CK, SH**	**Most all stream reaches within the North Fork Salmon River 5th field HUC and within the ESA Action Area can access their floodplains. Off channel areas are frequently hydrologically linked to main channels. Overbank flows occur and maintain wetland functions, riparian vegetation and succession.** **It is my professional judgment that floodplain connectivity is *Functioning Appropriately* on ESA stream reaches within the North Fork Salmon River 5th field HUC and the ESA Action Area. The effects of the proposed project's activities could play a role in decreasing streambank conditions, within the ESA Action Area, which in turn could negatively affect floodplain connectivity. The direct correlation between the proposed project's activities and a negative decrease in streambank conditions would be if livestock grazing activities are allowed to break down streambanks and significantly decrease the stability of streambanks. Range improvements such as fences and water developments that help to minimize and keep livestock grazing activities away from riparian areas and streambanks can help to maintain and restore degraded stream reaches where the percent stabile streambanks area higher than desired. Current and future livestock grazing activities are being managed so as not to degrade riparian areas and bank stability. Current streambank conditions at the two monitored sites show high bank stability. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Flow/Hydrology		
Pathways Indicators	**Status of Baseline**	**Discussion of Baseline – Current Condition**
Change in Peak/Base Flows	**FR BT, CK, SH**	**Within the entire North Fork Salmon River 5th field HUC, below National Forest System lands there are a number of water diversions that take water out of the stream. This would show some evidence of altered peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography. Within the ESA Action Area the watershed hydrograph would indicate peak flow, baseflow and/or flow timing characteristics comparable to an undisturbed watershed of similar size, geology and geography.** **It is my professional judgment that change in peak/base flows is *Functioning at Risk* for the North Fork Salmon River 5th field HUC but would be *Functioning Appropriately* on ESA stream reaches within the ESA Action Area. The effects of the proposed project's activities will not play a role in changing peak flows and base flows in the North Fork Salmon River 5th field HUC or within the ESA Action Area. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Increase in Drainage Network	**FA** $_{BT, CK, SH}$	**There has been a zero or minimum increase in active channel length correlated with human caused disturbance within the Indian Creek-Salmon River 5th field HUC.** **It is my professional judgment that increase in drainage network is *Functioning Appropriately* for the North Fork Salmon River 5th field HUC. The effects of the proposed project's activities will not play a role in changing or increasing the drainage network in the North Fork Salmon River 5th field HUC or within the ESA Action Area. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Watershed Condition		
Pathway Indicators	**Status of Baseline**	**Discussion of Baseline – Current Condition**
Road Density and Location	**FUR** $_{BT, CK, SH}$	**The North Fork Salmon River 5th field HUC has 571.1 miles of roads, a road density of 2.7 (mi/mi^2) with some valley bottom roads (145.5 miles of road within a PACFISH RHCA and 25.5% of the roads are within a PACFISH RHCA).** **It is my professional judgment that road density and location is *Functioning at Unacceptable Risk* for the North Fork Salmon River 5th field HUC. The effects of the proposed project's activities will not play a role in road density or location in the North Fork Salmon River 5th field HUC or within the ESA Action Area. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Disturbance History	**FA** **BT, CK, SH**	**The ECA for the North Fork Salmon River 5th field HUC is 8.0 percent with an overall cumulative effects rating of Moderate. This rating is caused by timber harvest and historic fires within the North Fork Salmon River 5th field HUC. There are no concentrations of disturbance in unstable areas, and/or refugia, and or riparian areas. An ECA rating of greater than 15 percent is considered functioning at risk.** **It is my professional judgment that disturbance history is *Functioning Acceptable* for the North Fork Salmon River 5th field HUC. The effects of the proposed project's activities will not play a role in disturbance history within the North Fork Salmon River 5th field HUC or within the ESA Action Area. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Riparian Conservation Areas	**FA $_{BT, CK, SH}$**	**The riparian conservation areas provide adequate shade, large woody debris recruitment and habitat protection and connectivity within the North Fork Salmon River 5th field HUC, buffers or includes known refugia for sensitive aquatic species (>80% intact) and adequately buffer impacts on rangelands. The percent similarity of riparian vegetation to the potential natural community/composition is >50%.** **It is my professional judgment that riparian conservation areas are *Functioning Appropriately for* the North Fork Salmon River 5th field HUC. The effects of the proposed project's activities could play a role in negatively affecting riparian conservation areas. Range improvements such as fences and water developments help to minimize or eliminate livestock grazing activities within some riparian areas. Current and future livestock grazing activities are being managed so as not to degrade riparian conservation areas. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Disturbance Regime **(bull trout only)**	**FA $_{BT}$**	**The disturbance regime, within the North Fork Salmon River 5th field HUC, has short lived environmental disturbances with a predictable hydrograph, high quality habitat and watershed complexity providing refuge and rearing space for all life stages or multiple life-history forms. Natural processes are stable.** **It is my professional judgment that disturbance regimes are *Functioning Appropriately for* the North Fork Salmon River 5th field HUC. The effects of the proposed project's activities could play a role in negatively affecting disturbance regimes. Range improvements such as fences and water developments help to minimize or eliminate livestock grazing activities within some riparian areas. Current and future livestock grazing activities are being managed so as not to degrade riparian areas and stream habitat within the ESA Action Area. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Integration of Species and Habitat Conditions		
Pathway Indicators	**Status of Baseline**	**Discussion of Baseline – Current Condition**
(bull trout only)	**FA $_{BT}$**	**Within the North Fork Salmon River 5th field HUC habitat quality and connectivity among subpopulations is high. The migratory form is present. Disturbance has not altered channel equilibrium. Fine sediments and other habitat characteristics influencing survival or growth are consistent with pristine habitat. The subpopulation has the resilience to recover from short-term disturbances within one to two generations (5-10 years). The subpopulation is fluctuating around equilibrium or is growing.** **It is my professional judgment that integration of species and habitat conditions are *Functioning Appropriately for* the North Fork Salmon River 5th field HUC. The effects of the proposed project's activities could play a role in negatively affecting integration of species and habitat conditions. Range improvements such as fences and water developments help to minimize or eliminate livestock grazing activities within some riparian areas and stream reaches. Current and future livestock grazing activities are being managed so as not to degrade riparian areas and stream habitat within the North Fork Salmon River 5th field HUC and the ESA Action Area. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Status of Baseline: Functioning Appropriately – **FA** Functioning at Risk – **FR** Functioning at Unacceptable Risk – **FUR**

$_{BT}$ Bull Trout, $_{CK}$ Chinook, $_{SH}$ Steelhead, $_1$ Rearing, $_2$ Spawning/Incubation, $_{TRIB}$ Tributaries,

Effects of the Action:

Restore – the action will result in a positive change in the indicator evaluated
Maintain – the action will have no effect on the status of the indicator evaluated
Degrade – the action will result in a negative change in the indicator evaluated
Professional Judgment – **PJ**

2 INDIAN CREEK - SALMON RIVER (5TH FIELD HUC) WATERSHED BASELINE

2.1 MATRIX OF DIAGNOSTIC PATHWAYS AND INDICATORS

Agency: USDA Forest Service, Salmon-Challis National Forest	**Watershed 5th field HUC: Indian Creek-Salmon River (1706020307)**
Unit: North Fork Ranger District	**Spatial Scale of Matrix:** One 5th field HUC
Fish Species Present: Chinook Salmon, Steelhead, Bull Trout	**Designated or Proposed Critical Habitat Present:** Chinook Salmon, Steelhead, Bull Trout
Anadromous Species Population: Salmon River	**Anadromous Species Subpopulation:** North Fork Salmon River
Bull Trout Recovery Unit: Upper Snake	**Bull Trout Critical Habitat Unit:** Salmon River Basin
Bull Trout Core Area: Middle Salmon River - Panther	**Bull Trout Local Population:** Indian Creek
Management Actions: Range (Ongoing) - Indian Ridge Allotment	**Updated:** 3/18/2010

Pathway - Subpopulation Characteristics (Bull Trout Only)		
Pathways Indicators	**Status of Baseline**	**Discussion of Baseline – Current Condition**
Subpopulation Size	**FR $_{BT}$**	**Bull Trout -Bull Trout are distributed throughout the Indian Creek-Salmon River 5th field HUC and in two streams within the ESA Action Area. All life stages are believed to be present within both streams. Fluvial individuals are suspected to be present in Indian Creek within the ESA Action Area. Bull trout is currently listed as "Threatened" under ESA.** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *Functioning at Risk*. The effects of the proposed project is likely to impact individuals but may not have a trend in decreasing or increasing the bull trout population in the ESA Action Area because the project's activities will not restore nor degrade stream habitat elements within the next 5 to 10 years. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Growth and Survival	**FA $_{BT}$**	**Bull Trout - The sub population, within the Indian Creek-Salmon River 5th field HUC, has the resilience to recover from short term disturbances or subpopulation declines within one to two generations (5 to 10 years). The subpopulation is characterized as increasing or stable. Bull trout streams within the ESA Action Area have good connectivity to the Salmon River. These bull trout streams: 1) Conserve opportunity for diverse life-history expression, 2) Conserve opportunity for genetic diversity, 3) Ensure bull trout are distributed across representative habitats, 4) Ensure sufficient connectivity among populations, and 5) Ensure sufficient habitat to support population viability (e.g., abundance, trend indices).** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *Functioning Appropriately*. The effects of the proposed project is likely to impact individuals but may not have a trend in decreasing or increasing the bull trout growth and survival in the ESA Action Area because the project's activities will not measurably restore nor degrade stream habitat elements or population size within the next 5 to 10 years. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Life History Diversity and Isolation	**FA $_{BT}$**	**Bull Trout - The migratory form of bull trout, within the Indian Creek-Salmon River 5th field HUC, is present and local populations are in close proximity to others spawning and rearing groups. Migratory corridors and rearing habitat are in good to excellent condition for the species.** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *Functioning Appropriately*. The effects of the proposed project is likely to impact individuals but may not have a trend in decreasing or increasing the bull trout life history diversity and Isolation in the ESA Action Area because the project's activities will not measurably restore nor degrade stream habitat elements or population size within the next 5 to 10 years. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Persistence and Genetic Integrity	**FA $_{BT,}$**	**Bull Trout – Bull Trout stream connectivity is high within the Indian Creek-Salmon River 5th field HUC. Each of the relevant subpopulations has a low risk of extinction. The probability of hybridization or displacement by competitive species is low to nonexistent.** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *Functioning Appropriately*. The effects of the proposed project is likely to impact individuals but may not have a trend in decreasing or increasing the bull trout persistence and genetic integrity in the ESA Action Area because the project's activities will not measurably restore nor degrade stream habitat elements, population size or the probability of hybridization with eastern brook trout within the next 5 to 10 years. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Pathway - Water Quality		
Pathway Indicators	**Status of Baseline**	**Discussion of Baseline – Current Condition**
Temperature (7day average. Maximum, °C)	**FA** BT, CK, SH	**Since 1993 stream temperature data has been collected on numerous streams within the Indian Creek-Salmon River 5th field HUC. Within the ESA Action Area there are two streams with stream temperature data between 1993 and 2009. Data indicates that stream temperatures are not a limiting factor for fish production and meets PACFISH spawning and rearing criteria. PACFISH page C-6. Water temperatures are below 64°F within migration and rearing habitats and below 60°F within spawning habitats. There is no measurable increase in maximum water temperature using 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.** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *Functioning Appropriately*. The effects of the proposed project will not play a role in decreasing or increasing steam temperatures within the ESA Action Area because the project's activities will not measurably restore nor degrade stream habitat elements that effect stream temperatures. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Sediment	Indian Creek **FA** BT, CK, SH	**Salmon-Challis National Forest Watershed program uses McNeil core sampling methodologies to monitor substrate % depth fines annually on selected streams. Analysis of core sampling data correlates measured levels of depth fines in spawning habitats to predicted egg incubation success values determined by Stowell, et al (1983).** **Since 1993 stream sediment data has been collected on numerous streams within the Indian Creek-Salmon River 5th field HUC. Within the ESA Action Area there is one stream with sediment data between 1993 and 2009. The uplands within the ESA Action Area are primarily granitic geology. In granitic geology baseline conditions are rated as follows:** ▪ **< 25 % depth fines (<1/4" diameter) = Functioning Appropriately;** ▪ **26-29% depth fines = Functioning at Risk;** ▪ **>30% depth fines = Functioning at Unacceptable Risk** **Therefore it is my professional judgment that the Environmental Baseline for this indicator within the ESA Action Area is *Functioning Appropriately* for one stream. The effects of the proposed project will not play a role in decreasing or increasing steam sediment within the Indian Creek-Salmon River 5th field HUC and the ESA Action Area because the project's activities will not measurably restore nor degrade upland and riparian habitats that influence overland sediment flow into the stream. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Chemical Contaminants/Nutrients	**FR $_{BT, CK, SH}$**	**There is one 303d stream listed for chemical contaminants within the Indian Creek-Salmon River 5th field HUC and no 303d streams listed within the ESA Action Area. That stream is Dump Creek and is listed for sedimentation and siltation. This stream is not within the ESA Action Area and is across the Salmon River from the Indian Creek drainage.** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *Functioning at Risk*. The effects of the proposed project will not play a role in decreasing or increasing chemical contaminants/nutrients within the Indian Creek-Salmon River 5th field HUC and the ESA Action Area because the project's activities will not measurably add any chemical contaminants/nutrients into the stream. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Pathway - Habitat Access		
Pathway Indicator	**Status of Baseline**	**Discussion of Baseline – Current Condition**
Physical Barriers	**FA $_{BT, CK, SH}$**	**There are man-made physical barriers (culverts and diversion dams) within the Indian Creek-Salmon River 5th field HUC on both public and private lands. There are five fish migration barrier culverts in the Sage Creek drainage. Sage Creek is a very small high gradient mountain stream that only supports a westslope cutthroat trout population. There are no human made physical barriers within the ESA Action Area.** **Therefore it is my professional judgment that the Environmental Baseline for this indicator is *Functioning Appropriately* since there are no human made physical barriers on ESA streams. The effects of the proposed project will not play a role in decreasing or increasing man made barriers within the Indian Creek-Salmon River 5th field HUC and the ESA Action Area because the project's activities will not create any man made barriers within any ESA fish bearing streams. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Habitat Elements		
Pathway Indicators	**Baseline**	**Discussion of Baseline – Current Condition**
Substrate Embeddedness	**NA**	**The Salmon-Challis National Forest does not collect substrate embeddedness data. Refer to Sediment.**

Large Woody Debris	**FA to FR** **BT, CK, SH**	**Data is limited for large woody debris within the Indian Creek-Salmon River 5th field HUC and within the ESA Action Area.** **It is my professional judgment that large woody debris is *Functioning Appropriately* to *Functioning at Risk*. For those streams adjacent to motorized road corridors there is some amount of unauthorized fuelwood gathering that takes place. Some of those trees removed for personal fuelwood could have made it to the stream channel as large woody debris. Those are the stream reaches that would have a *Functioning at Risk* call. The effects of the proposed project will not play a role in decreasing or increasing large woody debris within the Indian Creek-Salmon River 5th field HUC and the ESA Action Area because the project's activities will not remove any overstory trees that could create large woody debris in any ESA fish bearing stream within the ESA Action Area. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Pool Frequency and Quality	**FA to FR** **BT, CK, SH**	**Data is limited for pool frequency and quality within the Indian Creek-Salmon River 5th field HUC and within the ESA Action Area.** **It is my professional judgment that pool frequency and quality is *Functioning Appropriately* to *Functioning at Risk*. For those streams adjacent to motorized road corridors there is some amount of unauthorized fuelwood gathering that takes place. Some of those trees removed for personal fuelwood could have made it to the stream channel as large woody debris and created more quality pools. Those are the stream reaches that would have a *Functioning at Risk* call. The effects of the proposed project will not play a role in decreasing or increasing pool frequency and quality within the Indian Creek-Salmon River 5th field HUC and the ESA Action Area because the project's activities will not remove any overstory trees that could create quality pools in any ESA fish bearing stream within the ESA Action Area. Also, livestock grazing is being managed so as not to degrade bank stability which could degrade quality pool habitat. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Off-channel Habitat	**FA** $_{BT, CK, SH}$	**Data is limited for off-channel habitat within the Indian Creek-Salmon River 5th field HUC and within the ESA Action Area. On non confined stream channel reaches where there should be off-channel habitat (ie. Salmon River and Sheep Creek there are backwaters with cover and low energy off channel areas.** **It is my professional judgment that off-channel habitats are *Functioning Appropriately* and naturally. The effects of the proposed project will not play a role in decreasing or increasing off channel habitat within the Indian Creek-Salmon River 5th field HUC and the ESA Action Area because the project's activities will not measurably restore nor degrade stream habitat elements that create and maintain off channel habitats. Also, livestock grazing is being managed so as not to degrade bank stability which could degrade off channel habitat. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Refugia	**FA** $_{BT, CK, SH}$	**Quantifiable data is limited for refugia habitat within the Indian Creek-Salmon River 5th field HUC and within the ESA Action Area. Professional judgment states Refugia Habitat (important remnant habitat for sensitive aquatic species) does exist and are adequately buffered with intact riparian areas. Existing refugia are sufficient in size, number and connectivity to maintain viable populations or sub-populations.** **It is my professional judgment that refugia habitat is *Functioning Appropriately* and naturally. The effects of the proposed project will not play a role in decreasing or increasing Refugia Habitat within the Indian Creek-Salmon River 5th field HUC and the ESA Action Area because the project's activities will not measurably restore nor degrade stream habitat elements or riparian areas that create and maintain Refugia Habitat. Also, livestock grazing is being managed so as not to degrade riparian areas and bank stability which could create and maintain Refugia Habitat. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Channel Condition & Dynamics		
Pathways Indicators	**Status of Baseline**	**Discussion of Baseline – Current Condition**
Average Wetted Width/Maximum Depth Ratio	**FA to FR** **BT, CK, SH**	**Data is limited for average wetted width/maximum depth ratio within the Indian Creek-Salmon River 5th field HUC and within the ESA Action Area (see sections 6.4.4 & 7.1.4 above).** **It is my professional judgment that average wetted width/maximum depth ratio is *Functioning Appropriately* to *Functioning at Risk* on ESA stream reaches within the Indian Creek-Salmon River 5th field HUC and the ESA Action Area. The effects of the proposed project could play a role in decreasing or increasing average wetted width/maximum depth ratio within the Indian Creek-Salmon River 5th field HUC and the ESA Action Area. The direct correlation between the proposed project's activities and a negative increase in average wetted width/maximum depth ratio would be if livestock grazing activities are allowed to break down streambanks and significantly decrease the stability of streambanks. Range improvements such as fences and water developments that help to minimize and keep livestock grazing activities away from riparian areas and streambanks can help to restore degraded stream reaches where the average wetted width/maximum depth ratio is greater than 10. Current and future livestock grazing activities are being managed so as not to degrade riparian areas and bank stability which would increase average wetted width/maximum depth ratio. Current streambank conditions at the one monitored site show high bank stability. Therefore the effects of this action will *Maintain or Restore* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Streambank Condition	**FA BT, CK, SH**	**Data is limited for streambank condition within the Indian Creek-Salmon River 5th field HUC and within the ESA Action Area (see sections 6.4.5 & 7.1.5 above).** **It is my professional judgment that streambank condition is *Functioning Appropriately* on ESA stream reaches within the Indian Creek-Salmon River 5th field HUC and the ESA Action Area. The effects of the proposed project's activities could play a role in decreasing streambank conditions within the ESA Action Area. The direct correlation between the proposed project's activities and a negative decrease in streambank conditions would be if livestock grazing activities are allowed to break down streambanks and significantly decrease the stability of streambanks. Range improvements such as fences and water developments that help to minimize and keep livestock grazing activities away from riparian areas and streambanks can help to maintain and restore degraded stream reaches where the percent stabile streambanks area higher than desired. Current and future livestock grazing activities are being managed so as not to degrade riparian areas and bank stability. Current streambank conditions at the one monitored site show high bank stability. Therefore the effects of this action will *Maintain or Restore* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Floodplain Connectivity	FA BT, CK, SH	Most all stream reaches within the Indian Creek-Salmon River 5th field HUC and within the ESA Action Area can access their floodplains. Off channel areas are frequently hydrologically linked to main channels. Overbank flows occur and maintain wetland functions, riparian vegetation and succession. It is my professional judgment that floodplain connectivity is ***Functioning Appropriately*** on ESA stream reaches within the Indian Creek-Salmon River 5th field HUC and the ESA Action Area. The effects of the proposed project's activities could play a role in decreasing streambank conditions, within the ESA Action Area, which in turn could negatively affect floodplain connectivity. The direct correlation between the proposed project's activities and a negative decrease in streambank conditions would be if livestock grazing activities are allowed to break down streambanks and significantly decrease the stability of streambanks. Range improvements such as fences and water developments that help to minimize and keep livestock grazing activities away from riparian areas and streambanks can help to maintain and restore degraded stream reaches where the percent stabile streambanks area higher than desired. Current and future livestock grazing activities are being managed so as not to degrade riparian areas and bank stability. Current streambank conditions at the two monitored sites show high bank stability. Therefore the effects of this action will ***Maintain*** this environmental baseline condition because of the action's design criteria and following required standard and guidelines.
Flow/Hydrology		
Pathways Indicators	**Status of Baseline**	**Discussion of Baseline – Current Condition**
Change in Peak/Base Flows	FR BT, CK, SH	Within the entire Indian Creek-Salmon River 5th field HUC, below National Forest System lands there are a couple of water diversions that take water out of the stream. This would show some evidence of altered peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography. Within the ESA Action Area the watershed hydrograph would indicate peak flow, baseflow and/or flow timing characteristics comparable to an undisturbed watershed of similar size, geology and geography. It is my professional judgment that change in peak/base flows is ***Functioning at Risk*** for the Indian Creek-Salmon River 5th field HUC but would be ***Functioning Appropriately*** on ESA stream reaches within the ESA Action Area. The effects of the proposed project's activities will not play a role in changing peak flows and base flows in the Indian Creek-Salmon River 5th field HUC or within the ESA Action Area. Therefore the effects of this action will ***Maintain*** this environmental baseline condition because of the action's design criteria and following required standard and guidelines.

Increase in Drainage Network	**FA BT, CK, SH**	**There has been a zero or minimum increase in active channel length correlated with human caused disturbance within the Indian Creek-Salmon River 5th field HUC.** **It is my professional judgment that increase in drainage network is *Functioning Appropriately* for the Indian Creek-Salmon River 5th field HUC. The effects of the proposed project's activities will not play a role in changing or increasing the drainage network in the Indian Creek-Salmon River 5th field HUC or within the ESA Action Area. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Watershed Condition		
Pathway Indicators	**Status of Baseline**	**Discussion of Baseline – Current Condition**
Road Density and Location	**FUR BT, CK, SH**	**The Indian Creek-Salmon River 5th field HUC has 395.8 miles of roads, a road density of 4.8 (mi/mi^2) with some valley bottom roads (74.9 miles of road within a PACFISH RHCA and 18.9% of the roads are within a PACFISH RHCA).** **It is my professional judgment that road density and location is *Functioning at Unacceptable Risk* for the Indian Creek-Salmon River 5th field HUC. The effects of the proposed project's activities will not play a role in road density or location in the Indian Creek-Salmon River 5th field HUC or within the ESA Action Area. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Disturbance History	**FA** **BT, CK, SH**	**The ECA for the Indian Creek-Salmon River 5th field HUC is 8.0 percent with an overall cumulative effects rating of High. This rating is caused by timber harvest and historic fires within the Indian Creek-Salmon River 5th field HUC. There are no concentrations of disturbance in unstable areas, and/or refugia, and or riparian areas. An ECA rating of greater than 15 percent is considered functioning at risk.** **It is my professional judgment that disturbance history is *Functioning Acceptable* for the Indian Creek-Salmon River 5th field HUC. The effects of the proposed project's activities will not play a role in disturbance history within the Indian Creek-Salmon River 5th field HUC or within the ESA Action Area. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Riparian Conservation Areas	**FA $_{BT, CK, SH}$**	**The riparian conservation areas provide adequate shade, large woody debris recruitment and habitat protection and connectivity within the Indian Creek-Salmon River 5th field HUC, buffers or includes known refugia for sensitive aquatic species (>80% intact) and adequately buffer impacts on rangelands. The percent similarity of riparian vegetation to the potential natural community/composition is >50%.** **It is my professional judgment that riparian conservation areas are *<u>Functioning Appropriately</u> for* the Indian Creek-Salmon River 5th field HUC. The effects of the proposed project's activities could play a role in negatively affecting riparian conservation areas. Range improvements such as fences and water developments help to minimize or eliminate livestock grazing activities within some riparian areas. Current and future livestock grazing activities are being managed so as not to degrade riparian conservation areas. Therefore the effects of this action will *<u>Maintain</u>* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**
Disturbance Regime **(bull trout only)**	**FA $_{BT}$**	**The disturbance regime, within the Indian Creek-Salmon River 5th field HUC, has short lived environmental disturbances with a predictable hydrograph, high quality habitat and watershed complexity providing refuge and rearing space for all life stages or multiple life-history forms. Natural processes are stable.** **It is my professional judgment that disturbance regimes are *<u>Functioning Appropriately</u> for* the Indian Creek-Salmon River 5th field HUC. The effects of the proposed project's activities could play a role in negatively affecting disturbance regimes. Range improvements such as fences and water developments help to minimize or eliminate livestock grazing activities within some riparian areas. Current and future livestock grazing activities are being managed so as not to degrade riparian areas and stream habitat within the ESA Action Area. Therefore the effects of this action will *<u>Maintain</u>* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Integration of Species and Habitat Conditions		
Pathway Indicators	**Status of Baseline**	**Discussion of Baseline – Current Condition**
(bull trout only)	**FA $_{BT}$**	**Within the Indian Creek-Salmon River 5th field HUC habitat quality and connectivity among subpopulations is high. The migratory form is present. Disturbance has not altered channel equilibrium. Fine sediments and other habitat characteristics influencing survival or growth are consistent with pristine habitat. The subpopulation has the resilience to recover from short-term disturbances within one to two generations (5-10 years). The subpopulation is fluctuating around equilibrium or is growing.** **It is my professional judgment that integration of species and habitat conditions are *Functioning Appropriately for* the Indian Creek-Salmon River 5th field HUC. The effects of the proposed project's activities could play a role in negatively affecting integration of species and habitat conditions. Range improvements such as fences and water developments help to minimize or eliminate livestock grazing activities within some riparian areas and stream reaches. Current and future livestock grazing activities are being managed so as not to degrade riparian areas and stream habitat within the Indian Creek-Salmon River 5th field HUC and the ESA Action Area. Therefore the effects of this action will *Maintain* this environmental baseline condition because of the action's design criteria and following required standard and guidelines.**

Status of Baseline: Functioning Appropriately – **FA** Functioning at Risk – **FR** Functioning at Unacceptable Risk – **FUR**

$_{BT}$ Bull Trout, $_{CK}$ Chinook, $_{SH}$ Steelhead, $_{1}$ Rearing, $_{2}$ Spawning/Incubation, $_{TRIB}$ Tributaries,

Effects of the Action:

Restore – the action will result in a positive change in the indicator evaluated
Maintain – the action will have no effect on the status of the indicator evaluated
Degrade – the action will result in a negative change in the indicator evaluated
Professional Judgment – **PJ**

APPENDIX C – MONITORING DATA AND SUMMARIES

Figure 7 - Indian Ridge Allotment Monitoring Sites

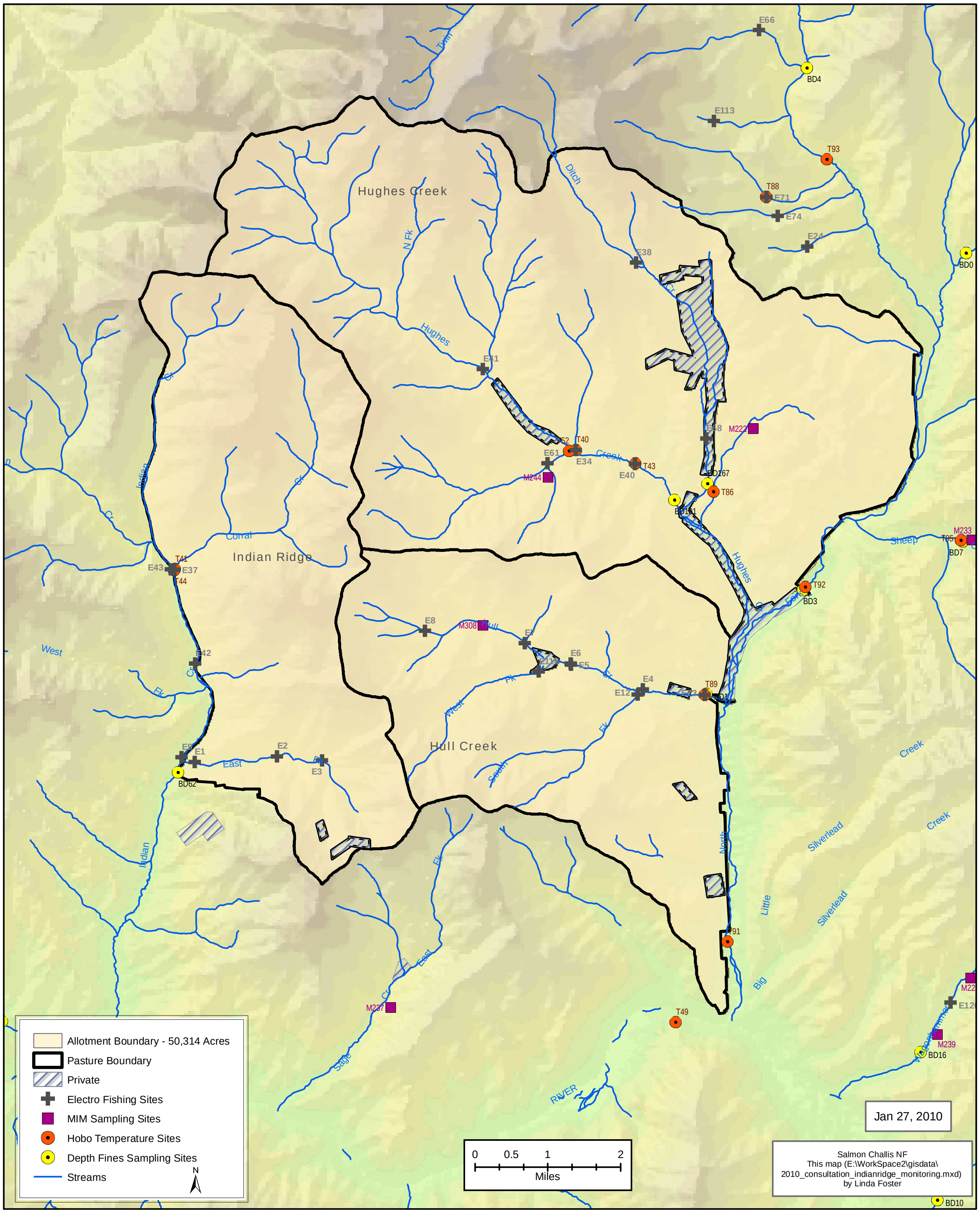


Table 14 - Indian Ridge Allotment Summary of Monitoring Data Collected

Indian Ridge Allotment - (9)	Chinook salmon	Chinook Salmon Presence Miles	Spawning Miles	Chinook salmon DCH miles	steelhead	Steelhead Presence Miles	Spawning Miles	steelhead DCH miles	bull trout	Bull Trout Presence Miles	Spawning Miles	bull trout proposed DCH miles	Temperature	Sediment	Electrofishing	Width to Depth Ratio	Streambank Condition	Greenline Ecological Status
Allen Creek	No	No	No	No	Yes	0.23	0.23	0.00	No	No	No	No	99-02, 05-07, 09	No	97-99, 03, 09	No	No	No
Corral Creek	No	No	No	No	No	No	No	No	Yes	0.14	0.14	4.73	97-02, 09	No	09	No	No	No
Ditch Creek	No	No	No	No	Yes	3.77	3.77	0.00	No	No	No	No	93-96, 98, 00, 02-03, 05-07, 09	95, 96, 07	97-99, 03, 09	No	No	No
Hughes Creek	Yes	0.25	0.25	2.58	Yes	2.74	2.74	2.58	Yes	6.92	6.92	6.92	93-03, 05-07, 09	93-01, 03-09	97, 98, 01-04, 09	No	No	No
Hull Creek	No	No	No	No	Yes	0.46	0.46	0.00	No	No	No	No	95, 97-06, 09	93-96, 98, 03-05, 09	97, 98, 03, 04, 09	No	04	93, 04
Indian Creek	Yes	0.00	0.00	0.00	Yes	5.19	5.19	3.84	Yes	6.86	6.86	6.95	93-06, 09	93-09	09	No	No	No
Salzer Creek	No	No	No	No	No	No	No	No	Yes	1.27	1.27	1.87	01, 02	No	No	No	No	No
West Fork Hughes Creek	No	No	No	No	Yes	0.43	0.43	0.00	No	No	No	No	01-03, 05-07, 09	No	97, 99, 01-03, 09	No	04	93, 04, 09
North Fork Salmon River	Yes	6.46	6.46	6.46	Yes	6.46	6.46	6.46	Yes	6.46	6.46	0.86	95-01, 03-06,09	No	No	No	No	No

Table 15 - Indian Ridge Allotment (steelhead)

Steelhead Present

Row Labels	Sum of LENGTH
Allan Creek	0.23
Ditch Creek	3.77
Hughes Creek	2.74
Hull Creek	0.46
Indian Creek	5.19
North Fork Salmon River	6.46
West Fork Hughes Creek	0.43
Grand Total	19.27

Steelhead Spawning

Row Labels	Sum of LENGTH
Allan Creek	0.23
Ditch Creek	3.77
Hughes Creek	2.74
Hull Creek	0.46
Indian Creek	5.19
North Fork Salmon River	6.46
West Fork Hughes Creek	0.43
Grand Total	19.27

Steelhead DCH

Row Labels	Sum of LENGTH
Hughes Creek	2.58
Indian Creek	3.84
North Fork Salmon River	6.46
Grand Total	12.88

Table 16 - Indian Ridge Allotment's Units (steelhead)

Steelhead Present

Row Labels	Sum of LENGTH
⊟ Hughes Creek Unit	10.26
⊞ Allan Creek	0.23
⊞ Ditch Creek	3.77
⊞ Hughes Creek	2.74
⊞ North Fork Salmon River	3.09
⊞ West Fork Hughes Creek	0.43
⊟ Hull Creek Unit	3.82
⊞ Hull Creek	0.46
⊞ North Fork Salmon River	3.37
⊟ Indian Ridge Unit	5.19
⊞ Indian Creek	5.19
Grand Total	19.27

Steelhead Spawning

Row Labels	Sum of LENGTH
⊟ Hughes Creek Unit	10.26
⊞ Allan Creek	0.23
⊞ Ditch Creek	3.77
⊞ Hughes Creek	2.74
⊞ North Fork Salmon River	3.09
⊞ West Fork Hughes Creek	0.43
⊟ Hull Creek Unit	3.82
⊞ Hull Creek	0.46
⊞ North Fork Salmon River	3.37
⊟ Indian Ridge Unit	5.19
⊞ Indian Creek	5.19
Grand Total	19.27

Steelhead DCH

Row Labels	Sum of LENGTH
⊟ Hughes Creek Unit	5.67
⊞ Hughes Creek	2.58
⊞ North Fork Salmon River	3.09
⊟ Hull Creek Unit	3.37
⊞ North Fork Salmon River	3.37
⊟ Indian Ridge Unit	3.84
⊞ Indian Creek	3.84
Grand Total	12.88

Table 17 - Indian Ridge Allotment (bull trout)

Bull Trout Present	
Row Labels	Sum of LENGTH
Corral Creek	0.14
Hughes Creek	6.92
Indian Creek	6.86
North Fork Salmon River	6.46
Salzer Creek	1.27
Grand Total	21.65

Bull Trout Spawning	
Row Labels	Sum of LENGTH
Corral Creek	0.14
Hughes Creek	6.92
Indian Creek	6.86
North Fork Salmon River	6.46
Salzer Creek	1.27
Grand Total	21.65

Bull Trout Proposed DCH	
Row Labels	Sum of LENGTH
Corral Creek	4.73
Hughes Creek	6.92
Hull Creek	4.30
Indian Creek	6.95
North Fork Salmon River	0.86
(blank)	1.87
Grand Total	25.64

Table 18 - Indian Ridge Allotment's Units (bull trout)

Bull Trout Present	
Row Labels	Sum of LENGTH
Hughes Creek Unit	11.29
Hughes Creek	6.92
North Fork Salmon River	3.09
Salzer Creek	1.27
Hull Creek Unit	3.37
North Fork Salmon River	3.37
Indian Ridge Unit	6.99
Corral Creek	0.14
Indian Creek	6.86
Grand Total	21.65

Bull Trout Spawning	
Row Labels	Sum of LENGTH
Hughes Creek Unit	11.29
Hughes Creek	6.92
North Fork Salmon River	3.09
Salzer Creek	1.27
Hull Creek Unit	3.37
North Fork Salmon River	3.37
Indian Ridge Unit	6.99
Corral Creek	0.14
Indian Creek	6.86
Grand Total	21.65

Bull Trout Proposed DCH	
Row Labels	Sum of LENGTH
Hughes Creek Unit	8.41
Hughes Creek	6.92
North Fork Salmon River	0.62
(blank)	0.86
Hull Creek Unit	4.98
Hull Creek	4.30
North Fork Salmon River	0.24
(blank)	0.43
Indian Ridge Unit	12.26
Corral Creek	4.73
Indian Creek	6.95
(blank)	0.58
Grand Total	25.64

Table 19 - Indian Ridge Allotment (Chinook salmon)

Chinook Present	
Row Labels	Sum of LENGTH
Hughes Creek	0.25
North Fork Salmon River	6.46
Grand Total	6.71

Chinook Spawning	
Row Labels	Sum of LENGTH
Hughes Creek	0.25
North Fork Salmon River	6.46
Grand Total	6.71

Chinook DCH	
Row Labels	Sum of LENGTH
Hughes Creek	2.58
Indian Creek	3.84
North Fork Salmon River	6.46
Grand Total	12.88

Table 20 - Indian Ridge Allotment's Units (Chinook salmon)

Chinook Present	
Row Labels	Sum of LENGTH
Hughes Creek Unit	3.34
Hughes Creek	0.25
North Fork Salmon River	3.09
Hull Creek Unit	3.37
North Fork Salmon River	3.37
Grand Total	6.71

Chinook Spawning	
Row Labels	Sum of LENGTH
Hughes Creek Unit	3.34
Hughes Creek	0.25
North Fork Salmon River	3.09
Hull Creek Unit	3.37
North Fork Salmon River	3.37
Grand Total	6.71

Chinook DCH	
Row Labels	Sum of LENGTH
Hughes Creek Unit	5.67
Hughes Creek	2.58
North Fork Salmon River	3.09
Hull Creek Unit	3.37
North Fork Salmon River	3.37
Indian Ridge Unit	3.84
Indian Creek	3.84
Grand Total	12.88

Table 21 - Water Temperature 2004 – 2009

Unit	Site ID	Year	Monitoring Period	Maximum Daily Temperature	Maximum of 7 day Moving Maximum	Mean Temperature 7/1 to 9/30
Hughes Creek	Allen Creek	2005	6/16 – 9/19	14.9°C	14.4°C	Insufficient Data
		2006	6/30 – 9/18	14.5°C	14.2°C	Insufficient Data
		2007	6/30 – 9/25	15.2°C	14.6°C	Insufficient Data
		2009	6/24 – 10/15	14.1°C	13.4°C	10.1°C
	Ditch Creek	2005	6/29 – 9/19	17.1°C	16.5°C	Insufficient Data
		2007	6/29 – 9/26	17.5°C	17.2°C	Insufficient Data
		2009	6/24 – 10/18	15.6°C	14.7°C	11.3°C
	Hughes Creek	2005	6/16 – 9/19	16.4°C	16.0°C	Insufficient Data
		2006	6/22 – 9/18	16.8°C	16.3°C	Insufficient Data
		2007	6/29 – 9/25	16.8°C	16.1°C	Insufficient Data
		2009	6/19 – 10/15	14.5°C	13.9°C	10.3°C
	North Fork Salmon River	2004	6/22 – 9/29	17.1°C	16.6°C	Insufficient Data
		2005	7/01 – 9/19	17.9°C	17.5°C	Insufficient Data
		2006	7/11 – 9/18	17.5°C	16.9°C	Insufficient Data
		2009	7/14 – 10/15	16.3°C	15.5°C	Insufficient Data

	West Fork of Hughes Creek	2005	6/16 – 9/19	14.9°C	14.4°C	Insufficient Data
		2006	6/22 – 9/18	14.9°C	14.7°C	Insufficient Data
		2007	7/03 – 9/25	15.2°C	14.9°C	Insufficient Data
		2009	6/19 – 10/15	19.0°C	17.5°C	9.9°C

Unit	Site ID	Year	Monitoring Period	Maximum Daily Temperature	Maximum of 7 day Moving Maximum	Mean Temperature 7/1 to 9/30
Hull Creek	Hull Creek	2004	6/23 – 9/29	11.8°C	11.5°C	Insufficient Data
		2005	6/16 – 9/19	11.4°C	11.3°C	Insufficient Data
		2006	6/22 – 9/18	12.9°C	12.8°C	Insufficient Data
		2009	6/24 – 9/30	11.8°C	11.5°C	9.8°C
Indian Ridge	Corral Creek	2009	6/26 – 10/18	11.4°C	10.7°C	8.8°C
	Indian Creek (lower)	2004	6/24 – 9/27	15.2°C	14.8°C	Insufficient Data
	Indian Creek (upper)	2009	6/26 – 10/18	11.0°C	10.6°C	8.4°C

Table 22 - Multiple Indicators Monitoring (MIM) Summary

Indian Ridge Greenline Summary

<table>
<tr><th rowspan="2">Unit</th><th rowspan="2">Creek Name</th><th rowspan="2">Site #</th><th rowspan="2">Year</th><th rowspan="2">Width:Depth Ratio</th><th rowspan="2">Bank Stability</th><th colspan="2">Woody Species Regeneration</th><th rowspan="2">Greenline Ecological Status (GES)</th><th rowspan="2">GES Trend</th><th rowspan="2">Summary of Trend</th></tr>
<tr><th>Seedling/Young (#/%)</th><th>Mature/Dead (#/%)</th></tr>
<tr><td rowspan="2">Hull Creek</td><td rowspan="2">Hull Creek</td><td rowspan="2">M308</td><td>1993</td><td>N/A</td><td>N/A</td><td>257/47</td><td>296/53</td><td>PNC/103</td><td>Base</td><td rowspan="2">GES is static at PNC. Site is dominated by Alder with a mesic grass understory. Woody dominance affords very limited access to livestock. Noxious weeds have been encroaching on the site since 1993.</td></tr>
<tr><td>2004</td><td>N/A</td><td>89</td><td>55/39</td><td>86/61</td><td>PNC/106</td><td>Static</td></tr>
<tr><td rowspan="3">Hughes Creek</td><td rowspan="3">West Fork Hughes Creek</td><td rowspan="3">M244</td><td>1993</td><td>N/A</td><td>N/A</td><td>294/86</td><td>48/14</td><td>PNC/94</td><td>Base</td><td rowspan="3">GES is static at PNC. Site is dominated by Alder with a mesic grass understory. Woody dominance affords very limited access to livestock.</td></tr>
<tr><td>2004</td><td>N/A</td><td>93</td><td>93/40</td><td>140/60</td><td>PNC/87</td><td>Static</td></tr>
<tr><td>2009</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>PNC</td><td>Static</td></tr>
<tr><td rowspan="2">Hughes Creek</td><td rowspan="2">Ransack Creek</td><td rowspan="2">M222</td><td>1994</td><td>N/A</td><td>20</td><td>37/49</td><td>38/51</td><td>MS/44</td><td>Base</td><td rowspan="2">GES is in a downward trend at Early Seral. Site is inside a two stage exclosure. First stage fence excludes livestock but not wildlife. Second stage excludes all ungulates. Site is dominated by Spikerush with some Alder. Since area is excluded from livestock down trend could be attributed to wildlife, not livestock.</td></tr>
<tr><td>2004</td><td>N/A</td><td>89</td><td>21/75</td><td>7/25</td><td>ES/18</td><td>Down</td></tr>
</table>

*0-15 Very Early Seral; 16-40 Early Seral; 41-60 Mid Seral; 61-85 Late Seral; 86+ PNC

Indian Ridge Allotment Riparian Discussion:

Monitoring sites were established and subsequent monitoring has occurred on the Indian Ridge Allotment since the early 90's. Since that time, grazing management has evolved based upon management in reference to listed fish species which occur within the allotment. Greenline Ecological Status (GES) typically is the element in which interpretations of ecological status and trend will be discussed in the following:

Generally, of the three sites monitored since the early 90's, 2 are in upward trend or at Late Seral/ PNC. The monitoring site on Ransack Creek (M222) is Down at Early Seral.

All sites will have a bank alteration monitoring attribute with an annual use indicator of 20%.

Hull Creek: GES is static at PNC. Site is dominated by Alder with a mesic grass understory. Woody dominance affords very limited access to livestock. Noxious weeds have been encroaching on the site since 1993. The best monitoring attribute to manage site is browse use with an annual use indicator not to exceed 30% on Alder. The monitoring attribute of greenline stubble with an annual use indicator no less than 4 inches will also be used.

West Fork Hughes Creek: GES is static at PNC. Site is dominated by Alder with a mesic grass understory. Woody dominance affords very limited access to livestock. The best monitoring attribute to manage site is browse use with an annual use indicator not to exceed 30% on Alder. The monitoring attribute of greenline stubble with an annual use indicator no less than 4 inches will also be used.

Ransack Creek: GES is in a downward trend at Early Seral. Site is inside a two stage exclosure. First stage fence excludes livestock but not wildlife. Second stage excludes all ungulates. Site is dominated by Spikerush with some Alder. Since area is excluded from livestock downward trend is attributed to wildlife, not livestock. Exclosure area is not representative of entire stream. Exclosure was installed due to adverse impact to wet meadow area. No monitoring attributes or annual use indicators will be monitored because the site is inside an exclosure

APPENDIX D – 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 create a detailed map 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 PRIMARY CONSTITUENT ELEMENTS OF CRITICAL HABITAT

Primary Constituent Elements for Proposed Bull Trout Critical Habitat and Associated Habitat Indicators PCE # PCE Description Associated Habitat Indicator

PCE #	PCE Description	Associated Habitat Indicators
1	Permanent water having low levels of contaminants such that normal reproduction, growth and survival are not inhibited	sediment, chemical contamination/nutrients, change in peak/base flows
2	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 trou t life history stage and for m, 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
3	Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures	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
4	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 of fine substrate less than 0.63 cm (0.25 in) in diameter and minimal substrate embeddedness are characteristic of these conditions	sediment, substrate embeddedness, large woody debris, pool frequency and quality
5	A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated , a hydrograph that demonstrates the ability to support bull trout populations	change in pea k/base flows, increase in drainage network, disturbance history, disturbance regime
6	Springs, seeps, groundwater sources, and subsurface water connectivity to contribute to water quality and quantity	floodplain connectivity, change in peak/base flows, increase in drainage network, riparian conservation areas, chemical contamination/nutrients
7	Migratory corridors with minimal physical, biological, or chemical barriers between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows	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
8	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 hab itat condition indirectly covered by previous seven PCEs)
9	Few or no predatory, interbreeding, or competitive nonnative species present	persistence and genetic integrity, physical barriers

The following rationale supports that the PCEs for proposed bull trout critical habitat are

thoroughly addressed in the current matrix analysis and that the environmental baseline conditions and determination for effects to the species consists of a biological and habitat component addressing in total the PCEs listed in the proposed rule for proposed critical habitat (USDI 2002a).

1. Permanent water having low levels of contaminants such that normal reproduction, growth and survival are not inhibited.

Flow conditions, such as perennial or ephemeral would be analyzed through *changes in peak/base flows*, and addressed in consideration of current base flows. Changes in hydrograph amplitude or timing with respect to watershed size, geology, and geography would be considered. The level of contaminants is addressed directly by the analysis of *chemical contamination/nutrients* and *sediment*. Current listing under 303(d) status should be considered, as well as the causes for that listing. *Sediment* is considered a contaminant especially in spawning and rearing habitat and analysis would apply to this PCE.

2. 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. This PCE is addressed directly by the analysis of *temperature*. It is addressed indirectly through consideration of *refugia*, which by definition is high quality habitat of appropriate temperature. Availability of refugia is also considered in analysis of *pool frequency and quality* and *large pools*. *Average wetted width/maximum depth ratio in scour pools* is an indication of water volume, which indirectly indicates water temperature, i.e., low ratios indicate deeper water, which in turn indicates possible refugia. This indicator in conjunction with *change in peak/base flows* is an indicator of potential temperature and refugia concerns particularly during low flow periods. *Streambank condition*, *floodplain connectivity* and *riparian conservation areas* address the components of shade and groundwater influence, both of which are important factors of water temperature. Stable streambanks and intact riparian areas, which include part of the floodplain, typically support adequate vegetation to maintain thermal cover to streams during low flow periods.

3. Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures. The analysis of *large woody debris*, such as current values and sources available for recruitment, directly addresses this PCE. Large woody debris increases channel complexity and creates pools and undercut banks. *Pool frequency and quality* would also directly address this PCE*,* showing the number of pools per mile as well as the amount of cover and temperature of water in the pools. *Average wetted width/maximum depth ratio in scour pools in a reach* is an indicator of channel shape and pool quality. Low ratios suggest deeper, 3 higher quality pools. *Large pools,* consisting of a wide range of water depths, velocities, substrates and cover, are typical of high quality habitat and are a key component of channel complexity (USDI 1998e). An analysis of *off-channel habitat* would describe side-channels and other off-channel areas. *Streambank condition* would analyze the stability of the banks*,* including such features as undercut banks. The analysis of both *riparian conservation areas* and *floodplain connectivity* would directly address this PCE. Floodplain and riparian functions include the maintenance of habitat and channel complexity, the recruitment of large woody debris and the connectivity to off-channel habitats or side channels (USDI 1998e). Complex habitats provide refugia for bull trout and in turn, *refugia* analysis would assess complex stream channels. All of these habitat indicators consider the numerous characteristics of instream bull trout habitat and quantify critical components that are fundamental to creating and maintaining complex instream habitat over time.

4. 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 of fine substrate less than 0.63 cm (0.25 in) in diameter and minimal substrate embeddedness are characteristic of these conditions. This PCE is addressed directly by analysis of *sediment* in areas of spawning and incubation and considers directly the size class composition of instream sediments, particularly fine sediments <63 mm. This PCE also is addressed directly by analysis of *substrate embeddedness* in rearing areas, which is a function of sediment size class and bedload transport. Both of these indicators would assess substrate composition and stability in relation to the various life stages of the bull trout as well as the sediment transportation and deposition. *Large woody debris* and *pool frequency and quality* affect sediment transport and redistribution within a stream and would indirectly assess substrate composition and amounts.

5. A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated, a hydrograph that demonstrates the ability to support bull trout populations. This PCE is addressed by analysis of *change in peak/base flows*, which considers changes in hydrograph amplitude or timing with respect to watershed size, geology, and geography. Considering *increase in drainage network* and *disturbance history* provides further information. Roads and vegetation management both have effects strongly linked to a stream's hydrograph. *Disturbance regime* ties this information together to consider how a watershed reacts to disturbance and the time required to recover back to pre-disturbance conditions.

6. Springs, seeps, groundwater sources, and subsurface water connectivity to contribute to water quality and quantity. This PCE is addressed by analysis of *floodplain connectivity* and *riparian conservation areas*. *Floodplain connectivity* considers hydrologic linkage of off-channel areas with the main channel and overbank flow maintenance of wetland function and riparian vegetation and succession. Floodplain and riparian areas provide hydrologic connectivity for springs, seeps, groundwater upwelling and wetlands and contribute to the maintenance of the water table (USDI 1998e). The analysis of *changes in peak/base flows* would address subsurface water connectivity. *Increase in drainage network* would address potential changes to groundwater sources and subsurface water connectivity. C*hemical contamination/nutrients* would address concerns regarding groundwater water quality.

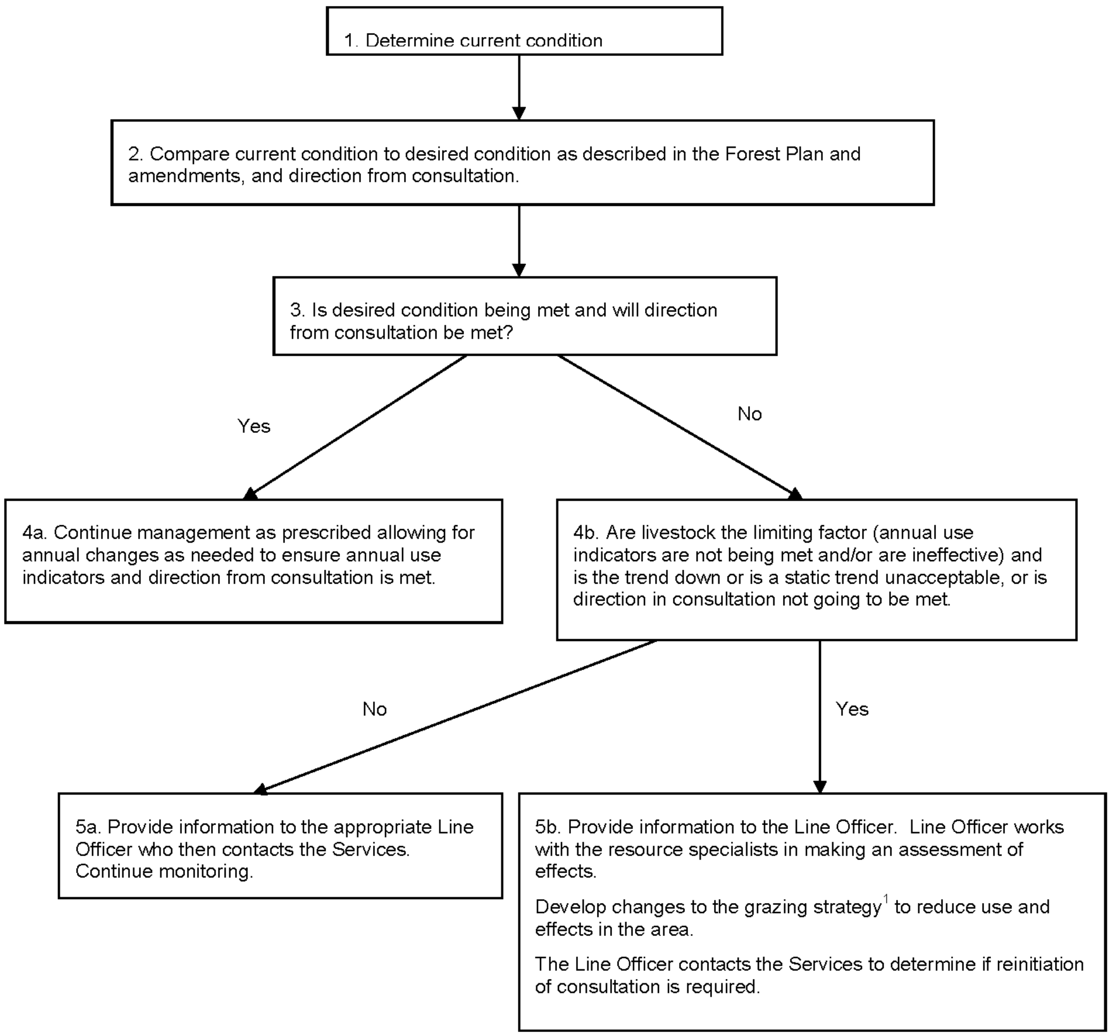
7. Migratory corridors with minimal physical, biological, or chemical barriers between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows. The biological indicator *life history diversity and isolation* addresses the function of migration and/or subsequent isolation with respect to the population. The biological indicator *persistence and genetic integrity* indirectly reflects the status of migratory corridors. Physical, biological or chemical barriers to migration are addressed directly through water quality habitat indicators, including *temperature*, *chemical contamination/nutrients* and *physical barriers*. The analysis of these indicators would assess if barriers have been created due to impacts such as high temperatures, high concentrations of contaminants or physical barriers. Analysis of *change in peak/base flows* and *average wetted width/maximum depth ratio in scour pools in a reach* would assess whether changes in flow might create a seasonal barrier to migration. An analysis of *refugia,* which considers the habitat's ability to support strong, well distributed, and connected populations for all life stages and forms of bull trout, would also be pertinent to this PCE.

8. An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish. An analysis of *floodplain connectivity* and *riparian conservation areas* would assess these contributions to the food base. Floodplain and riparian areas provide habitat to aquatic invertebrates, which in turn provides a forage base to bull trout (USDI 1998e). This PCE is indirectly addressed through the biological indicator of *growth and survival* and *life history diversity and isolation*. Both of these indicators look at habitat quality and subpopulation condition, which provides information on food base. This PCE is a synthesis of the previous PCEs. It is addressed through the analysis of biological and habitat indicators in that, if a bull trout population either exists or could exist in a watershed, then there is an adequate forage base. A healthy habitat provides a forage base for the target species. Any potential impairment to the forage base has been addressed by way of summarizing the biological and habitat indicators.

9. Few or no predatory, interbreeding, or competitive nonnative species present. This PCE is addressed specifically by analysis of the biological *indicator persistence and genetic integrity*. This indicator analyzes the probability of hybridization or displacement by competitive species. An analysis of *physical barriers* may indirectly address non-native species in those areas where a barrier may prevent the invasion of non-native species.

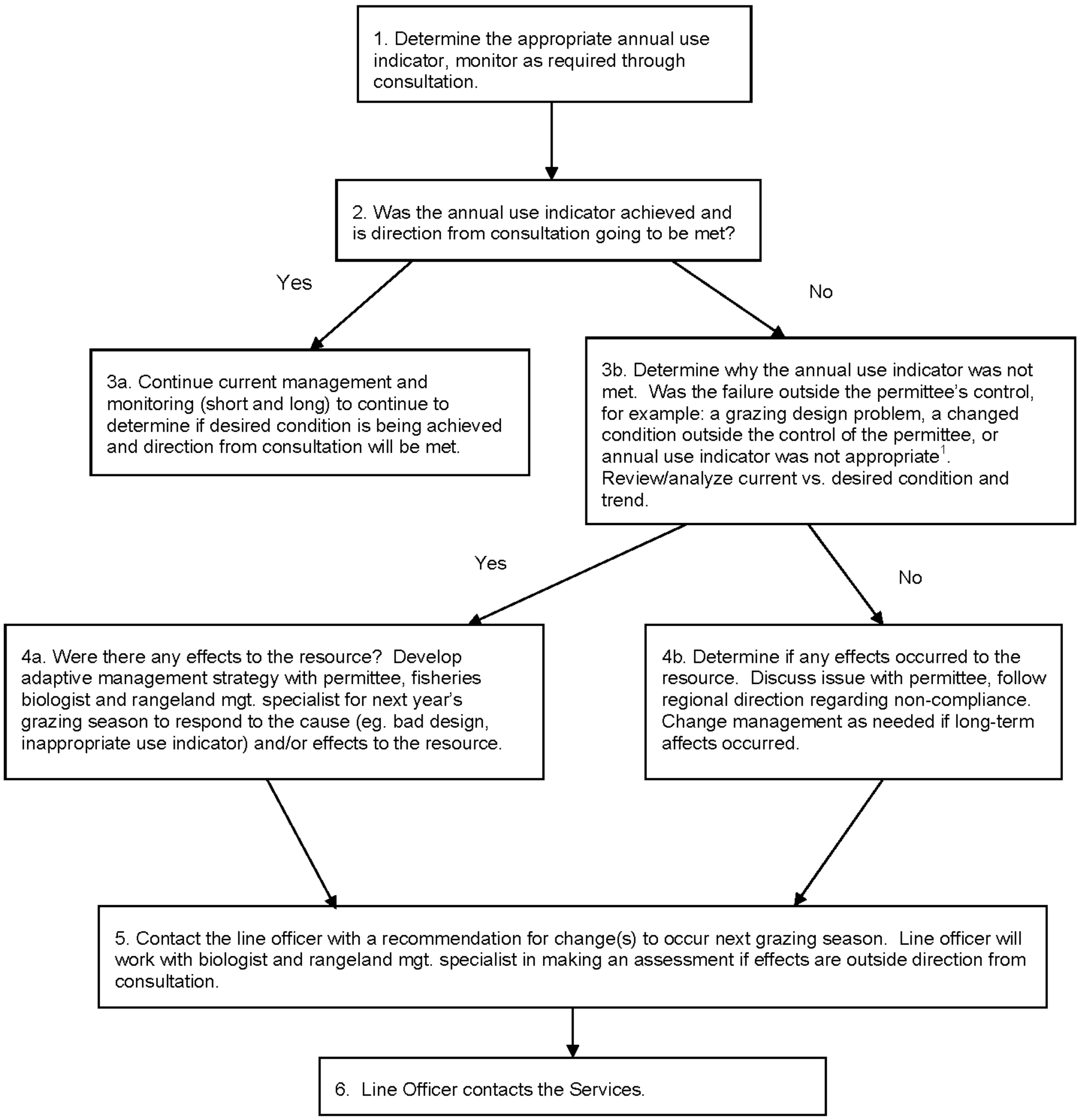
APPENDIX F – ADAPTIVE MANAGEMENT DIAGRAMS

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



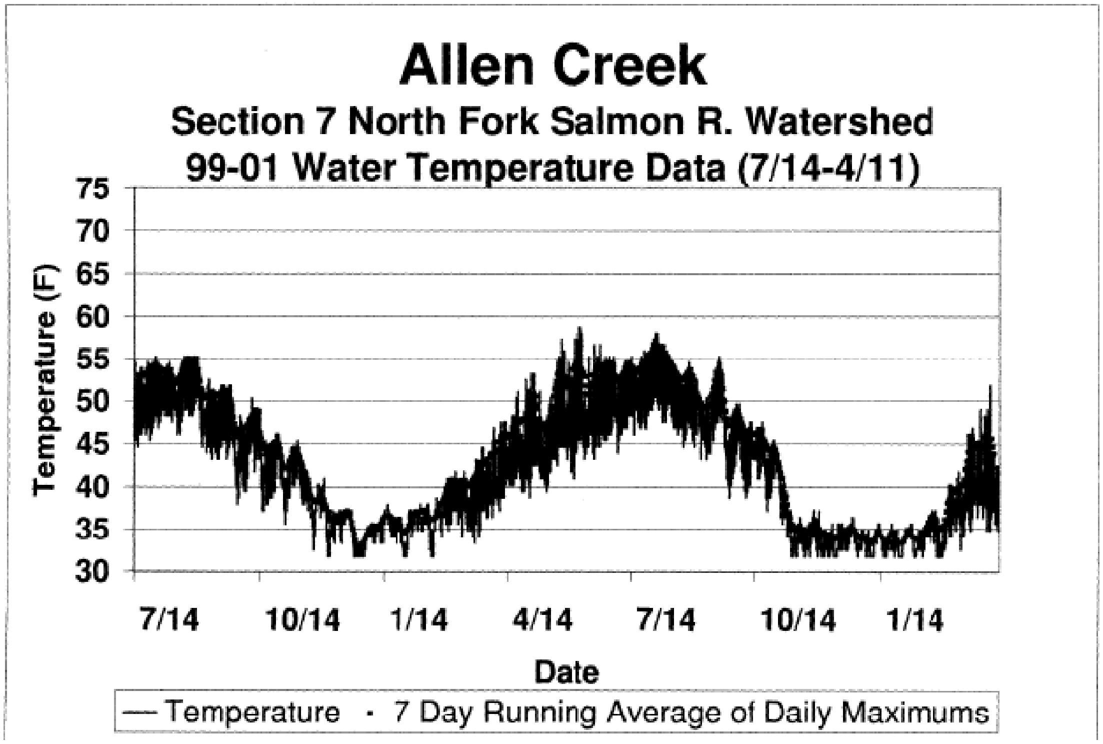
[1]Management actions will initially reduce use in the area. It is expected this may occur in any number of ways including but not limited to changing the season of use, reducing numbers, changing amount of use on annual indicator, changing herding practices, changing salting practices and/or reconstructing/constructing 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.

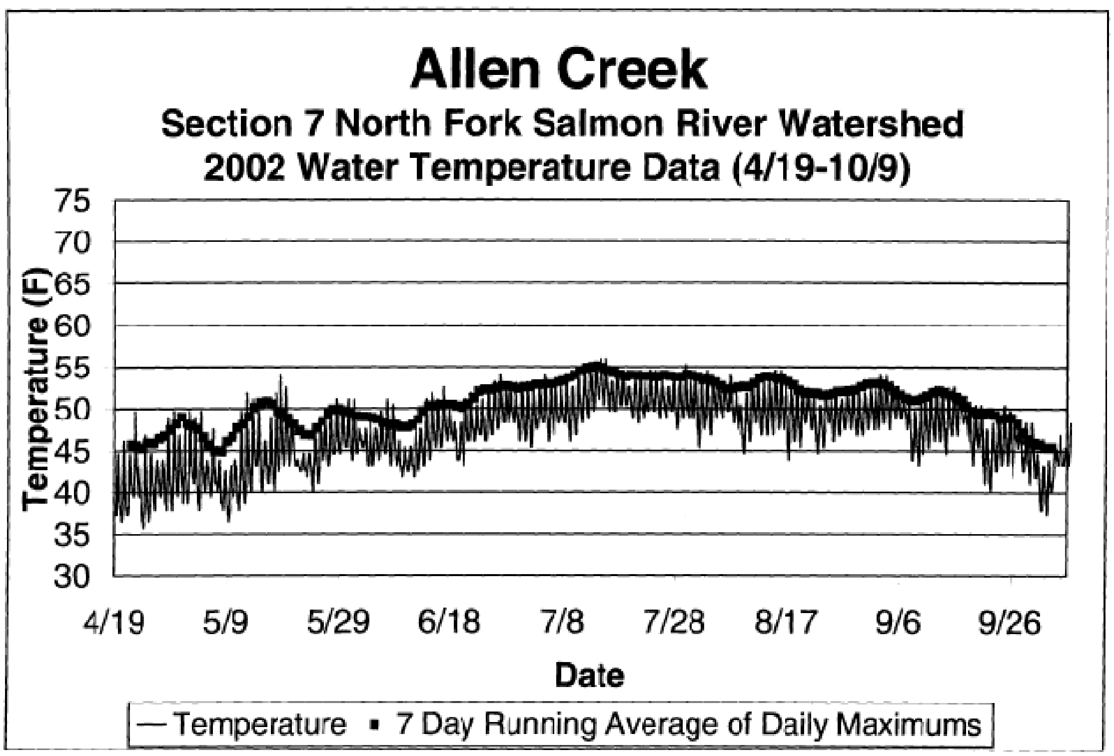
Diagram 2.0 - Implementation of Annual Adaptive Management Strategy for Allotments Requiring Consultation.

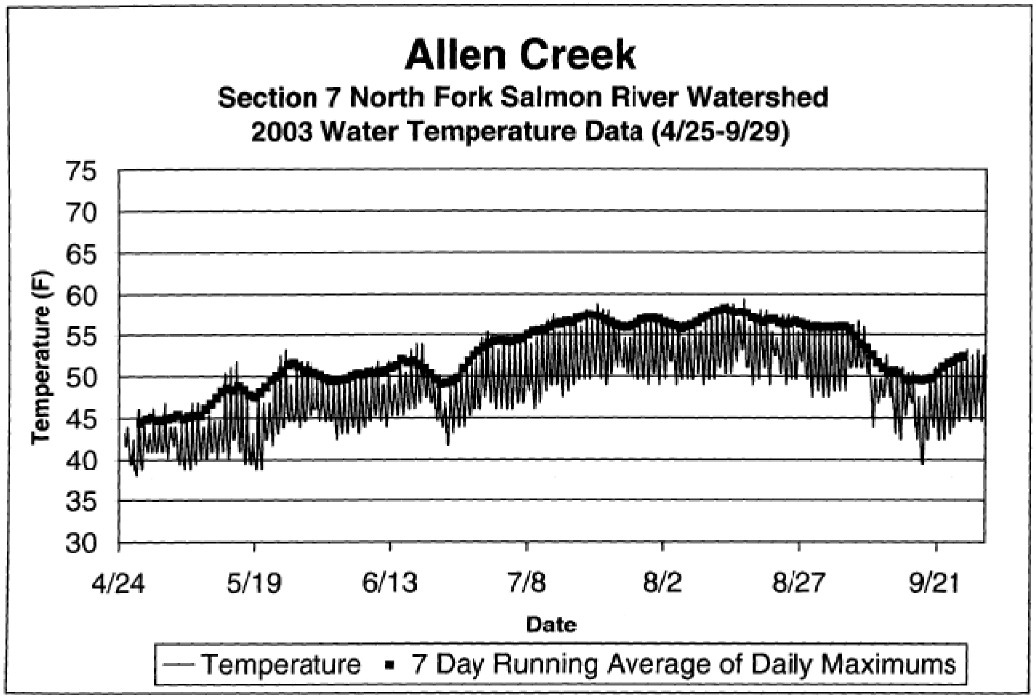


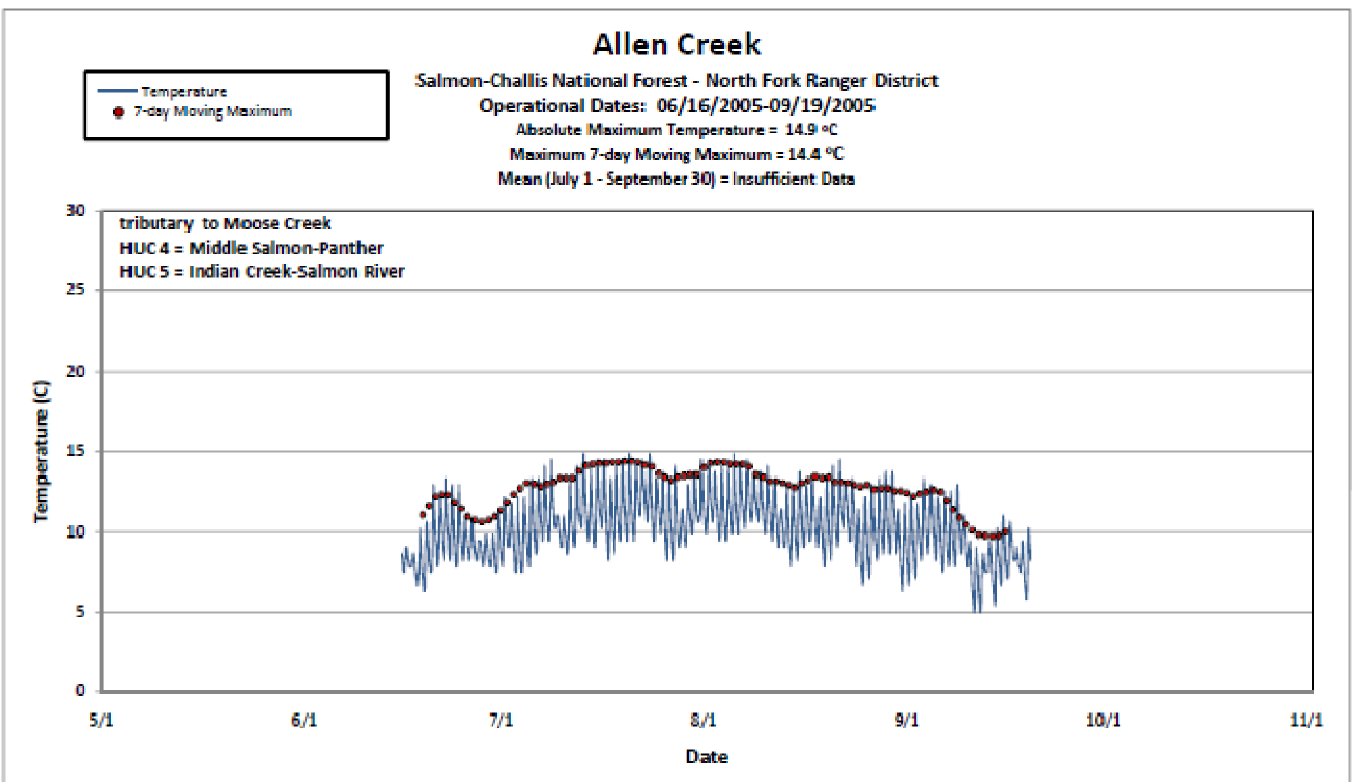
[1]An inappropriate annual use indicator is an indicator that does not most accurately identify the weak link or first attribute that would indicate excessive livestock impacts. In this situation, changing to a more appropriate indicator will help achieve or maintain desired conditions.

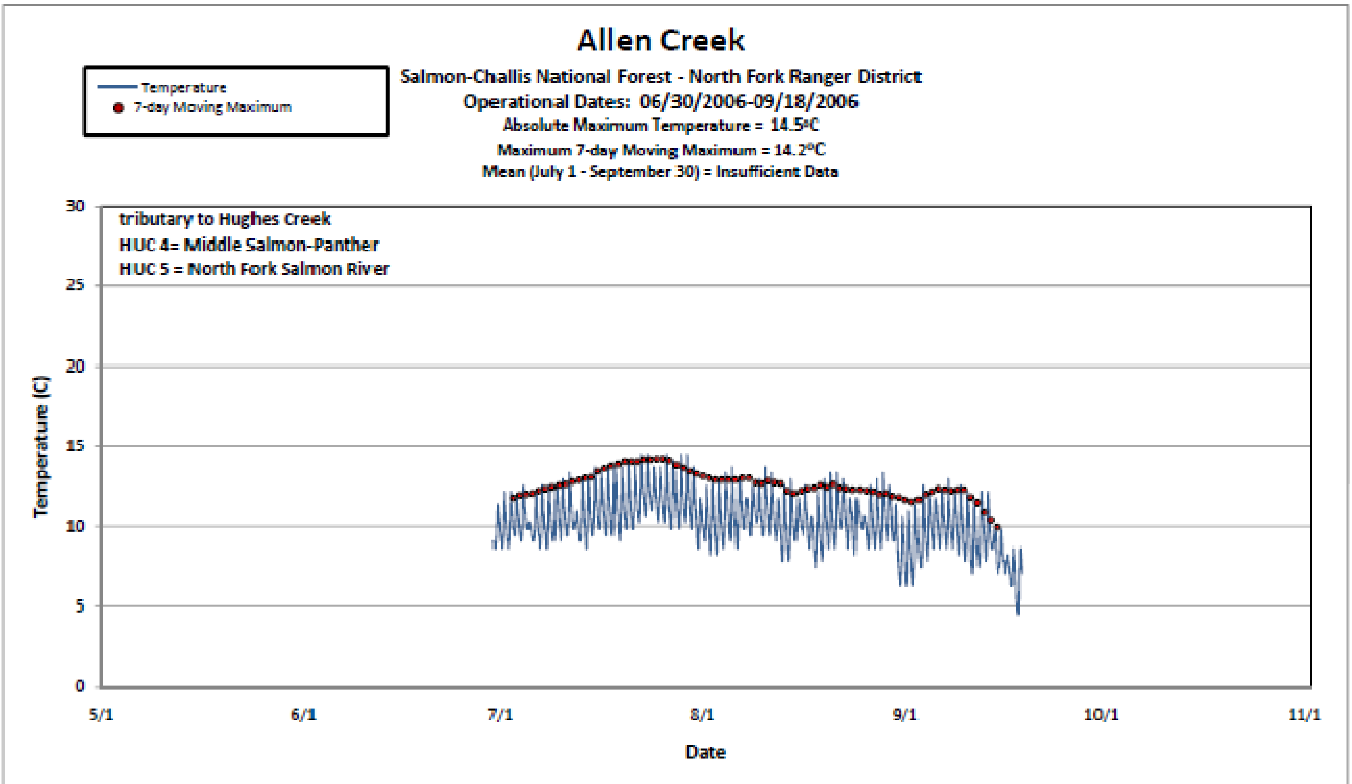
APPENDIX G – STREAM TEMPERATURE GRAPHS

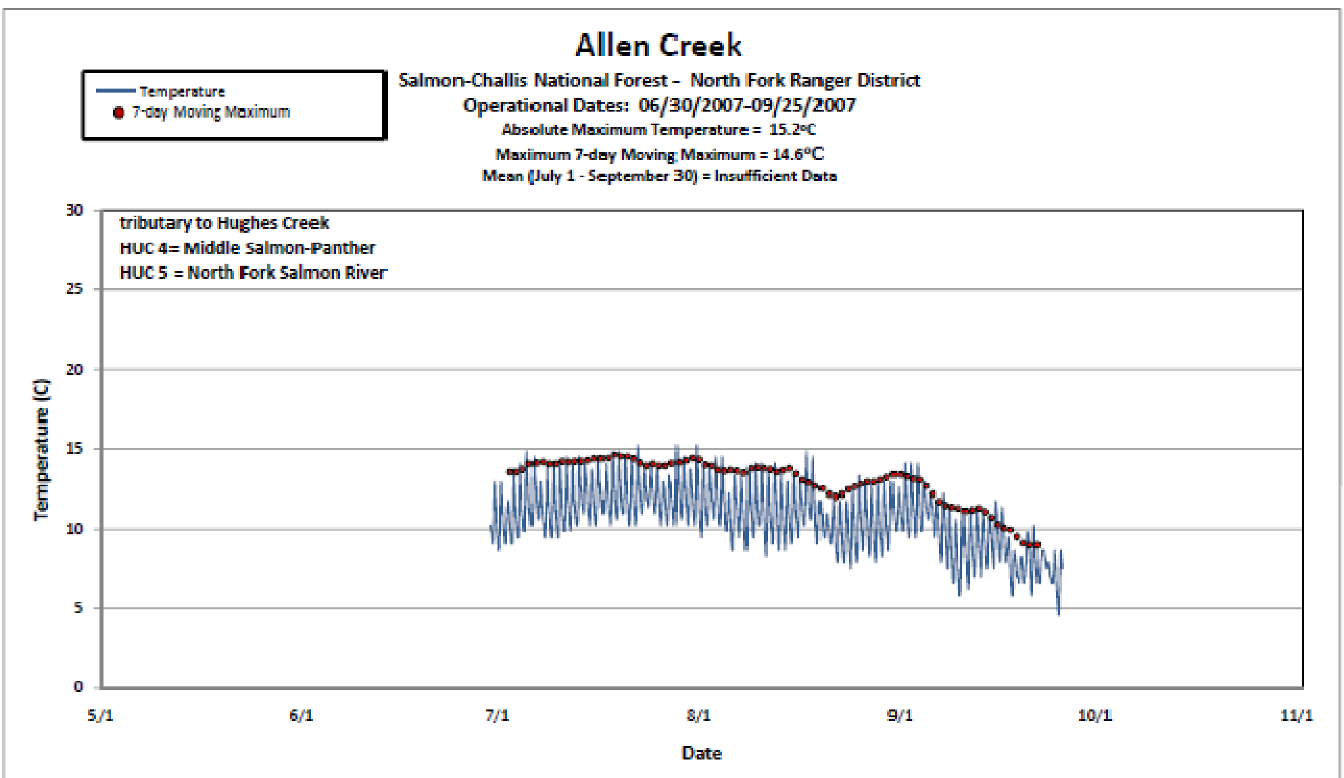

Allen Creek
Section 7 North Fork Salmon R. Watershed
99-01 Water Temperature Data (7/14-4/11)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
7/14
10/14
1/14
4/14
7/14
10/14
1/14
Date
— Temperature
7 Day Running Average of Daily Maximums

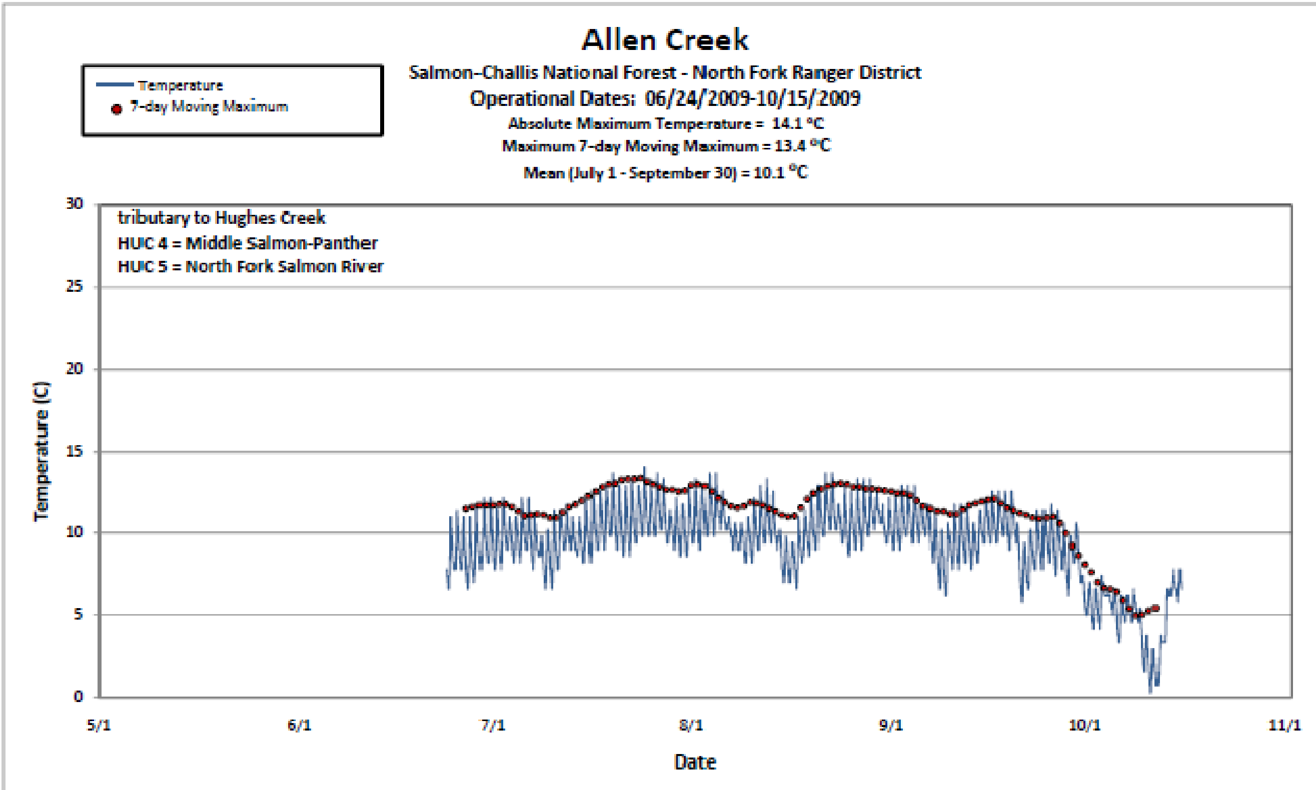

Allen Creek
Section 7 North Fork Salmon River Watershed
2002 Water Temperature Data (4/19-10/9)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/19
5/9
5/29
6/18
7/8
7/28
8/17
9/6
9/26
Date
— Temperature
7 Day Running Average of Daily Maximums

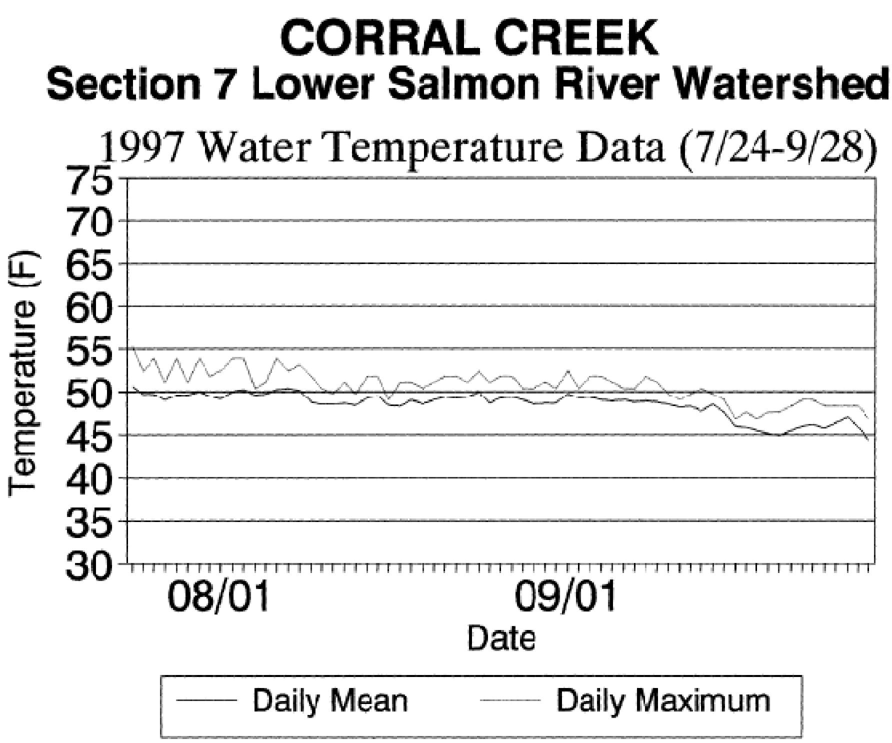

Allen Creek
Section 7 North Fork Salmon River Watershed
2003 Water Temperature Data (4/25-9/29)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/24
5/19
6/13
7/8
8/2
8/27
9/21
Date
Temperature
7 Day Running Average of Daily Maximums

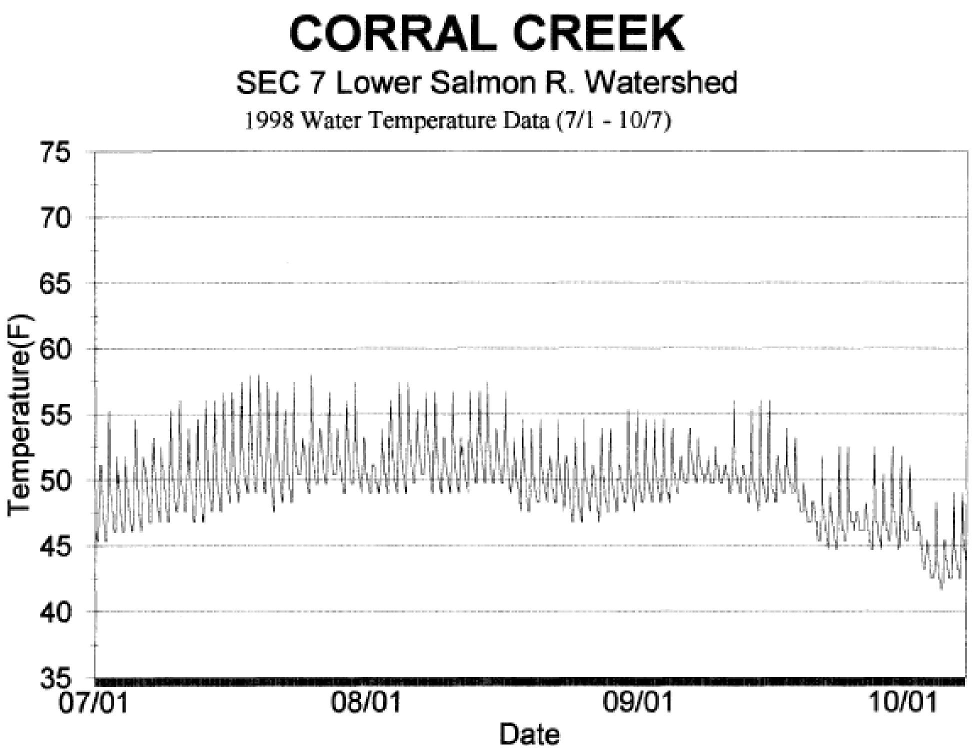

Allen Creek
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/16/2005-09/19/2005
Absolute Maximum Temperature = 14.9 °C
Maximum 7-day Moving Maximum = 14.4 °C
Mean (July 1 - September 30) = Insufficient Data
tributary to Moose Creek
HUC 4 = Middle Salmon-Panther
HUC 5 = Indian Creek-Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

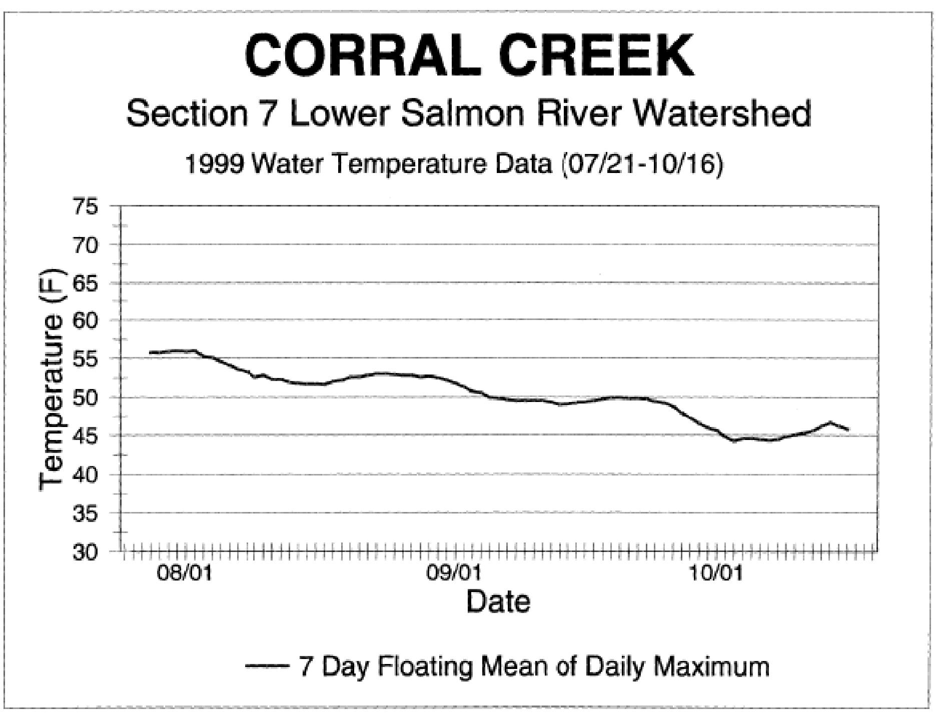

Allen Creek
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/30/2006-09/18/2006
Absolute Maximum Temperature = 14.5ºC
Maximum 7-day Moving Maximum = 14.2ºC
Mean (July 1 - September 30) = Insufficient Data
tributary to Hughes Creek
HUC 4= Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

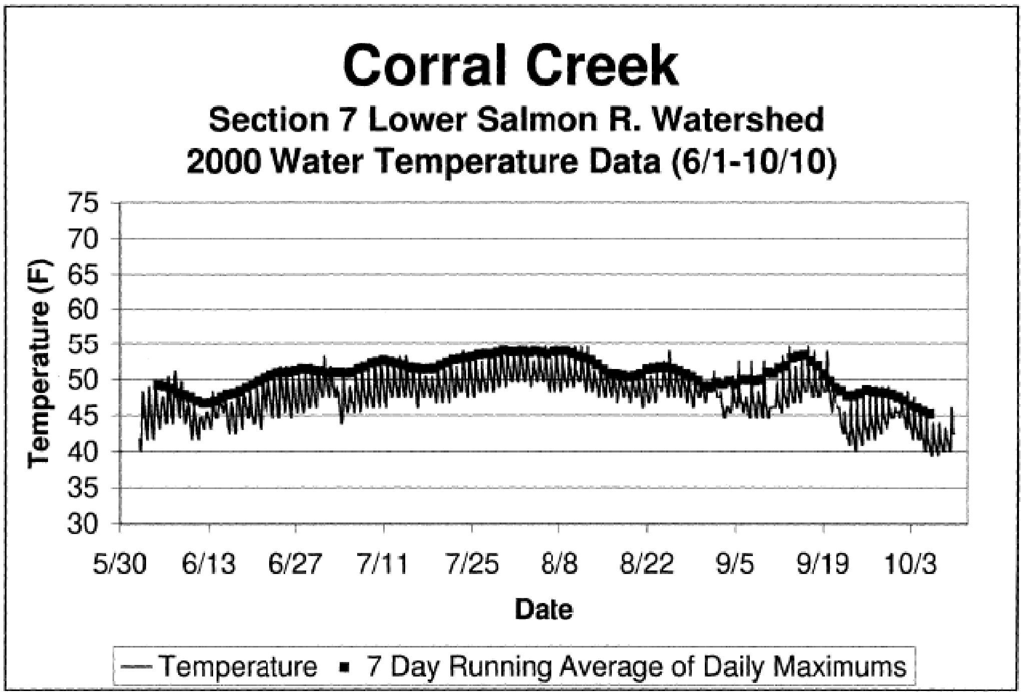

Allen Creek
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/30/2007-09/25/2007
Absolute Maximum Temperature = 15.2ºC
Maximum 7-day Moving Maximum = 14.6ºC
Mean (July 1 - September 30) = Insufficient Data
tributary to Hughes Creek
HUC 4= Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

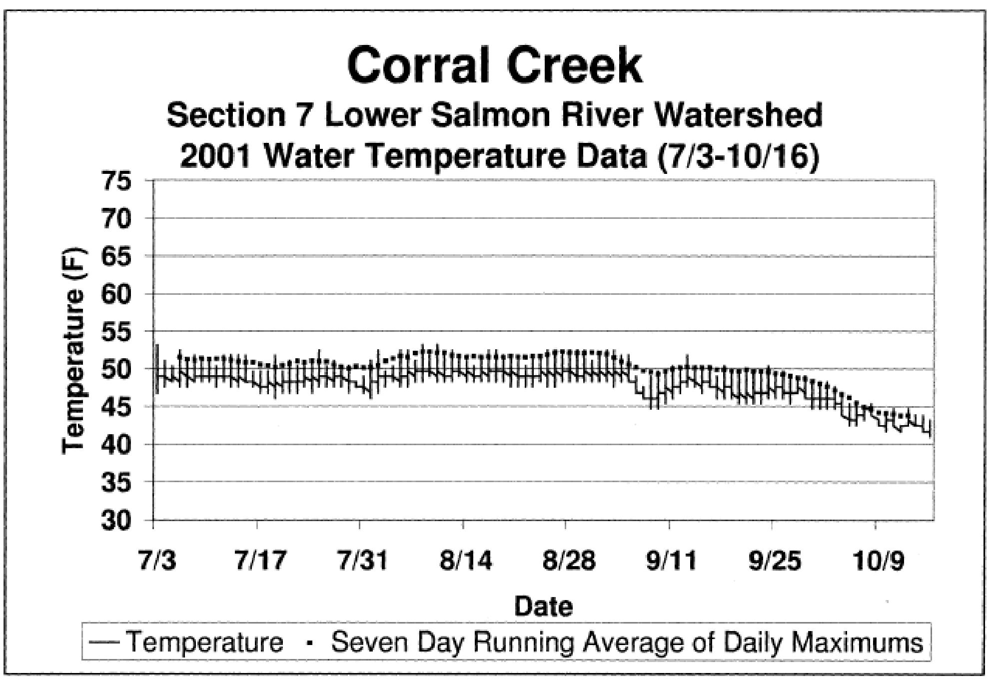

Allen Creek
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/24/2009-10/15/2009
Absolute Maximum Temperature = 14.1 °C
Maximum 7-day Moving Maximum = 13.4 °C
Mean (July 1 - September 30) = 10.1 °C
Temperature
7-day Moving Maximum
tributary to Hughes Creek
HUC 4 = Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

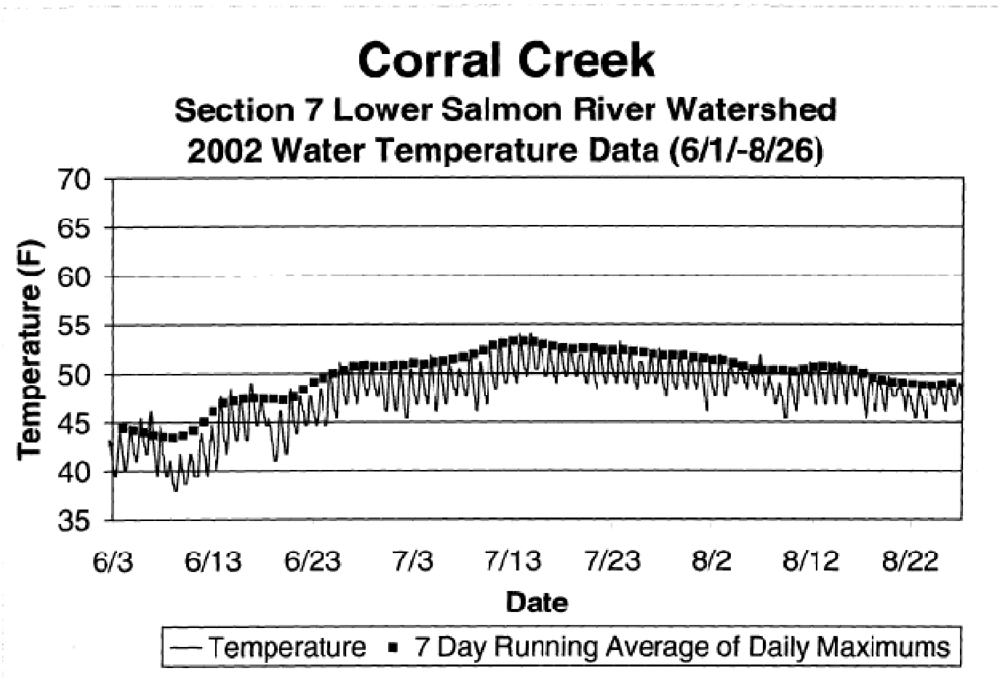

CORRAL CREEK
Section 7 Lower Salmon River Watershed
1997 Water Temperature Data (7/24-9/28)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
08/01
09/01
Date
Daily Mean
Daily Maximum

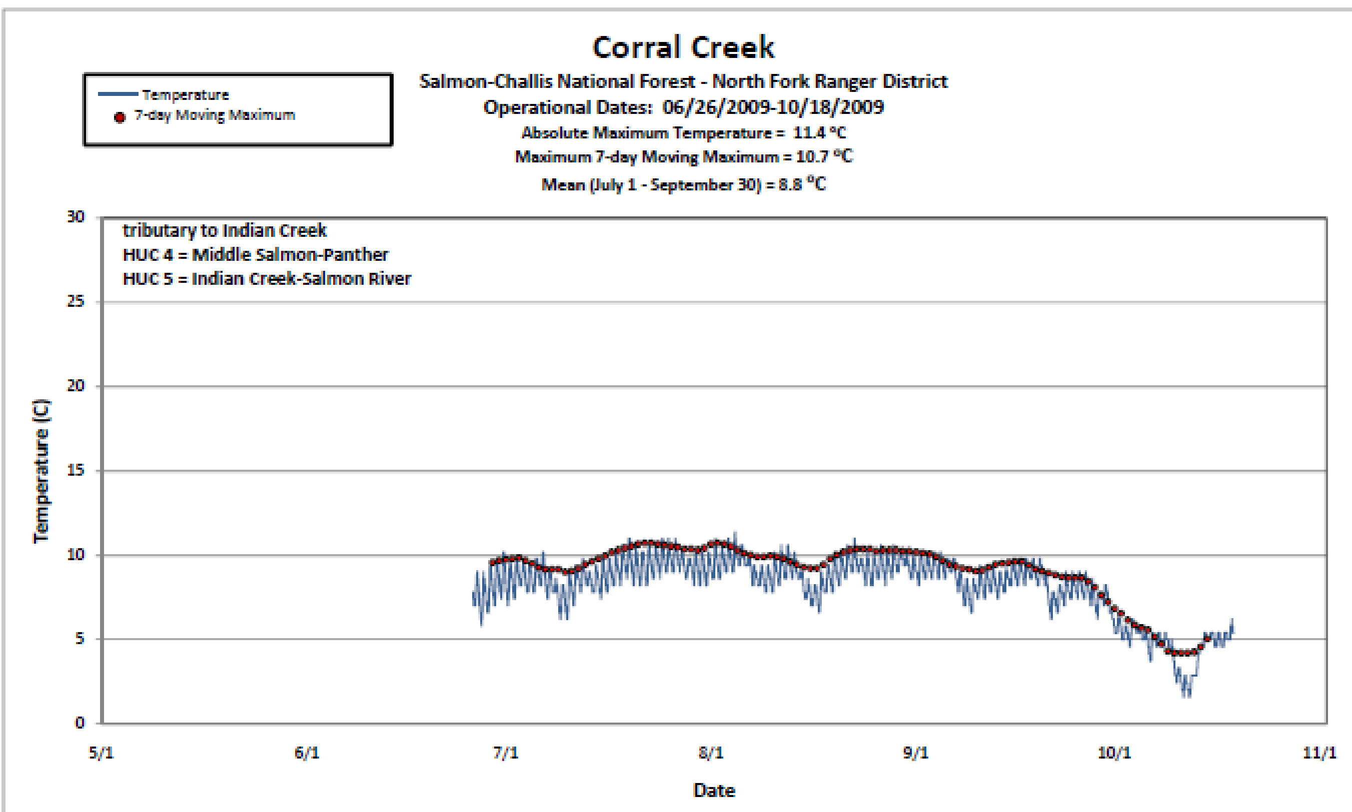

CORRAL CREEK
SEC 7 Lower Salmon R. Watershed
1998 Water Temperature Data (7/1 - 10/7)
Temperature(F)
75
70
65
60
55
50
45
40
35
07/01
08/01
09/01
10/01
Date


CORRAL CREEK
Section 7 Lower Salmon River Watershed
1999 Water Temperature Data (07/21-10/16)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
08/01
09/01
10/01
Date
7 Day Floating Mean of Daily Maximum


Corral Creek
Section 7 Lower Salmon R. Watershed
2000 Water Temperature Data (6/1-10/10)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
5/30
6/13
6/27
7/11
7/25
8/8
8/22
9/5
9/19
10/3
Date
— Temperature ▪ 7 Day Running Average of Daily Maximums

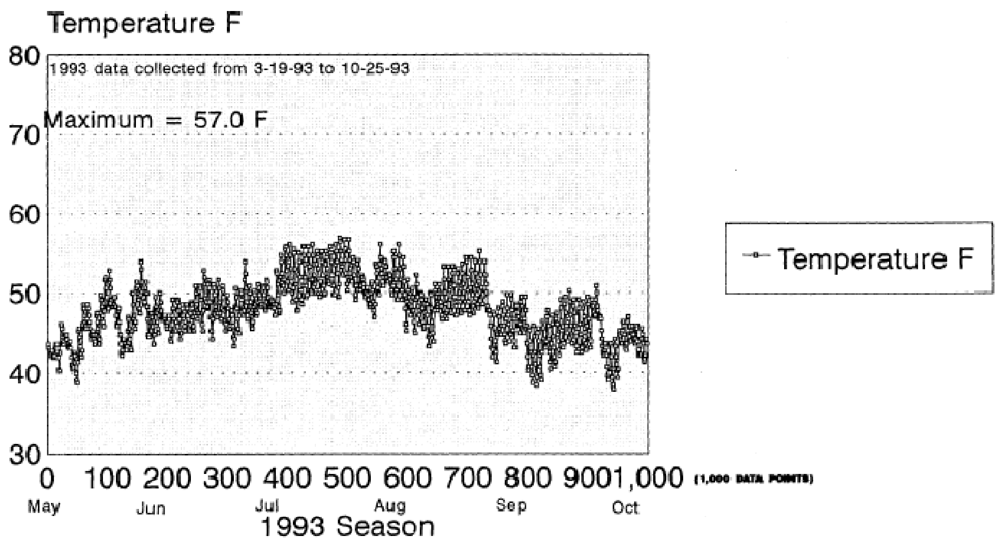

Corral Creek
Section 7 Lower Salmon River Watershed
2001 Water Temperature Data (7/3-10/16)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
7/3
7/17
7/31
8/14
8/28
9/11
9/25
10/9
Date
— Temperature · Seven Day Running Average of Daily Maximums


Corral Creek
Section 7 Lower Salmon River Watershed
2002 Water Temperature Data (6/1/-8/26)
Temperature (F)
70
65
60
55
50
45
40
35
6/3
6/13
6/23
7/3
7/13
7/23
8/2
8/12
8/22
Date
Temperature
7 Day Running Average of Daily Maximums

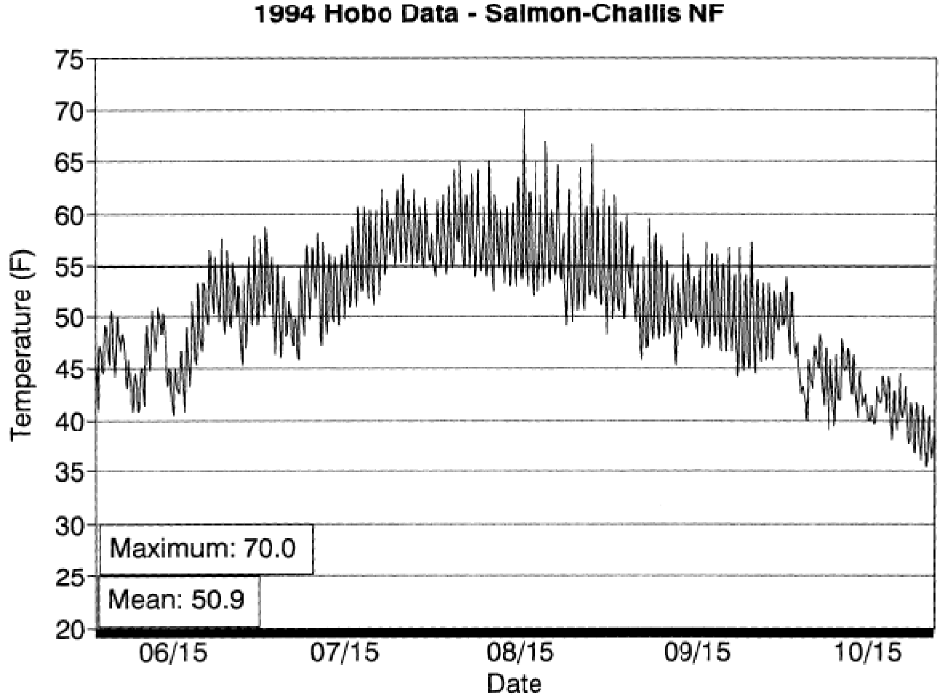

Corral Creek
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/26/2009-10/18/2009
Absolute Maximum Temperature = 11.4 °C
Maximum 7-day Moving Maximum = 10.7 °C
Mean (July 1 - September 30) = 8.8 °C
Temperature
7-day Moving Maximum
tributary to Indian Creek
HUC 4 = Middle Salmon-Panther
HUC 5 = Indian Creek-Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

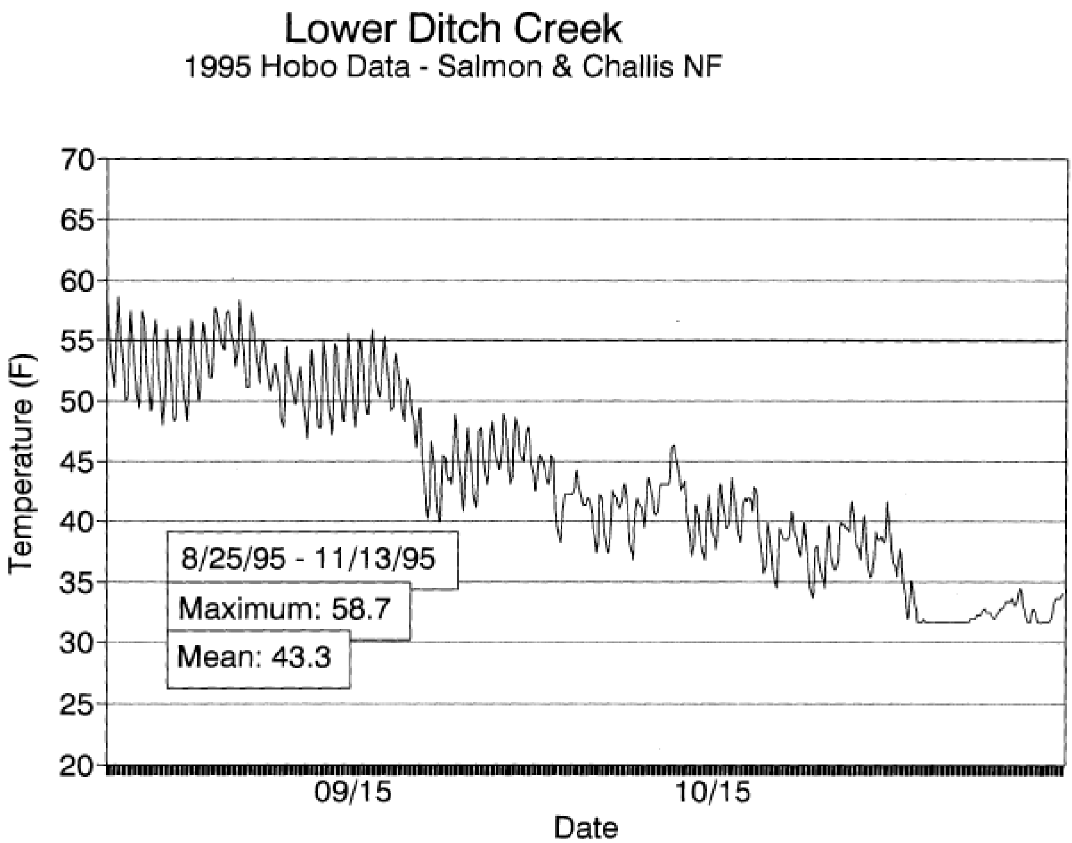
Ditch Creek (North Fork District)

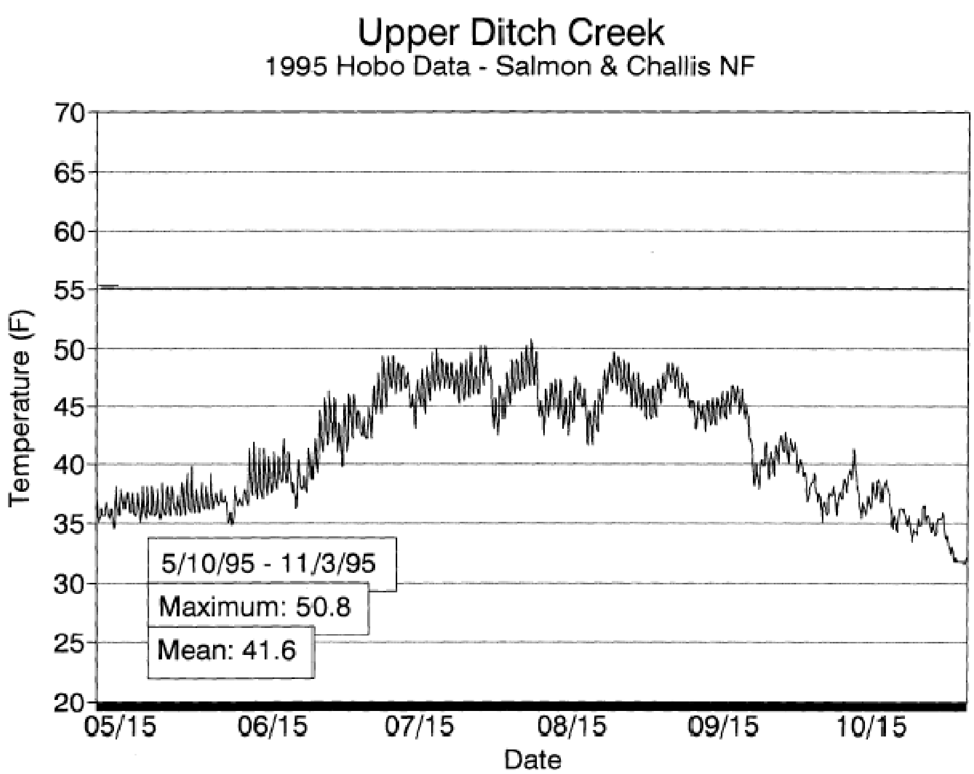
1993 Hobotemp Data

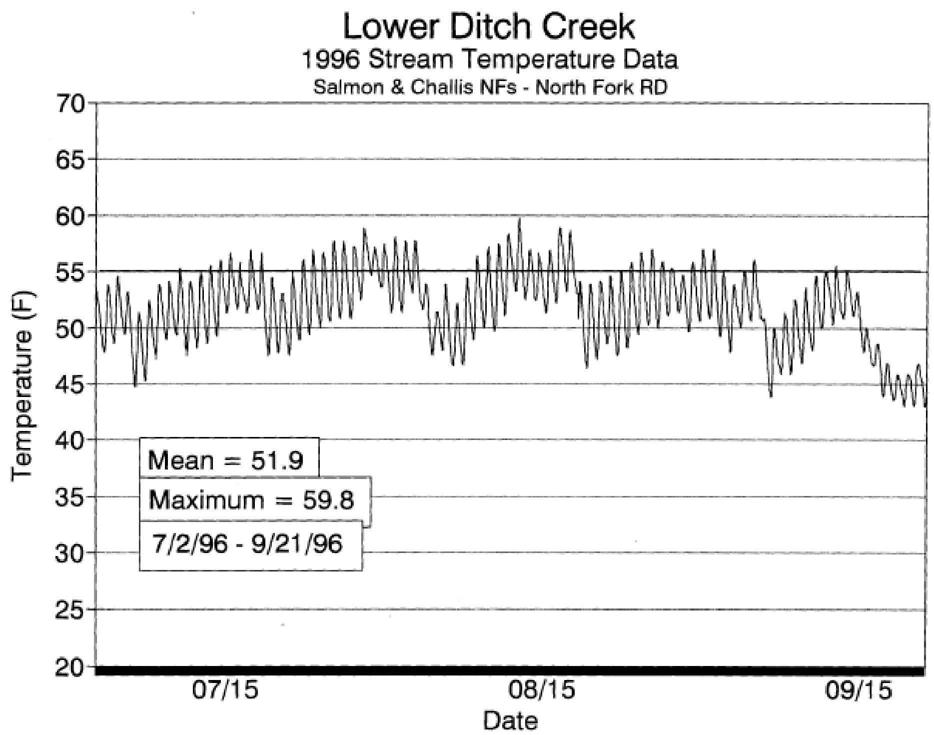


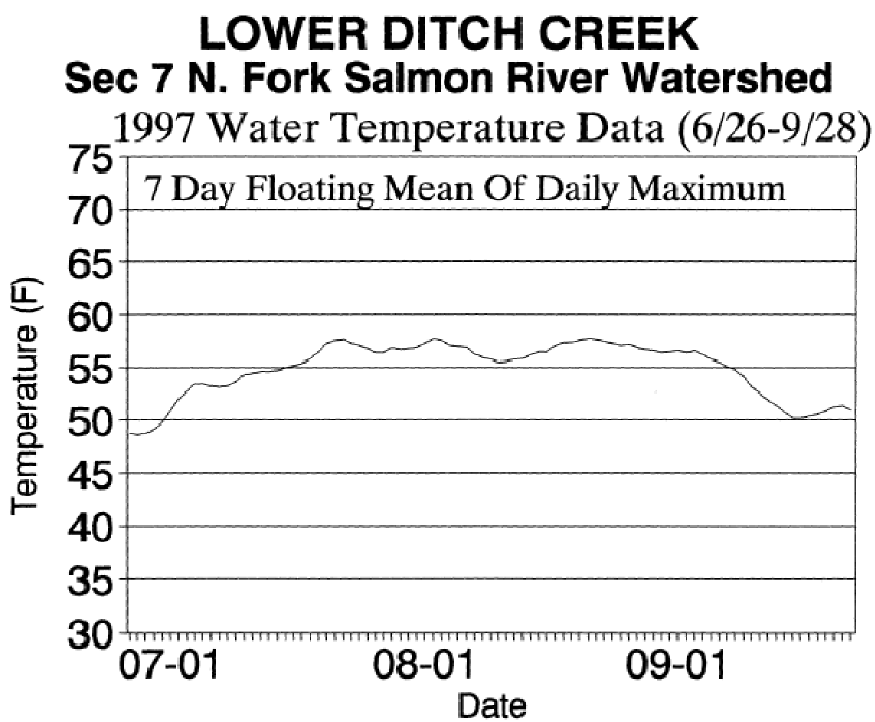
Data Graphed from 5-25-93 to 10-15-93

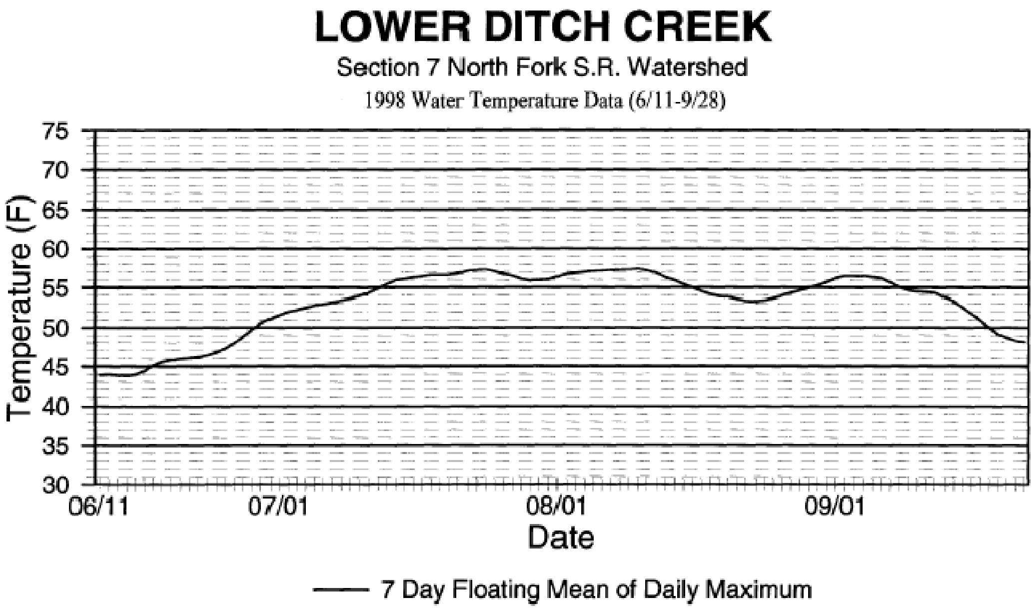


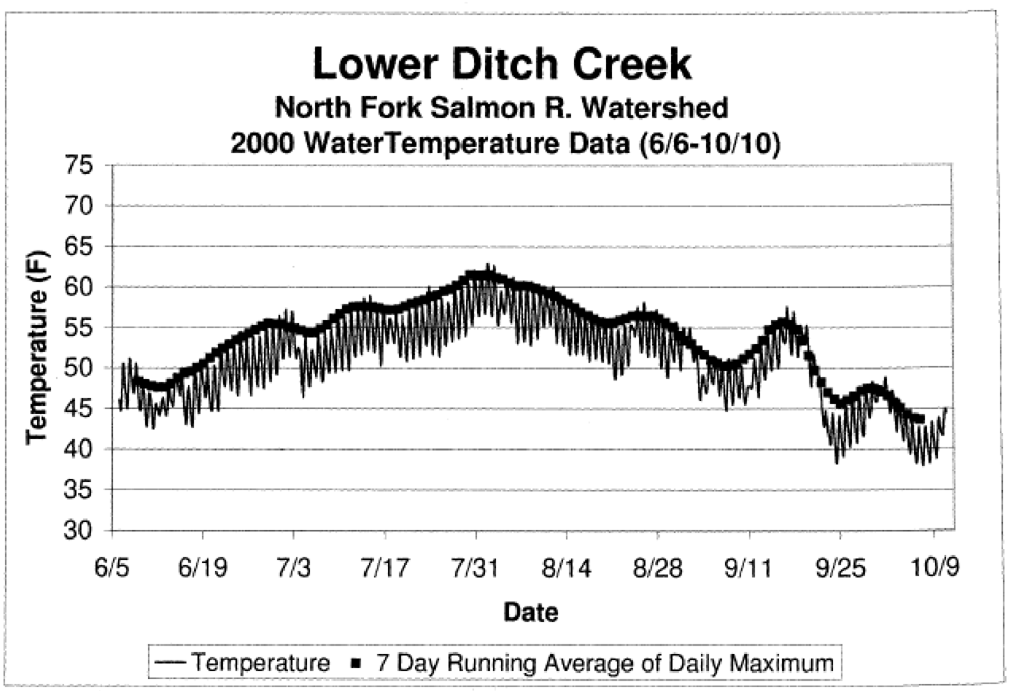

Lower Ditch Creek
1995 Hobo Data - Salmon & Challis NF
Temperature (F)
70
65
60
55
50
45
40
35
30
25
20
8/25/95 - 11/13/95
Maximum: 58.7
Mean: 43.3
09/15
10/15
Date

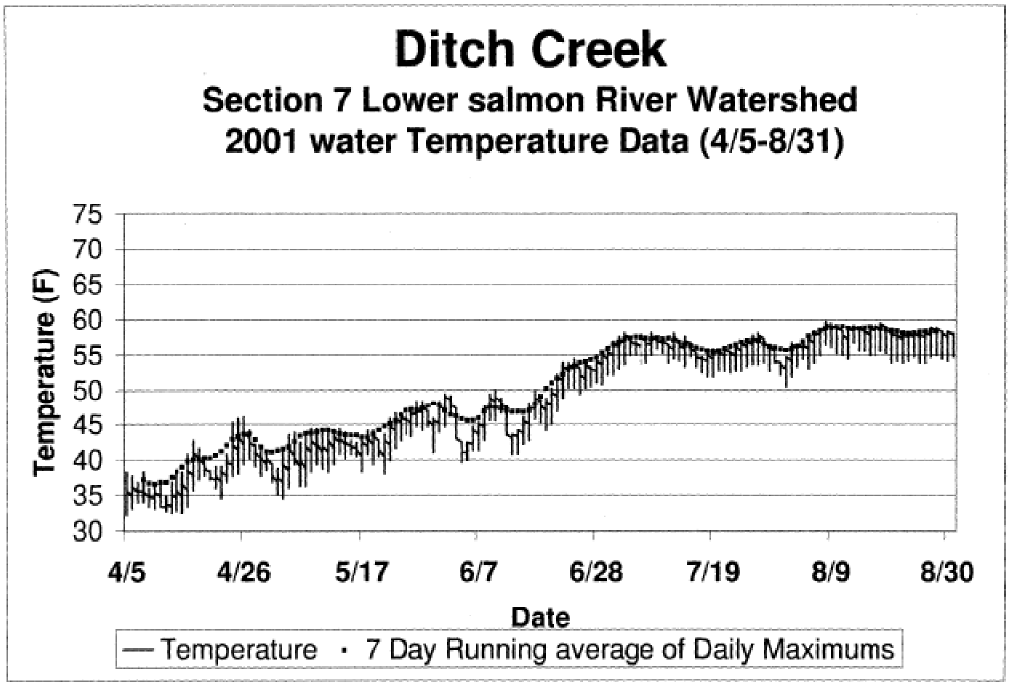

Upper Ditch Creek
1995 Hobo Data - Salmon & Challis NF
Temperature (F)
70
65
60
55
50
45
40
35
30
25
20
5/10/95 - 11/3/95
Maximum: 50.8
Mean: 41.6
05/15
06/15
07/15
08/15
09/15
10/15
Date

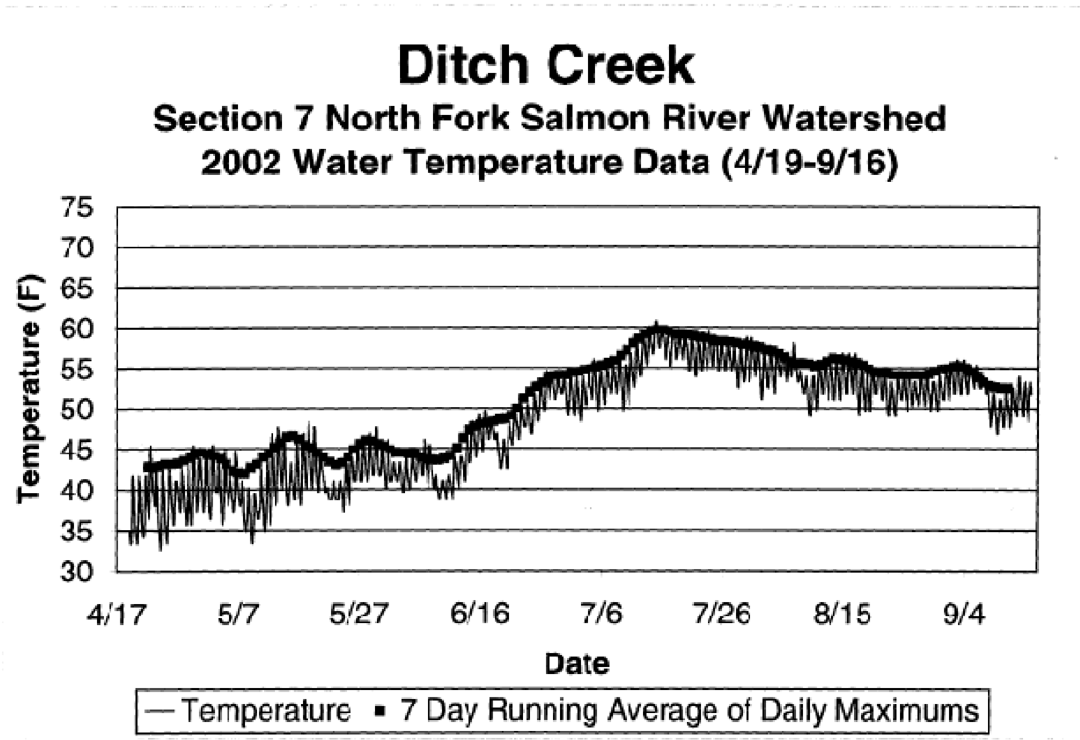

Lower Ditch Creek
1996 Stream Temperature Data
Salmon & Challis NFs - North Fork RD
Temperature (F)
70
65
60
55
50
45
40
35
30
25
20
Mean = 51.9
Maximum = 59.8
7/2/96 - 9/21/96
07/15
08/15
09/15
Date

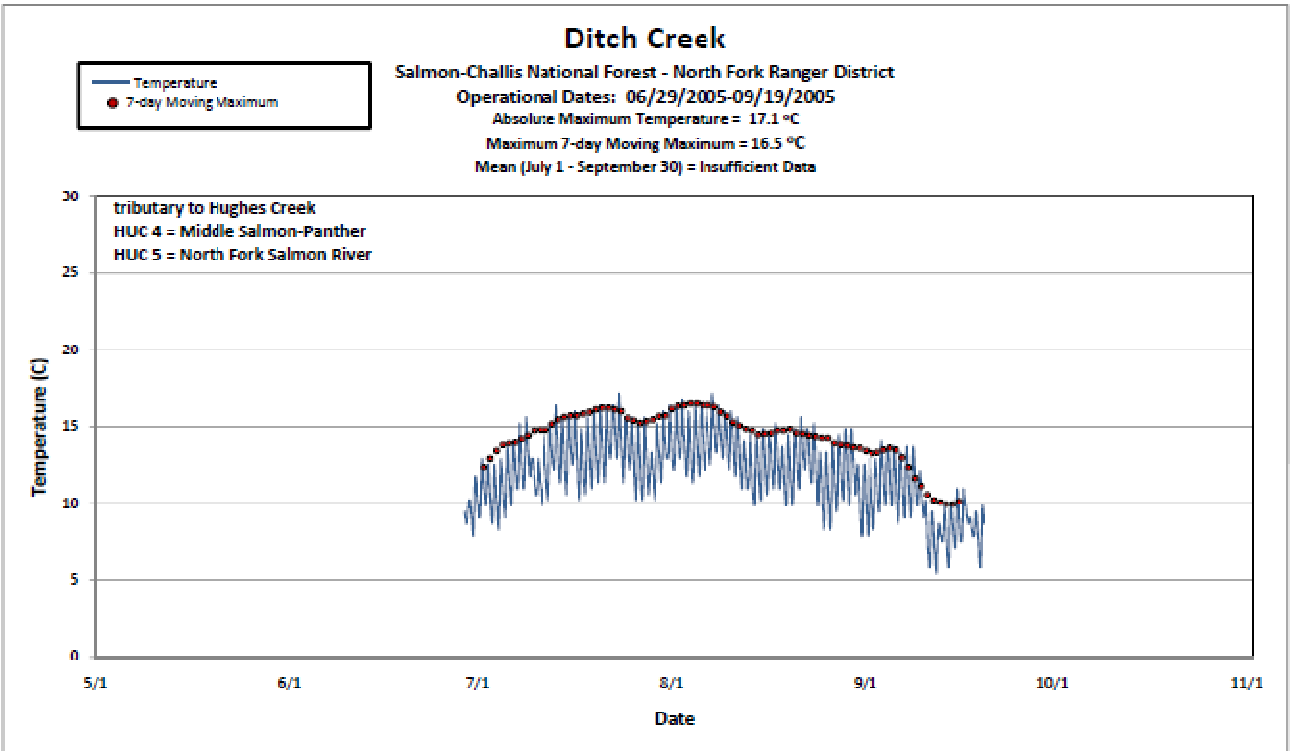

LOWER DITCH CREEK
Sec 7 N. Fork Salmon River Watershed
1997 Water Temperature Data (6/26-9/28)
7 Day Floating Mean Of Daily Maximum
Temperature (F)
75
70
65
60
55
50
45
40
35
30
07-01
08-01
09-01
Date

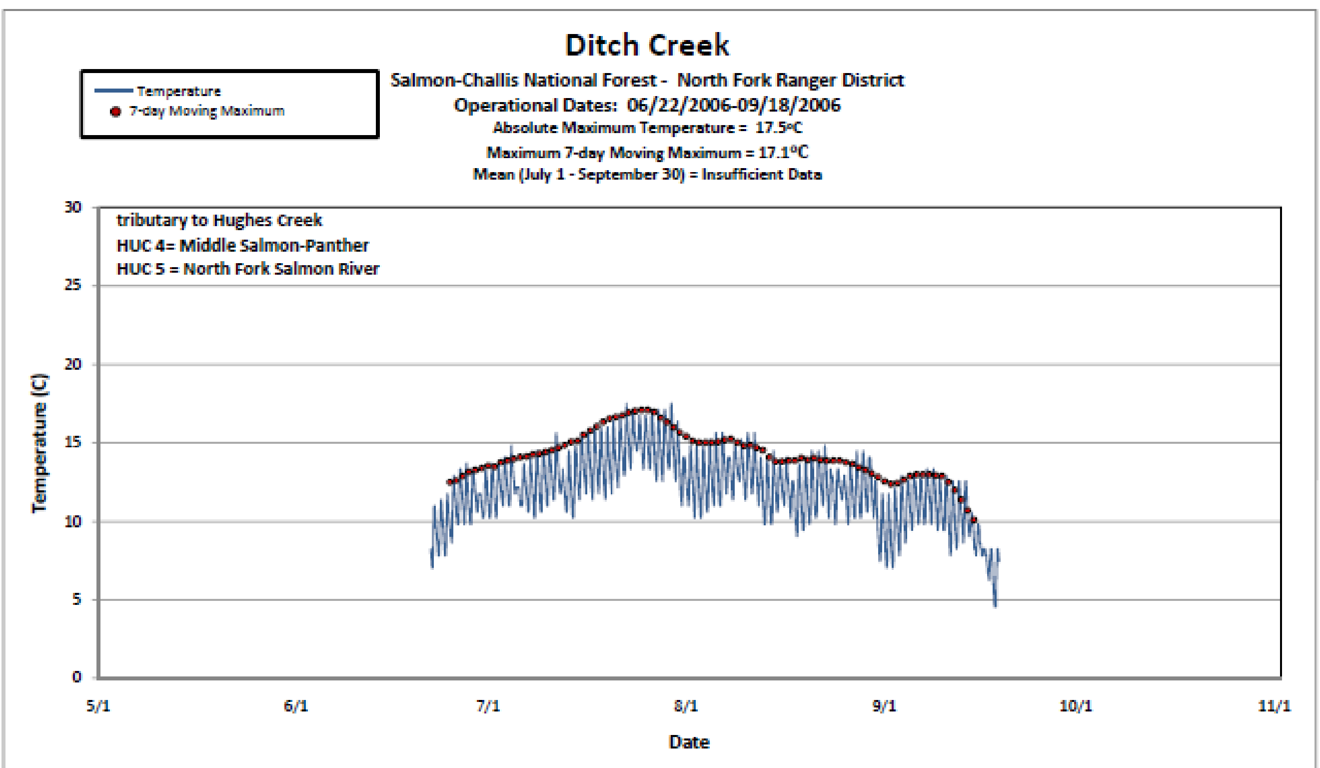

LOWER DITCH CREEK
Section 7 North Fork S.R. Watershed
1998 Water Temperature Data (6/11-9/28)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
06/11
07/01
08/01
09/01
Date
7 Day Floating Mean of Daily Maximum

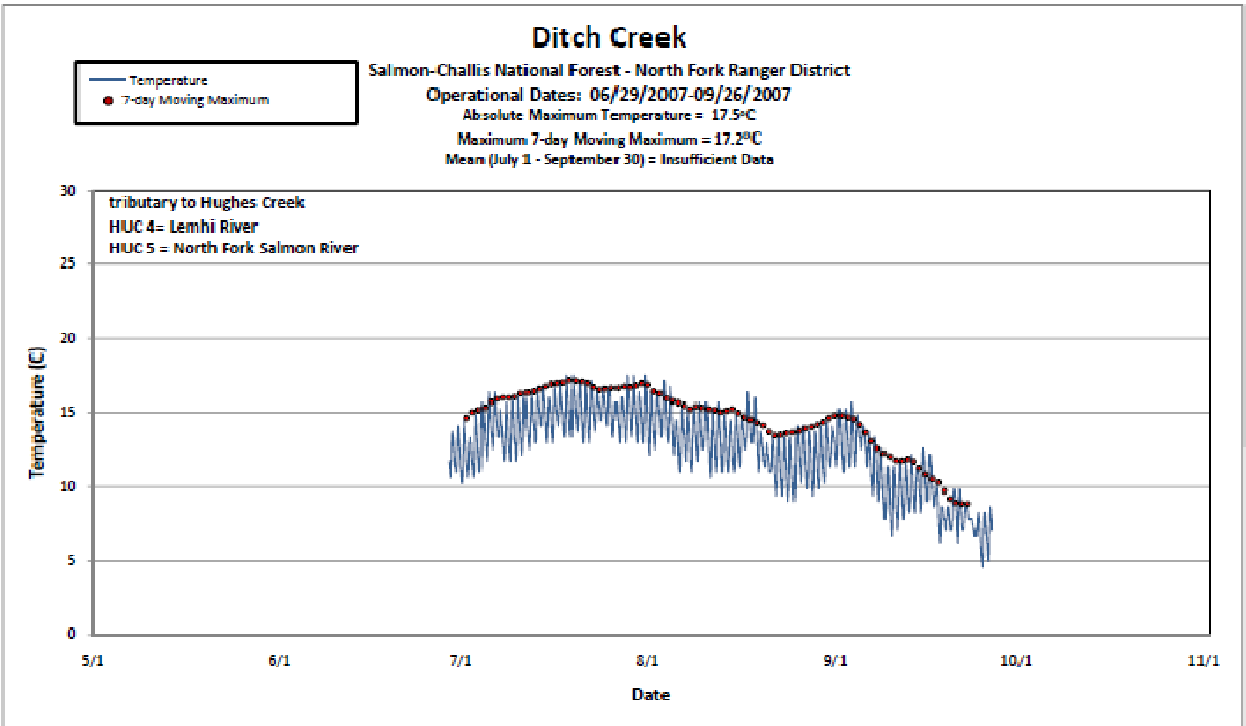

Lower Ditch Creek
North Fork Salmon R. Watershed
2000 WaterTemperature Data (6/6-10/10)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
6/5
6/19
7/3
7/17
7/31
8/14
8/28
9/11
9/25
10/9
Date
Temperature
7 Day Running Average of Daily Maximum

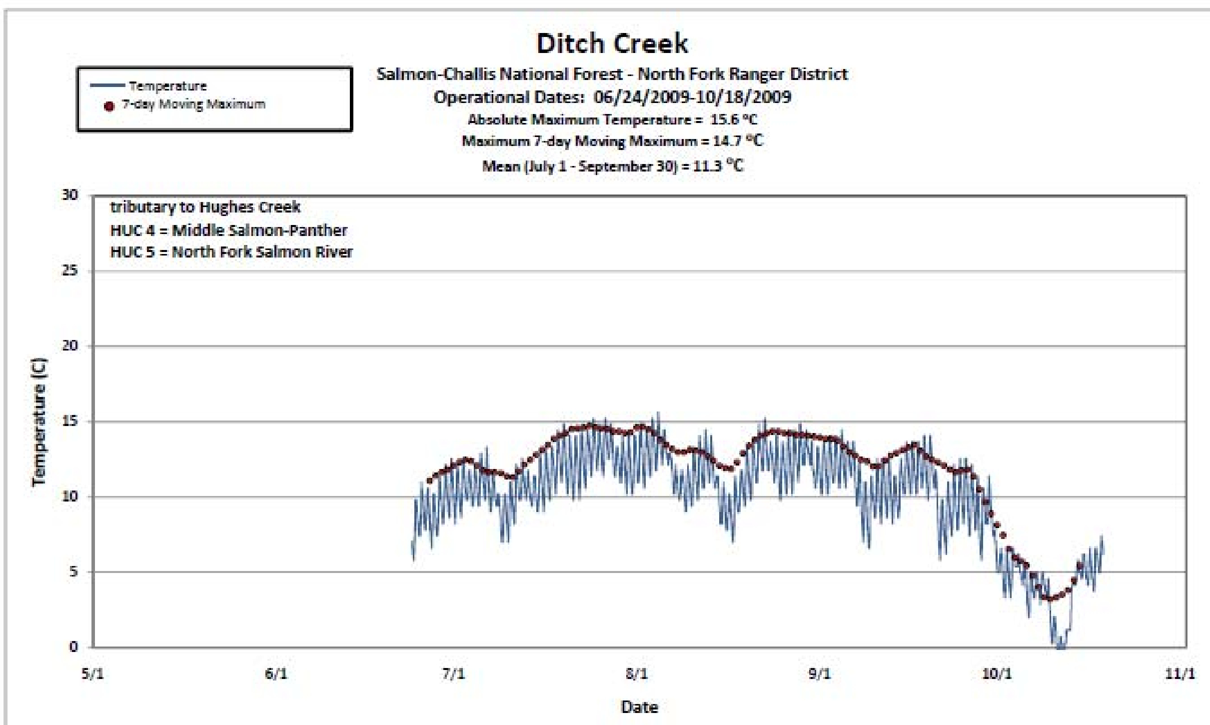

Ditch Creek
Section 7 Lower salmon River Watershed
2001 water Temperature Data (4/5-8/31)
75
70
65
60
55
50
45
40
35
30
Temperature (F)
4/5
4/26
5/17
6/7
6/28
7/19
8/9
8/30
Date
— Temperature · 7 Day Running average of Daily Maximums


Ditch Creek
Section 7 North Fork Salmon River Watershed
2002 Water Temperature Data (4/19-9/16)
75
70
65
60
55
50
45
40
35
30
Temperature (F)
4/17
5/7
5/27
6/16
7/6
7/26
8/15
9/4
Date
— Temperature ▪ 7 Day Running Average of Daily Maximums


Ditch Creek
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/29/2005-09/19/2005
Absolute Maximum Temperature = 17.1 °C
Maximum 7-day Moving Maximum = 16.5 °C
Mean (July 1 - September 30) = Insufficient Data
Temperature
7-day Moving Maximum
tributary to Hughes Creek
HUC 4 = Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

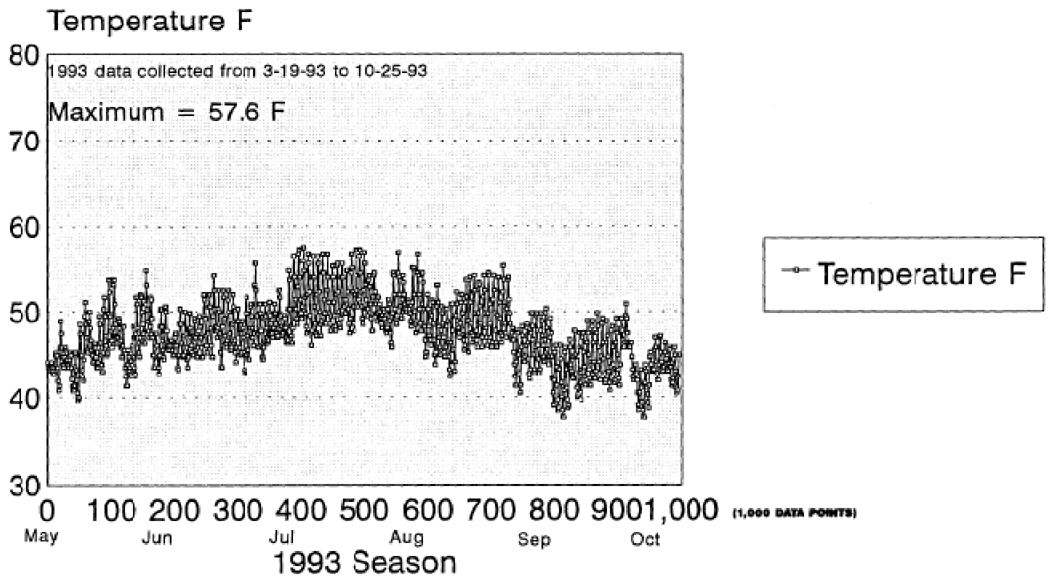

Ditch Creek
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/22/2006-09/18/2006
Absolute Maximum Temperature = 17.5°C
Maximum 7-day Moving Maximum = 17.1°C
Mean (July 1 - September 30) = Insufficient Data
Temperature
7-day Moving Maximum
tributary to Hughes Creek
HUC 4= Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date


Ditch Creek
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/29/2007-09/26/2007
Absolute Maximum Temperature = 17.5°C
Maximum 7-day Moving Maximum = 17.2°C
Mean (July 1 - September 30) = Insufficient Data
tributary to Hughes Creek
HUC 4= Lemhi River
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

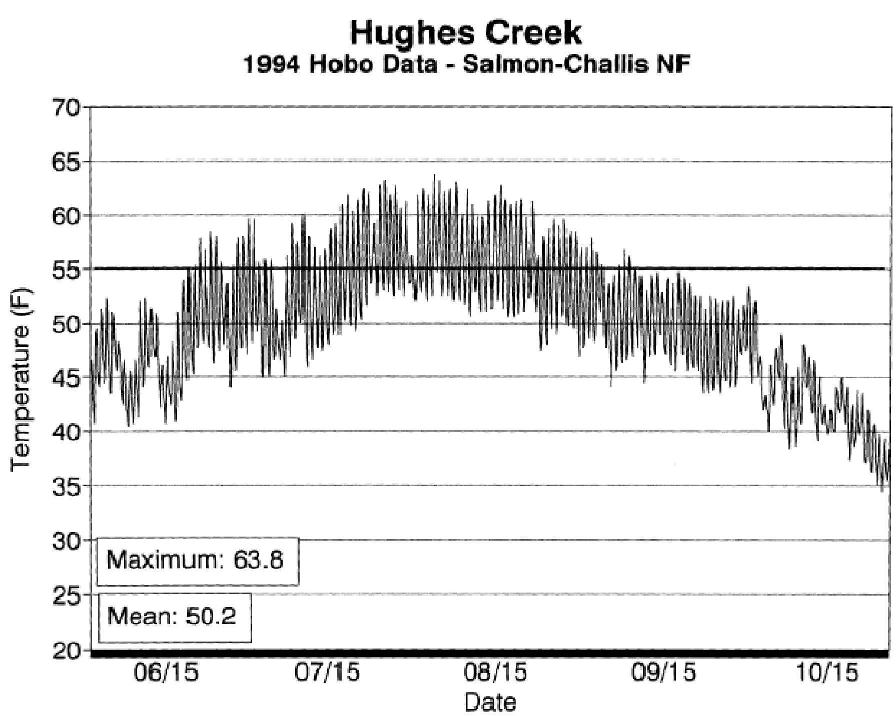

Ditch Creek
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/24/2009-10/18/2009
Absolute Maximum Temperature = 15.6 °C
Maximum 7-day Moving Maximum = 14.7 °C
Mean (July 1 - September 30) = 11.3 °C
tributary to Hughes Creek
HUC 4 = Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

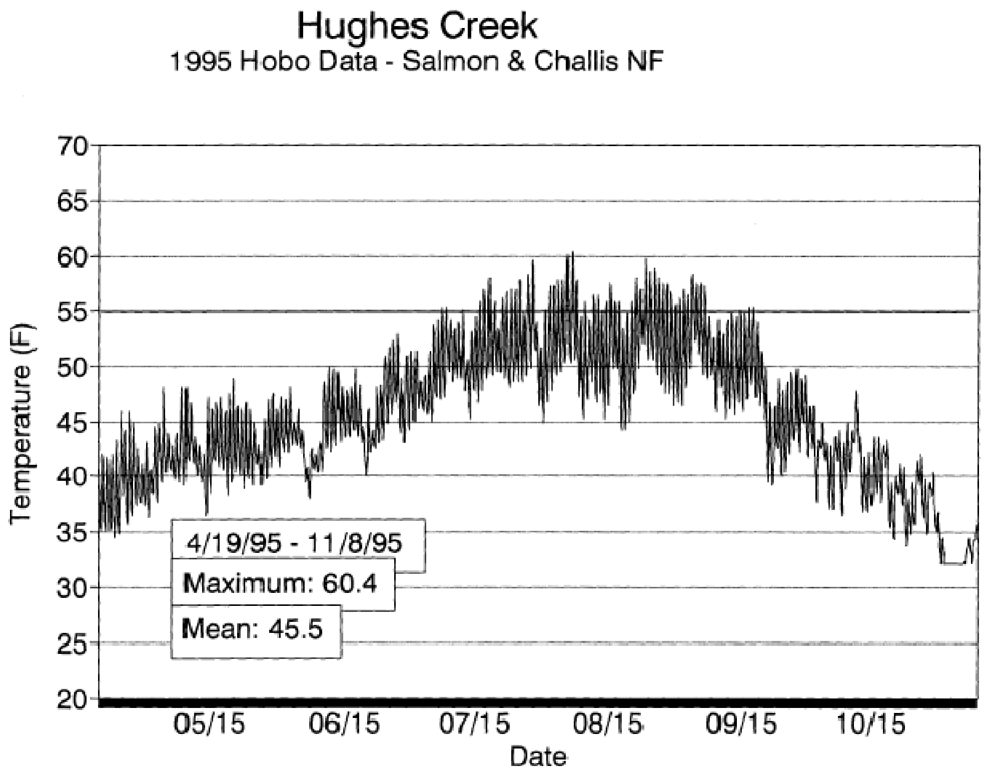
Hughes Creek (North Fork District)

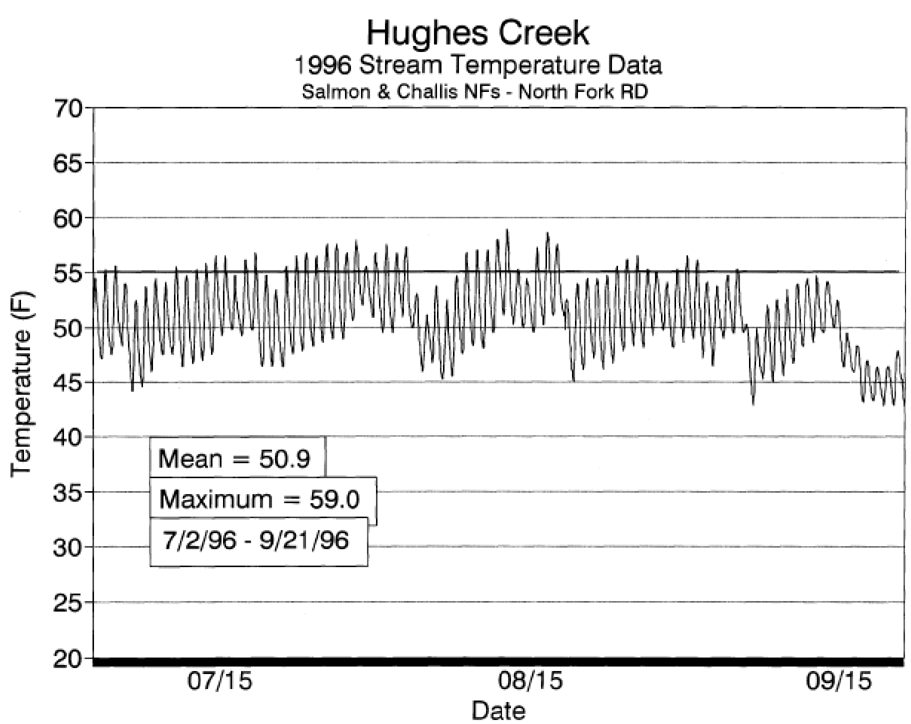
1993 Hobotemp Data

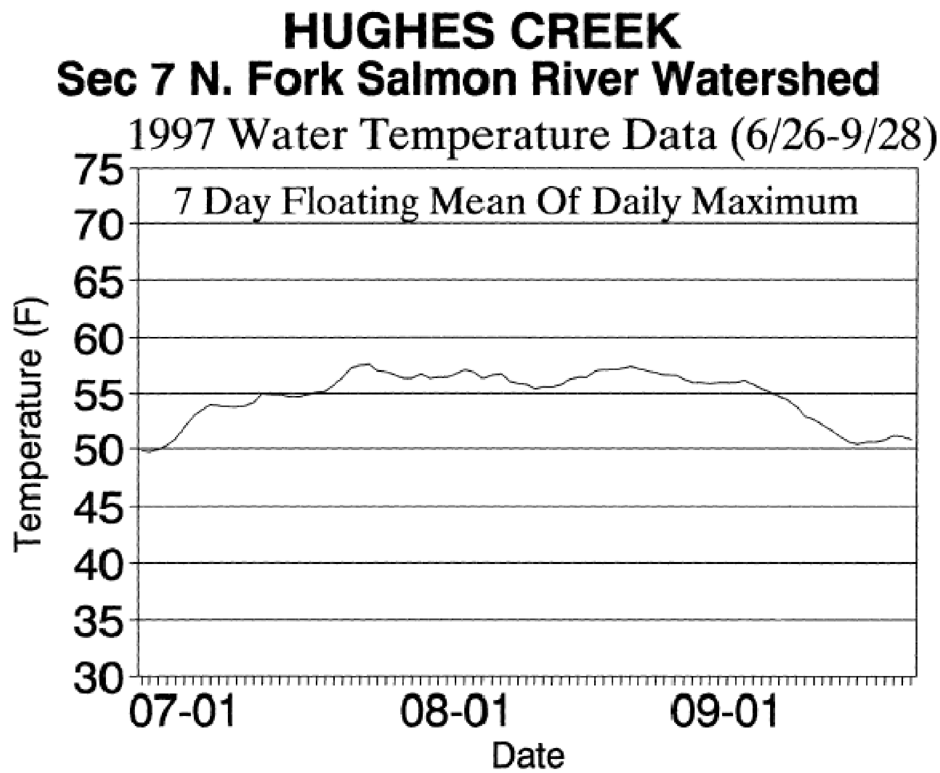


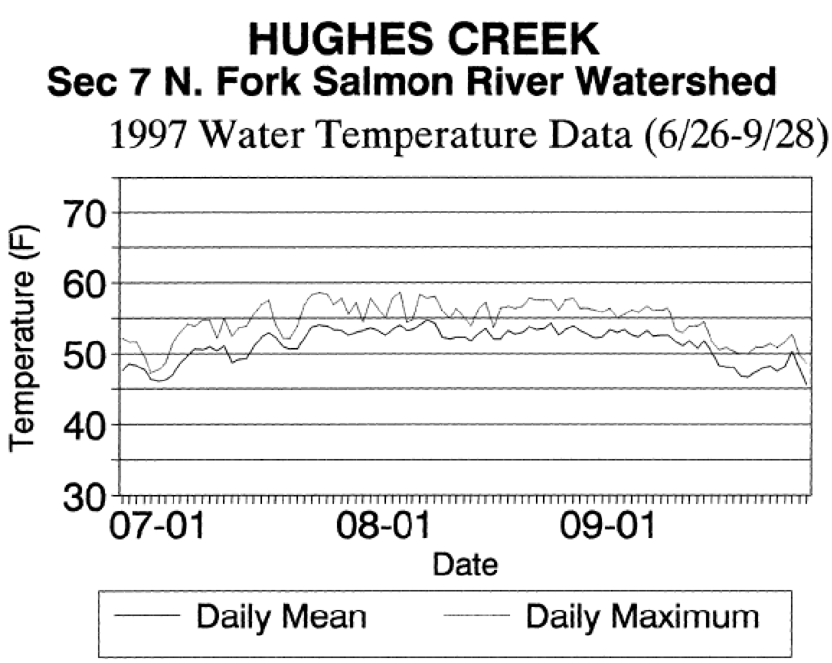
Data Graphed From 5-25-93 to 10-15-93

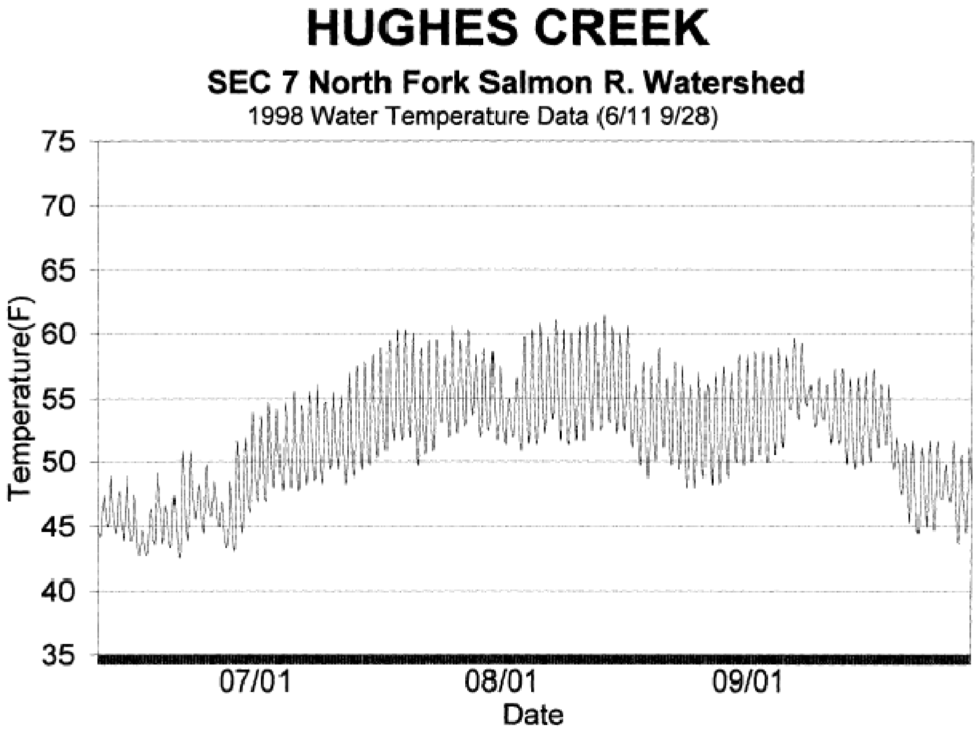


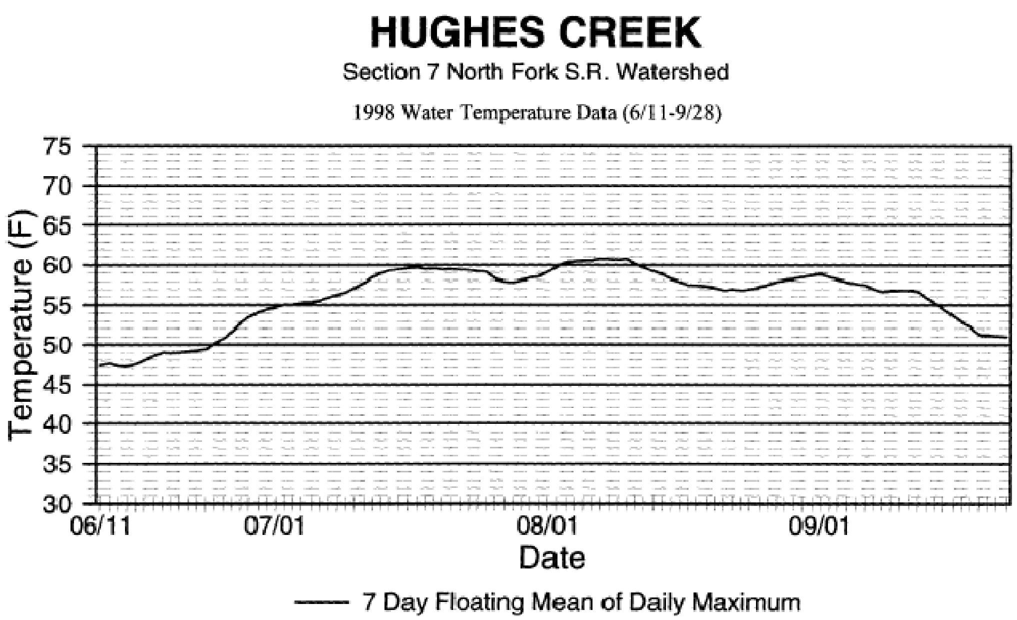

Hughes Creek
1995 Hobo Data - Salmon & Challis NF
Temperature (F)
70
65
60
55
50
45
40
35
30
25
20
4/19/95 - 11/8/95
Maximum: 60.4
Mean: 45.5
05/15
06/15
07/15
08/15
09/15
10/15
Date

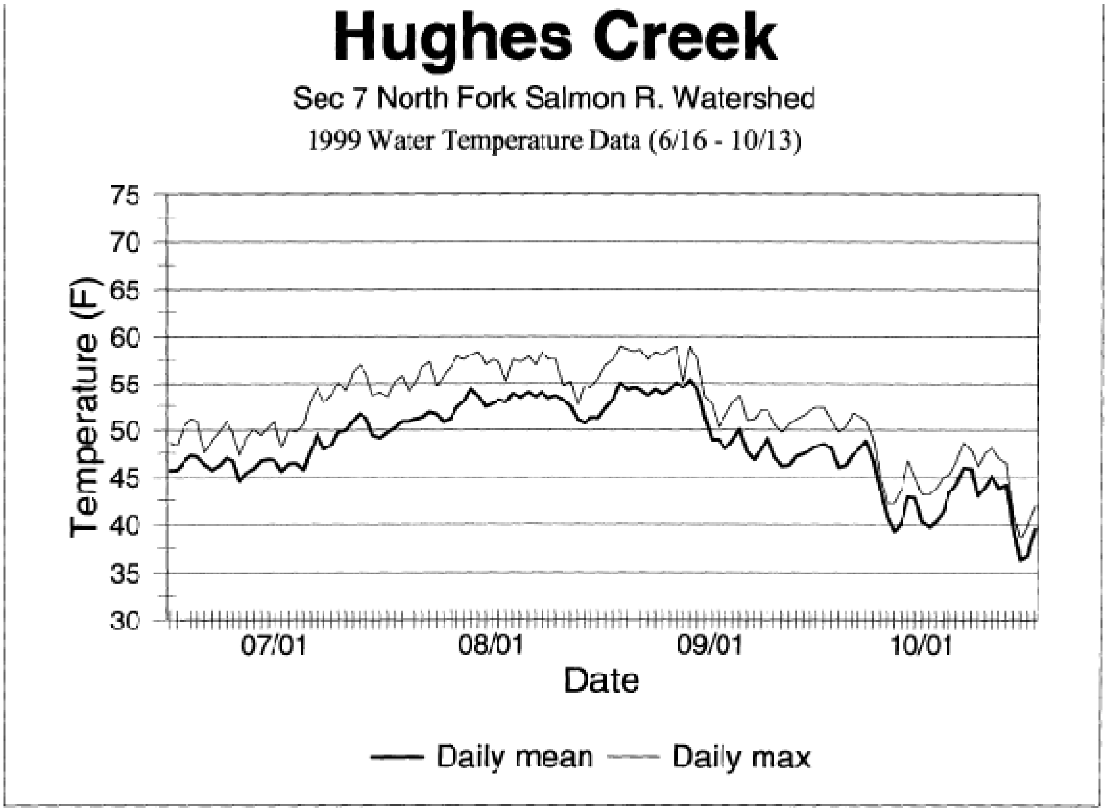

Hughes Creek
1996 Stream Temperature Data
Salmon & Challis NFs - North Fork RD
Temperature (F)
70
65
60
55
50
45
40
35
30
25
20
Mean = 50.9
Maximum = 59.0
7/2/96 - 9/21/96
07/15
08/15
09/15
Date

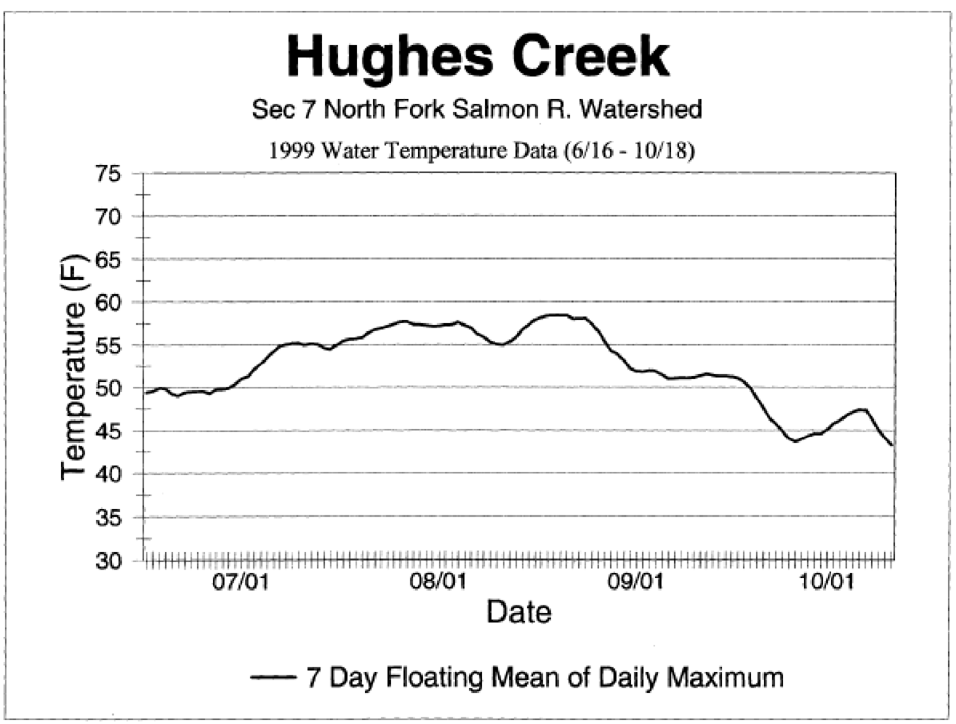

HUGHES CREEK
Sec 7 N. Fork Salmon River Watershed
1997 Water Temperature Data (6/26-9/28)
7 Day Floating Mean Of Daily Maximum
Temperature (F)
75
70
65
60
55
50
45
40
35
30
07-01
08-01
09-01
Date

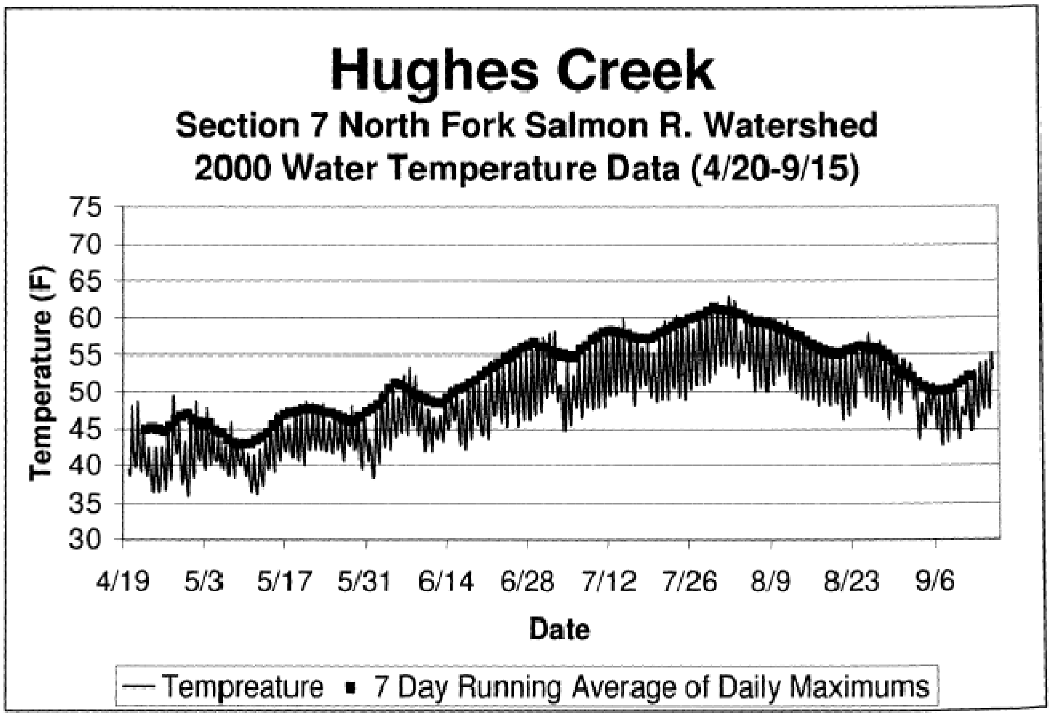

HUGHES CREEK
Sec 7 N. Fork Salmon River Watershed
1997 Water Temperature Data (6/26-9/28)
Temperature (F)
70
60
50
40
30
07-01
08-01
09-01
Date
Daily Mean
Daily Maximum

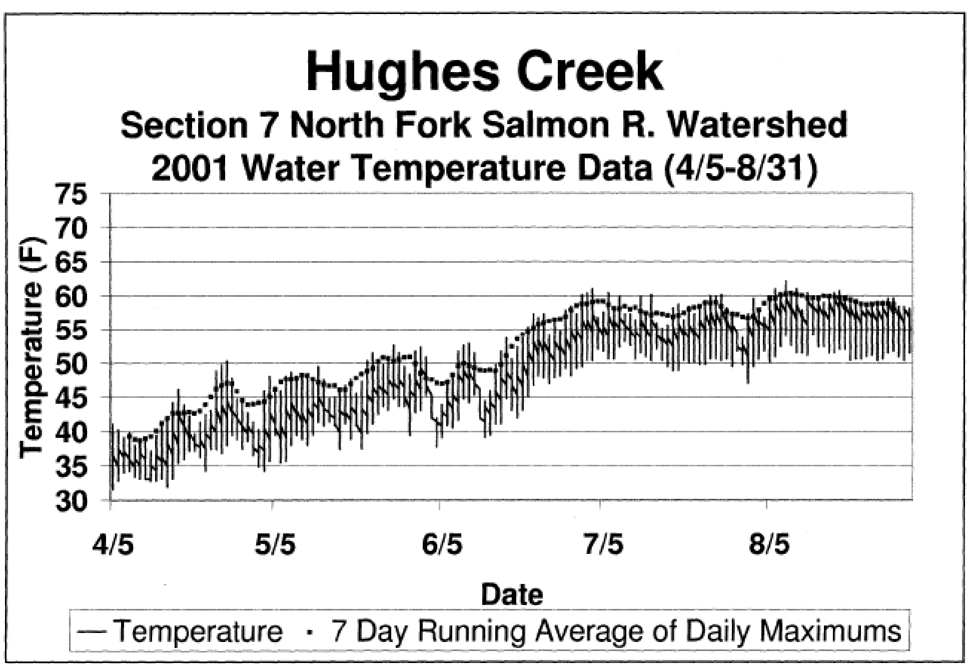

HUGHES CREEK
SEC 7 North Fork Salmon R. Watershed
1998 Water Temperature Data (6/11 9/28)
Temperature(F)
75
70
65
60
55
50
45
40
35
07/01
08/01
09/01
Date

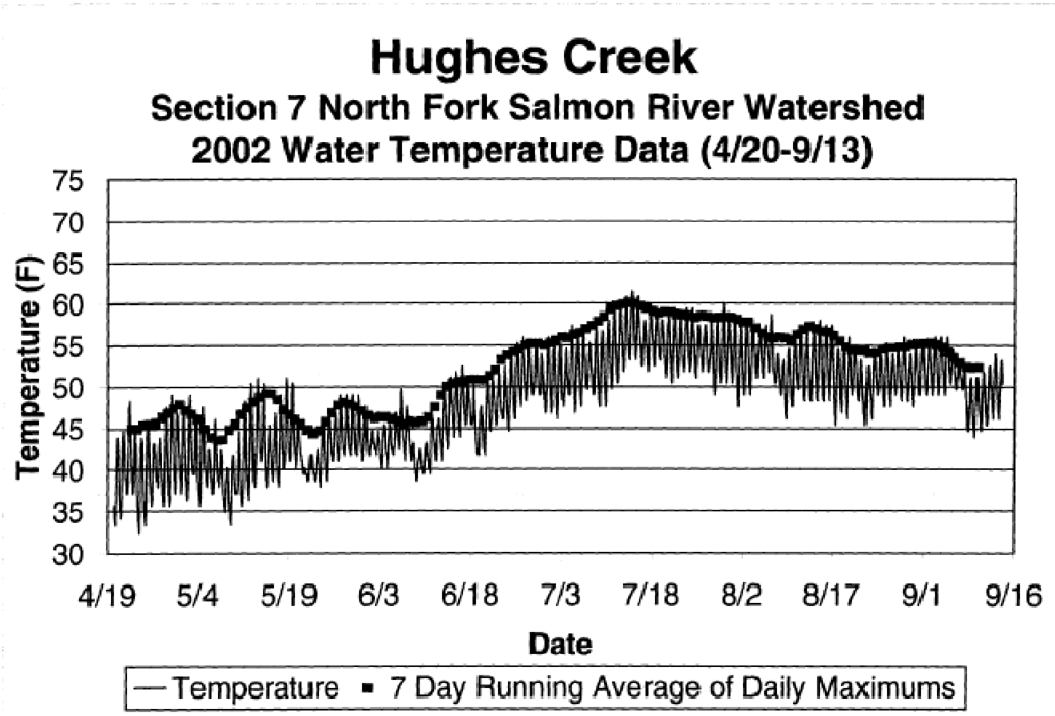

HUGHES CREEK
Section 7 North Fork S.R. Watershed
1998 Water Temperature Data (6/11-9/28)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
06/11
07/01
08/01
09/01
Date
7 Day Floating Mean of Daily Maximum

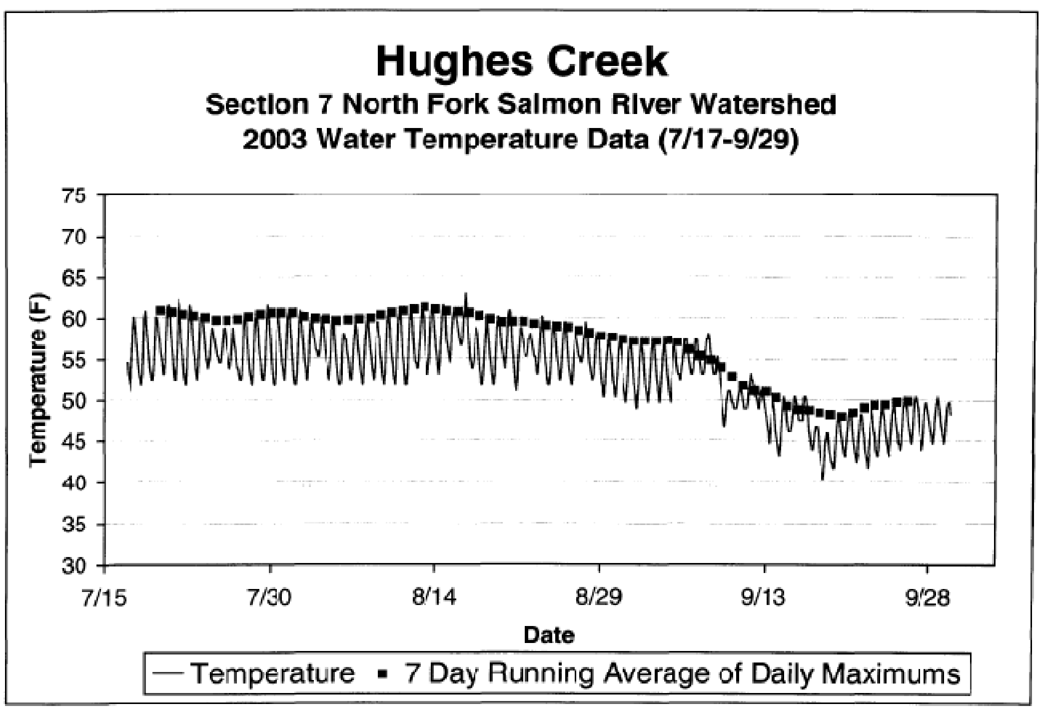

Hughes Creek
Sec 7 North Fork Salmon R. Watershed
1999 Water Temperature Data (6/16 - 10/13)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
07/01
08/01
09/01
10/01
Date
Daily mean
Daily max

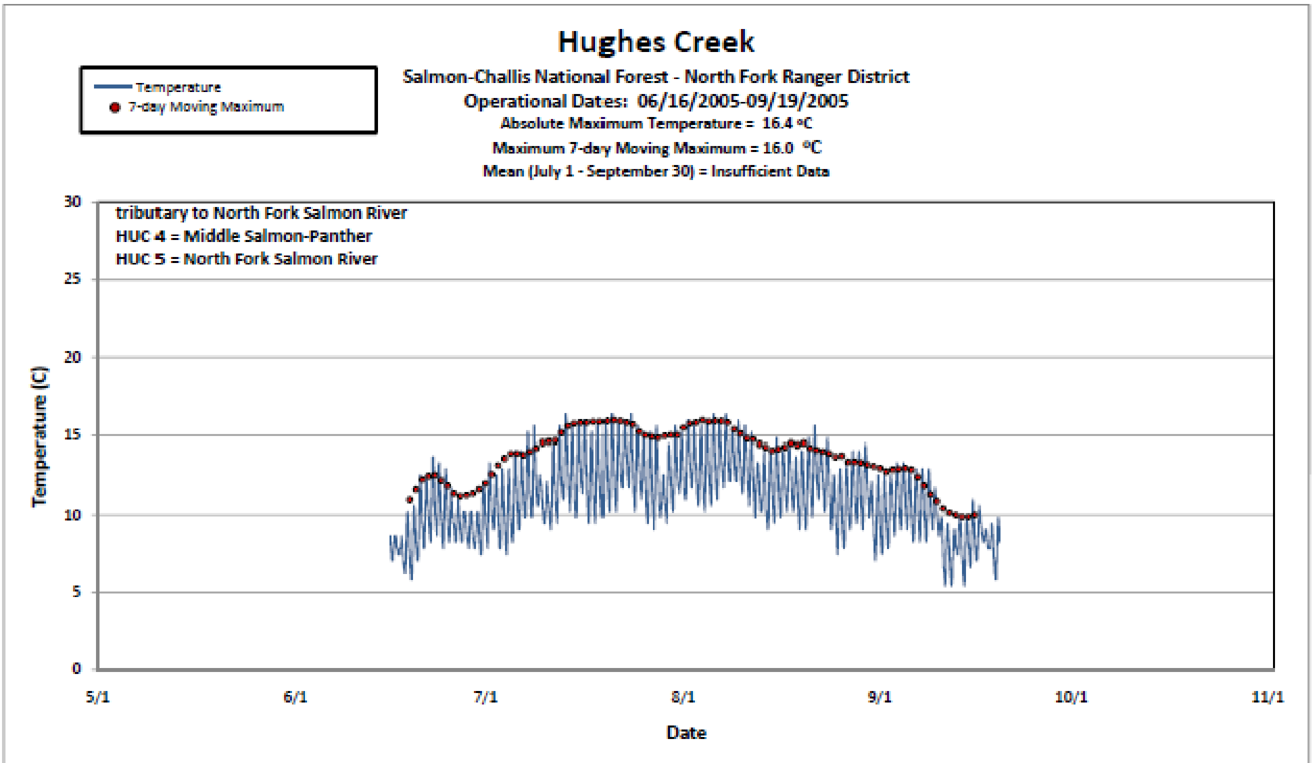

Hughes Creek
Sec 7 North Fork Salmon R. Watershed
1999 Water Temperature Data (6/16 - 10/18)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
07/01
08/01
09/01
10/01
Date
7 Day Floating Mean of Daily Maximum

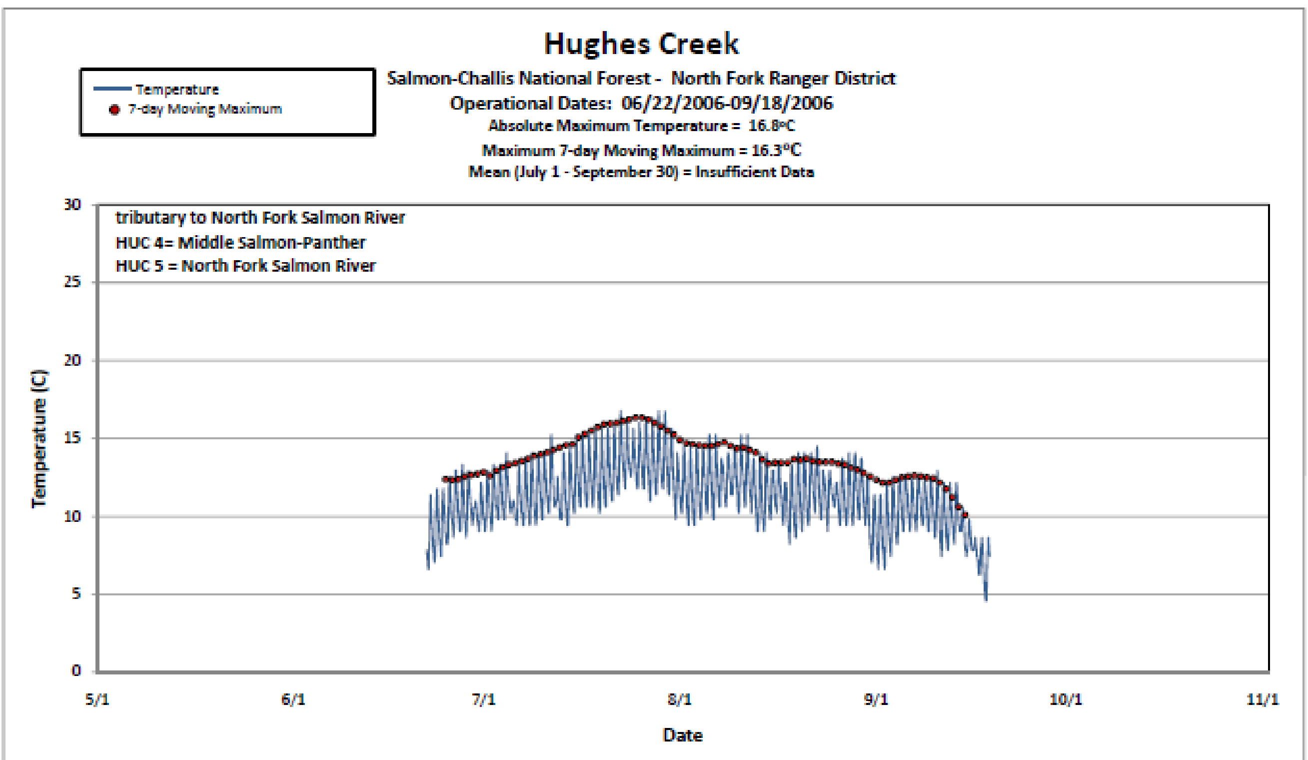

Hughes Creek
Section 7 North Fork Salmon R. Watershed
2000 Water Temperature Data (4/20-9/15)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/19
5/3
5/17
5/31
6/14
6/28
7/12
7/26
8/9
8/23
9/6
Date
Tempreature
7 Day Running Average of Daily Maximums

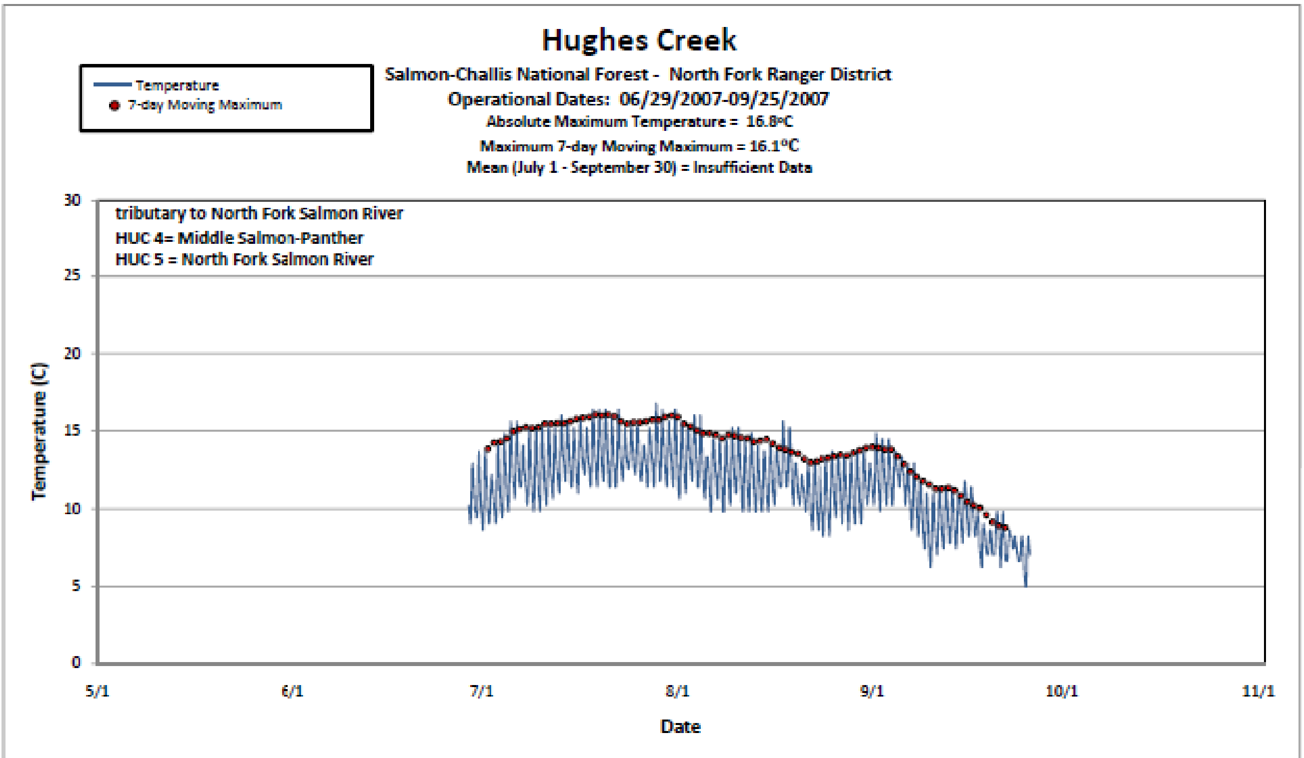

Hughes Creek
Section 7 North Fork Salmon R. Watershed
2001 Water Temperature Data (4/5-8/31)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/5
5/5
6/5
7/5
8/5
Date
Temperature
7 Day Running Average of Daily Maximums

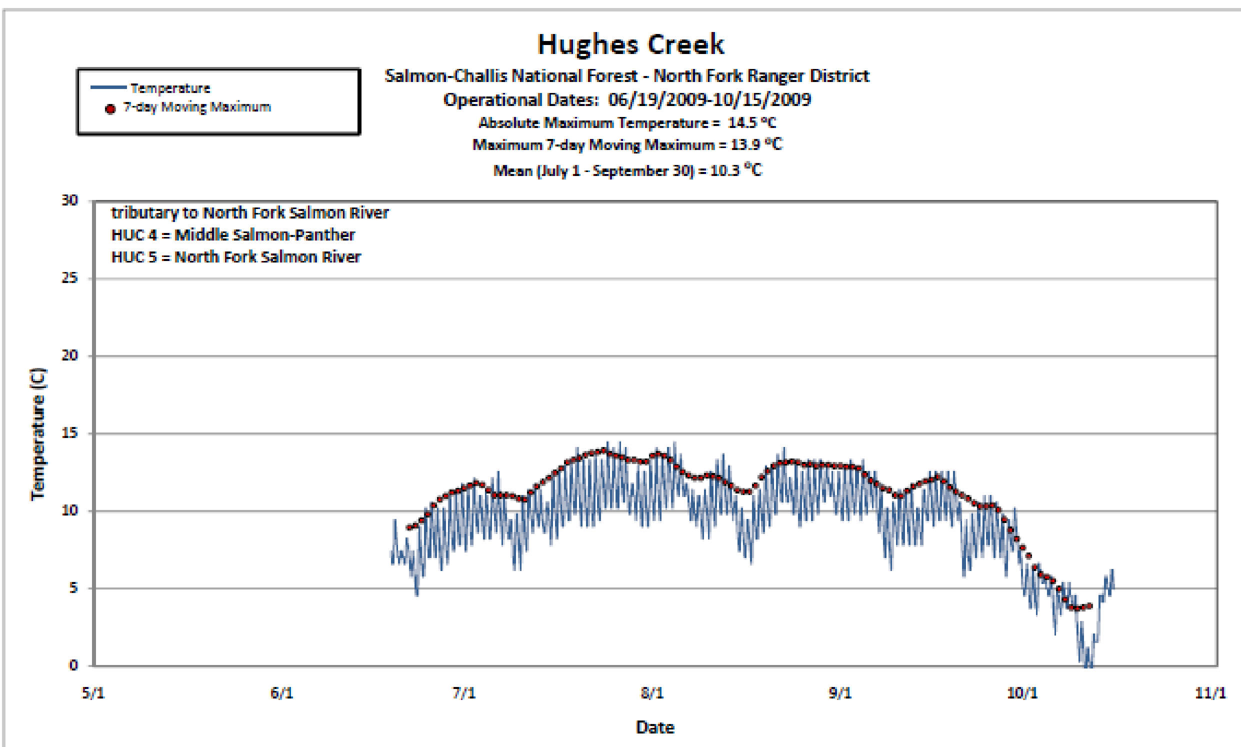

Hughes Creek
Section 7 North Fork Salmon River Watershed
2002 Water Temperature Data (4/20-9/13)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/19
5/4
5/19
6/3
6/18
7/3
7/18
8/2
8/17
9/1
9/16
Date
Temperature
7 Day Running Average of Daily Maximums

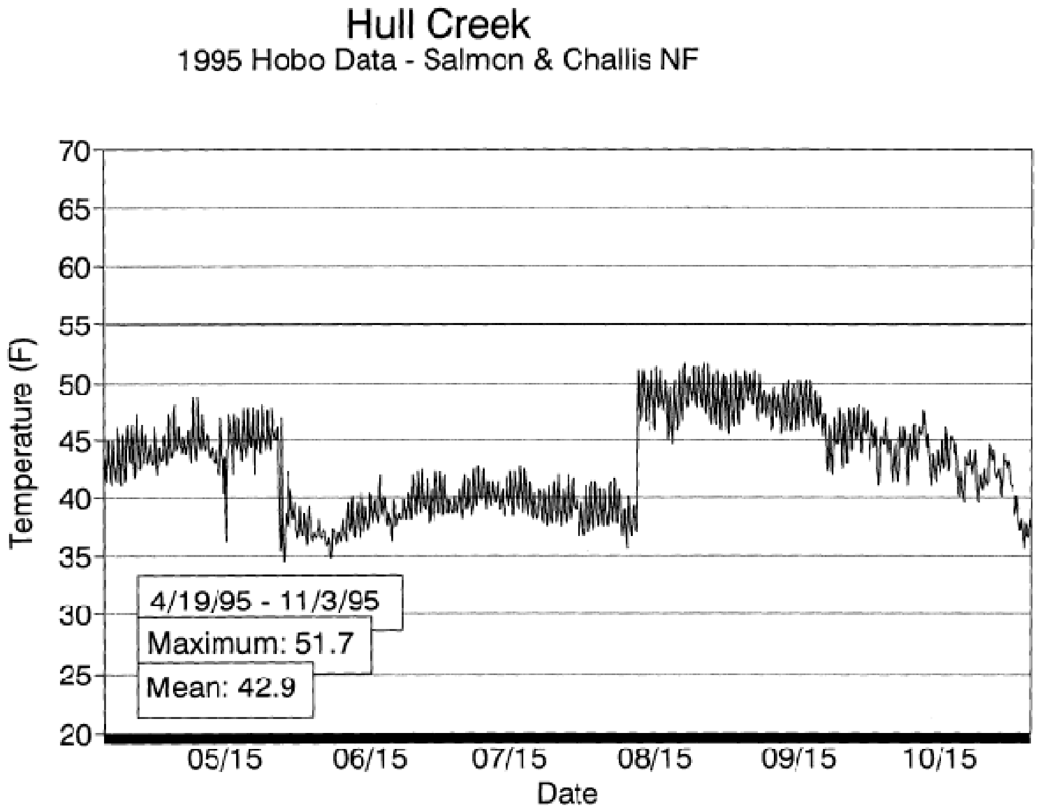

Hughes Creek
Section 7 North Fork Salmon River Watershed
2003 Water Temperature Data (7/17-9/29)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
7/15
7/30
8/14
8/29
9/13
9/28
Date
Temperature
7 Day Running Average of Daily Maximums

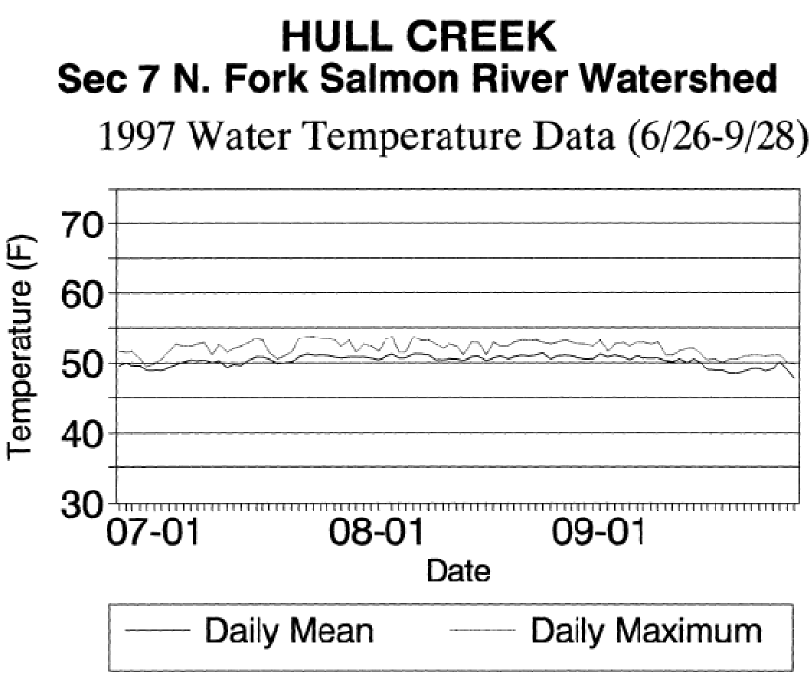

Hughes Creek
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/16/2005-09/19/2005
Absolute Maximum Temperature = 16.4 ºC
Maximum 7-day Moving Maximum = 16.0 ºC
Mean (July 1 - September 30) = Insufficient Data
tributary to North Fork Salmon River
HUC 4 = Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date


Hughes Creek
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/22/2006-09/18/2006
Absolute Maximum Temperature = 16.8ºC
Maximum 7-day Moving Maximum = 16.3ºC
Mean (July 1 - September 30) = Insufficient Data
tributary to North Fork Salmon River
HUC 4= Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

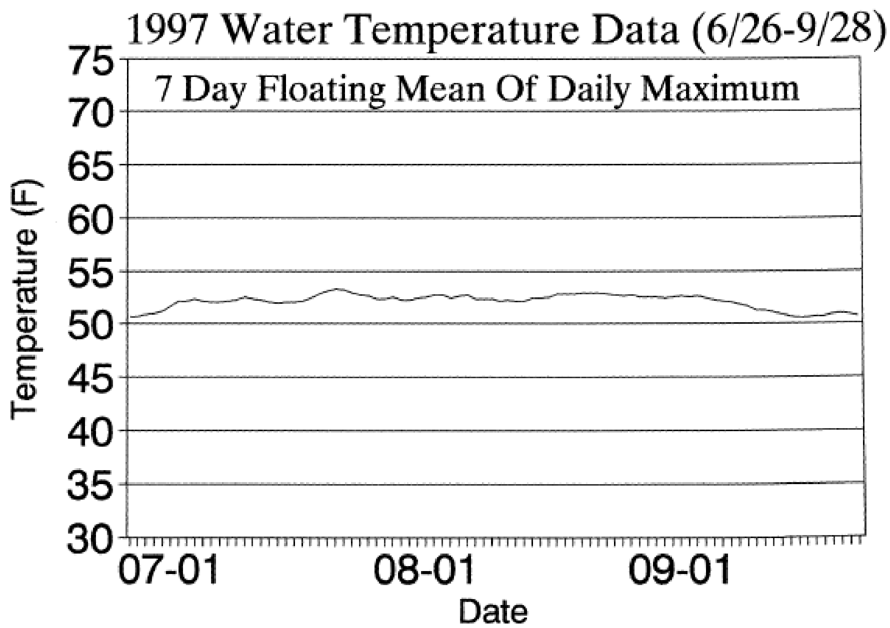

Hughes Creek
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/29/2007-09/25/2007
Absolute Maximum Temperature = 16.8°C
Maximum 7-day Moving Maximum = 16.1°C
Mean (July 1 - September 30) = Insufficient Data
tributary to North Fork Salmon River
HUC 4= Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date


Hughes Creek
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/19/2009-10/15/2009
Absolute Maximum Temperature = 14.5 °C
Maximum 7-day Moving Maximum = 13.9 °C
Mean (July 1 - September 30) = 10.3 °C
tributary to North Fork Salmon River
HUC 4 = Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

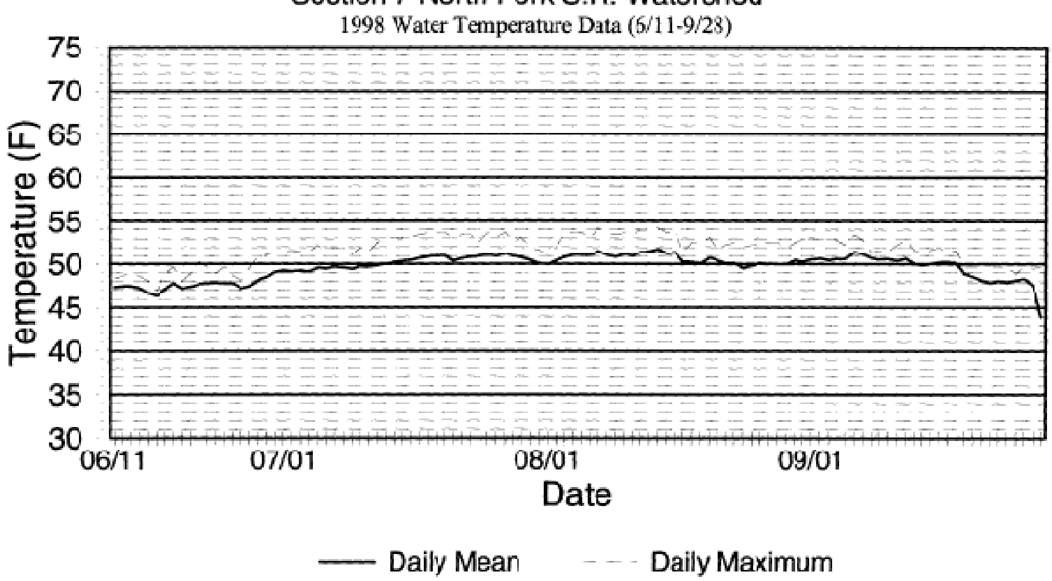

Hull Creek
1995 Hobo Data - Salmon & Challis NF
70
65
60
55
50
45
40
35
30
25
20
Temperature (F)
4/19/95 - 11/3/95
Maximum: 51.7
Mean: 42.9
05/15
06/15
07/15
08/15
09/15
10/15
Date

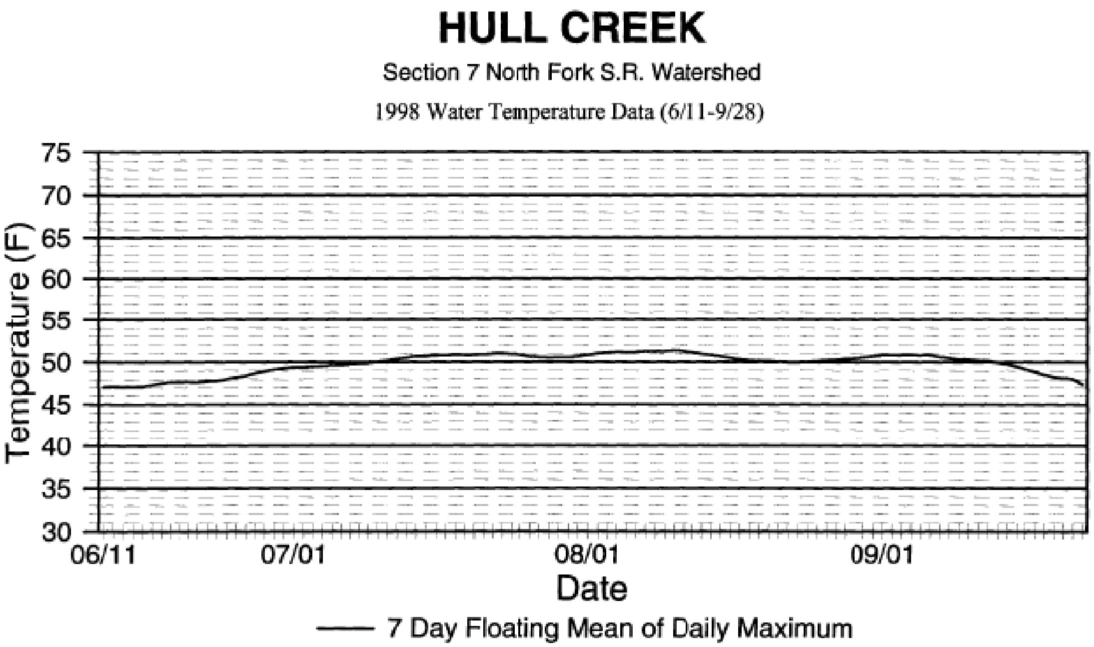

HULL CREEK
Sec 7 N. Fork Salmon River Watershed
1997 Water Temperature Data (6/26-9/28)
70
60
50
40
30
Temperature (F)
07-01
08-01
09-01
Date
Daily Mean
Daily Maximum

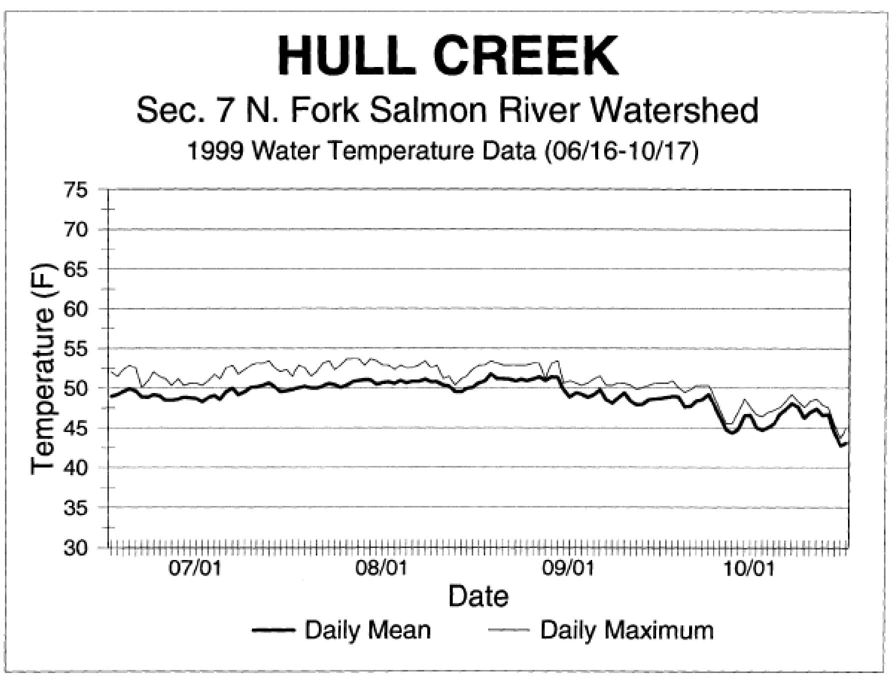
HULL CREEK
Sec 7 N. Fork Salmon River Watershed

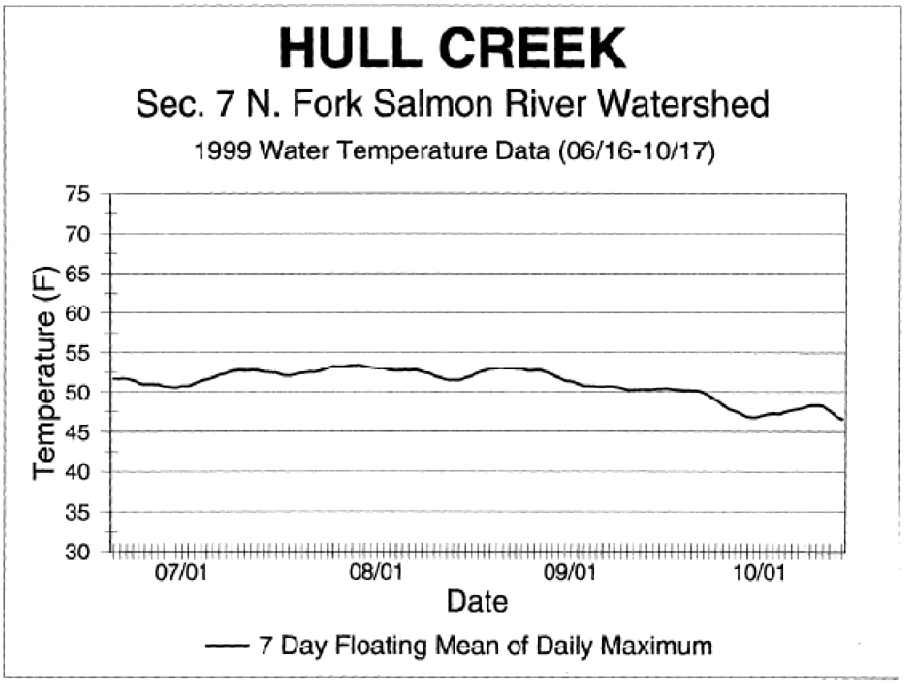


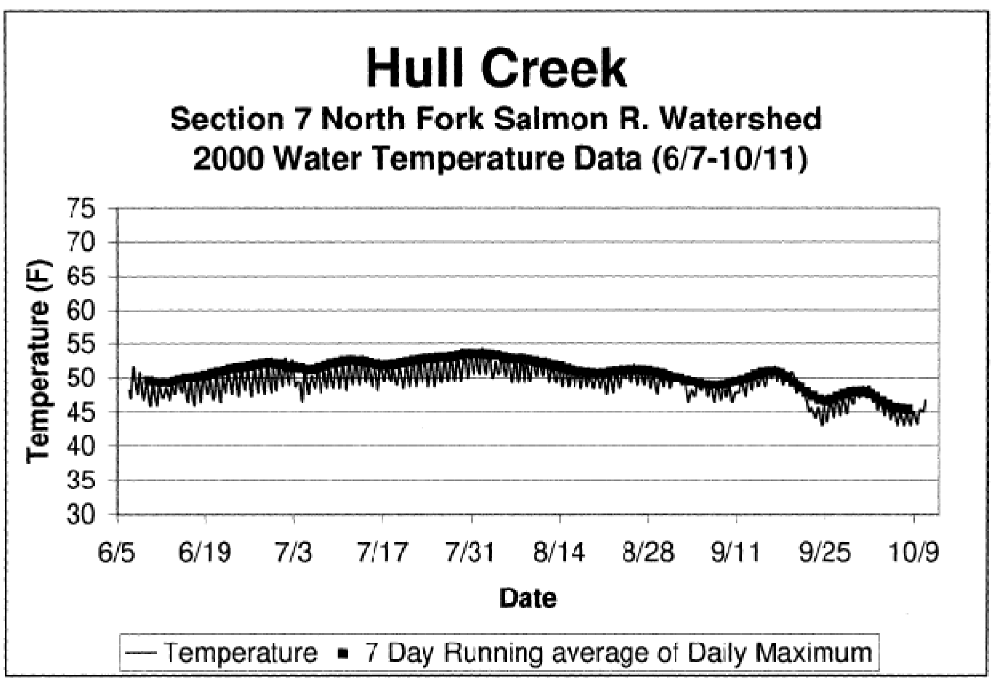
HULL CREEK
Section 7 North Fork S.R. Watershed

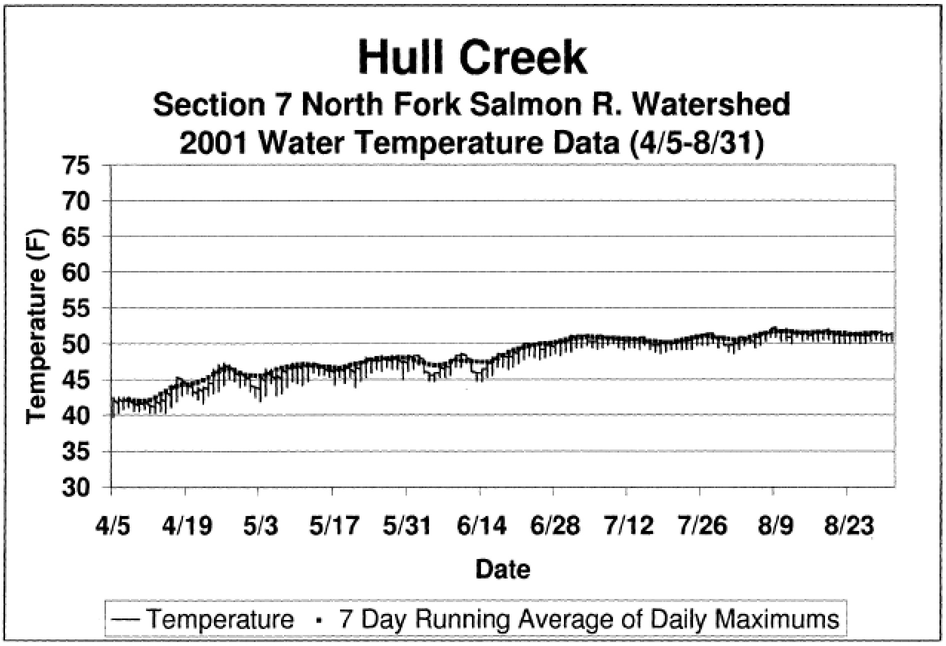


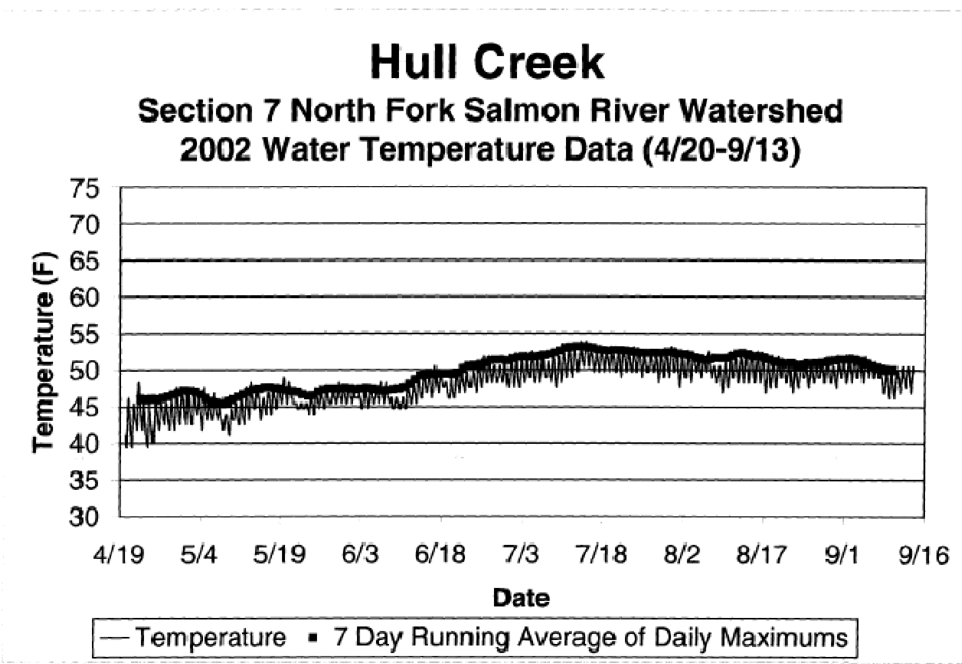

HULL CREEK
Section 7 North Fork S.R. Watershed
1998 Water Temperature Data (6/11-9/28)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
06/11
07/01
08/01
09/01
Date
7 Day Floating Mean of Daily Maximum

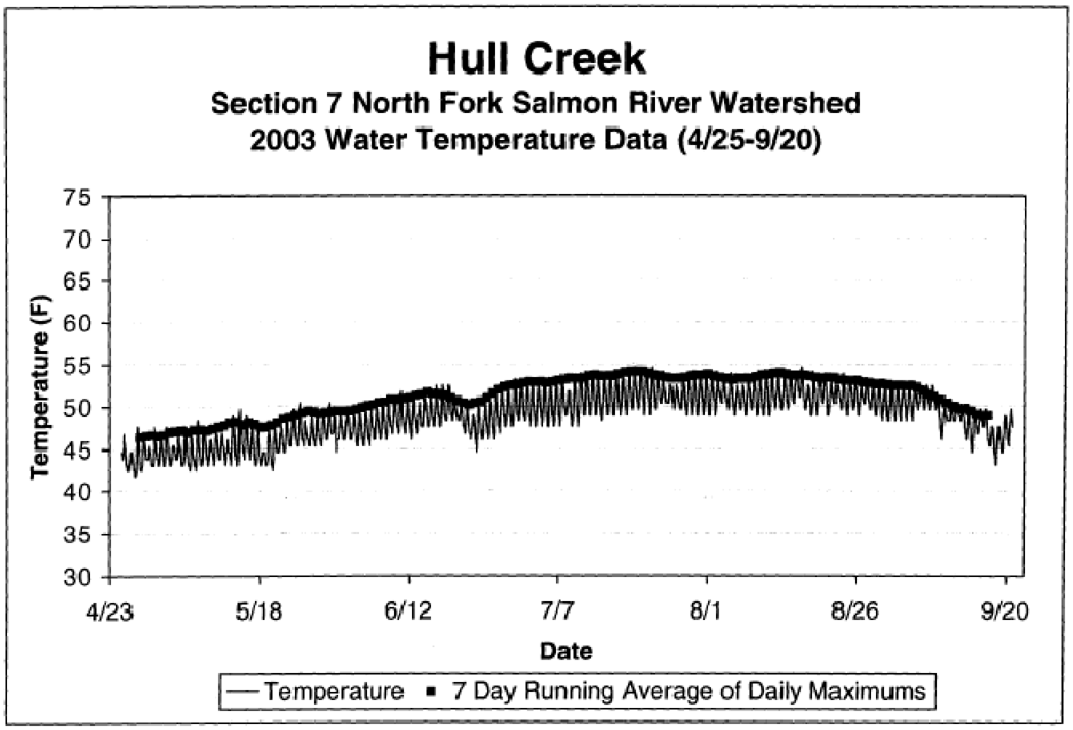

HULL CREEK
Sec. 7 N. Fork Salmon River Watershed
1999 Water Temperature Data (06/16-10/17)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
07/01
08/01
09/01
10/01
Date
Daily Mean
Daily Maximum

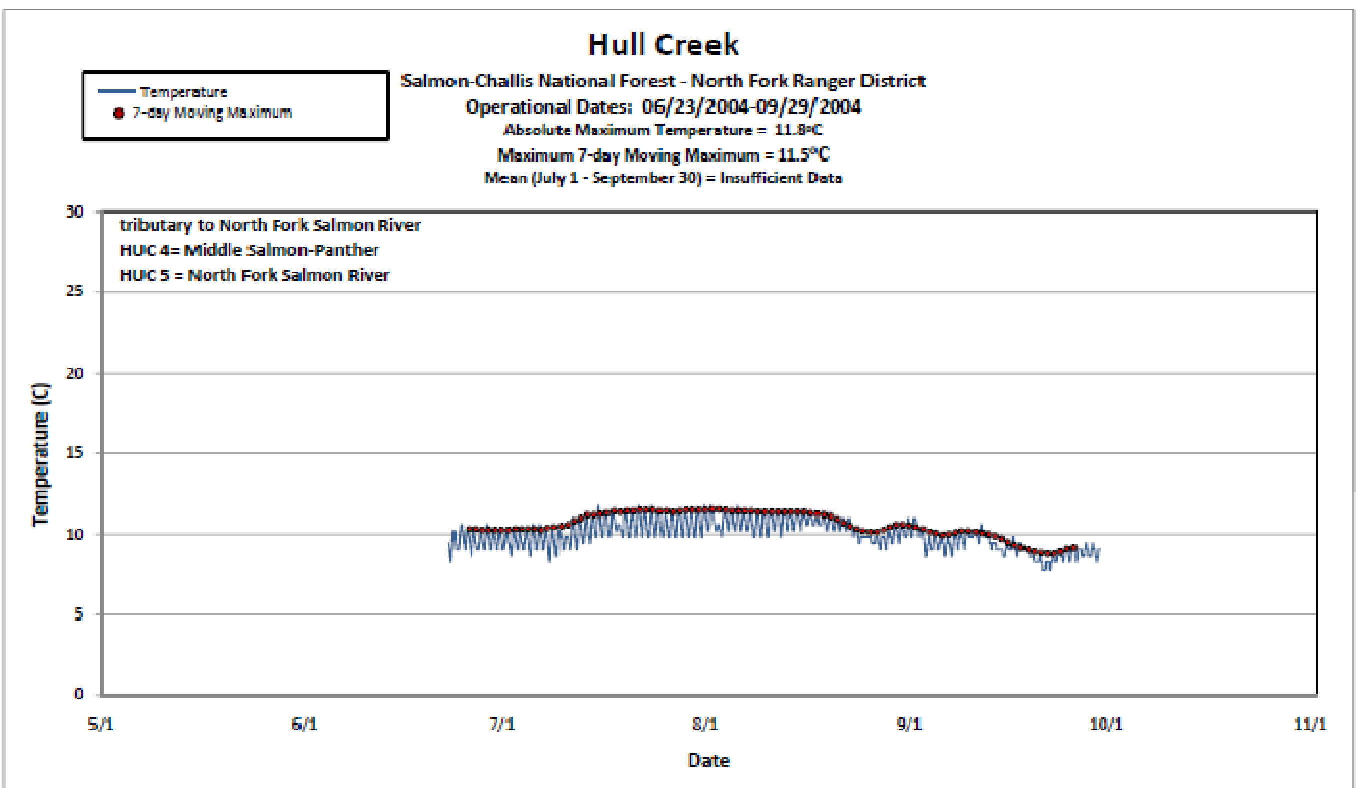

HULL CREEK
Sec. 7 N. Fork Salmon River Watershed
1999 Water Temperature Data (06/16-10/17)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
07/01
08/01
09/01
10/01
Date
7 Day Floating Mean of Daily Maximum

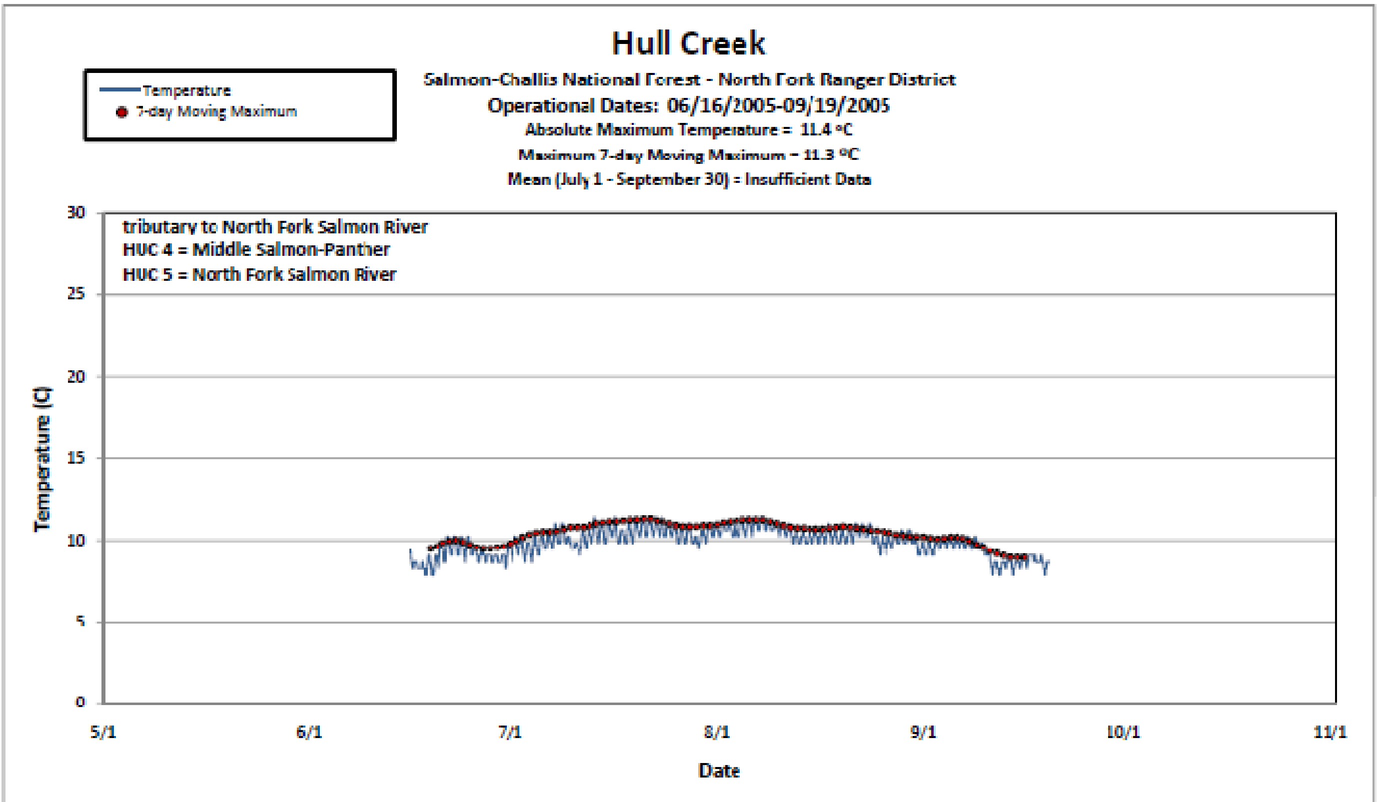

Hull Creek
Section 7 North Fork Salmon R. Watershed
2000 Water Temperature Data (6/7-10/11)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
6/5
6/19
7/3
7/17
7/31
8/14
8/28
9/11
9/25
10/9
Date
Temperature
7 Day Running average of Daily Maximum

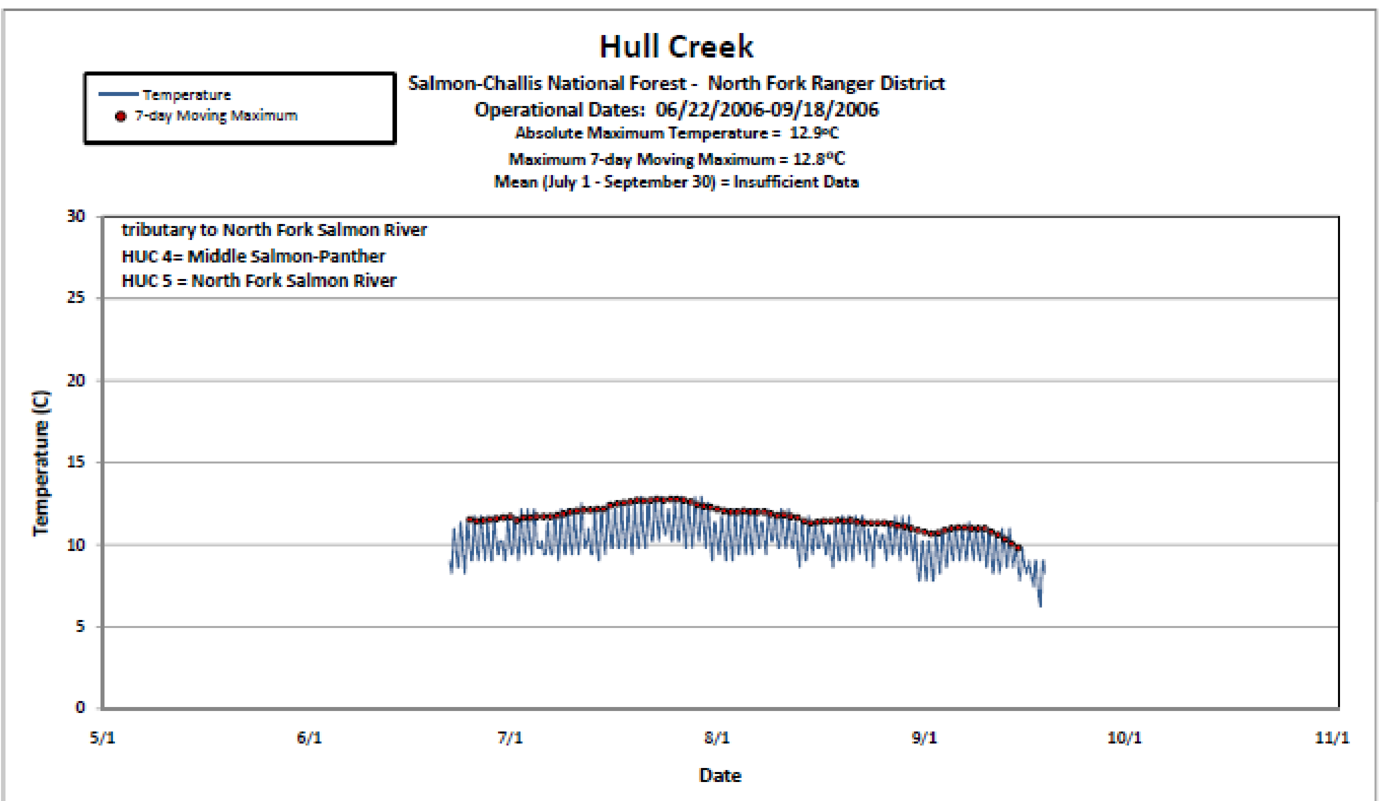

Hull Creek
Section 7 North Fork Salmon R. Watershed
2001 Water Temperature Data (4/5-8/31)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/5
4/19
5/3
5/17
5/31
6/14
6/28
7/12
7/26
8/9
8/23
Date
Temperature
7 Day Running Average of Daily Maximums

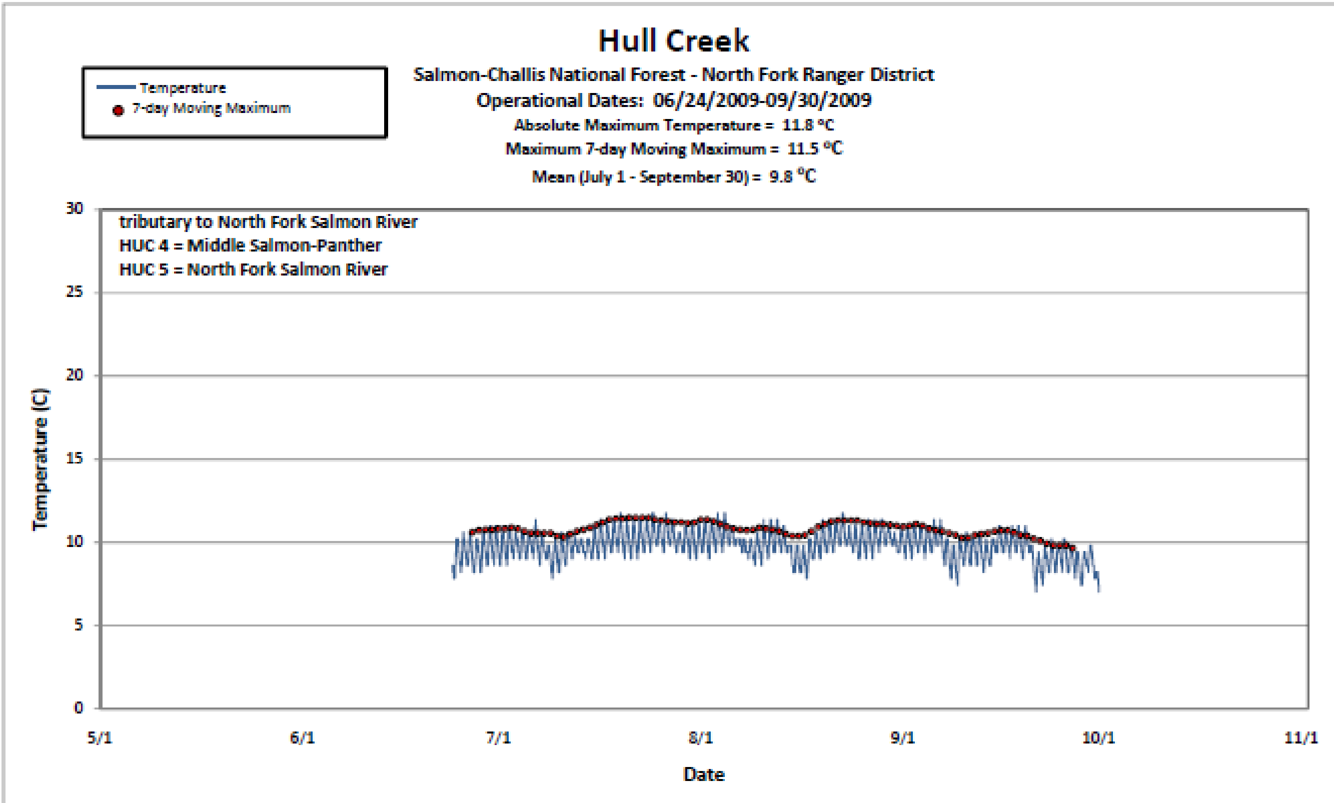

Hull Creek
Section 7 North Fork Salmon River Watershed
2002 Water Temperature Data (4/20-9/13)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/19
5/4
5/19
6/3
6/18
7/3
7/18
8/2
8/17
9/1
9/16
Date
Temperature
7 Day Running Average of Daily Maximums

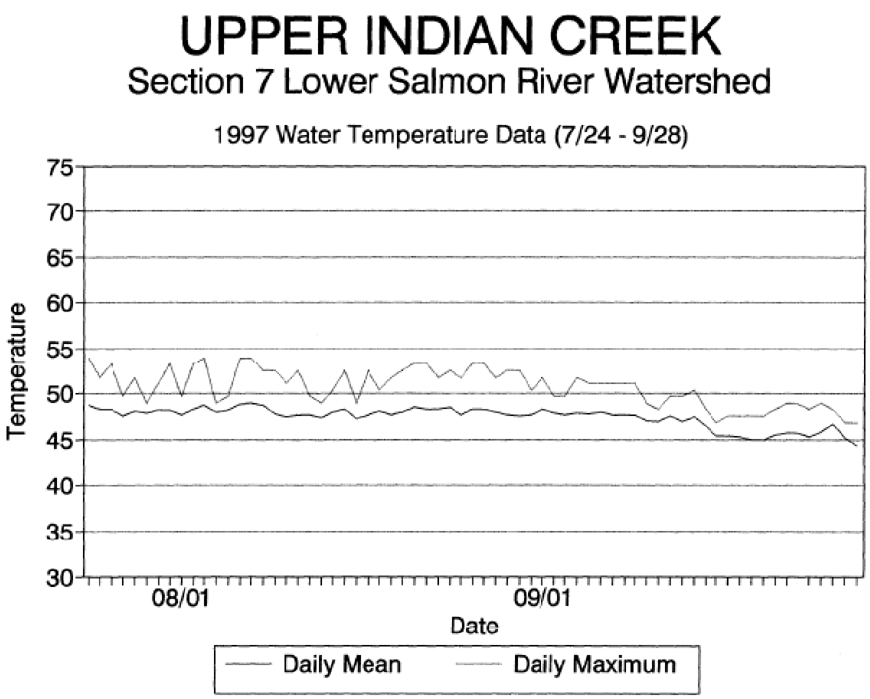

Hull Creek
Section 7 North Fork Salmon River Watershed
2003 Water Temperature Data (4/25-9/20)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/23
5/18
6/12
7/7
8/1
8/26
9/20
Date
Temperature
7 Day Running Average of Daily Maximums

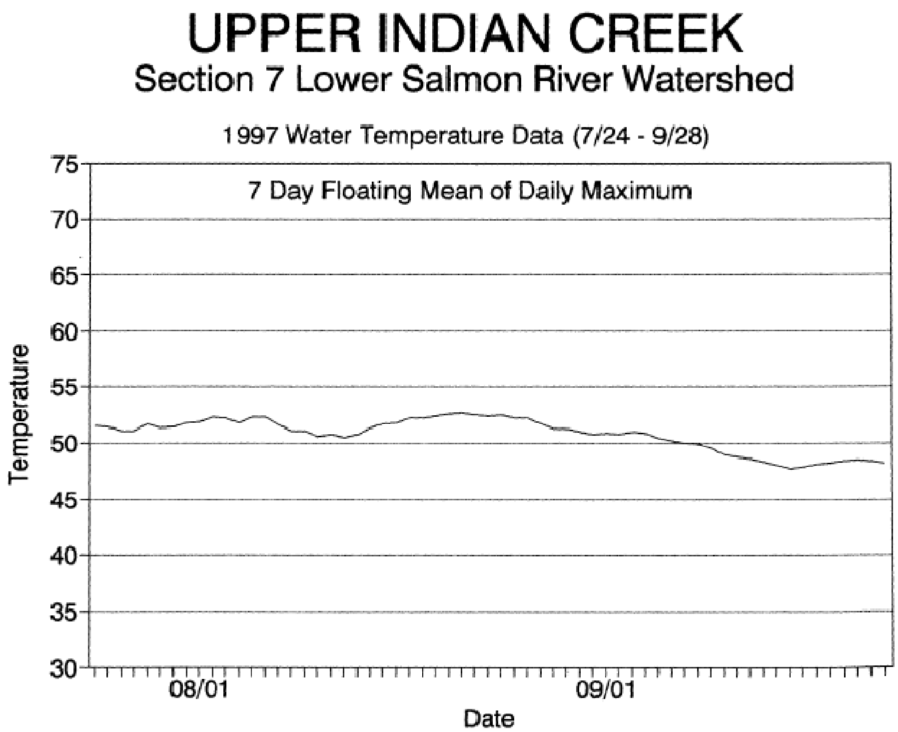

Hull Creek
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/23/2004-09/29/2004
Absolute Maximum Temperature = 11.8ºC
Maximum 7-day Moving Maximum = 11.5ºC
Mean (July 1 - September 30) = Insufficient Data
tributary to North Fork Salmon River
HUC 4= Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

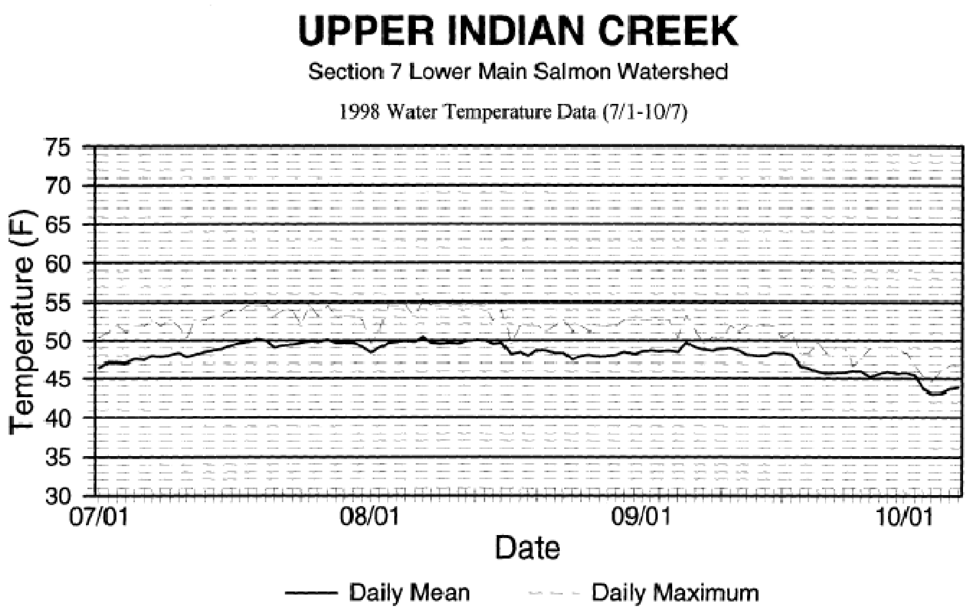

Hull Creek
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/16/2005-09/19/2005
Absolute Maximum Temperature = 11.4 ºC
Maximum 7-day Moving Maximum = 11.3 ºC
Mean (July 1 - September 30) = Insufficient Data
tributary to North Fork Salmon River
HUC 4 = Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

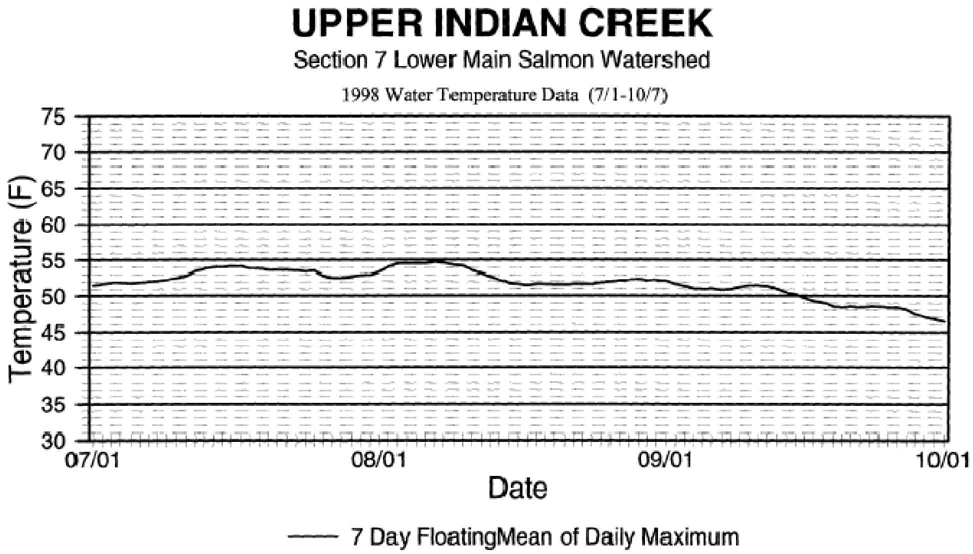

Hull Creek
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/22/2006-09/18/2006
Absolute Maximum Temperature = 12.9ºC
Maximum 7-day Moving Maximum = 12.8ºC
Mean (July 1 - September 30) = Insufficient Data
tributary to North Fork Salmon River
HUC 4= Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

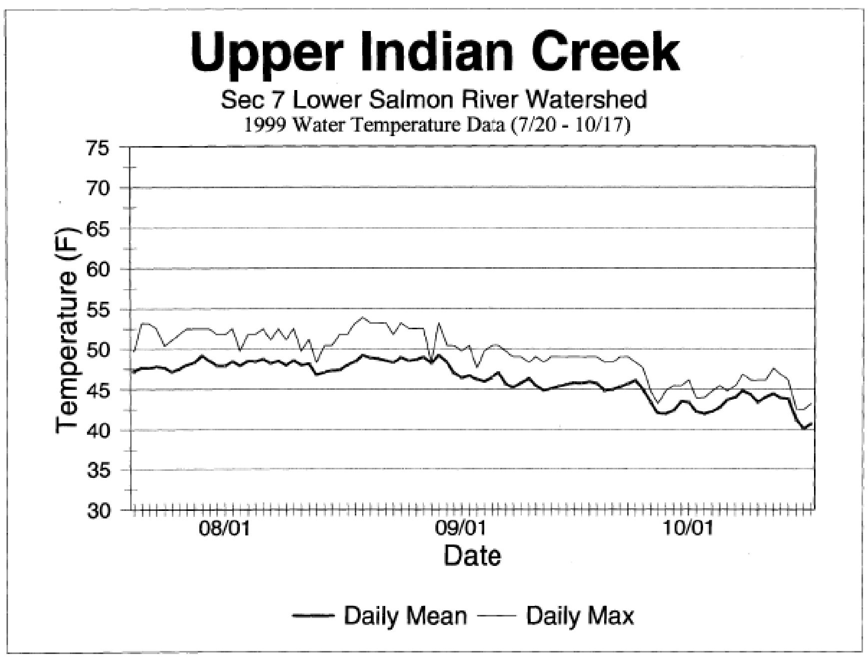

Hull Creek
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/24/2009-09/30/2009
Absolute Maximum Temperature = 11.8 °C
Maximum 7-day Moving Maximum = 11.5 °C
Mean (July 1 - September 30) = 9.8 °C
Temperature
7-day Moving Maximum
tributary to North Fork Salmon River
HUC 4 = Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

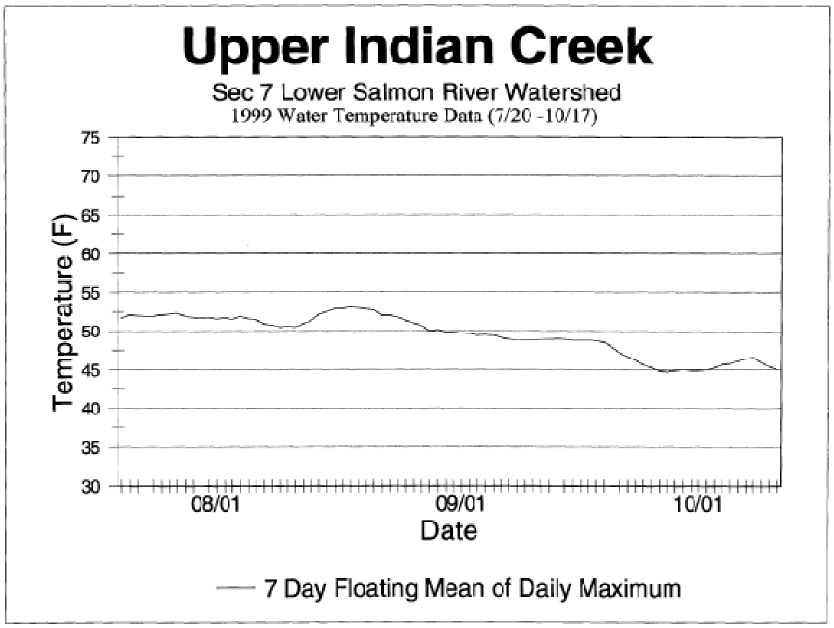

UPPER INDIAN CREEK
Section 7 Lower Salmon River Watershed
1997 Water Temperature Data (7/24 - 9/28)
Temperature
75
70
65
60
55
50
45
40
35
30
08/01
09/01
Date
Daily Mean
Daily Maximum

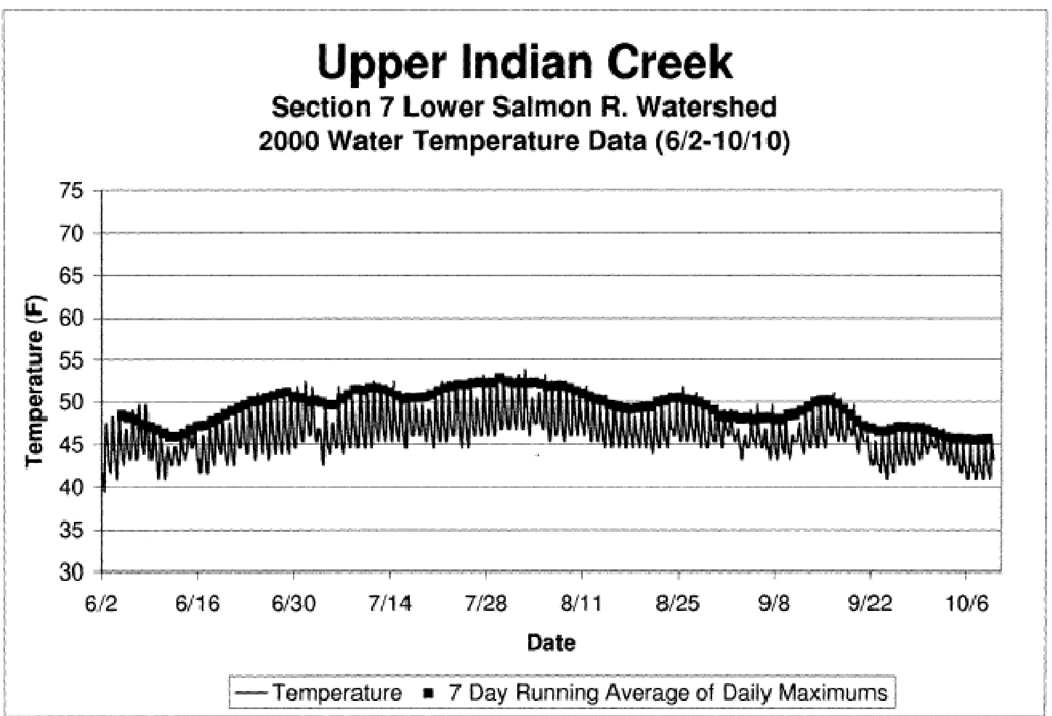

UPPER INDIAN CREEK
Section 7 Lower Salmon River Watershed
1997 Water Temperature Data (7/24 - 9/28)
7 Day Floating Mean of Daily Maximum
Temperature
75
70
65
60
55
50
45
40
35
30
08/01
09/01
Date

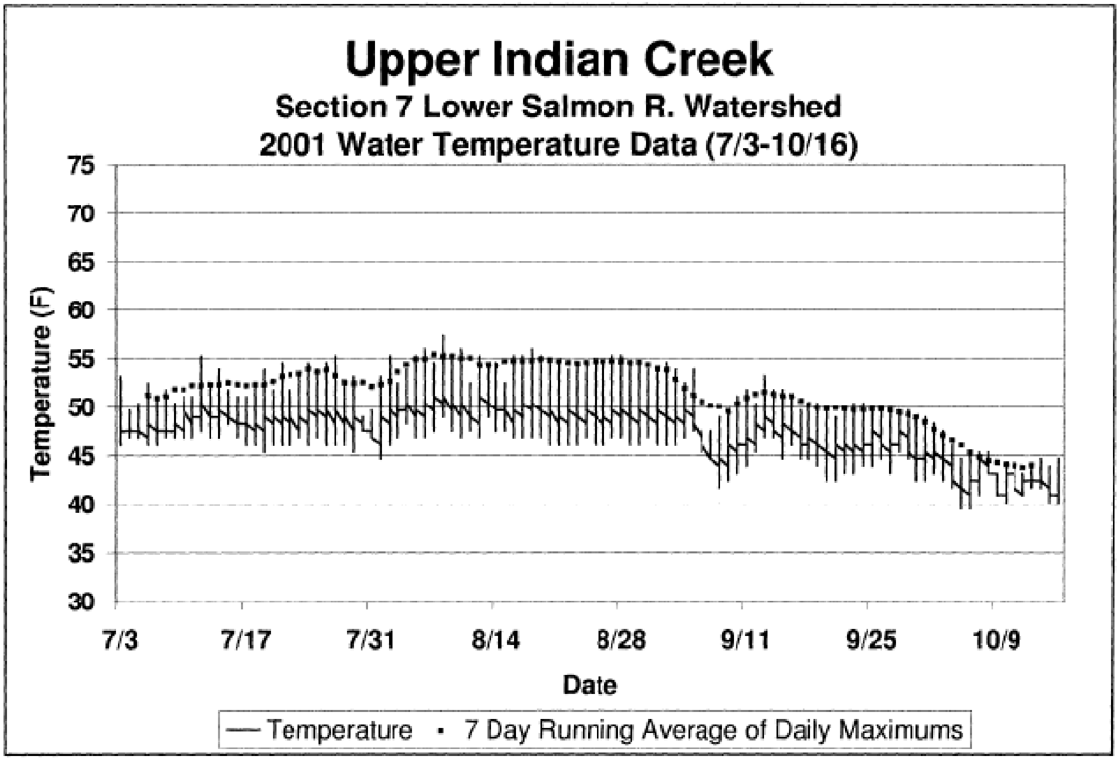

UPPER INDIAN CREEK
Section 7 Lower Main Salmon Watershed
1998 Water Temperature Data (7/1-10/7)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
07/01
08/01
09/01
10/01
Date
Daily Mean
Daily Maximum

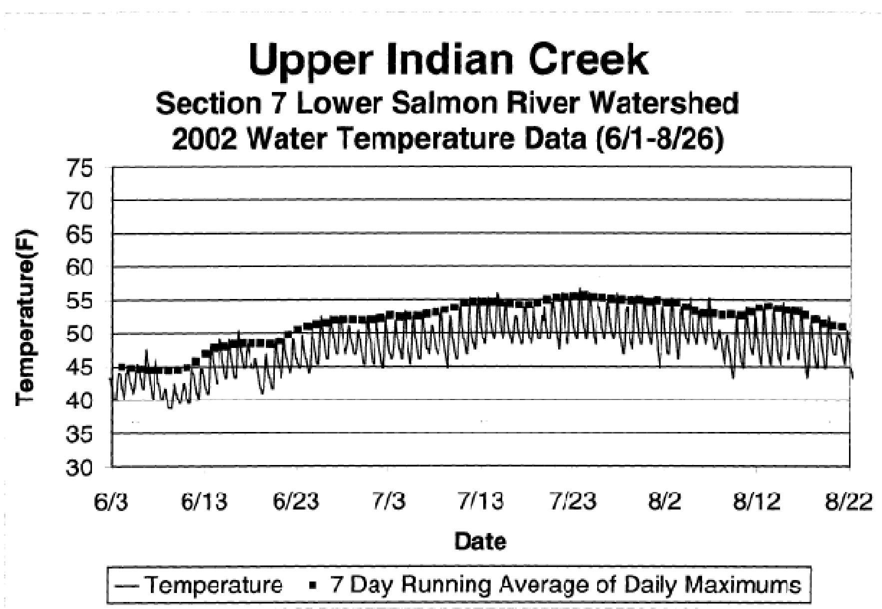

UPPER INDIAN CREEK
Section 7 Lower Main Salmon Watershed
1998 Water Temperature Data (7/1-10/7)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
07/01
08/01
09/01
10/01
Date
7 Day FloatingMean of Daily Maximum

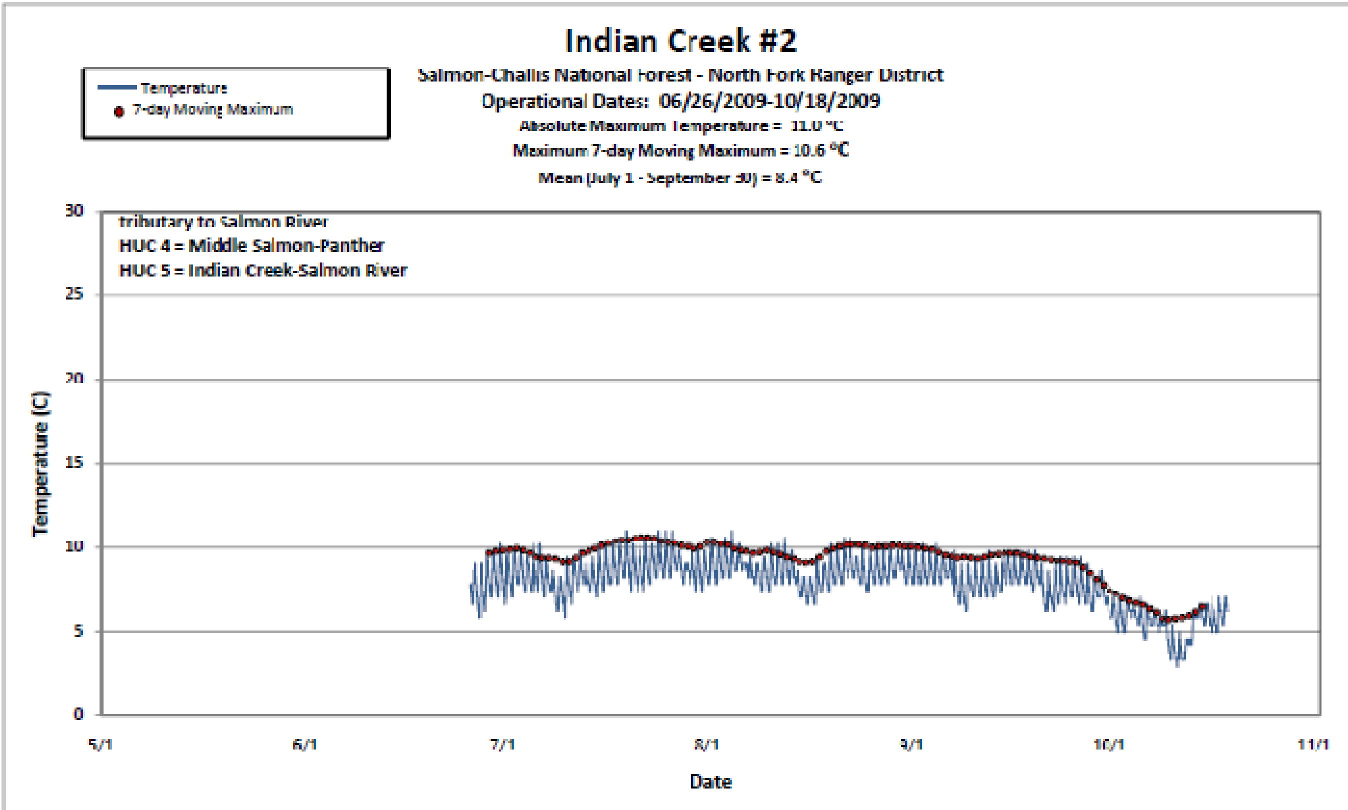

Upper Indian Creek
Sec 7 Lower Salmon River Watershed
1999 Water Temperature Data (7/20 - 10/17)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
08/01
09/01
10/01
Date
Daily Mean
Daily Max

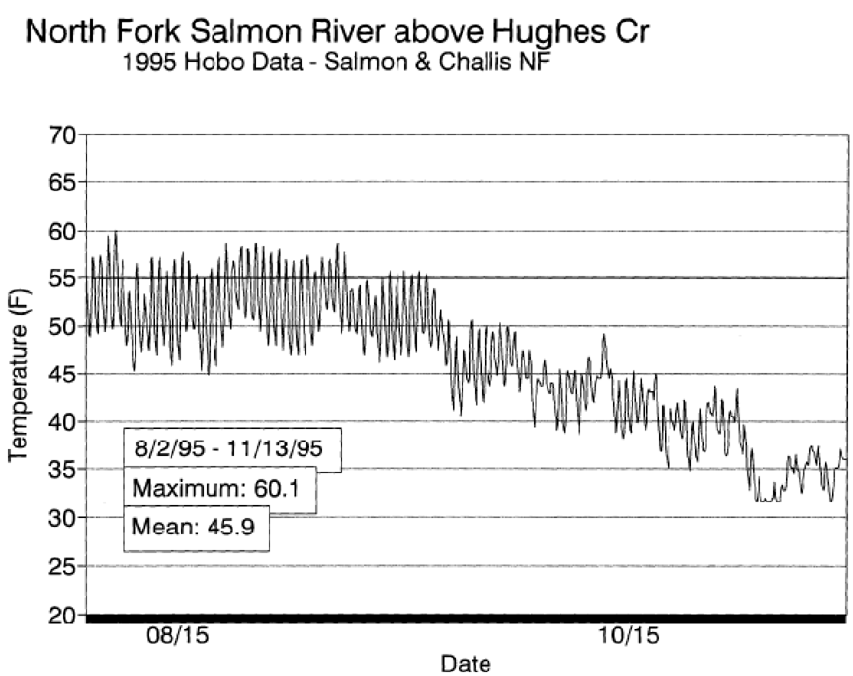

Upper Indian Creek
Sec 7 Lower Salmon River Watershed
1999 Water Temperature Data (7/20 -10/17)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
08/01
09/01
10/01
Date
7 Day Floating Mean of Daily Maximum

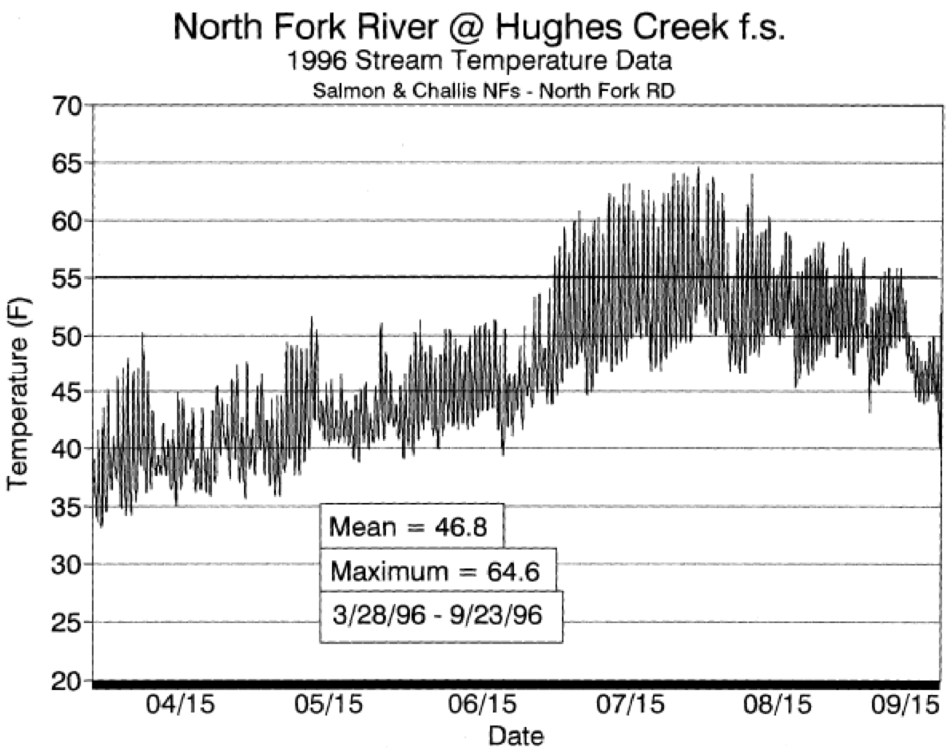

Upper Indian Creek
Section 7 Lower Salmon R. Watershed
2000 Water Temperature Data (6/2-10/10)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
6/2
6/16
6/30
7/14
7/28
8/11
8/25
9/8
9/22
10/6
Date
Temperature
7 Day Running Average of Daily Maximums


Upper Indian Creek
Section 7 Lower Salmon R. Watershed
2001 Water Temperature Data (7/3-10/16)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
7/3
7/17
7/31
8/14
8/28
9/11
9/25
10/9
Date
Temperature
7 Day Running Average of Daily Maximums

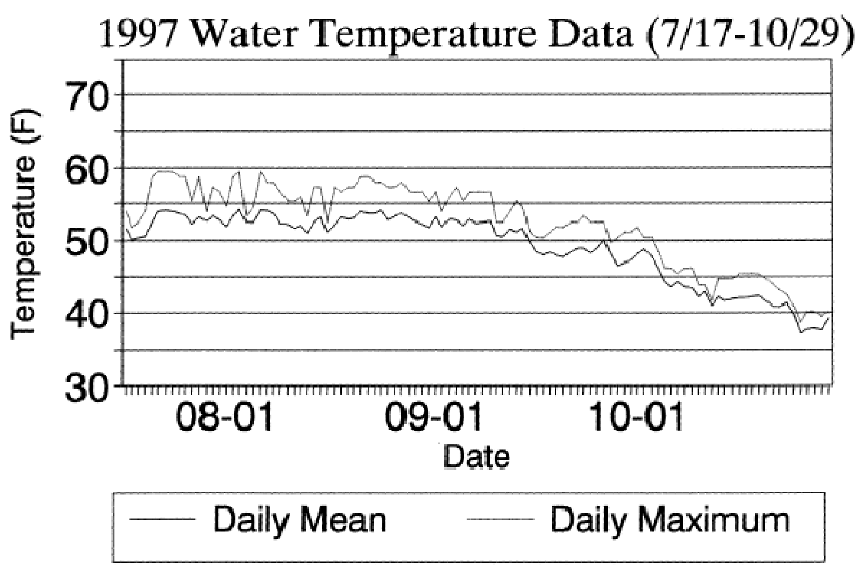

Upper Indian Creek
Section 7 Lower Salmon River Watershed
2002 Water Temperature Data (6/1-8/26)
Temperature(F)
75
70
65
60
55
50
45
40
35
30
6/3
6/13
6/23
7/3
7/13
7/23
8/2
8/12
8/22
Date
Temperature
7 Day Running Average of Daily Maximums


Indian Creek #2
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/26/2009-10/18/2009
Absolute Maximum Temperature = 11.0 °C
Maximum 7-day Moving Maximum = 10.6 °C
Mean (July 1 - September 30) = 8.4 °C
Temperature
7-day Moving Maximum
tributary to Salmon River
HUC 4 = Middle Salmon-Panther
HUC 5 = Indian Creek-Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date


North Fork Salmon River above Hughes Cr
1995 Hobo Data - Salmon & Challis NF
Temperature (F)
70
65
60
55
50
45
40
35
30
25
20
8/2/95 - 11/13/95
Maximum: 60.1
Mean: 45.9
08/15
10/15
Date

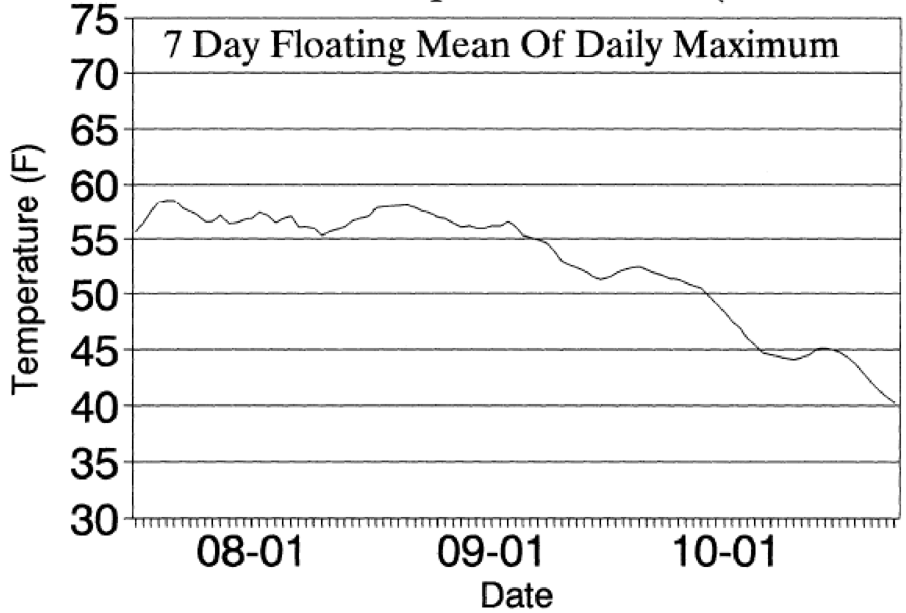


N. FORK SALMON RIVER @ HUGHES CREEK
Sec 7 N. Fork Salmon River Watershed



N. FORK SALMON RIVER @ HUGHES CREEK
Sec 7 N. Fork Salmon River Watershed

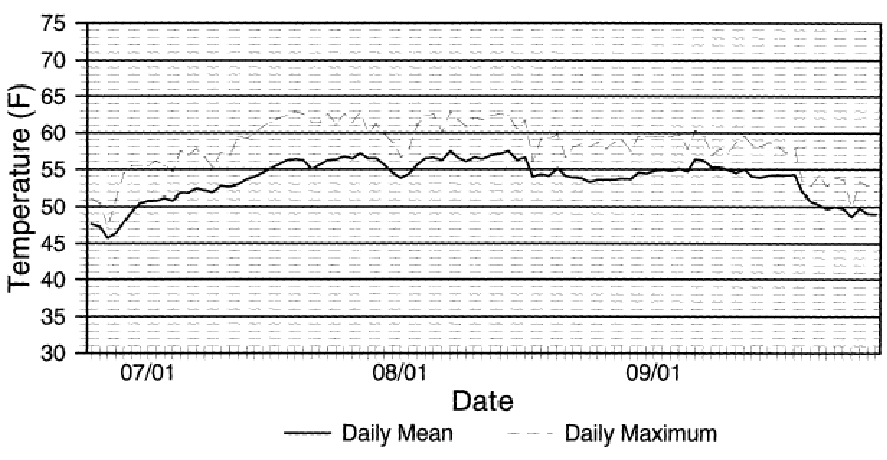
1997 Water Temperature Data (7/17-10/29)

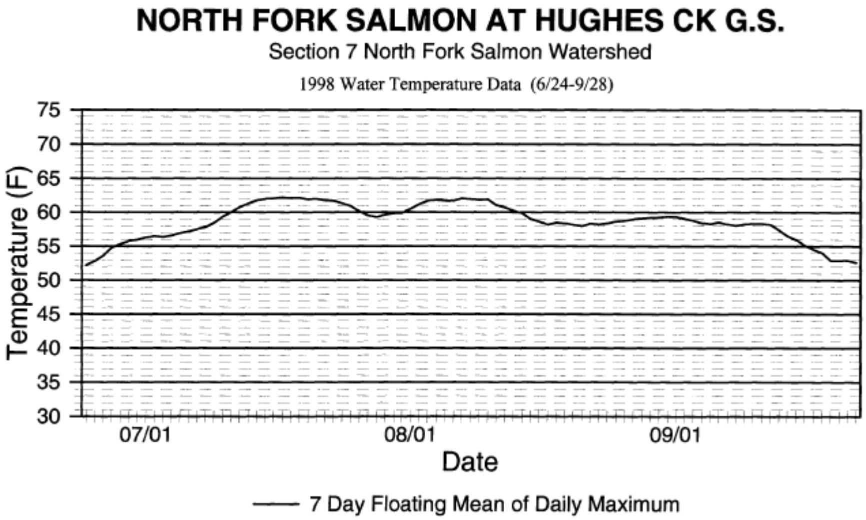


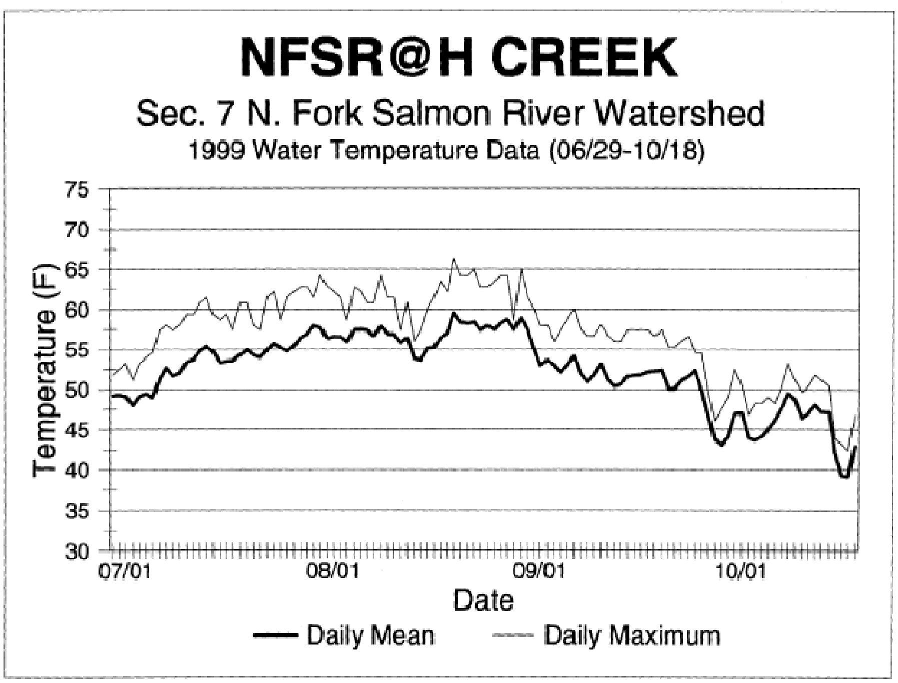
NORTH FORK SALMON AT HUGHES CK G.S.

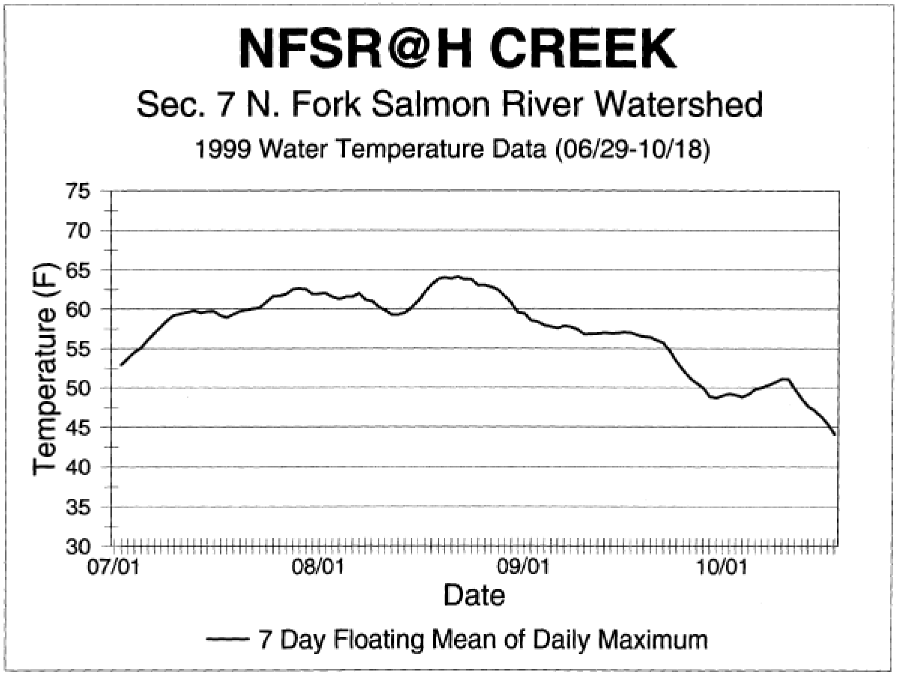
Section 7 North Fork Salmon Watershed

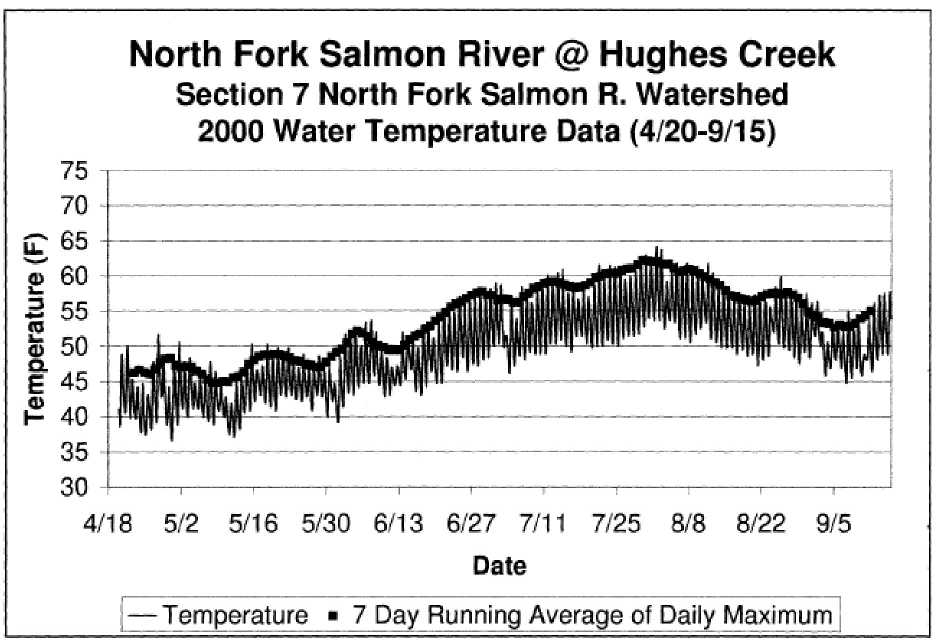
1998 Water Temperature Data (6/24-9/28)

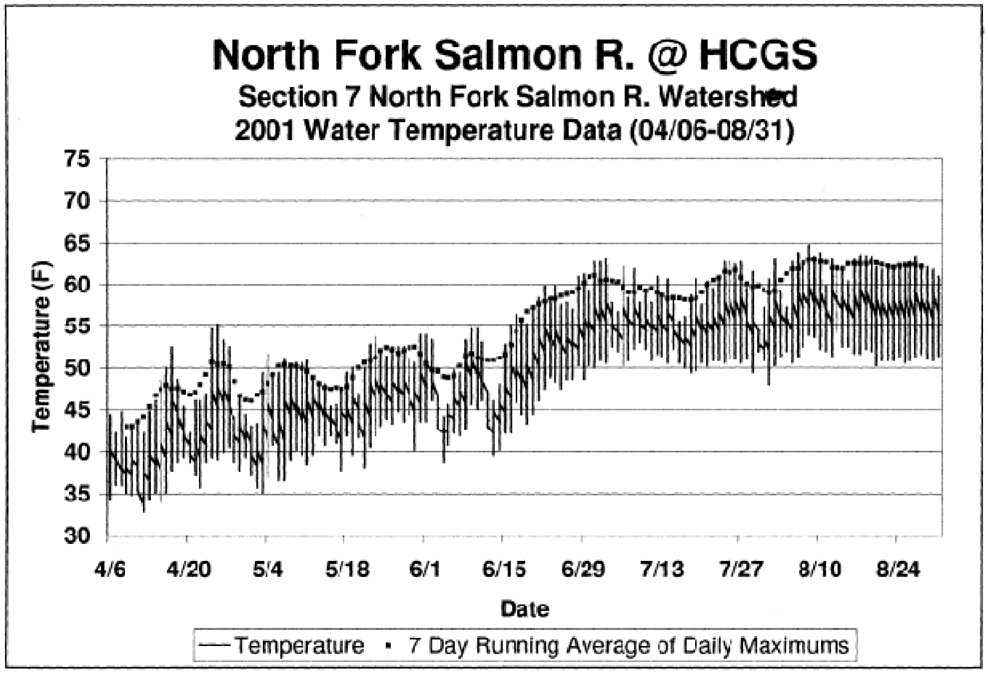


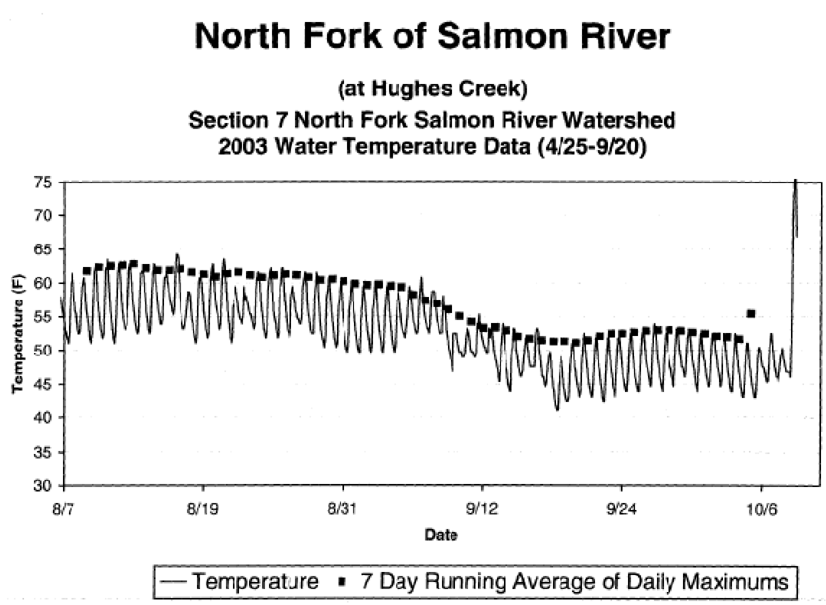

NORTH FORK SALMON AT HUGHES CK G.S.
Section 7 North Fork Salmon Watershed
1998 Water Temperature Data (6/24-9/28)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
07/01
08/01
09/01
Date
7 Day Floating Mean of Daily Maximum

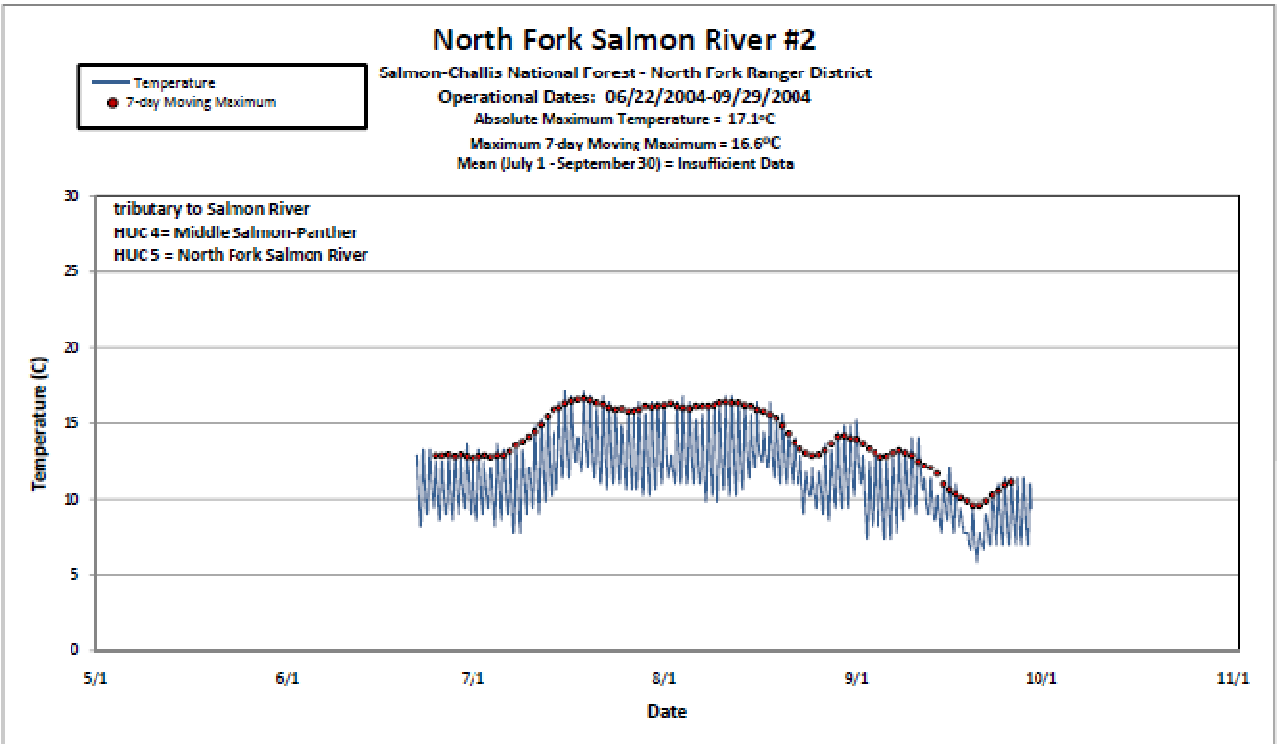

NFSR@H CREEK
Sec. 7 N. Fork Salmon River Watershed
1999 Water Temperature Data (06/29-10/18)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
07/01
08/01
09/01
10/01
Date
Daily Mean
Daily Maximum

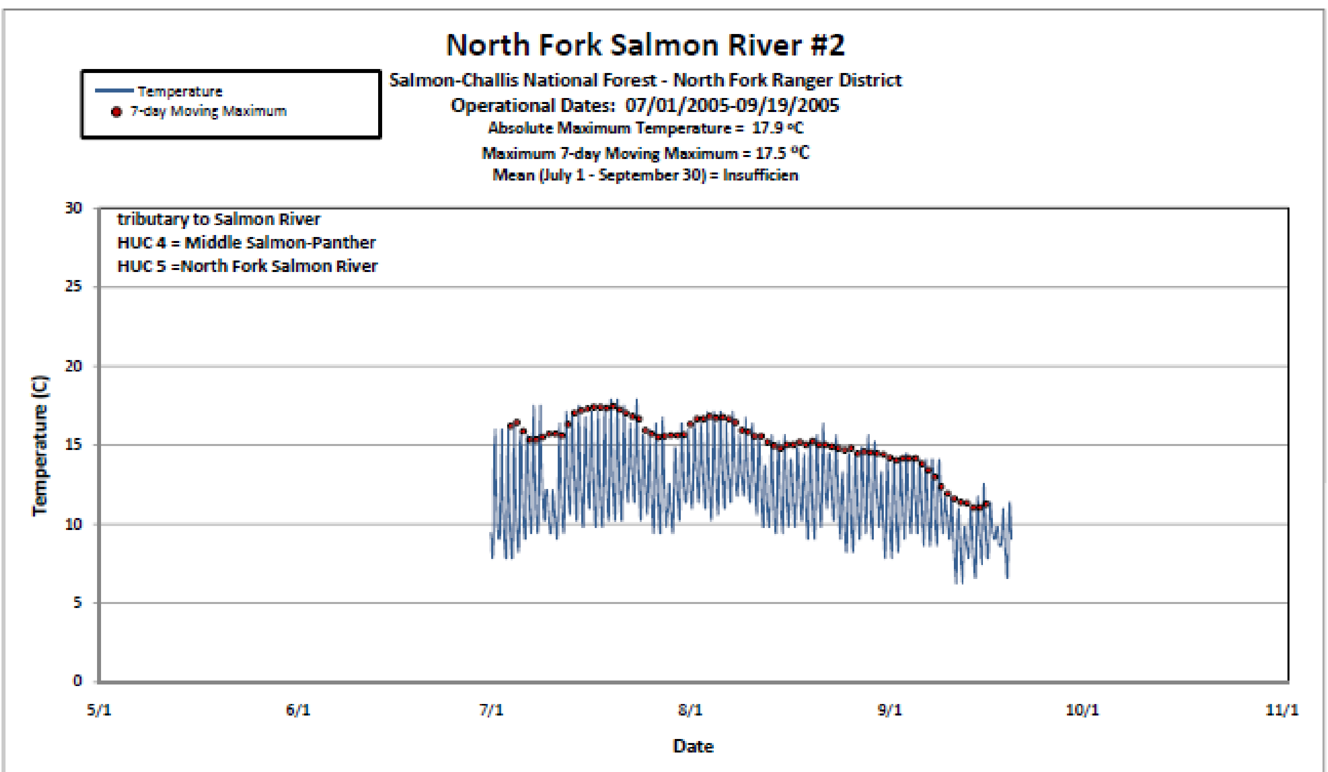

NFSR@H CREEK
Sec. 7 N. Fork Salmon River Watershed
1999 Water Temperature Data (06/29-10/18)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
07/01
08/01
09/01
10/01
Date
7 Day Floating Mean of Daily Maximum

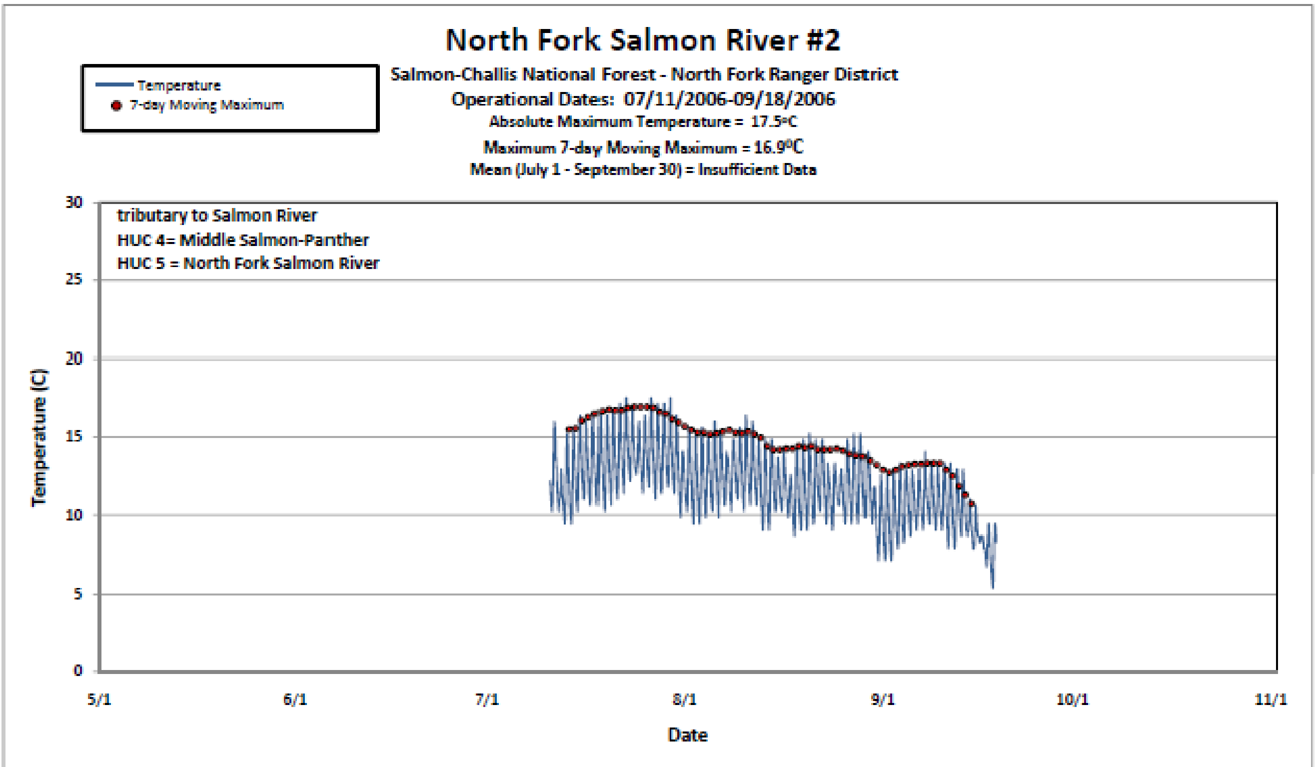

North Fork Salmon River @ Hughes Creek
Section 7 North Fork Salmon R. Watershed
2000 Water Temperature Data (4/20-9/15)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/18
5/2
5/16
5/30
6/13
6/27
7/11
7/25
8/8
8/22
9/5
Date
Temperature
7 Day Running Average of Daily Maximum

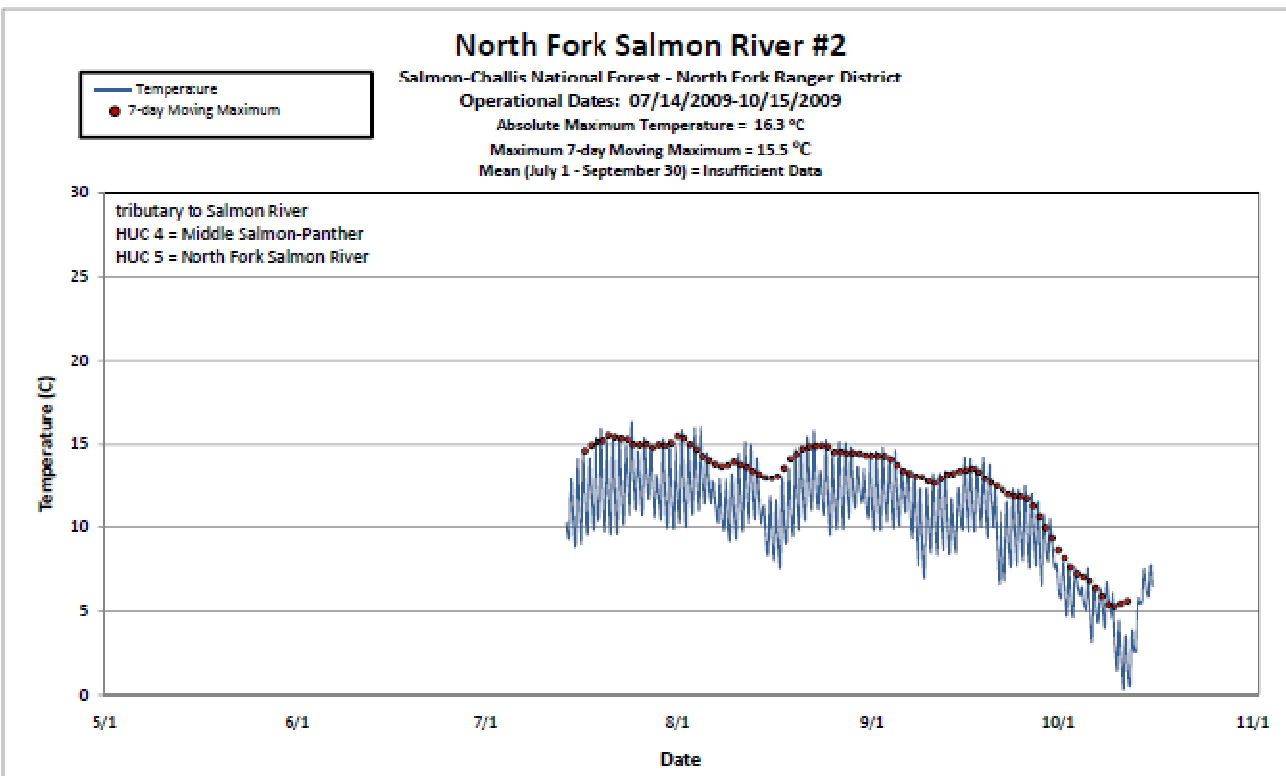

North Fork Salmon R. @ HCGS
Section 7 North Fork Salmon R. Watershed
2001 Water Temperature Data (04/06-08/31)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/6
4/20
5/4
5/18
6/1
6/15
6/29
7/13
7/27
8/10
8/24
Date
Temperature
7 Day Running Average of Daily Maximums

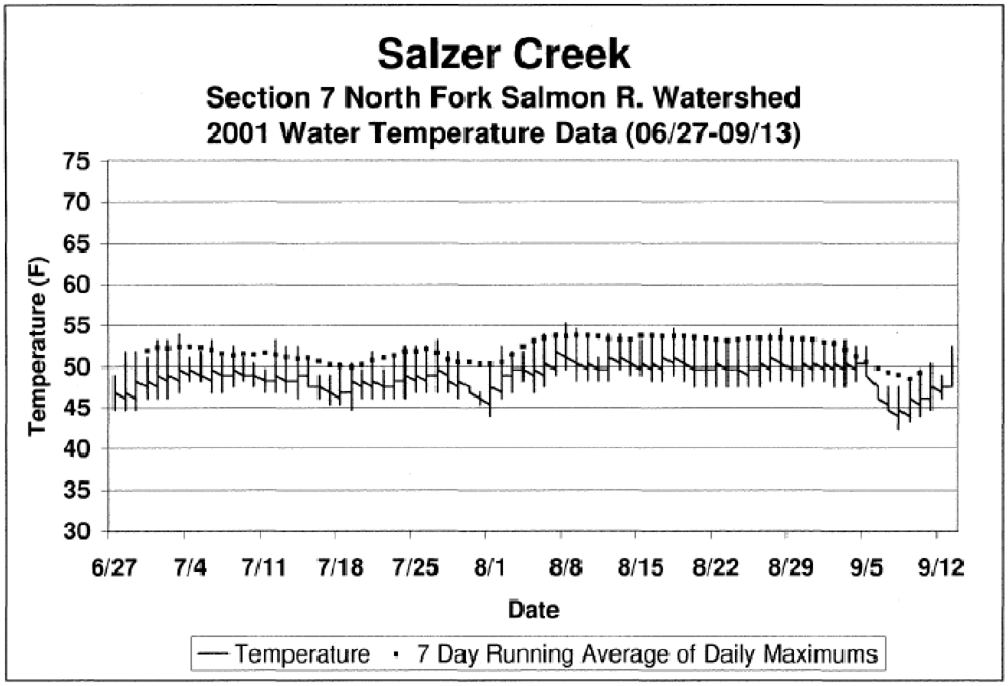

North Fork of Salmon River
(at Hughes Creek)
Section 7 North Fork Salmon River Watershed
2003 Water Temperature Data (4/25-9/20)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
8/7
8/19
8/31
9/12
9/24
10/6
Date
Temperature
7 Day Running Average of Daily Maximums

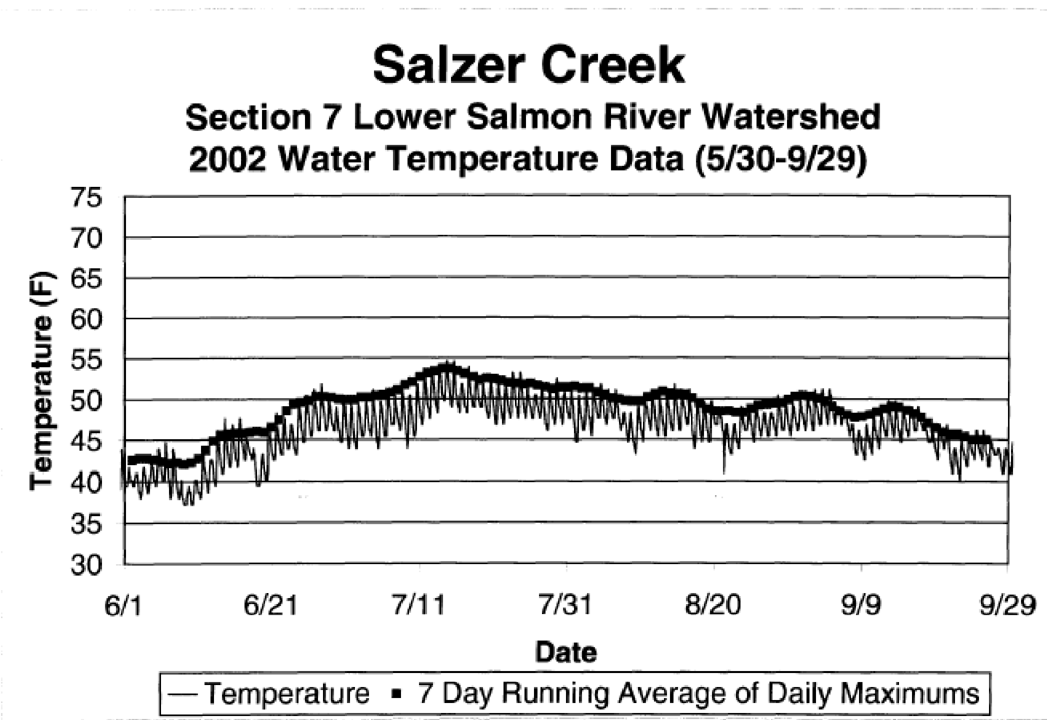

North Fork Salmon River #2
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/22/2004-09/29/2004
Absolute Maximum Temperature = 17.1°C
Maximum 7-day Moving Maximum = 16.6°C
Mean (July 1 - September 30) = Insufficient Data
tributary to Salmon River
HUC 4= Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

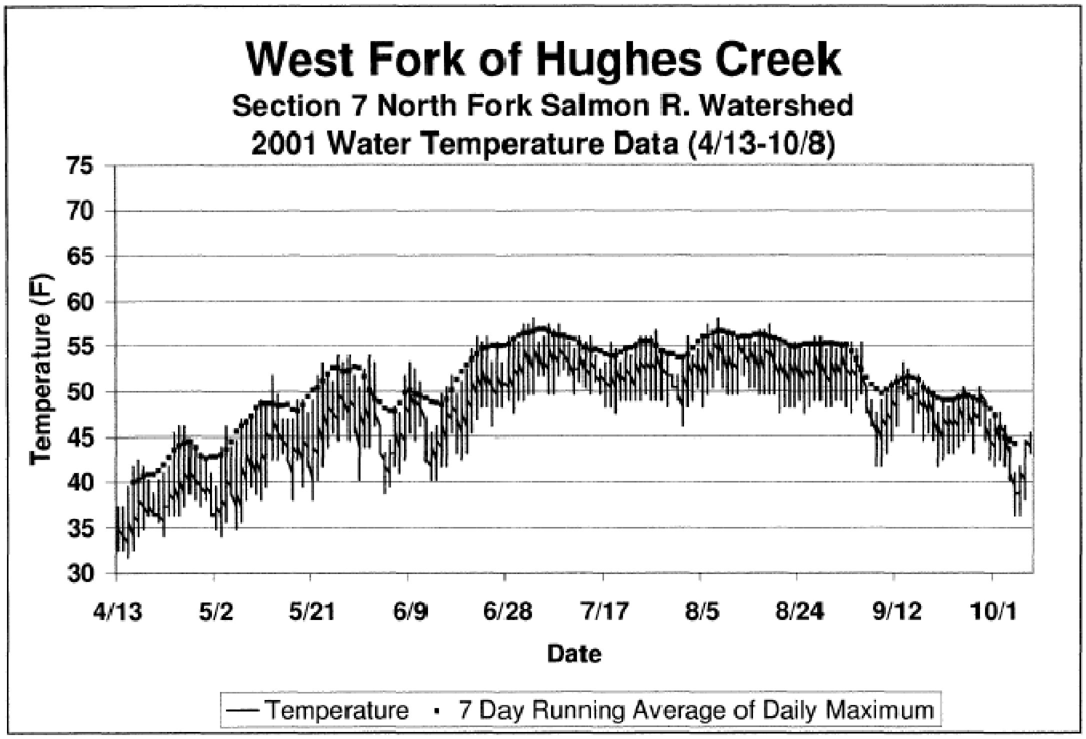

North Fork Salmon River #2
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 07/01/2005-09/19/2005
Absolute Maximum Temperature = 17.9 °C
Maximum 7-day Moving Maximum = 17.5 °C
Mean (July 1 - September 30) = Insufficien
tributary to Salmon River
HUC 4 = Middle Salmon-Panther
HUC 5 =North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

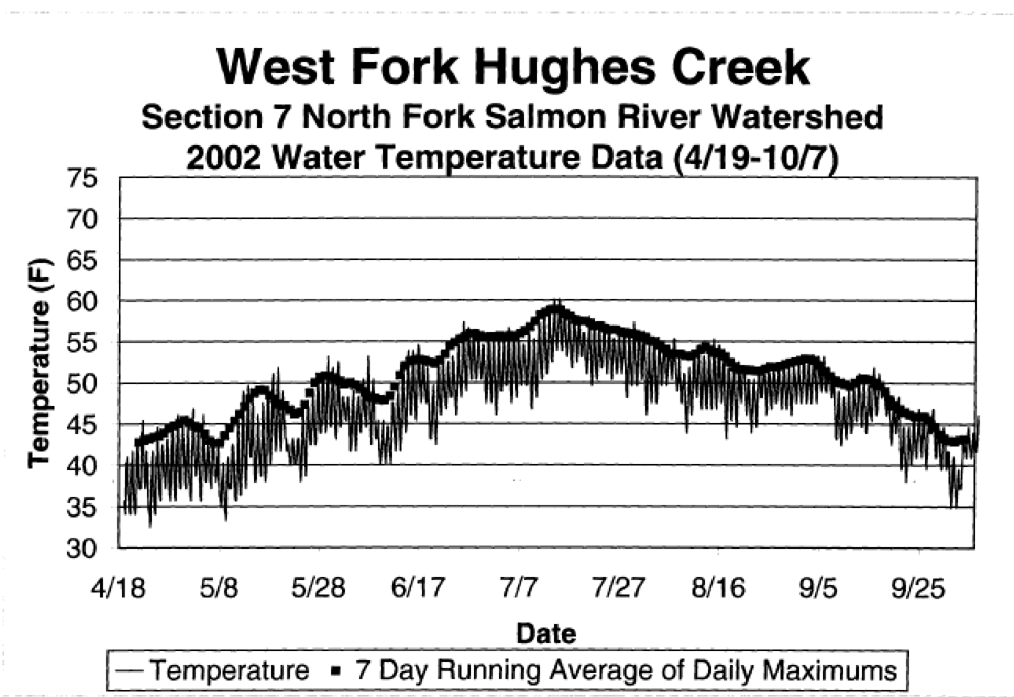

North Fork Salmon River #2
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 07/11/2006-09/18/2006
Absolute Maximum Temperature = 17.5°C
Maximum 7-day Moving Maximum = 16.9°C
Mean (July 1 - September 30) = Insufficient Data
tributary to Salmon River
HUC 4= Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
0
5
10
15
20
25
30
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

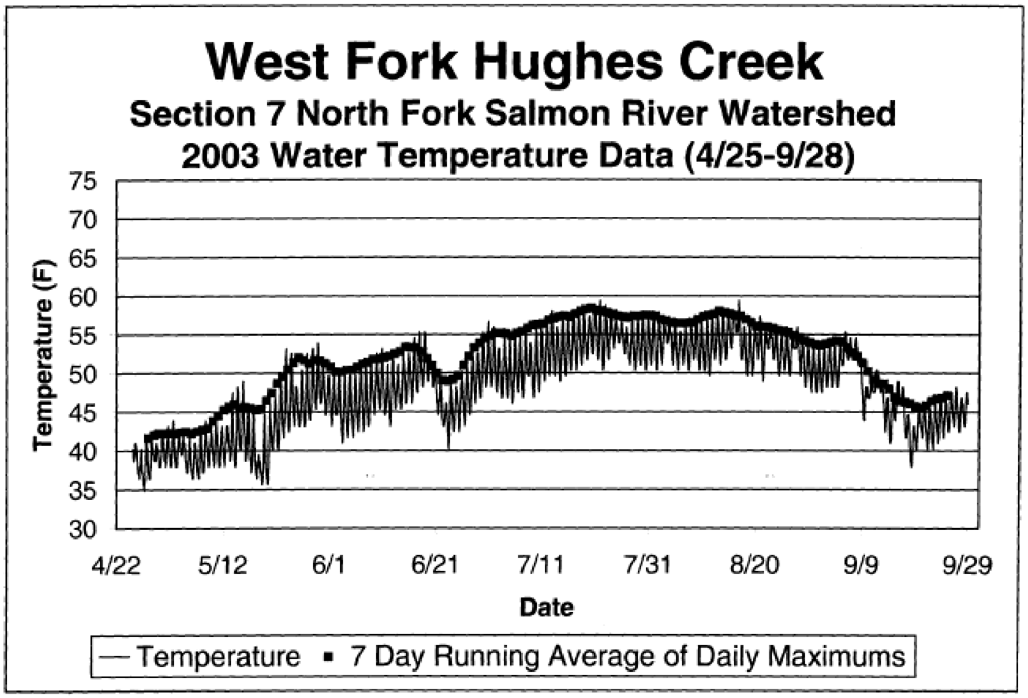

North Fork Salmon River #2
Temperature
7-day Moving Maximum
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 07/14/2009-10/15/2009
Absolute Maximum Temperature = 16.3 °C
Maximum 7-day Moving Maximum = 15.5 °C
Mean (July 1 - September 30) = Insufficient Data
tributary to Salmon River
HUC 4 = Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
0
5
10
15
20
25
30
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

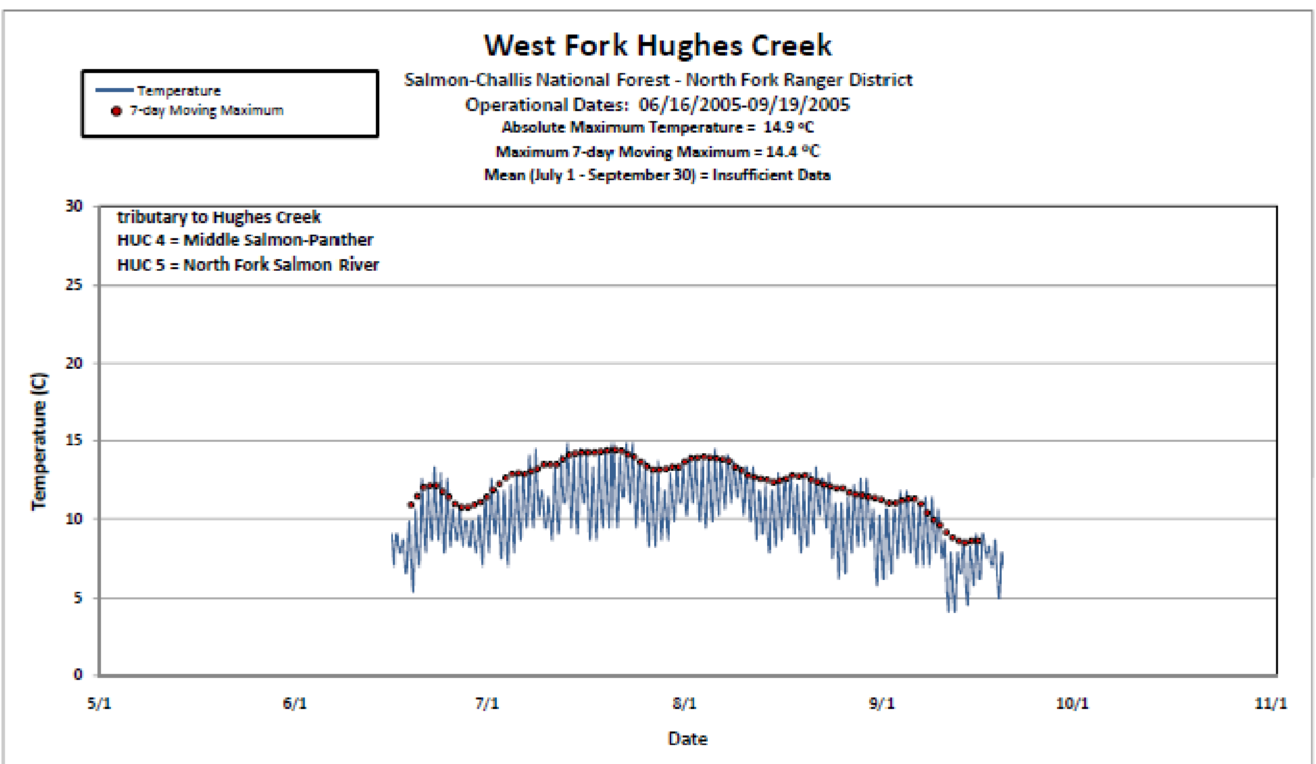

Salzer Creek
Section 7 North Fork Salmon R. Watershed
2001 Water Temperature Data (06/27-09/13)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
6/27
7/4
7/11
7/18
7/25
8/1
8/8
8/15
8/22
8/29
9/5
9/12
Date
Temperature
7 Day Running Average of Daily Maximums

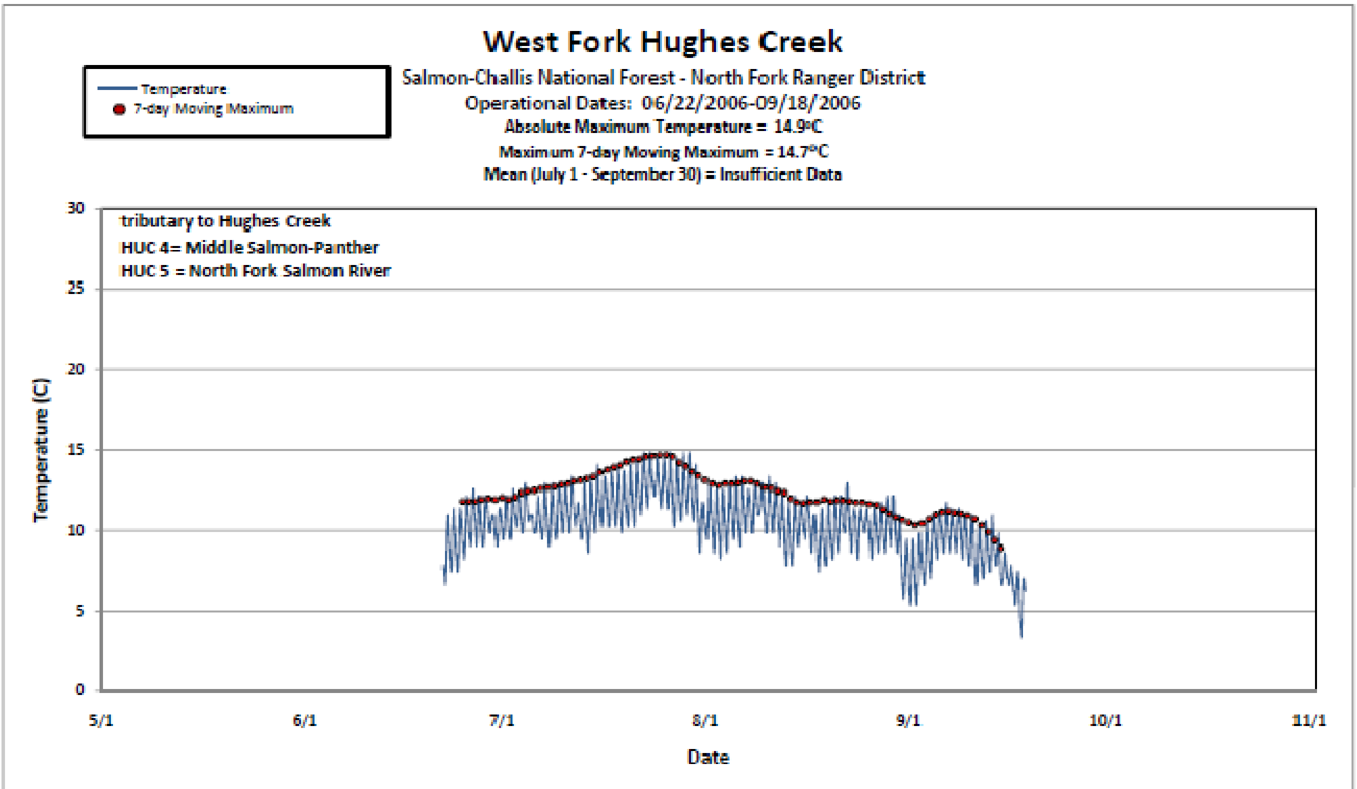

Salzer Creek
Section 7 Lower Salmon River Watershed
2002 Water Temperature Data (5/30-9/29)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
6/1
6/21
7/11
7/31
8/20
9/9
9/29
Date
Temperature
7 Day Running Average of Daily Maximums

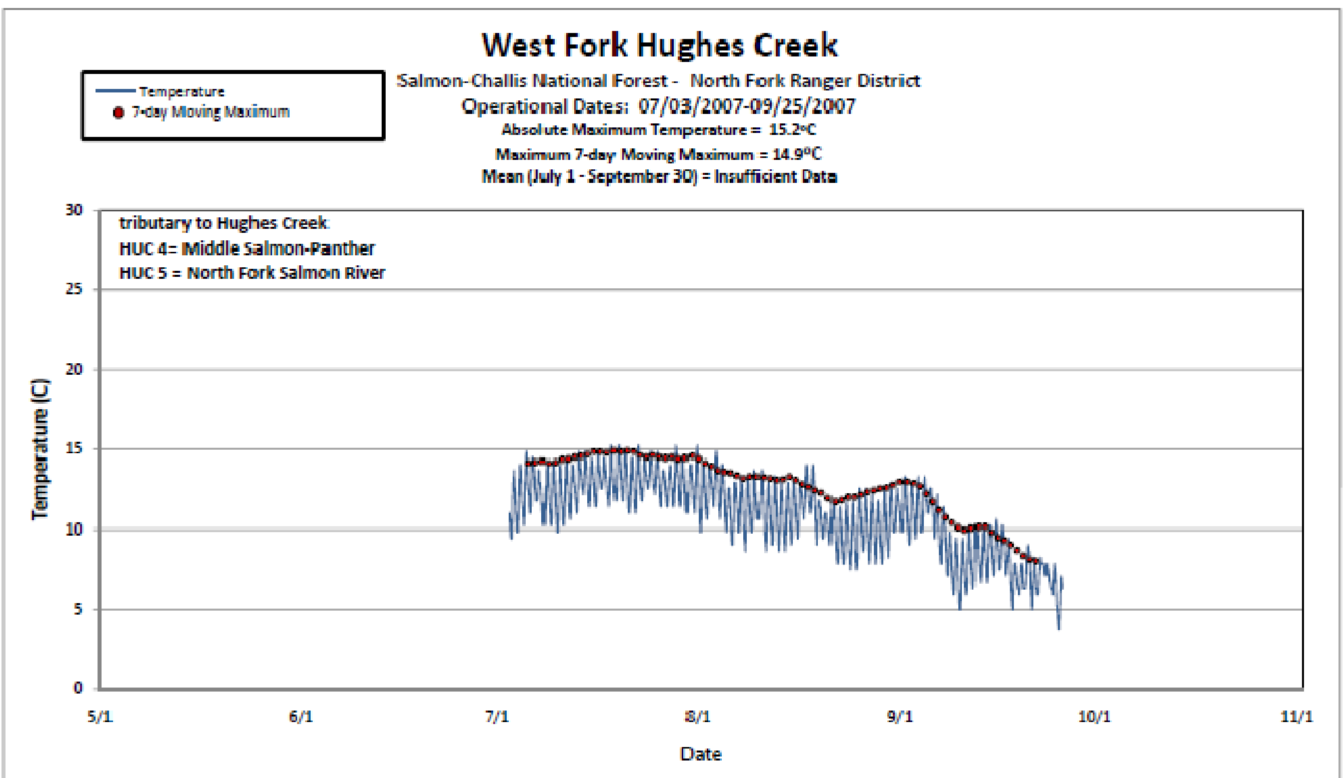

West Fork of Hughes Creek
Section 7 North Fork Salmon R. Watershed
2001 Water Temperature Data (4/13-10/8)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/13
5/2
5/21
6/9
6/28
7/17
8/5
8/24
9/12
10/1
Date
Temperature
7 Day Running Average of Daily Maximum

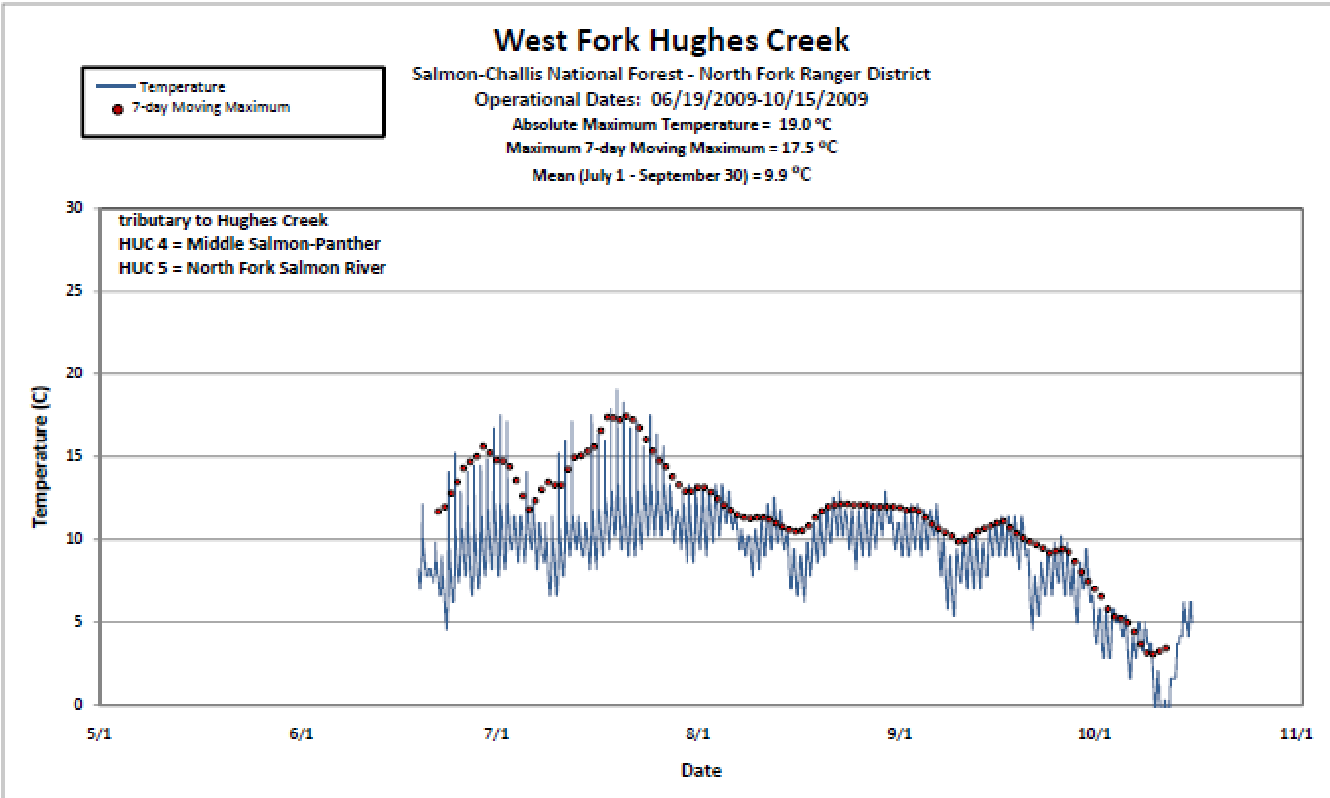

West Fork Hughes Creek
Section 7 North Fork Salmon River Watershed
2002 Water Temperature Data (4/19-10/7)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/18
5/8
5/28
6/17
7/7
7/27
8/16
9/5
9/25
Date
Temperature
7 Day Running Average of Daily Maximums


West Fork Hughes Creek
Section 7 North Fork Salmon River Watershed
2003 Water Temperature Data (4/25-9/28)
Temperature (F)
75
70
65
60
55
50
45
40
35
30
4/22
5/12
6/1
6/21
7/11
7/31
8/20
9/9
9/29
Date
Temperature
7 Day Running Average of Daily Maximums


West Fork Hughes Creek
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/16/2005-09/19/2005
Absolute Maximum Temperature = 14.9 °C
Maximum 7-day Moving Maximum = 14.4 °C
Mean (July 1 - September 30) = Insufficient Data
Temperature
7-day Moving Maximum
tributary to Hughes Creek
HUC 4 = Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date


West Fork Hughes Creek
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/22/2006-09/18/2006
Absolute Maximum Temperature = 14.9ºC
Maximum 7-day Moving Maximum = 14.7ºC
Mean (July 1 - September 30) = Insufficient Data
Temperature
7-day Moving Maximum
tributary to Hughes Creek
HUC 4= Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date


West Fork Hughes Creek
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 07/03/2007-09/25/2007
Absolute Maximum Temperature = 15.2ºC
Maximum 7-day Moving Maximum = 14.9ºC
Mean (July 1 - September 30) = Insufficient Data
Temperature
7-day Moving Maximum
tributary to Hughes Creek
HUC 4= Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date


West Fork Hughes Creek
Salmon-Challis National Forest - North Fork Ranger District
Operational Dates: 06/19/2009-10/15/2009
Absolute Maximum Temperature = 19.0 °C
Maximum 7-day Moving Maximum = 17.5 °C
Mean (July 1 - September 30) = 9.9 °C
Temperature
7-day Moving Maximum
tributary to Hughes Creek
HUC 4 = Middle Salmon-Panther
HUC 5 = North Fork Salmon River
Temperature (C)
30
25
20
15
10
5
0
5/1
6/1
7/1
8/1
9/1
10/1
11/1
Date

APPENDIX H – ELECTROFISHING STREAM SUMMARY WITHIN ESA ACTION AREA

Fish/100m^2 population density is calculated using fish 70mm or greater in length.

	Year								
Stream Name	**2009**			**2009**			**2009**		
Allen Creek	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	NA	NA	1	NA	NA	0	NA	NA
	2003			**2003**			**2003**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	NA	NA	0	NA	NA	0	NA	NA
	1999			**1999**			**1999**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0/0	NA	2	0/0	NA	0	0/0	NA
	1998			**1998**			**1998**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0/0	NA	3	3/0	15	0	0/0	NA
	1997			**1997**			**1997**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	NA	NA	9	NA	NA	0	NA	NA

	Year								
Stream Name	**1999**			**1999**			**1999**		
Ditch Creek .57	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	7	0	NA	0	0	NA

	Year								
Stream Name	**2009**			**2009**			**2009**		
Ditch Creek #1	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	NA	NA	16	NA	NA	0	NA	NA
Ditch Creek 1.14	**2003**			**2003**			**2003**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	0	0	NA	0	0	NA
	1998			**1998**			**1998**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	5	1	5	0	0	NA
	1997			**1997**			**1997**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	12	2	10	0	0	NA

	Year								
Stream Name	**2009**			**2009**			**2009**		
Ditch Creek #2	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	NA	NA	0	NA	NA	0	NA	NA
Ditch Creek 3.79	**1997**			**1997**			**1997**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	1	1	NA	0	0	NA

	Year								
Stream Name	**2009**			**2009**			**2009**		
Hughes Creek #1	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	64	13	16.88	0	0	NA
Hughes Creek 3.03	**2003**			**2003**			**2003**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	22	5	1	0	0	NA
	2002			**2002**			**2002**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	22	6	6	0	0	NA
	2001			**2001**			**2001**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	18	7	6	0	0	NA
	1998			**1998**			**1998**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	NA	NA	11	NA	NA	1	NA	
	1997			**1997**			**1997**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	6	2	4	0	0	NA

	Year								
Stream Name	**1997**			**1997**			**1997**		
Hughes Creek 4.62	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	12	6	10	0	0	NA

	Year								
Stream Name	**2009**			**2009**			**2009**		
Hughes Creek #2	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²
	0	NA	NA	0	NA	NA	4	NA	NA
Hughes Creek 6.06	**2004**			**2004**			**2004**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²
	0	0	NA	3	1	0.9	1	2	0.68
	1998			**1998**			**1998**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²
	0	0	NA	1	0	NA	4	1	2

	Year								
Stream Name	**2009**			**2009**			**2009**		
Hull Creek	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²
	0	NA	NA	14	NA	NA	0	NA	NA
Hull Creek .49	**2004**			**2004**			**2004**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²
	0	0	NA	1	0	NA	0	0	NA
	2003			**2003**			**2003**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²
	0	NA	NA	0	NA	NA	0	NA	NA
	1998			**1998**			**1998**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²
	0	0	NA	3	1	7	0	0	NA
	1997			**1997**			**1997**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²
	0	0	NA	1	2	3	0	0	NA

	Year								
Stream Name	**2009**			**2009**			**2009**		
Hull Creek #2	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²	1st pass	2nd/3rd pass	fish/100m²
	0	NA	NA	6	NA	NA	0	NA	NA

	Year								
Stream Name	**2009**			**2009**			**2009**		
Indian Creek #3	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	NA	NA	20	NA	NA	3	NA	NA

	Year								
Stream Name	**2009**			**2009**			**2009**		
Indian Creek 4	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	NA	NA	13	NA	NA	4	NA	NA

	Year								
Stream Name	**2009**			**2009**			**2009**		
Indian Creek 5	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	NA	NA	0	NA	NA	12	NA	NA

	Year								
Stream Name	**2009**			**2009**			**2009**		
West Fork Hughes Creek	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	NA	NA	0	NA	NA	0	NA	NA
	2003			**2003**			**2003**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	19	5	13	0	0	NA
	2002			**2002**			**2002**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	3	1	2	0	0	NA
	2001			**2001**			**2001**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	1	0	NA	0	0	NA
	1999			**1999**			**1999**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	1	3	4	0	0	NA
	1997			**1997**			**1997**		
	Chinook salmon			steelhead			bull trout		
	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2	1st pass	2nd/3rd pass	fish/100m^2
	0	0	NA	8	2	11	0	0	NA

APPENDIX I – STREAM PICTURES WITHIN THE ESA ACTION AREA

Corral Creek

Ditch Creek

East Fork Indian Creek

Hughes Creek

Hull Creek

Indian Creek