SAWTOOTH NATIONAL FOREST
LAND AND RESOURCE MANAGEMENT PLAN

2011 MONITORING AND EVALUATION REPORT
FY 2012

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ATTACHMENTS

I. INTRODUCTION

In September 2003, the Sawtooth National Forest (NF) began implementing its revised Land and Resource Management Plan (Forest Plan). The revised Forest Plan defines a strategy that manages Forest resources to attain a set of desired resource and social and economic conditions by emphasizing the maintenance or restoration of watershed conditions, species viability, terrestrial and aquatic habitats, and healthy, functioning ecosystems. Monitoring and evaluation are critical to determining if we are attaining desired goals. In accordance with the regulations at 36 CFR 219.12(k): "At intervals established in the plan, implementation shall be evaluated on a sample basis to determine how well objectives have been met and how closely management standards and guidelines have been applied. Based upon this evaluation, the interdisciplinary team shall recommend to the Forest Supervisor such changes in management direction, revisions, or amendments to the Forest Plan as are deemed necessary."

Chapter IV of the 2003 Forest Plan establishes that formal evaluation and reporting will occur every 5 years. 2008 marked completion of the first five years of implementation under the 2003 revised Forest Plan, triggering a formal review. The Forest completed the formal evaluation of the first five years of Forest Plan implementation and published the results of that evaluation in 2011.

As a result of the 5 year evaluation, several changes were made to the monitoring elements described in Chapter IV of the Forest Plan. These changes are reflected in this monitoring report. In addition to completion of the 5 year evaluation, the Forest completed an amendment of the Forest Plan to adopt a forested biological community Wildlife Conservation Strategy (WCS) in 2012. The 2012 (WCS) Forest Plan amendment included several changes to the monitoring elements described in Chapter IV of the Forest Plan, as well as added, deleted or modified several management objectives. Because the changes identified in the 2012 WCS Forest Plan amendment were not in effect in 2011, monitoring results included in this report do not reflect the changes included in that amendment.

This document reflects the final monitoring report for fiscal year 2011.

II. 2012 FOREST PLAN MONITORING and EVALUATION REPORT ORGANIZATION

As previously stated, monitoring and evaluation provide knowledge and information to keep the Land and Resource Management Plan viable. Appropriate selection of indicators, and monitoring and evaluation of key results helps us determine if we are meeting the desired conditions identified in the Plan. Chapter IV of the Revised Forest Plan provides the list of activities, practices and/or effects to be monitored and the various indicators to be used as measures. While most of the monitoring elements require that some level of data be gathered each year, the majority of elements are designed to evaluate the effects of management over time. Therefore, results of monitoring efforts for most elements are reported after evaluation of data that has been gathered for multiple years.

Chapter IV, Table IV-1 of the Forest Plan identifies elements related to National Forest Management Act (NFMA) and other pertinent laws and regulations that are reported on either an annual basis or every 5 years. Elements that are not reported each year are typically those that require the collection of information over multiple years before a meaningful evaluation is possible. In this eighth year monitoring report under the 2003 Forest Plan, only the 5 elements identified in Table IV-1 with a "yes" in the "Annual Posting of Results" column will be discussed in Section III-A below.

Table IV-2 of the Forest Plan identifies questions and indicators that will be monitored to determine the success of the Forest Plan management strategy in progressing toward desired conditions. Similar to Table IV-1, information pertaining to many of the indicators requires multiple years of collection before any meaningful evaluation of an element and its related question can be made. Therefore, only the monitoring questions and their related indicators with "annually" or "biennially" in the "Report Period" column will be addressed in Section III-B below.

III. SUMMARY OF MONITORING RESULTS:

III-A. Annual Monitoring Requirements – Table IV-1:

Monitoring requirements identified in the Forest Plan shall provide for:
1. A quantitative estimate of performance comparing outputs and services with those projected by the Forest Plan.

As defined in the Forest Plan, Objectives are "concise time-specific statements of actions or results designed to help achieve goals". As such, objectives provide the best projection of outputs and services to be provided through implementation of the Forest Plan. Forest Plan objectives are found under the various Forest-wide Resources sections in Chapter III of the Forest Plan. Following is a summary of the Forest's accomplishments for those objectives designed to provide for specific services on an annual basis, and/or projected outputs resulting from management actions. Other objectives found in the various sections of the Forest Plan that were not required to be accomplished in the first or second year of plan implementation or did not require an annual accomplishment are *not* discussed in this second year monitoring report. These objectives are discussed only in those cases where activities have been implemented that substantially contribute toward or fully accomplish the objective in the first year. Typically, these objectives will be addressed in detail every 5 years, unless otherwise specified or warranted due to changed conditions or circumstances.

The objectives addressed below are organized by resource section as they are found in the Forest Plan. Those resource sections in the Plan that do not contain objectives that are reported on an annual or biennial basis or require an annual or biennial accomplishment will be noted below.

THREATENED, ENDANGERED, PROPOSED, AND CANDIDATE SPECIES OBJECTIVES (FLRMP pages III-8 to III-11)

Objective TEOB03 - *Identify and reduce road-related effects on TEPC species and their habitats using the Watershed and Aquatic Recovery Strategy and other appropriate methodologies.*

Accomplishment: In addition to annual road maintenance, two projects reduced road sediment effects within aquatic TEPC subwatersheds. Two and a half miles of non-system roads were decommissioned within Pole and Valley Creek within the Upper Salmon subbasin. Within Pole Creek two miles of unauthorized routes were closed with heavy equipment to prevent further use. Travel routes were closed by decompacting soils, re-establishing natural drainage, and incorporating organic material on each route. The project in Valley Creek curtailed inappropriate and unauthorized motorized use that was exasperated by recent right-of-way clearing along powerlines. Heavy equipment was utilized to close and encumber areas to travel while breaking compaction, re-establishing natural drainage, incorporating organic material, and accelerating restoration of damaged areas.

Objective TEOB11: *Update appropriate NRIS database modules for TEPC species and their habitats on a biennially basis to incorporate latest field data.*

Accomplishment: In 2011, all bighorn sheep observation data was entered into NRIS Wildlife. This data will be used to run the Bighorn Sheep Risk of Contact model once it is available and fully operational. All data from biological surveys in the Upper Salmon, S.F. Boise, and raft River subbasins where T&E species are present were entered into NRIS water. Legacy data collected by other agencies from Leatherside Chub and Wood River Sculpin surveys were also entered into NRIS.

Objective TEOB22: *Develop operational resources (maps, keys, desk guides, etc.) within 1 year of signing the ROD, to coordinate TEPC species concerns and practical mitigations, and include those resource tools in the Fire Management Plan. Consult with NMFS and USFWS on operational resources on an annual basis.*

Accomplishment: Fire operational guidelines were originally developed in the spring of 2004. The guidelines included protective measures for wildlife, botanical, and aquatic resources. In 2006, the Boise NF and Sawtooth NF completed a Programmatic Biological Assessment (BA) for Wildfire Suppression and Wildland Fire Use activities that incorporated and improved upon the 2004 guidance. This BA was submitted for informal consultation, which concluded with letters of concurrence from the FWS and NOAA on 08-11-2006 and 08-30-2006, respectively. In 2011 the Forest continued to implement the programmatic consultation direction and was close to finishing guidance for an updated fire suppression consultation to be completed in 2012.

AIR QUALITY AND SMOKE MANAGEMENT Objectives (Forest Plan, page III-16)

This section contains no annual accomplishment requirements.

SOIL, WATER, RIPARIAN AND AQUATIC RESOURCES Objectives (Forest Plan, pages III-19 to III-21)

Objective SWOB11: *Coordinate with state and local agencies and tribal governments annually to limit or reduce degrading effects from stocking programs on native and desired non-native fish and aquatic species.*

Accomplishment: No coordination meetings relative to fish stocking occurred in 2011.

WILDLIFE RESOURCES Objectives (Forest Plan, pages III-25 to III-26)

Objective WIOB03: *Prioritize wildlife habitats to be restored at a mid- or Forest-scale, using information from sources such as species habitat models, and fine-scale analyses. Initiate restoration activities on priority wildlife habitats to move current conditions toward desired conditions.*

Accomplishment: Throughout 2011, the Forest continued work on the proposed Wildlife Conservation Strategy Forest Plan amendment. Through this amendment, wildlife habitats associated with forested biological communities would e prioritized for restoration.

Objective WIOB10: *Update appropriate NRIS database modules for sensitive species' occurrence and habitat on a biennial basis to incorporate latest field data.*

Accomplishment: In FY11 sensitive species occurrence data was entered into the NRIS Wildlife database. Also in FY11, the SNF completed entering all observational data for Bighorn Sheep occurrences on the Forest.

VEGETATION RESOURCES Objectives (Forest Plan, page III-30)

This section contains no annual or biennial accomplishment requirements.

BOTANICAL RESOURCES Objectives (Forest Plan, pages III-32 to III-33)

Objective BTOB07: *Maintain annually a list of Forest Watch plants that identify species of concern (see Appendix C for list of species).*

Accomplishment: In FY11 no species were added to or deleted from the Forest Watch list

NON-NATIVE PLANTS Objectives (Forest Plan, pages III-35 to III-36)

Objective NPOB03: *Develop strategic noxious weed management plans for Coordinated Weed Management Areas. Cooperate on a regular basis with federal agencies, tribal governments, the State of Idaho, county weed organizations, state and local highway departments, and private*

individuals in establishing Coordinated Weed Management Area strategic priorities, and locating and treating noxious weed species.

Accomplishment: The administrative boundary of the Forest falls within seven Cooperative Weed Management Areas (CWMAs): Camas Creek, Blaine County, Shoshone Basin, Goose Creek, South Fork Boise, Custer County and Raft River. Coordinated accomplishments for CWMAs are reported in the winter following the field season of work. The Forest treated a total of 10,126 acres of noxious weed across the Forest in FY11. Table 1 shows the total number of acres treated by treatment method.

Table 1: Acres of Noxious Weed Treated by Method

Method	Minidoka	Ketchum	SNRA	Fairfield	Forest
Chemical	1,668	486	811	1,291	4,256
Biological			5	5,865	5,870
Total	**1,668**	**486**	**816**	**7,156**	**10,126**

FIRE MANAGEMENT Objectives (Forest Plan, pages III-38 to III-39)

Objective FMOB04: *Schedule and complete at least 40,000 acres of fuels management through prescribed fire and mechanical treatments in the next decade to achieve desired vegetation attributes and fuel reduction goals. Focus on wildland/urban interface and areas in Fire Regimes 1, 2, and 3 (non-lethal, mixed1, mixed2) in Condition Classes 2 and 3 (moderate to extreme hazard rating).*

Accomplishment: In FY11, the Forest treated 5,588 acres in non-wildland urban interface (Non-WUI) and 448 acres in wildland urban interface (WUI) with prescribed fire. Mechanical treatment was used to treat 119 acres in WUI and 204 acres in Non-WUI for an accomplishment of 6,357 acres.

TIMBERLAND RESOURCES Objectives (Forest Plan, pages III-42 to III-43)

Objective TROB01: *Provide timber harvest, and related reforestation and timber stand improvement activities, to contribute toward the attainment of desired vegetation conditions. Annually, during the next 10 to 15 years:*

a) Harvest timber, other than by salvage, on an average of approximately 2,000 acres,
b) Reforest an average of approximately 480 acres, and
c) Complete timber stand improvement activities on an average of approximately 300 acres.

Accomplishment:

a) Harvested timber, other than by salvage, on 458 acres;
b) No reforestation; and
c) Timber stand improvement activities were completed on 202 acres

Objective TROB02: *Make available an estimated 60 million board feet of timber for the decade, which will contribute to Allowable Sale Quantity (ASQ).*

Accomplishment: In 2011, the Forest made available 1.05 million board feet (MMBF) of timber (0.0 MMBF of salvage and 1.05 MMBF of green) which contributed to the Allowable Sale Quantity.

Objective TROB03: *Utilize wood products (e.g., fuelwood, posts, poles, house logs, etc.) generated from vegetation treatment activities, on both suited and not suited timberlands, to produce an estimated 69 million board feet of volume for the decade. This volume, when combined with ASQ, is the Total Sale Program Quantity (TSPQ). The TSPQ for the first decade is estimated to be 129 million board feet.*

Accomplishment: In 2011, the Forest made available 4.0 million board feet (MMBF) of wood products (.07MMBF in post and poles, 3.6 MMBF in personal use firewood and 0.33 MMBF in free use firewood). When combined with the 1.05 MMBF contributing to ASQ (i.e. TROB02), the Sawtooth National Forest made available 5.05 MMBF that contributed to the Total Sale Program Quantity (TSPQ).

RANGELAND RESOURCES Objectives (Forest Plan, page III-44)

This section contains no annual accomplishment requirements.

MINERALS AND GEOLOGY RESOURCES Objectives (Forest Plan, pages III-48 to III-49)

This section contains no annual accomplishment requirements.

LANDS AND SPECIAL USES Objectives (Forest Plan, page III-53)

This section contains no annual accomplishment requirements.

FACILITIES AND ROADS Objectives (Forest Plan, pages III-58 to III-59)

Objective FROB01: *Analyze road system needs and associated resource effects in accordance with the established agency policy direction for roads analysis.*

Accomplishment: Although some roads analyses were on-going in FY11, none were completed.

Objective FROB05: *Coordinate transportation systems, management, and decommissioning with other federal, state and county agencies, tribal governments, permittees, contractors, cost-*

share cooperators, and the public to develop a shared transportation system serving the needs of all parties to the extent possible.

Accomplishment: Timber sale purchasers and other commercial users of FS roads either participate in road maintenance based on the amount of timber they haul or contribute money toward FS maintenance. Road maintenance coordination meetings were held with Camas County and the Idaho Transportation Department this year. Forest Service road maintenance work was expanded through Forest Road Agreements with Blaine, Camas, and Custer County.

Objective FROB06: *Identify roads and facilities that are not needed for land and resource management, and evaluate for disposal or decommissioning.*

Accomplishment: An active road decommissioning program continued during FY11 with 40.4 miles of unauthorized roads being decommissioned on the Minidoka Ranger District and 16.7 miles of unauthorized roads being decommissioned on the Fairfield Ranger District.

Objective FROB11: *In the Forest's annual program of work, prioritize and schedule improvements to existing culverts, bridges, and other stream crossings to accommodate fish passage, 100-year flood flow, and bedload and debris transport. Include accomplishments in the biennial update of the Watershed and Aquatic Recovery Strategy (WARS) database.*

Accomplishment: In 2011, two culverts were replaced on Goat Creek and Iron Creek on Idaho State Highway 21 (SH-21). Replacement of these culverts represents a culmination of several years of work between the Western Federal Lands Highway Division of the Federal Highway Administration, the Idaho Transportation Department, and the Sawtooth NF. Replacement of these culverts increased access for federally-listed Snake River Chinook salmon and Snake River steelhead, and Columbia River bull trout. Specifically 6.5 miles of habitat were made accessible in Goat Creek and 5.7 miles in Iron Creek. Some access gains to headwater habitat however may be seasonally affected by water diversions and associated headgates on private property.
A contract was awarded for relocation of the Iron Creek Subdivision Road, including a new bridge crossing of Iron Creek. The work will be completed in FY12. This crossing will replace an existing multi-culvert crossing of Iron Creek, opening up 4.0 miles of Iron Creek that has been blocked to some life stages of Bull trout and Chinook salmon.

RECREATION RESOURCES Objectives (Forest Plan, pages III-62 to III-64)

Objective REOB12: *Annually update recreation databases for developed sites, dispersed areas, and trails.*

Accomplishment: Condition and deferred maintenance surveys were conducted for developed recreation sites, recreation buildings, and trails according to schedule. The schedules for these inspections are based on inspecting approximately 20% of each recreation element every year.

In accordance with Trails Deferred Maintenance Protocols, data entry for national core data relative to trails is randomly selected and condition surveys were completed in 2011. National Core data includes data elements such as completed condition survey dates, trail jurisdiction, trail status, and length.

Objective REOB17: *Initiate a process of phased, site-specific travel management planning as soon as practicable. Prioritize planning based on areas where the most significant user conflicts and resource concerns are occurring. Identify and address inconsistent access management of roads, trails, and areas across Forest, Ranger District, and interagency boundaries.*

Accomplishment: The Forest completed Travel Management in 2008, focusing on areas with unrestricted cross-country motorized travel on the Minidoka, Ketchum and Fairfield Districts. Districts implemented trail construction and reconstruction projects in 2011, tiering back to the priorities identified in 2008. The Forest decommissioned 57.1 miles of unneeded user created routes in a continuing effort to consolidate a manageable system of roads and trails.

SCENIC ENVIRONMENT Objectives (Forest Plan, page III-68)

This section contains no annual accomplishment requirements.

HERITAGE PROGRAM Objectives (Forest Plan, page III-70)

This section contains no annual accomplishment requirements.

TRIBAL RIGHTS AND INTERESTS Objectives (Forest Plan, page III-72)

Objective TROB01: *Meet annually with designated tribal representatives to coordinate tribal uses of National Forest System lands as provided for through existing tribal rights with the U.S. Government*

Accomplishment: The Forest currently consults with four tribes in Idaho and Utah. Consultation occurs through notification letters which include invitations to meet with each tribe to discuss specific projects or other concerns associated with the Forest. Tribal relation on the Sawtooth National Forest is conducted by the Forest Archaeologist as a collateral duty. There are no tribal relations duties at the District level.

In 2011, the Forest only received one response to a notification letter. This response was associated with the national policy concerning BAER practices. The Nez Perce Tribe was concerned about how the Forest Service conducts BAER work, and whether heritage resources and watersheds are being properly protected during project implementation. The Forest notified the tribal representatives that the Forest Supervisor, Forest Fire Management Officer, and Forest

Tribal Liaison would travel to Lapwai, Idaho to discuss the Forest's specific policy concerning BAER practices.

The Forest continues the policy of non-participation with the Wings and Roots consultation program utilized by the Shoshone-Paiute Tribes of the Duck Valley Indian Reservation. The Tribe feels that the Forest is not meeting its legal requirements to consult by not participating in the program.

WILDERNESS, RECOMMENDED WILDERNESS and INVENTORIED ROADLESS AREA Objectives (Forest Plan, page III-74)

This section contains no annual accomplishment requirements.

WILD and SCENIC RIVERS Objectives (Forest Plan, page III-76)

This section contains no annual accomplishment requirements.

RESEARCH NATURAL AREAS Objectives (Forest Plan, page III-77)

This section contains no annual accomplishment requirements.

SOCIAL and ECONOMIC Objectives (Forest Plan, page III-78)

This section contains no annual accomplishment requirements.

SAWTOOTH NATIONAL RECREATION AREA Objectives (Forest Plan, page III-79)

This section contains no annual accomplishment requirements.

2. Documentation of costs associated with carrying out the planned management prescriptions as compared with the costs estimated in the Forest Plan.

Summary of findings: As described in Chapter IV of the Forest Plan, the final determining factor in carrying out the intent of the Forest Plan is the adequacy of funding. Allocation of dollars from Congress during the first planning period (1987-2003) was consistently lower than Forest Plan projections for most program areas. Because of this, rate of implementation of the 1987 Forest Plan was considerably lower than projected.

To predict a more realistic rate of implementation, the budget level used to develop the revised Forest Plan for all programs except timber management and hazardous fuels was

based on average allocations from 2001 to 2003. Timber management and hazardous fuels reduction were based on a 10% increase over average service level constraints from the Forest Service Budget Formulation and Execution System. Actual allocations by fund code and program emphasis will vary on an annual basis based on Forest priorities for a given year as well as the will of Congress. Table 2 shows the predicted Forest Plan budget level by program area based on average allocations and the actual allocation for fiscal year 2011 deflated to 2003 values, not including carry over dollars. Carry over dollars are unobligated funds remaining at the end of the fiscal year that may be carried over to the next fiscal year. These funds tend to be highly variable and therefore are not included.

Table 2. Predicted versus Actual Forest Budget Levels

Fund Code	DESCRIPTION	Predicted Forest Plan Budget Level	FY 2011 Actual Allocation	Percent Change
BDBD	BRUSH DISPOSAL	$ 45,371	$ 4,908	-89%
CMFC/ CMII	FACILITY CONSTRUCTION AND MAINTENANCE	$1,429,817	$1,185,256	-17%
CMRD	ROAD CONSTRUCTION AND MAINTENANCE	$1,316,835	$ 459,820	-55%
CMTL	TRAIL CONSTRUCTION AND MAINTENANCE	$ 562,505	$ 464,279	-17%
CWKV	REFORESTATION	$ 220,134	$ 4,829	-98%
LALW	LAND ACQUISITION MGMT.	$ 254,864	$ 327	-100%
NFIM	INVENTORY AND MONITORING	$ 566,172	$ 429,796	-24%
NFLM	LAND OWNERSHIP MGMT.	$ 297,027	$ 165,639	-44%
NFMG	MINERALS & GEOLOGY MGMT.	$ 323,269	$ 291,133	-10%
NFPN	LAND MGMT PLANNING	$ 635,318	$ 66,149	-90%
NFRG	GRAZING MGMT.	$ 744,380	$ 588,309	-21%
NFRW	RECREATION/HERITAGE RESOURCES/WILDERNESS MGMT.	$2,493,970	$1,282,200	-49%
NFTM	TIMBER MANAGEMENT	$ 641,189	$ 268,811	-58%
NFVW	VEGETATION MANAGEMENT (FOREST AND RANGE)/WATERSHED IMPROVEMENTS/SOIL/WATER/AIR MGMT.	$1,006,738	$ 656,940	-35%
NFWF	WILDLIFE/FISH/THREATENED & ENDANGERED SPECIES HABITAT MGMT.	$ 829,674	$ 443,049	-47%
RBRB	RANGE BETTERMENT	$ 76,764	$ 58,829	-23%
SSSS	SALVAGE SALE	$ 252,967	$ 81,800	-68%
WFHF	HAZARDOUS FUELS	$ 702,760	$ 883,760	+21%
WFPR	FIRE PREPAREDNESS	$3,897,403	$2,711,440	-31%

Substantial differences in predicted allocations versus actual were seen in Land Acquisition Management; Inventory and Monitoring and Land Management Planning; Grazing Management; Timber Management and Salvage Sales; and Hazardous Fuels. During Forest Plan revision, the Forest received Land Management Planning funds at a level necessary for revising the plan. Now that the revision process has been completed, the Forest is being funded at a maintenance level which is considerably less. The reduction in Land Management Planning funds also correlates with an increase in Inventory and Monitoring funds. As a direct result of the insect related mortality on the SNRA, the Forest had shifted its emphasis from a "green" timber program to salvage harvest. In 2011, the Forest began shifting its emphasis from a primarily salvage emphasis to a more balanced emphasis

between a "green" timber program and salvage harvest. The Forest has also increased its emphasis on fuels reduction treatments.

3. Population trends of the management indicator species will be monitored and relationships to habitat changes determined.

Table 3 shows the Management Indicator Species (MIS) selected by the Sawtooth NF in the 2003 Forest Plan. The primary reason MIS are selected is because their populations are believed to indicate the effects of management activities. Other reasons are also considered (36 CFR 219.19(a)(1).

Table 3. Management Indicator Species for the Sawtooth NF, 2003 Forest Plan

Type	Common Name	Habitat	Management Concerns
Bird Species	Pileated Woodpecker	PVGs 2-9	Sufficient large trees, snags, and down logs
	Sage Grouse	Sagebrush/grassland	Habitat reduction and alteration
Fish Species	Bull Trout	Perennial streams	Sediment in spawning and rearing areas, water temperature, habitat connectivity

Following is a summary of the monitoring completed for each MIS on the Forest in FY 2005:

Bull Trout Monitoring:

A variety of factors influences the distribution of bull trout populations across the Sawtooth NF. As has been reported in the literature, results from our MIS sampling indicate that patch size, stream temperature, patch connectivity, habitat condition, and the occurrence of brook trout can all influence the presence or absence of reproducing bull trout populations. Information collected over the past eight years has better defined bull trout distribution within patches and across each subbasin. At the subbasin scale, it appears bull trout local populations have remained stable since 2003 with the exception of the loss of a hybridized population in Crooked Creek. We have also found more occupied patches than previously thought. However, this doesn't imply bull trout have expanded their range. Only that we have confirmed their presence in streams that likely supported them all along. In 2011, bull trout populations continue to occupy Boardman, Deadwood, Skeleton, Big Boulder, and Germania patches and are absent in Paradise, Bowns, Carrie, Wickiup, Pole, and Iron patches with detection probabilities ranging from of 0.87 to 0.99.

In 2004, fisheries staff identified and stratified 97 bull trout patches on the Sawtooth NF. Since that time six additional patches have been identified in the Upper Salmon subbasin and one dropped in the S.F. Boise subbasin resulting in 102 patches on the Forest. During the 2004 to 2011 field seasons, crews completed MIS protocol surveys in 100% of the category 1-2 patches. Bull trout presence was confirmed in 36 patches; habitat was determined to be suitable but no bull trout were detected in 17 patches; and habitat was determined to be unsuitable in 50 patches.

Data collected over the past eight years were compared with information collected prior to 2004 to provide a preliminary indication of bull trout trend across the planning unit. Results from this comparison indicate a slight increase in bull trout distribution in the S.F. Boise, M.F./N.F Boise, and Upper Salmon subbasins. Bull trout were probably present, but previously undetected, in many of the patches that are now reclassified as occupied (category 1). Still, the data indicates that bull trout presence is more robust than previously thought in 2004 and that bull trout are still occupying most patches where previously detected. Table 4 shows an increase in the number of unsuitable/inaccessible patches in the S.F. Boise and Upper Salmon subbasins. These patches were reclassified as unsuitable based on recently acquired data that documented unfavorable existing conditions such as streams with culvert barriers, maximum weekly maximum temperature that exceed 15 °C over most of the available habitat, abundant brook trout populations, and no strong bull trout populations in adjacent streams.

Table 4 - Comparison of bull trout patch strata 2004-2011.

Category	S.F. Boise Subbasin # of Patches		N.F. & M.F. Boise Subbasin # of Patches		S.F. Payette Subbasin # of Patches		Upper Salmon Subbasin # of Patches	
	2004	**2011**	**2004**	**2011**	**2004**	**2011**	**2004**	**2011**
1 – Occupied	11	13	4	4	0	2	6	17
2 – Suitable/Unoccupied	22	7	1	1	4	2	28	7
3 – Unsuitable/Inaccessible	10	22	0	0	0	0	3	28
4 - Unsurveyed	0	0	0	0	0	0	8	0
Total	**43**	**42**	**5**	**5**	**4**	**4**	**45**	**52**

Yellowstone Cutthroat Monitoring:

The 2012 WCS Amendment to the Sawtooth Forest Plan included a decision to add Yellowstone Cutthroat trout (YCT) as an MIS. While this species was not officially an MIS in FY11, monitoring for this species did begin in FY11, therefore the results of this monitoring are being reported.

2011 Monitoring Results

A variety of factors influence the distribution of YCT populations across the Sawtooth NF. As has been reported in the literature, results from our MIS sampling indicate that drainage size, stream temperature, connectivity, habitat condition, and the occurrence of brook trout can all influence the presence or absence of reproducing YCT populations. Information collected has better defined YCT distributions within drainage and identified uses that threaten habitat conditions and the viability of some YCT populations. In 2011, YCT populations continue to occupy Cottonwood, Dry, Edwards, Almo, and Onemile/Sawmill Canyon and are absent in Wildcat and Green Creeks. At the subbasin scale it appears YCT populations have remained stable since last surveyed with the exception of the loss of the population in Wildcat Creek.

A more detailed discussion of the Forest's aquatic management indicator species monitoring can be found in Attachment 1 and 2, *2011 Sawtooth Aquatic Management Indicator Species Monitoring Reports,* of this monitoring report.

Pileated Woodpecker Monitoring:

2011 Monitoring Results

Fairfield Ranger District.
Number of Points Monitored – 100 points (10 transects, each with 10 observation points)
Number of Hits – 12 hits
Number of Acres Inventoried – 4,720

Ketchum Ranger District.
Number of Points Monitored – 90 points along a transect.
Number of Hits – 2 hits.
Number of Acres Inventoried – 4,248.

Sawtooth National Recreation Area (SNRA).
Number of Points Monitored – 150. (150 points along 15 transects)
Number of Hits – 6 hits.
Number of Acres Inventoried – 5,752

The methodology used for monitoring this species is consistent with the strategy used on the Boise NF, the Payette NF, and throughout the Forest Service. Data collected on the Sawtooth NF can be used to assess population trends on the planning unit, to contribute to population trend data at the scale of multiple Forests, or contribute to population trend data across the State of Idaho.

Sage Grouse Monitoring:

2011 Monitoring Results: Two lek routes were counted on the Cassia Division of the Minidoka Ranger District in 2011. On the Cottonwood Ridge Lek Route, 47 males were counted. On the Dry Creek Lek Route, 43 males were counted. Two leks on the Raft River Division were counted in 2011. There were no males counted on the Broad Hollow Lek Route, and 15 males were counted on the NE Lynn Reservoir. On the Fairfield Ranger District a Sawtooth NF Biologist spent 8 days monitoring sage-grouse leks within 10 miles of the Forest boundary. This is estimated to be approximately 210 acres of habitat inventoried.

4. Accomplishment of Aquatic Conservation Stratgey (ACS) priority subwatershed restoration objectives.

Summary of findings: The Watershed Aquatic Recovery Strategy (WARS) is a process that identified restoration priorities (high, moderate, and low) and restoration type (passive, active, and conservation) among the 650 subwatersheds across the Southwest Idaho Ecogroup. This strategy provides the "blue print" for recovery and protection of aquatic (both physical and biological) resources across the Ecogroup. Table 5 displays a summary of the aquatic restoration that occurred in ACS priority subwatersheds on the Sawtooth NF in 2011.

Table 5 – Sawtooth NF 2011 Aquatic Restoration Projects by WARS priority

	Within ACS Priority Watersheds	Outside ACS Priority Watersheds			TOTAL From Columns 3, 4 and 5
		WARS *High* Priority Watershed	WARS *Mod* Priority Watershed	WARS *Low* Priority Watershed	
Miles of Stream Improved	3	7	0	3	10
Acres of Lake Improved	8	8	0	0	8
Acres of Watershed Improved	25	232.5	8	60	300.5

5. Terms and conditions or reasonable and prudent measures that result from consultation under Section (a) of the Endangered Species Act.

A. Terms and Conditions - Summary of findings:
Both NOAA Fisheries and the USDI Fish and Wildlife Service (USFWS) issued Biological Opinions in response to the Federal Action (i.e. proposed action or management strategy) outlined in the 2003 Forest Plan. However, only NOAA Fisheries issued reasonable and prudent measures and related terms and conditions with their Biological Opinion.

Reasonable and Prudent Measures (RPMs) are non-discretionary measures to minimize take that may or may not already be part of the description of the proposed action. They must be implemented as binding conditions for the exemption in section 7(o)(2) to apply. The Forest Service has the continuing duty to regulate the activities covered in this incidental take statement. If the Forest Service fails to carry out required measures, fails to require applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) that will become effective at the project level may lapse. To be eligible for an exemption from the prohibitions of Section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above for each category of activity. These terms and conditions are non-discretionary.

The terms and conditions related to two of the three RPMs in the NOAA Fisheries Biological Opinion apply to the Sawtooth and require annual reporting. These terms and conditions are identified below, along with the accomplishments related to them.

RPM #1: Minimize the likelihood of incidental take by clarifying local sideboards pertaining to:

<u>Fire Management timelines for fire operational resource guidance</u>

Fire operational guidelines were originally developed in the spring of 2004. These guidelines included protective measures for wildlife, botanical, and aquatic resources. In 2006, the Boise NF and Sawtooth NF completed a Programmatic Biological Assessment (BA) for Wildfire Suppression and Wildland Fire Use activities that incorporated and improved upon the 2004 guidance. This BA was submitted for informal consultation, which concluded with

letters of concurrence from the FWS and NOAA on 08-11-2006 and 08-30-2006, respectively. In 2011, the Forest continued to implement the programmatic consultation direction and was close to finishing guidance for an updated fire suppression consultation to be completed in 2012.

RPM #2: Minimize the likelihood of incidental take by maintaining the necessary linkages between the Sawtooth NF Plan and broad-scale restoration/recovery strategies. To implement RPM #2 the Sawtooth NF is required to:

Provide an oversight and accountability body that links to IIT by continuing to work with the IIT and provide exchange of information regarding processes that are local in scope, but have broad-scale implications, such as subbasin planning, watershed analysis and monitoring.

The intent of the IIT implementation monitoring was to track implementation of management direction at the level of the FS Land and Resource Management Plan or BLM Resource Management Plan for the salmon, steelhead, and bull trout listed in the Upper Columbia and Snake River Basins. Specific objectives are to:

- Provide a reporting format for all Level 1 Team implementation monitoring requirements, and ensure a "feedback loop" for Level 1 Teams and Managers to accomplish agency adaptive management;
- Meet the broad-scale, mandatory requirements and commitments of the PACFISH/INFISH, the 1998 Biological Opinions, and the IIT Charter;
- Provide documentation to show that direction in PACFISH, INFISH and the 1998 Biological Opinions is being implemented on the ground; and
- Document status and trends in implementation of federal activities by land management agencies, including locations of non-compliance with the aquatic conservation direction.

It was hoped that data collected by the Implementation Monitoring Module in combination with data from the Effectiveness Monitoring Module, would provide information to help validate the basic assumptions under which the management direction was developed.

The Forest coordinated with the PIBO program and provided them information on DMAs within the allotments scheduled to be surveyed. PIBO then used this information to collect annual indictor data at each site. This information was provided to the Forest the following winter.

B. Conservation Recommendations that resulted from consultation under Section (a) of the Endangered Species Act.
In addition to the RPMs, the following conservation recommendations resulted from consultation with USFWS and NOAA fisheries:

1. The USFS should evaluate and report to NOAA Fisheries the effectiveness of rehabilitation efforts in RCAs in response to fire suppression activities (use of heavy machinery, fire retardants, camp and base locations, etc.) that affected RCAs.

No fire suppression actions occurred in 2011 within the range of listed anadromous species.

3. Over the planning period, the Forest Service objective for fish habitat restoration should be to move at least two ACS Priority Subwatersheds per subbasin into a "functioning appropriately" condition. The SWIE Matrix (LRMP Appendix B) should be used to assist in assessment of this objective. In addition, the Forest Service should initiate habitat improvements in the other ACS Priority Subwatersheds as identified by WARS. The strategy to achieve this objective should include steps to coordinate restoration activities, and should take advantage of opportunities to pool funding (within Forest Service, and among other sources including NOAA) across administrative boundaries to accomplish top priority restoration projects.

Refer to responses for (1) Accomplishment of ACS priority subwatershed restoration objectives and (2) Have restoration and conservation activities been focused in priority watersheds identified by the WARS process?

4. Cooperate with the State of Idaho, tribes, and others to evaluate bull trout subpopulation status and distribution on a regular basis.

The Sawtooth NF participated in meetings with Rocky Mountain Research Station (RMRS) and Bureau of Reclamation in Boise in 2011 to discuss bull trout monitoring. Discussions included how to analyze our eight year data set and on where to place long-term temperature sensors within each bull trout patch. The Forest also partnered with the RMRS to sample several streams in the S.F. Boise drainage with the intent of looking at stream temperature and bull trout distributions within each of the surveyed drainages.

5. Participate in and promote opportunities to study local populations of bull trout to gain a better understanding of conservation and recovery needs at a local scale.

The Sawtooth NF continues to gather information on the presence and vitality of bull trout for ESA and MIS purposes. More specifically, the current effort focuses on determining whether bull trout and/or reproducing bull trout populations exist in specific streams on the Fairfield Ranger District and Sawtooth National Recreation Area (SNRA). A detailed description of bull trout monitoring can be found in Attachment 1: 2011 Sawtooth Aquatic Management Indicator Species Monitoring Report.

6. Cooperate with others in efforts to reduce densities and distribution of brook trout, and to manage habitat to provide a competitive advantage to native salmonids, especially bull trout.

No projects were implemented to reduce brook trout densities in FY11.

7. Cooperate to increase the benefits for bull trout from work on Forest system lands and efforts by the State, counties, and other Federal agencies to conserve and recover the species. In particular, assist in identifying actions to remove barriers to bull trout movements in locations where the Forests is also doing work to resolve passage problems and improve habitat.

In 2011, two culverts were replaced on Goat Creek and Iron Creek on Idaho State Highway 21 (SH-21). Replacement of these culverts represents a culmination of several years of work between the Western Federal Lands Highway Division of the Federal Highway Administration, the Idaho Transportation Department, and the Sawtooth NF. Replacement of these culverts increased access for federally-listed the Snake River Chinook salmon and Snake River steelhead, and Columbia River bull trout. Specifically 6.5 miles of habitat were made accessible in Goat Creek and 5.7 miles in Iron. Some access gains to headwater habitat however may be seasonally affected by water diversions and associated headgates on private property.

III - B. Monitoring Elements in Table IV-2 of the Forest Plan with Annual Reporting Requirements:

As described in Chapter IV of the Forest Plan, monitoring elements were designed around monitoring questions that need to be answered about Forest Plan implementation. These questions are key to determining if we are moving towards meeting the desired conditions identified in the Forest Plan. Following is a summary of the findings for those elements that we are required to monitor and evaluate on an annual or biennial basis:

- **Activity or Practiced to Be Monitored: Safety of administrative facilities**

  Monitoring Question: Are administrative sites, including drinking water sources, safe for visitors and employees?

Summary of findings: Sanitary surveys are required every 5 years at a minimum to assess the overall operational quality, function and maintenance of water systems. In accordance with the schedule, sanitary surveys were conducted on 33 water systems in FY2011. In addition to the sanitary surveys, condition surveys were completed this year on approximately 20% of the total buildings.

Water systems are tested for bacteriological contamination on a monthly basis when they are open. Any systems that show bad results are re-tested according to FS direction and either closed or posted as non-potable if re-testing indicates a problem. The drinking water systems for all Forest administrative sites were opened in 2011. Monthly samples collected from these water systems during the months the systems were open for use determined that each of these systems was compliant with the Safe Drinking Water Act standards.

During FY11, the Forest implemented a number of projects that will maintain or improve the safety and/or accessibility of administrative sites. Major projects include:

- Installation of a new lift station serving facilities at Redfish Lake
- Installation of new water system at Sawtooth Valley Work Center
- SNRA Headquarters boiler replacement
- SNRA Headquarters roof replacement
- Stanley Ranger Station furnace replacement
- Replacement of roofs at Stanley Ranger Station, Stanley Bunkhouse, and Stanley Warehouse
- Hookup of an additional well at Stanley Ranger Station

- **Activity or Practiced to Be Monitored: Safety of developed recreation sites**

  Monitoring Question: Are developed recreation sites free of high-risk conditions? Do water systems meet Federal, State, and local requirements?

Summary of findings: Generally, all Forest developed recreation sites are inspected in the spring or early summer in conjunction with opening for the summer season. Any identified hazards are removed or mitigated at this time. Water systems are managed and tested in accordance with the Safe Drinking Water Act and Forest Service regulations.

The drinking water systems for the majority of the recreational facilities were open for use in 2011. Monthly samples collected during the months the systems were open for use determined that each of these systems was compliant with the Safe Drinking Water Act standards. In 2011, most of the developed recreation water systems met all standards established under this act and agency regulations.

- **Activity or Practiced to Be Monitored: Protection of historic properties**

  Monitoring Question: Are historic properties being affected by project activities?

Summary of findings: In 2011, the Forest (NF) consulted with the Idaho State Historic Preservation Office (SHPO) on all identified National Historic Preservation Act (NHPA) Section 106 undertakings. Only one adverse effect was identified in 2011 and involved a recreational residence on the Minidoka Ranger District. A Memorandum of Agreement (MOA) was developed between the Forest and Idaho SHPO to mitigate the effects.

In 2011, the Sawtooth NF Heritage Program did not meet the "program managed to standard" national target. The Forest reached a score of thirteen while the minimum score was forty-five for a program to be managed to standard. Not all the heritage program accomplishments were entered into INFRA by the deadline resulting in an inaccurate score. The Forest also had two vacant permanent archaeological positions in 2011. These positions are essential for NHPA Section 110 activities.

The Sawtooth NF is addressing this target in several ways. The Forest has started the development of a heritage overview and predictive model, which are defined as elements of a program managed to standard. The heritage overview will be a collection of data that outlines the Forest's history and heritage resources (such as: archaeological sites, historic buildings and museum collections). The predictive model will utilize GIS and statistical analysis to develop an archaeological model that will predict areas where heritage resources should be located. The Forest is also working on updating heritage legacy data in INFRA and GIS. The utilization of volunteers to accomplish NHPA, Section 110 will be a target for 2012. Heritage program staffing will be an issue in 2012 since one permanent archaeologist will remain on staff. Preliminary goals are to hire a winter seasonal archaeologist to work on heritage overview development and input legacy data.

- **Activity or Practiced to Be Monitored: Watershed restoration and conservation activities**

  Monitoring Question: Have restoration and conservation activities been focused in priority watersheds identified by the WARS process?

Summary of findings: The Watershed Aquatic Recovery Strategy (WARS) is a process that identified restoration priorities (high, moderate, and low) and restoration type (passive, active, and conservation) among the 650 subwatersheds across the Southwest Idaho Ecogroup. This strategy provides the "blue print" for recovery and protection of aquatic (both physical and biological) resources across the Ecogroup.

The intent of the WARS strategy is the movement of subwatershed functions, ecological processes, and structures toward desired conditions. The intent WARS is also to: (1) secure existing habitats that support the strongest populations of wide-ranging aquatic species and the highest native diversity and geomorphic and water quality integrities; (2) extend favorable conditions into adjacent subwatersheds to create a larger and more contiguous network of suitable and productive habitats; and (3) restore soil-hydrologic processes to ensure favorable water quality conditions for aquatic, riparian, and municipal beneficial uses that will fully support beneficial uses and contribute to the de-listing of fish species and 303(d) water quality limited water bodies.

WARS identified subwatersheds with high aquatic integrity (strong populations of listed fish species and native cutthroat trout), high geomorphic integrity, and high water quality integrity. These subwatersheds received the highest priority for restoration, specifically a conservation strategy that maintains and protects their high quality with minimal short-term risk from other management actions.

High priority subwatersheds were further prioritized to focus recovery efforts and provide a "blue print" as to which should be the highest priority for restoration or conservation during the planning period (next 10-15 years). ACS priority subwatersheds were identified for each subbasin to represent the "highest of the high" in terms of applying management direction and restoration prioritization, especially for short-term recovery objectives. This process is designed to focus management direction and restoration prioritization for the recovery of listed fish species, their habitats, and 303(d) impaired water bodies, and other SWRA resources.

Aquatic restoration can be measured by (1) How many projects were implemented; (2) How many acres or miles were accomplished; and (3) How many dollars were spent. In FY11, 13 projects were completed (Table 2) that protected, maintained, improved or restored water resources, soil resources, stream habitats, and lake habitats and associated desirable species. These projects improved 10 miles of stream, 300.5 acres of riparian and upland areas, 8 acres of lake, and decommissioned 59.1 miles of roads/trails. Approximately $226,729 was spent on these projects. Projects focused in ACS and WARS high priority subwatersheds

accomplished 7 miles (70%) of stream, 41.4 miles of road decommissioning (70%), 8 acres (100%) of lake, and 232.5 acres (77%) of riparian and upland improvements on the forest (Table 6).

Although ACS and WARS high subwatersheds are the highest priority for restoration, not all restoration projects implemented or dollars spent in FY11 occurred in these subwatersheds. This is due to several reasons. First, some of the aquatic restoration projects implemented in FY11 were planned several years ago under the old forest plan and past planning efforts. Projects were not planned with forest-wide, management area objectives or WARS emphasis in mind. Second, some restoration projects are driven by specific resource issues that must be addressed immediately or additional degradation may occur (i.e. sediment coming from a storm damaged road). Finally, restoration projects may be driven by outside groups that have a specific interest in an issue or aquatic resource that falls outside of ACS priority subwatersheds. Even with these considerations, the projects implemented in FY11 still addressed many key forest wide or management area objectives in ACS or high priority subwatersheds.

Table 6 - FY 11 aquatic restoration accomplishments on the Sawtooth NF

Project Name	Subwatershed in which restoration occurred	Summary of accomplished work	Target Accomplished	WARS Restoration Strategy and Priority	ACS priority
Beaver Program	**Deer Creek**	Through the Wood River RCD Interagency Beaver Committee the Sawtooth NF relocated beavers for the purpose of improving wildlife habitat. Accomplished 1 mile of stream in Little Deer Creek. Four beavers were trapped on private land by the local IDFG CO and all released on Little Deer Creek on private land 1.5 miles south of Forest boundary).	1 miles of stream and 4 acres	Active/Low	No
South Barker Trails (NFN3)	**Upper Willow Cr.** **Shake-S.F. Boise R.** **Kelley-S.F. Boise R.**	Heavy maintenance was completed on trails within the South Barker Fire Perimeter. Trails occurred in Shake, Willow, Van Gulch, Big Water, Little Water, Jumbo, Camp Gulch, Haypress, Edna and Narrow Creeks.	12 acres	Active/Low Active/Moderate Active/Moderate	Yes No No
Deer Park Trails (NFN3)	**Beaver Creek-South Fork Boise River**	Heavy maintenance was completed on trails within the Deer Fire Perimeter in the Beaver Creek drainage.	10 acres	Passive/High	No
Non System Road/Trail Obliteration	**Headwaters Little Smoky Creek**	Obliteration of priority non system roads and trails on the Fairfield Ranger District. Roads were ripped where compaction and surface condition warranted. Native material was used to block vehicles at all access points and throughout lengths of routes. Route closures were signed at all access points and obliterated surfaces were seeded to speed vegetative recovery. Benefits will be less bank erosion and	50 acres; 2 miles of stream; and 16.7 miles route decom.	Active/Low	No

		sediment input from stream crossings, increased riparian vegetation and habitat, and reduced road and trail surface erosion/sediment delivery.			
Eightmile Creek LWD	**Outlet Clear Creek**	Juniper boles and branches were placed in Eightmile Creek to improve cover around pool structures for Yellowstone cutthroat trout. The woody debris will provide overhead cover for aquatic organisms. They may also help to constrict the formation of a wider channel, thus increasing stream velocity, thus resulting in sediment flushing and wider scour pools for the cutthroat.	2 miles of stream and 1.5 acres	Active/High	Yes
Non System Road/Trail Obliteration	**Wildcat Creek** **Johnson Creek** **George Creek** **Onemile Creek**	Obliteration of priority non system roads and trails on the Minidoka Ranger District. Roads were ripped where road compaction and surface condition warranted. Native material was used to block vehicles at all access points and throughout lengths of routes. Route closures were signed at all access points and obliterated surfaces were seeded to speed vegetative recovery. Benefits will be less bank erosion and sediment input from stream crossings, increased riparian vegetation and habitat, and reduced road and trail surface erosion/sediment delivery.	123 acres; 2 miles of stream; and 40.4 miles route decom.	Active/High Active/High Active/High Active/High	Yes Yes Yes Yes
Cave Canyon Trail Bridge	**Upper Big Cottonwood Creek**	The project was designed to replace an over widen, eroding stream ford. Once the bridge was placed, streambanks were reconstructed on the ford and planted with willows.	1 acre	Active/Low	No
Goose Creek Trail Bridge	**Winecup Creek-Goose Creek**	The project was designed to replace an over widen, eroding stream ford. Once the bridge was placed, streambanks were reconstructed on the ford and planted with willows.	1 acre	Active/Passive/Low	No
Programmatic Conifer Encroachment Treatment	**Beaver Creek**	This project treated conifer encroachment in aspen, meadows and sagebrush on the Sawtooth NRA. Conifer encroachment has resulted in a loss of aspen forest and important wildlife habitat; conifer encroachment in meadows has reduced open meadow habitat and has negatively impacted watershed conditions by reducing available stream flows; and conifer encroachment has increased fuel density and continuity in forested and meadow communities which may lead to increased fire behavior and uncharacteristic fire effects in the event of a wildfire. Treatment areas included both wet and dry meadows and riparian areas.	75 acres	Active/High	No
Pole Creek Travel Management Implementation	**Pole Creek**	As a result of community collaboration facilitated by the Sawtooth Society, travel appropriate travel objectives were identified within the Pole Creek drainage. Closure of the inappropriate and unauthorized routes	0.5 miles of stream, 10 acres, and 2 miles of decom.	Active/High	Yes

		was initiated in 2011 with approximately 2 miles. Heavy equipment was utilized to close and encumber areas to travel while breaking compaction, re-establishing natural drainage, incorporating organic material, and accelerating restoration of damaged areas.			
Non System Road/Trail Obliteration	**Middle Valley Creek**	Project curtailed inappropriate and unauthorized motorized use along upper Valley Creek that occurs associated with the electric powerline, and exasperated by recent ROW clearing. Heavy equipment was utilized to close and encumber areas to travel while breaking compaction, re-establishing natural drainage, incorporating organic material, and accelerating restoration of damaged areas. Authorized travelways and parking areas where defined and drainage conditions improved.	0.5 miles of stream and 10 acres	Active/High	Yes
Hell Roaring Trailhead Relocation	**Hell Roaring Creek-Salmon River**	Project relocated and reestablished the Upper Hell Roaring Trailhead outside of the designated Sawtooth Wilderness. Includes closure and rehabilitation of the former streamside trailhead, and 1 mile of road converted to trail. Similar objectives on 1/4 mile of road within the adjacent Mays Creek drainage. Heavy equipment was utilized to break compaction, re-establish natural drainage, incorporate organic material, and accelerate restoration of the former road and parking areas.	2 miles of stream and 3 acres	Active/High	No
Aquatic Invasive Education Program and Management Strategy	**Lower Redfish Lake Cr.**	The Sawtooth NRA has several lakes that are popular boating destinations and are vulnerable to aquatic invasive species (i.e. mud snails, mussels, etc.). To help protect aquatic resources within these lakes the Forest Service partnered with Idaho Department of Agriculture (IDA) to establish a boat inspection station on Redfish Lake and completing monitoring in several of our large glacial lakes. The forest helped IDA with public outreach, boat washing, and equipment. Initiated boater surveys. Developed early detection/rapid response plan for most probable aquatic invasives. All boaters were surveyed and boats inspected prior to entering Redfish Lake. Boaters were asked where they were coming from and had their boat been inspected previously. Plankton tows and plant surveys were completed in several of the larger lakes in the area.	8 acres of lake	Passive/High	Yes

		Station was set up from June 24 through September 5. The Redfish Lake station (operated from 9:30am – 7:30pm, 4 days a week) ended the season with 990 inspections, which were up from the 841 that were done last year. One contaminated boat with New Zealand Mud Snails was washed. All boats with any plants on them were also washed			

IV. FUTURE MONITORING AND EVALUATION REPORTS and SCHEDULE

As described in the 2004 Monitoring Report, the Sawtooth NF will issue the Forest Plan Monitoring and Evaluation report in late spring or summer of each year. The report will describe findings from monitoring data collected through the prior year's field season and evaluated during the winter of the reporting year. As described in the 2004 report, 2004 data collections were not completed until late fall of 2004 and the evaluations of the data collected did not occur until late fall or winter 2004/2005. Thus, moving publication date of the monitoring and evaluation report will allow a complete display of the prior year's data collection, as well as the evaluation of that data.

Also, the Forest Plan Monitoring and Evaluation report is intended to be a "living" document. As such, it may be updated periodically through out the year to incorporate new information and findings.

2011 Sawtooth Aquatic Management Indicator Species Monitoring Report

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Introduction

In order to evaluate the effects of management practices on fisheries and wildlife resources, the U.S. Forest Service monitors select species whose population trends are believed to reflect the effects of management activities on Forest ecosystems. These species are termed "management indicator species" (MIS) and the rationale for MIS monitoring is outlined in federal regulation 36 CFR 219.19.

> *"In order to estimate the effects of each alternative on fish and wildlife populations, certain vertebrate and/or invertebrate species present in the area shall be identified and selected as management indicator species and the reasons for their selection will be stated. These species shall be selected because their population changes are believed to indicate the effects of management activities."*
>
> *"Population trends of the management indicator species will be monitored and relationships to habitat changes determined."*

An important principal to the MIS foundation is that monitoring results must allow managers to answer questions about population trends. Historically, monitoring of habitat was used as a surrogate for direct quantification of MIS populations. However, recent court cases (*Sierra Club v. Martin*, 168 F.3d 1 (11th Cir. 1999)) have ruled that assessing changes in habitat will no longer be accepted as a substitute for direct monitoring of populations. The Forest Service has an obligation to collect and analyze quantitative population trend data at both the Forest-plan and project level.

In response to issues raised by court challenges, the Sawtooth, Boise, and Payette National Forests (Southwest Idaho Ecogroup) revisited aquatic MIS species for the Draft Forest Plan EIS to determine if population data were sufficient to determine trend at the Forest scale.

Following this reevaluation, bull trout (*Salvelinus confluentus)* was selected as the aquatic MIS species (for a full explanation of the MIS review, see Aquatic Management Indicator Species for the Boise, Payette, and Sawtooth Forest Plan Revision, 2003). Bull trout were selected because the species is sensitive to habitat changes, dependent upon habitat conditions that are important to many aquatic organisms, relatively well understood by Forest biologists, and widely distributed across the Ecogroup. In addition, local bull trout populations are not influenced by stocking and likely persist at relatively small spatial scales that do not extend beyond Forest boundaries. Therefore, Forest bull trout populations are probably not heavily influenced by activities occurring outside Forest domains, and therefore changes in local bull trout populations are more likely to reflect local management activities on the Forest.

Protocol

Objectives

- Over the existing life of the Forest Plan for the Boise, Sawtooth, and Payette National Forests, determine the status and trend in distribution of bull trout within and among patches of suitable habitat within each subbasin across the planning area.
- To the full extent practicable, use the best available peer-reviewed science to allow formal inferences about observed status and trends in the distribution of bull trout.

Rationale

Monitoring is focused on patterns of occurrence of juvenile bull trout (<150 mm) for two reasons. First, presence of juvenile bull trout is an indicator of key spawning and rearing areas within a patch. These areas represent habitats that are essential for bull trout population viability within a patch. Other habitats within stream networks may be important for ranging or migrating individuals, but tracking fish in these areas is cost prohibitive and time consuming. Second, sampling patterns of occurrence requires less intense sampling than estimating abundance and is based on a peer-reviewed protocol for sampling of small bull trout (Peterson et al. 2002); similar protocols for larger, more mobile fish have not been developed. Key metrics for monitoring trends will be the proportion of habitat patches occupied in each subbasin across time and the spatial pattern of occupied patches.

Methods

Monitoring follows procedures specified by (Peterson et al. 2002)[1], with the following specific procedures and modifications.

Sampling frame - The fundamental unit for inference is a patch, defined following procedures outlined in Peterson, et al. (2002) and further clarified by the U.S. Fish and Wildlife Service Bull Trout Recovery Monitoring and Evaluation Group. The procedure involves delineating suitable habitats for bull trout within a patch to locate samples and making inferences about presence.

Downstream patch boundaries were delineated by 1600 meter elevation contours in the Boise and South Fork Payette River basins, based on previous research in the basins relating the distribution of juvenile bull trout to elevation. Outside of these basins, downstream patch boundaries correspond to stream temperature <15^{o}C (highest seven-day moving average of maximum daily temperature). Downstream limits to patches may also correspond to a confluence with a stream that is classified as too large for bull trout spawning, based on observed relationships between spawning use and stream size, as revealed by redd counts, direct observation of fish, radio telemetry, or other evidence.

During monitoring, efforts will be made to distinguish between "realized" and "potential" patch boundaries. The term "realized" refers to actual stream habitat that is used by bull trout. Realized boundaries may be less than potential boundaries, due to the influence of a number of factors, such as nonnative brook trout, dewatering of stream channels, or habitat alterations that increase stream temperature. The term "potential" refers to the maximum extent of coldwater naturally attainable, absent of irreversible human influences. This assumes the distribution of suitably cold water is the ultimate factor limiting the distribution of small bull trout.

In the upstream direction, stream networks will be truncated to include only those segments[2] with stream gradient of less than 20%. Further, all headwater areas within catchments corresponding to a contributing area of less than 500 hectares will be removed from sampling frames, due to low probability of bull trout occurrence (Dunham and Rieman 1999, as cited in Peterson et al. 2002). Information on local barriers will also be considered in truncating stream networks. For example, it may not be necessary to sample upstream of high natural waterfalls which prevents upstream passage of bull trout.

Metadata - For each patch, criteria for delineating down- and up-stream boundaries of the stream network to be sampled will be documented as metadata to accompany spatial data.

Sample allocation - Individual samples will be allocated to all patches within a Forest or subbasin. Within patches, only suitable habitat will be inventoried for informal and formal surveys. Suitable habitat is defined according to wetted width (greater than 2 meters), stream gradient (less than 20%), water temperatures (15 °C or less, 7-day average summer maximum), and connectivity (no natural or anthropogenic barriers).

Sampling unit - The fundamental sampling unit will be a 100 meter length of stream.

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[1] Available at www.fisheries.org and www.fs.fed.us/rm/boise

[2] Stream segments are defined as lengths of stream within drainage networks that are delineated on the up- and down-stream ends by tributary confluences.

Sampling method - Daytime electrofishing will be used to capture fish, with a variable number of passes, depending on site conditions. Habitat variables will also be measured to estimate sampling efficiencies. From 2004 to 2008 single and multiple pass electrofishing with blocknets was completed at random sites within each patch. However, random sites were not monumented to allow the site to be located and resurveyed. In 2009, sampling was changed to only single pass electrofishing without blocknets based on discussions with the Rocky Mountain Research Station. This change was made to increase the number of sample sites completed each year. But it was also made since the overall monitoring objective was only to show bull trout presence/absence and trend within patches over time. However, this approach did not allow the Forest to track fish abundance at smaller scales if desired and has not provided other state and federal agencies the information they often desire. To address this, in 2011 the Forest modified our sampling approach. All patches that do not support bull trout would continue to have single pass electrofishing with no blocknets. All patches that support bull trout would have at least three multiple-pass electrofishing sites without blocknets. We choose not to install blocknets because Young and Schmetterling (2004) found that electrofishing without blocknets on small streams did not appear to cause fish to flee the sample site and that the effect fish movement had on abundance estimates was minor. Random multiple-pass sites were selected in the lower, middle, and upper portions of each occupied patch. Each of these sites was monumented by placing metal tags at the beginning of the reach and GPS coordinates were recorded. Several photo points (beginning, middle, and end of transect) were also established. Each monumented site will be resampled either annually in our sentinel patches or every 3 to 5 years.

Depletion estimates were calculated for sites sampled where bull trout were captured using Microfish 3.0 population parameter calculation software (www.MicroFish.org 2005) (Van Deventer, 1989). In the future once we begin to accumulate enough multiple-pass information, we plan to analyze the relationship between first pass catches and population estimates from three-pass removals.

Random sampling - Sample sites within each patch can be determined using a variety of designs (e.g., representative reach, systematic, random, cluster, or convenience sampling). Probabilistic designs are usually best because site selection is randomized, each site has an equal selection probability, statistically valid, and unbiased estimates are provided. Purely random selection, however, can also result in spatial clustering of sites that may not adequately represent the strong environmental gradients that typically occur in small mountain streams. To address this issue, the Environmental Protection Agency's Environmental Monitoring and Assessment Program (EMAP) developed the Generalized Random Tessellation Stratified design (GRTS; Stevens and Olsen 2004). GRTS uses a randomized hierarchical grid that arrays sites throughout a stream network to achieve spatial representation. Sites using this EMAP approach were generated for all patches to establish potential sample locations. Once this first set of random sites is generated & surveyed, the same sites will be resampled on subsequent surveys in the future.

Selection of sample sites from the GRTS list were based on the unique identifier associated with each GRTS site. So, for example, if 20 GRTS sites are generated for a patch, and eight will be sampled in the field, the sites with the eight lowest identifiers were selected in sequential order. Once in the field, sites were sampled in any sequence that was logistically convenient whenever all sites are sampled. Once bull trout are detected, further sampling is unnecessary unless done for other reasons (e.g., development and refinement of detection efficiency, etc.). If bull trout are not detected, all identified sites within a patch must be sampled to reach the predefined probability of occurrence without detection.

Formal vs. informal sampling - Informal sampling (e.g. snorkeling, electrofishing, weirs, etc.) will be used initially to determine presence of juvenile bull trout, when deemed appropriate by local biologists. If juvenile bull trout are detected the informal sampling effort can cease, unless the local biologists wants to better determine distribution within the patch. If juvenile bull trout are not detected, it will be necessary to conduct formal sampling, as prescribed to estimate probability of presence in cases where bull trout are not detected (Peterson et al. 2002, Peterson and Dunham 2003). Site level detection probabilities will be estimated as outlined in Peterson et al. (2002) or through empirical methods based on repeated sampling of occupied patches and habitat information collected throughout the monitoring effort.

Sampling schedule - Initially, four patch types were recognized: 1) Known presence within last 7 years; 2) Likely present due to good habitat or detection > 7 years previous; 3) Likely not present due to poor habitat and bull trout not detected within last 7 years; 4) Patches without data. Patches will be defined relative to "potential" to support bull trout as defined above. Over the 2003-2018 Forest Plan timeline, targeted patches in categories 1 and 2 will be sampled at least twice. Initial sampling will be completed within first 7 years of the Forest Plan, preferably with as much time as possible in-between successive samples for each patch. Patches in category 3 will be sampled at least once. Additional sampling or re-sampling will be conducted if there is specific reason to do so (e.g., passage restoration, habitat improvement). Based on results following sampling, patch strata will be updated yearly (Table 1).

Table 1 - Number of bull trout patches on the Sawtooth NF within each subbasin by category prior to 2011 sampling.

Category	S.F. Boise Subbasin	M.F./N.F Boise Subbasin	S.F. Payette Subbasin	Upper Salmon Subbasin	Total
1	13	4	2	17	36
2	7	1	2	7	17
3	22	0	0	28	50
4	0	0	0	0	0
Total	42	5	4	52	103

Using data from the past 7 years (since 2004), all of the category 1 and 2 patches in the Middle Fork/North Fork Boise River, South Fork Boise River, Upper Salmon, and S.F. Payette subbasins have been sampled (Table 2).

Table 2 - Number of bull trout patches by category on the Sawtooth NF and the number surveyed within the last 7 years (since 2004) within each subbasin based on 2011 sampling.

Category	S.F. Boise Subbasin		N.F. and M.F. Boise Subbasin		S.F. Payette Subbasin		Upper Salmon Subbasin		Total	
	Patches	Surveyed	Patches	Surveyed	Patches	Surveyed	Patches	Surveyed	Patches	Surveyed
1	13	13 (100%)	4	4 (100%)	2	2 (100%)	17	17 (100%)	36	36 (100%)
2	7	7 (100%)	1	1 (100%)	2	2 (100%)	7	7 (100%)	17	17 (100%)
4	0	0	0	0	0	0	0	0	0	0 (0%)
Total	20	20 (100%)	5	5 (100%)	4	4 (100%)	24	24 (100%)	53	53 (100%)
3	22	18 (82%)	0	0	0	0	28	23 (82%)	50	41 (82%)

Sentinel Streams - In 2009 sentinel streams were established in the S.F. Boise (Boardman, Skeleton, Deadwood, and Paradise) and Upper Salmon (Pole, Iron, and Big Boulder) to detect expansion of bull trout populations within downstream marginal habitats or to detect changes in bull trout distribution within suitable areas within a patch. These streams were selected because

they represent broad thermal ranges, are near occupied patches which may be more easily colonized, and/or are the focus of restoration actions that may make habitat more suitable for bull trout. All sentinel streams will be sampled annually to detect subtle changes in stream temperatures and bull trout distributions over time.

PIBO Monitoring Sites - To evaluate trends in habitat and watershed condition, the Sawtooth NF has worked with the PACFISH/INFISH Biological Opinion (PIBO) monitoring program in Logan, Utah. This monitoring approach evaluates the trend of select Watershed Condition Indicators (WCIs) across subwatersheds where PIBO integrator reaches have been established. An integrator reach is the lowest stream reach within the subwatershed that has greater than 50% federal ownership upstream of the sample reach, contains no tributary junctions or beaver activity, and has a stream gradient less than 3%. It is assumed that integrator reaches would be responsive to all management activities that occurred upstream or around the reach. Each integrator reach has been sampled during one of the first five years (2001 to 2005), and will be resampled on a five-year rotation after 2006.

To evaluate select WCIs an integrity index of physical habitat indicators was used. Physical stream habitat and landscape data from reference reaches were used to develop an index of physical habitat condition. PIBO identified candidate attributes from the 17 total attributes collected at PIBO sample sites using a three-step sequence. First, PIBO selected those physical habitat attributes that exhibited relatively low sampling variation based on reaches repeat-sampled within a year, which enabled empirical estimates of signal/noise (Kaufmann 1999). Next, PIBO tested whether attributes with low sampling variation were responsive to management actions. As such, PIBO evaluated the responsiveness of each attribute to management activities by comparing the means of each candidate attribute from reference reaches and managed reaches. Finally, PIBO minimized redundancy of those attributes that met the specific criteria in the first two steps to avoid over-weighting certain components of the physical instream habitat represented in the overall index. Here, PIBO calculated Pearson correlation coefficients for all remaining candidate attributes and considered attributes redundant if correlation coefficients exceeded 0.70.

Once attributes were selected, PIBO used the Forest's reference sites to construct the index. Specifically, PIBO incorporated landscape and climatic covariates into multiple linear regression analyses to control for inherent differences in physical habitat attributes among reaches. PIBO used the residuals from these analyses to score individual attributes and summed the 7 attributes (i.e. d50, average bank angle, the percent of fine sediment in pool tails, the frequency of large woody debris (pieces/km), the volume of LWD, the percent of pool habitat, and the average residual pool depth) retained in the index for an overall index of abiotic condition (range = 0-100). PIBO incorporated the data from managed sites (both landscape and field data) into the regression models used to develop the index (from reference sites) to calculate and score the residuals and overall index for managed sites (again ranging from 0-100).

2011 Results and Discussion

Monitoring for bull trout on the Sawtooth NF occurred in 12 patches in 2011 (Figure 1). In the S.F. Boise subbasins, six patches were surveyed using formal protocols. Of these patches, juvenile bull trout were observed in Boardman, Deadwood, and Skeleton Creeks. In the Upper Salmon six patches were sampled and juvenile bull trout were observed in Germania and Big Boulder Creeks. Discussion of changes in bull trout distribution within a patch or abundance is discussed below for each patch.

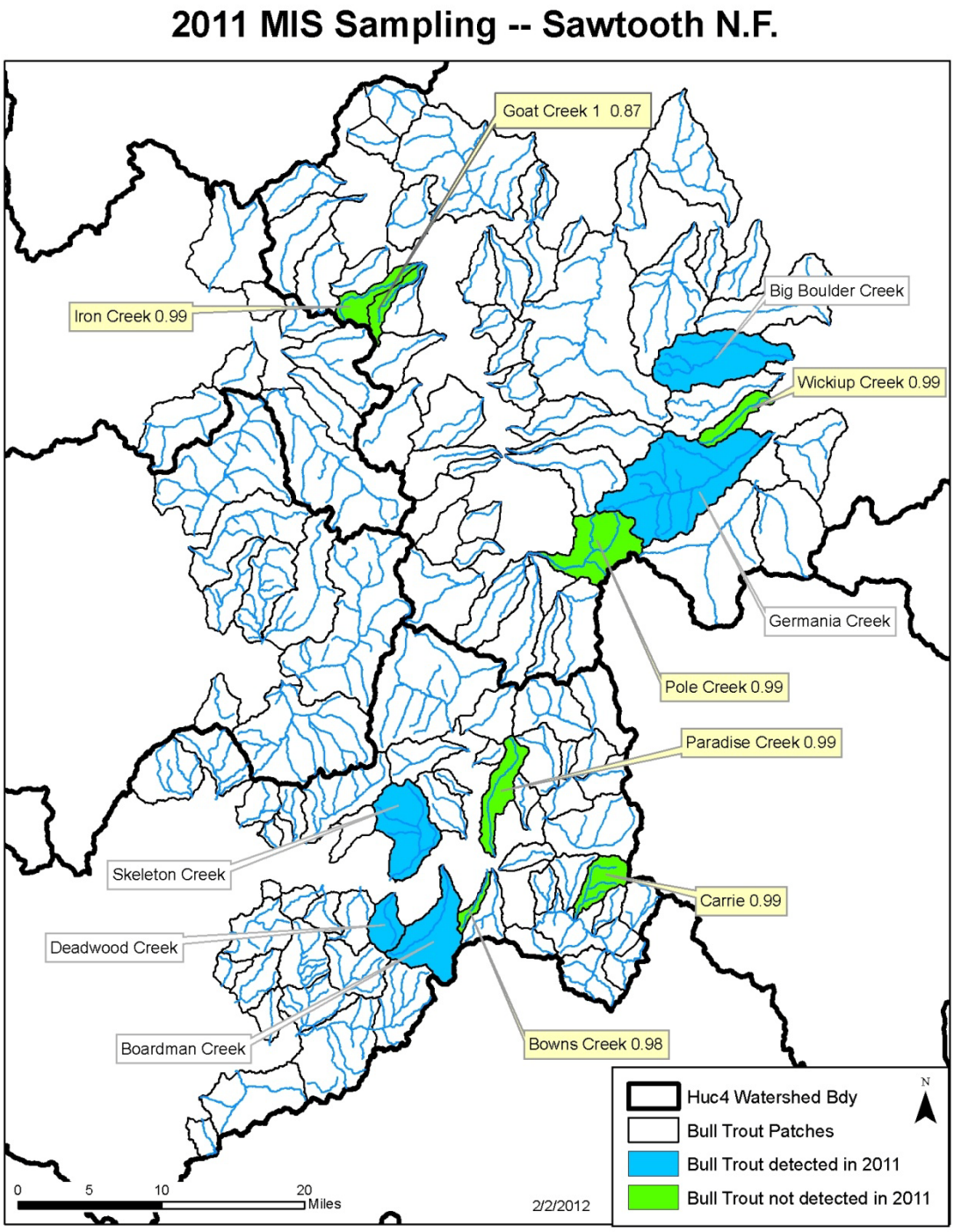

Figure 1 - Bull trout patches sampled and probabilities of detection on the northern portion of the Sawtooth N.F. (2011).

Patches Where Bull Trout Were Detected

Boardman Creek – Bull trout continue to be distributed throughout this 12,561 acre (10.9 accessible miles) patch (Figure 2). Juvenile bull trout were observed in 8 of the 14 100m electrofishing sites. A total of 70 bull trout were captured at the 8 sites. Population estimates ranged from 3 to 18 fish per reach (Table 3), with the highest estimates observed in the headwater sites of the mainstem of Boardman Creek above the Smoky Dome confluence and Smoky Dome Creek. Bull trout ranged from 63mm to 250mm total length and dominant age classes were 0+, 1+, and 2+. Findings from the 2011 survey are consistent with other surveys (i.e. the Idaho Fish and Game 1993, 1999, and 2000, and Bureau of Reclamation, Boise NF, and Rocky Mountain Research Station in 2001, and Sawtooth NF 2002-2009) completed in this patch.

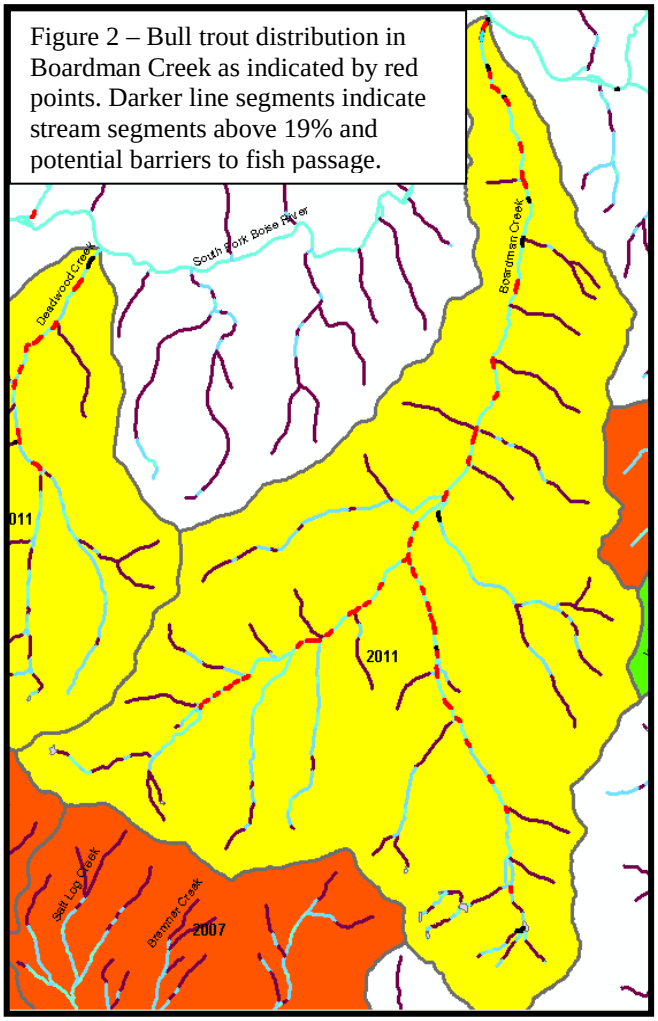

Figure 2 – Bull trout distribution in Boardman Creek as indicated by red points. Darker line segments indicate stream segments above 19% and potential barriers to fish passage.

A small tributary of Boardman Creek drains a cirque pond, called Boardman Creek Lake. IDFG stocking records indicate that this lake has been stocked with several strains of rainbow/redband trout beginning in 1967. Redband trout have been observed at most of the Boardman Creek sites and all of the Smoky Dome sites. It is assumed that most redband are native fish, but some may have been influenced by past stocking.

Stream temperatures (MWMT) near the mouth of Boardman Creek from 2002 through 2007 ranged from approximately 14.0°C to nearly 18.0°C. However, the 7-day max for stream temperatures higher in the subwatershed, where bull trout are known to spawn and rear, typically ranged from approximately 10.0°C to 12.0°C. These stream temperature readings suggest that temperatures are higher than desired for bull trout lower in the subwatershed, but temperatures are optimal or close to optimal in a substantial portion of upper Boardman and Smoky Dome Creeks.

In general, stream habitat is considered in good condition across the drainage (Figure 3), although fine sediment may be elevated from historic sheep grazing and mining in the headwaters of Smoky Dome Creek,

Figure 3 – Habitat conditions in Boardman Creek

headwater roads, and streamside trails. There is good connectivity to the S.F. Boise River with no known barriers. A PIBO integrator reach is located just above the confluence with the S.F. Boise River. The habitat index score from 2005 survey is 35.1 and in 2010 29.5 indicating poorer habitat conditions within this site compared to reference streams. PIBO found habitat indices averaged 63.4 in unmanaged reference, habitat. PIBO also concluded that habitat in good condition had scores 70 and above, habitat in a moderate condition averaged a 40-70 score, and habitat in poor condition averaged less than a 40 score for streams within the Southwest Idaho Ecogroup. Subtle changes in PIBO scores between 2005 and 2010 appear to be from a decrease in the number of pools, woody debris frequency and volume.

Table – 2011 bull and rainbow trout densities and population estimates in Boardman Creek

Transect (rivermile)	# of Passes	Transect Length (m)	Species	#Caught	Total Length (mm)		Density (fish/100m^2)	Pop Estimate (Fish ≥ 60 mm)
					Mean	Range		
1.55	3	96	Bull Trout	11	103	67-144	2.24	11
			Rainbow Trout	2	165	140-190	0.48	2
5.01	3	87	Bull Trout	3	115	84-164	0.53	3
			Rainbow Trout	8	157	100-210	1.41	8
7.71	3	77	Bull Trout	18	113	63-151	2.67	18
			Rainbow Trout	5	200	143-248	0.75	5

Deadwood Creek – Juvenile bull trout were detected at three of the four 100m electrofishing sites within this 4,558 acre (2.22 accessible miles) patch (Figure 4). A total of 22 bull trout were captured at the 3 sites. Population estimates ranged from 2 to 8 fish (Table 4) with higher estimates observed in headwater sites. Bull trout ranged from 90mm to 245mm total length and the dominant age classes were 1+, 2+, and 3+. Bull trout distribution in 2011 continues to mirror what has been observed in previous surveys (Idaho Fish and Game and Boise/Sawtooth NFs 1991, 1994, 1998, and 2003). Bull trout (presumably migratory individuals) appeared in each of the IDFG Deadwood Creek samples. Several other salmonid species, including redband, westslope cutthroat trout and kokanee salmon, were also collected during these surveys. The presumed origin of the cutthroat trout is Heart Lake, in the Deadwood Creek drainage, which has been stocked approximately every 2-3 years since 1972 by IDFG. Redband trout were the only other species observed during the 2011 surveys.

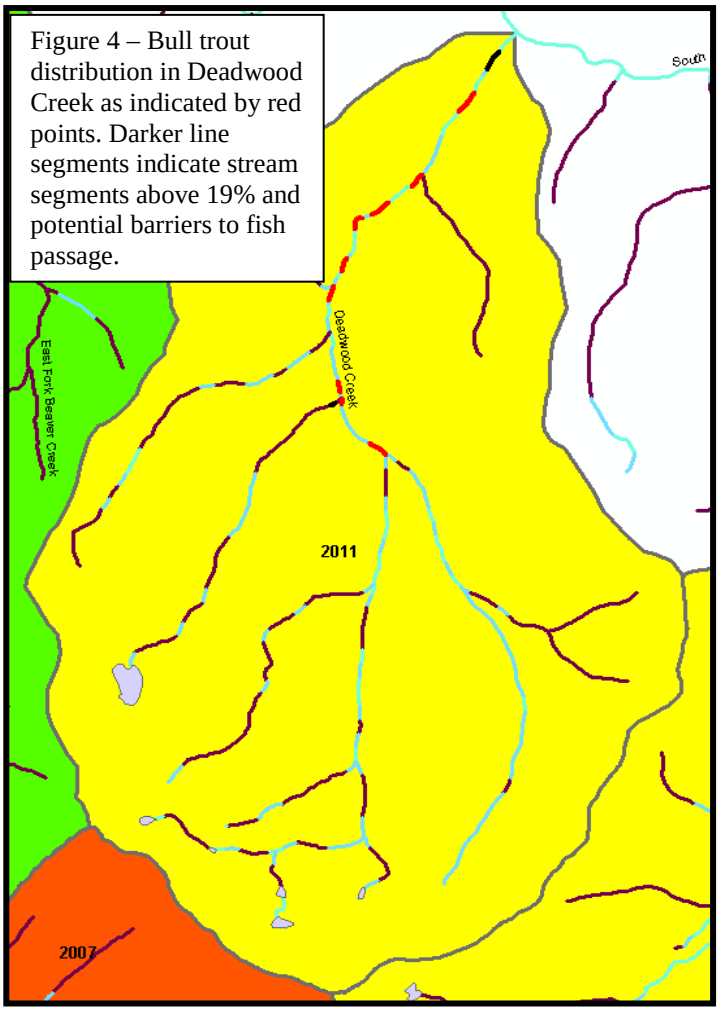

Figure 4 – Bull trout distribution in Deadwood Creek as indicated by red points. Darker line segments indicate stream segments above 19% and potential barriers to fish passage.

Habitat conditions within Deadwood Creek are believed to be in good condition and there is good connectivity to this patch from the S.F. Boise River. 7-day max temps at the mouth of Deadwood Creek in 2003, 2004, and 2007 ranged between 15°C and 16°C. Livestock grazing has occurred within the patch since late in the 19th century, but major reductions in sheep numbers have been made.

Table 4 – 2011 bull and rainbow trout densities and population estimates in Deadwood Creek

Transect (rivermile)	#of Passes	Transect Length (m)	Species	# Caught	Total Length (mm)		Density (fish/100m^2)	Population Estimates (Fish ≥ 60 mm)
					Mean	Range		
0.53	3	82	Bull Trout	2	137	105-184	0.59	2
			Rainbow Trout	5	124	76-171	1.48	6
2.95	3	85	Bull Trout	8	191	149-245	2.04	8
			Rainbow Trout	2	134	131-137	0.51	2
			Cutthroat Trout	2	156	154-158	0.51	2

Skeleton Creek – Juvenile bull trout were detected at 10 of the 16 100m electrofishing sites within this 4,558 acre (2.22 accessible miles) patch (Figure 5). A total of 154 bull trout were captured at the 10 sites. Population estimates ranged from 1 to 58 fish (Table 5) with higher estimates observed at the headwater sites; especially in the W.F. Skeleton Creek. These estimates are higher than those observed in 2003 by the Sawtooth NF (Kenney 2003). Population estimates from this 2003 survey ranged from 0-31 fish. Bull trout ranged from 85mm to 248mm total length and dominant age classes are1+, 2+, 3+ and 4+. Findings from the 2011 survey are consistent with other surveys (i.e. the Idaho Fish and Game 1994, 1999, and 2000, and Bureau of Reclamation, Boise NF, and Rocky Mountain Research Station in 2001, and Sawtooth NF 2002-2009) completed on the mainstem of Skeleton and W.F. Skeleton Creeks in this patch.

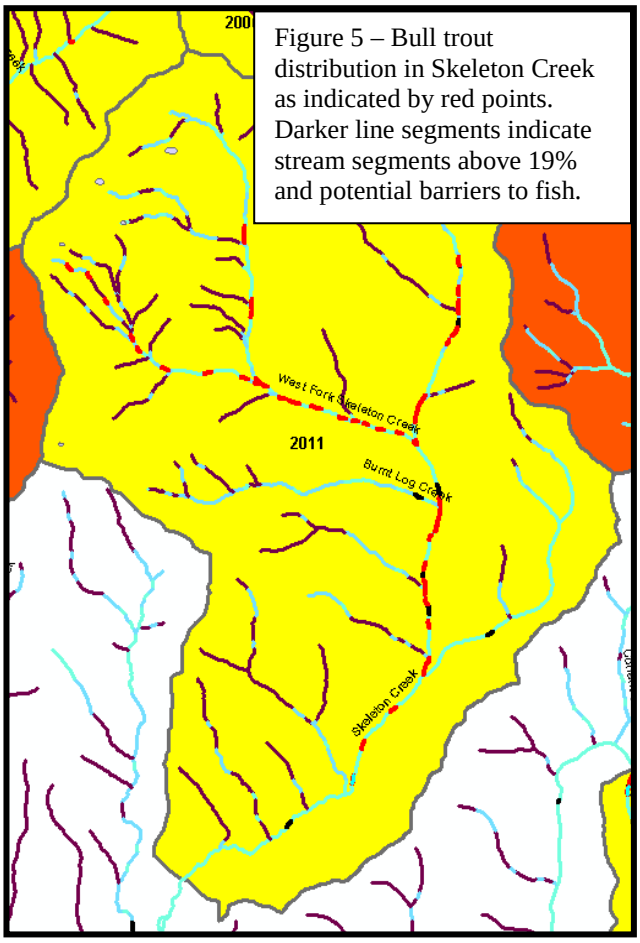

Figure 5 – Bull trout distribution in Skeleton Creek as indicated by red points. Darker line segments indicate stream segments above 19% and potential barriers to fish.

The radio-telemetry study by Partridge et al. (2000) also showed the presence of migratory bull trout in the mainstem of Skeleton Creek, the East and West Forks of Skeleton Creek, as well as Burnt Log Creek. Specifically, in 1998, a 420 mm bull trout was tracked to Burnt Log Creek and a 500 mm fish was last located in Skeleton Creek, while in 1999 a 425mm bull trout was located first in the East Fork and then in the West Fork and a second fish, 515 mm in length, was located in the West Fork. The largest fish found in 2011 surveys was 260 mm at river mile 8.59. Weir counts from 2002 through 2005 captured only a limited amount of large (>300 mm) individuals out-migrating after spawning in these years. Therefore, the size of the spawning population is unclear, although the subpopulation

may include a resident spawning component that would likely remain undetected due to lack of migration and therefore low probability of capture by the weir. .

Seven-day max weekly max temperatures (MWMT) near the confluence of Skeleton Creek with the S.F. Boise River in 2001 through 2007 ranged from 18 to 19.5°C. However, MWMT stream temperatures are considerably cooler in headwater locations, as evidenced by temperature samples recorded at electrofishing sites and the presence of a reproducing bull trout population. Thermographs placed in Skeleton Creek within the patch recorded 7-day maximum temperatures from 13.7 to 9.9°C.

In general, stream habitat is in good condition in the drainage, although fine sediment is likely elevated from historic sheep grazing, logging, and mining in the headwaters. There is good connectivity to the S.F. Boise River with no known barriers. A PIBO integrator reach is located just above the confluence with the S.F. Boise River. The habitat index score from 2005 survey is 18.8 and 44.4 in 2010 indicating moderate habitat conditions when compared to reference streams. Changes in PIBO scores between 2005 and 2010 appear to be from an increase in the pool depth and substrate size.

Table 5 – 2011 bull and rainbow trout densities and population estimates in Skeleton Creek

Transect (rivermile)	#of Passes	Transect Length (m)	Species	# Caught	Total Length (mm)		Density (fish/100m^2)	Pop Estimates (Fish ≥ 60 mm)
					Mean	Range		
5.08	3	97	Bull Trout	1	165	--	0.17	1
			Rainbow Trout	21	160	104-229	3.54	21
6.54	3	85	Bull Trout	7	137	116-146	1.19	24
			Rainbow Trout	46	151	68-209	7.84	67
10.96	3	96	Bull Trout	55	162	85-248	14.69	58
			Rainbow Trout	6	181	154-196	1.6	6

Germania Creek – Bull trout are present throughout this patch, including exclusive use of habitat upstream of a 30-foot vertical falls near the mouth of Chamberlain Creek. Juvenile bull trout were detected at 5 of the 7 100m electrofishing sites within this 32,033 acre (18.2 accessible miles) patch (Figure 6). A total of 35 bull trout of differing age classes were captured at 6 sites. Population estimates ranged from 11 to 14 fish (Table 6) with higher estimates observed at the headwater sites and in Chamberlain Creek. Bull trout ranged from 94mm to 250mm total length and dominant age classes were 1+, 2+, and 3+. Bull trout had been detected previously in Germania Creek in 1992 and 2004 by the Sawtooth NF. Bull trout have also been observed in lower Washington, MacRae, and Galena Creeks.

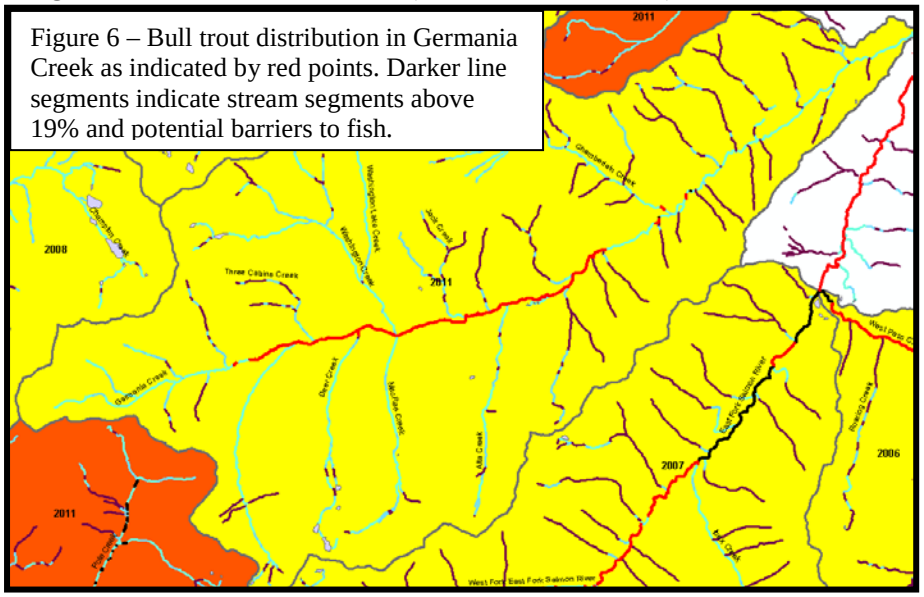

Figure 6 – Bull trout distribution in Germania Creek as indicated by red points. Darker line segments indicate stream segments above 19% and potential barriers to fish.

Water temperatures recorded for Germania Creek in 1994 remained less than 15°C over the entire patch. Season maximum temperatures above the falls from 2004-2009 ranged from 8.6-12.7°C during the summer months. Streams within this patch originate in high elevations and flow much of their lengths to the mouth through shaded environments.

Aquatic habitats within this patch are believed to be at or near natural conditions in most areas, although fine sediment may be elevated from sheep grazing and mining occurring in the headwaters. Patented mining claims exist within Washington Basin, although none are currently active. In 2001, a concentrated summer convective storm passed through the mid portions of the Germania drainage. As a result, substantial debris flows burst from several tributaries on either side of the drainage dumping thousands of cubic yards of sediment and debris into Germania Creek. Most pools downstream of the event were filled with sediment. However, much of the finest sediment was flushed downstream the following spring. Some areas and habitat features remain less than their potential, such as bank stability in response reaches. Conditions are believed to be continuing to improve from past intensive uses, primarily sheep and cattle grazing.

A PIBO integrator reach is located just above the confluence with the S.F. Boise River. The habitat index score from 2005 survey is 28.7 and in 2010 27.0 indicating poor habitat conditions when compared to reference streams. Minor changes in PIBO scores between 2005 and 2010 appear to be from an increase in the pool depth, decrease in percent fines in pool tailouts, but a decrease in the frequency of pools.

Table 6 – 2011 trout densities and population estimates in Germania Creek

Transect (rivermile)	# of Passes	Transect Length (m)	Species	# Caught	Total Length (mm)		Density (fish/100m^2)	Pop estimate (Fish ≥ 60 mm)
					Mean	Range		
17.88	3	103.7	Bull Trout	12	141	94-213	3.97	14
0.19	3	71	Bull Trout	11	150	60-220	3.87	11
			Westslope Cutthroat	3	182	155-220	1.05	3

Big Boulder Creek – Juvenile bull trout were detected in the three of the 10 100m electrofishing sites on the mainstem Big Boulder and Jim Creeks in 2011 within this 17,712 acre (7.64 accessible miles) patch (Figure 7). A total of 26 bull trout of all age classes were captured at 3sites. Population estimates ranged from 1 to 7 fish (Table 7) with higher estimates observed just below the barrier falls. These estimates are higher than those found by the Salmon Challis N.F. in Upper Salmon River tributaries (Gamett et al. 2010). Bull trout ranged from 90mm to 200mm total length and dominant age classes are1+, 2+, and 3+.

Bull trout distribution in 2011 continues to be similar to what has been observed in past surveys. Bull trout had been detected previously in Big Boulder in 2006 and 2009 by the Sawtooth NF. In 2009 bull trout were found in lower Jim Creek (0.6 miles above the Big Boulder confluence) which is just downstream of barrier falls. Bull trout were also found again up to the barrier falls (1.9 miles above the Jim Creek confluence) in the main channel of Big Boulder Creek. Above these falls only stocked rainbow, westslope cutthroat or hybrids were found at the five surveyed transects. Extensive snorkel surveys of Big Boulder Creek in 2000 also observed steelhead/redband trout, bull trout, cutthroat, and brook trout below the falls, and redband and cutthroat above the falls. Below the falls, both resident and fluvial bull trout were observed.

Water temperatures monitored in the lower reaches of Big Boulder Creek from May to mid-August 1994 recorded MWMT temperatures less than 16.0°C. Recent temperature monitoring in

2006 and 2010 found stream temperatures of 16.0°C and 13.5°C in Boulder Creek and 14.8°C in 2005 in Jim Creek.

Management disturbances during the past century have been extreme in some areas of this patch, near and below the Livingston Mill mine. In 1925 a power dam was constructed on the mainstem and operated until it was abandoned in 1941. In 1991 a passable notch was cut in the dam, and the accumulated sediments upstream removed. This dam eliminated all migratory fish from E.F. Salmon River from reaching headwater habitat for almost 50 years. Fluvial bull trout have since been observed upstream of the dam.

Portions of the Big Boulder Creek subwatershed has been extensively mined since the 1920's contaminating soils in the valley bottom with zinc, lead, and arsenic. In the 1960s Big Boulder Creek was diverted into a low sagebrush swale near the Livingston Mill to avoid growing conflicts with the mine tailings. The fine textured soils and shallow roots within the swale quickly gave way and an extensive blowout emerged and expanded over the following decades – up to 25 feet in depth, 250 feet across, and nearly ¼ mile in length. Tens of thousands of cubic yards of sediment buried downstream habitats and initiated similar channel responses. Efforts to prevent further expansion of the blowout and rehabilitate the area were attempted in 1994 and have been partially successful.

In 2008 shallow tailings and contaminated soils within the Livingston Mill site were "treated in place" in an on-site repository. All but approximately 120 of the 71,600 cubic yards were placed in a central repository. The remaining 120 cubic yards were treated in place with a mixture of compost and soil amendments. Treatments have reduced exposure to potential contaminants of concern and should in time improve water quality in Jim Creek and Big Boulder Creek by decreasing contaminant loading from the mine tailings areas.

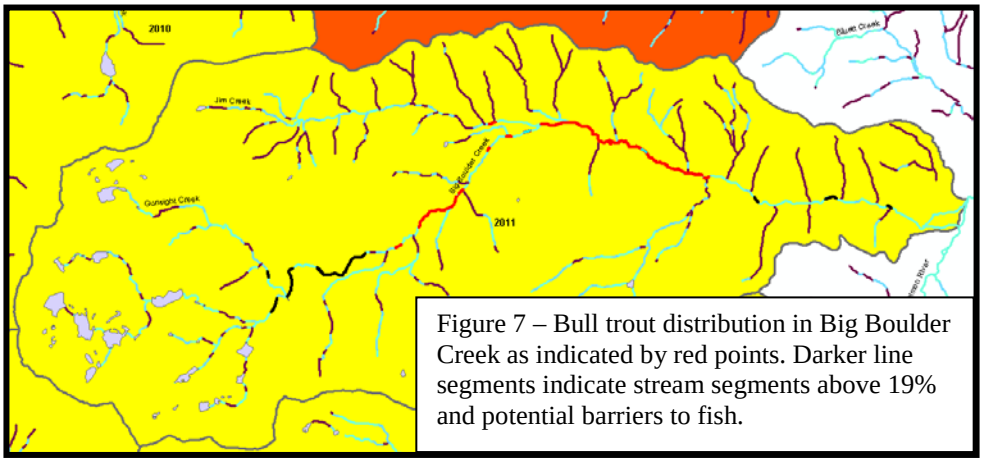

Figure 7 – Bull trout distribution in Big Boulder Creek as indicated by red points. Darker line segments indicate stream segments above 19% and potential barriers to fish.

The Big Boulder Creek road (#667) is cut into the steep slope sitting immediately above Big Boulder Creek. The road suffers chronic erosion problems brought on from this untenable location, and from inadequate surface, cut, and fill slope drainage. Chronic disturbance has also occurred from sheep and cattle grazing on public and private lands. Cattle grazing had impacted (i.e. compaction, pedestal formation, and excessive browse) riparian areas below Livingston Mill and within select headwater tributaries. However, this drainage has been rested since 2004 and many impacted areas are beginning to recover. Finally, near the mouth on BLM and private lands, much of Big Boulder Creek is diverted in the summer for irrigation purposes before reaching the East Fork.

A PIBO integrator reach is located 0.89 miles below the Livingston Mill Mine. The habitat index score from 2005 survey is 57.9 and in 2010 49.4 indicating moderate habitat conditions within

this site compared to reference streams. Changes in PIBO scores between 2005 and 2010 appear to be from decreases in the number of pools, pool depth, streambank stability, and woody debris frequency and volume.

Table 7 – 2011 trout densities and population estimates in Big Boulder Creek

Transect (rivermile)	# of Passes	Transect Length (m)	Species	# Caught	Total Length (mm)		Density (fish/100m^2)	Pop Estimates (Fish ≥ 60 mm)
					Mean	Range		
7.5	3	108	Bull Trout	2	137	102-172	0.33	2
			Rainbow Trout	1	73	--	0.16	1
			Westslope Cutthroat	3	201	129-251	0.49	5
			Cut-Bow	1	138	--	0.16	1
0.77	3	92	Bull Trout	1	162	--	0.45	1
10.1	3	103	Bull Trout	7	156	90-200	0.92	7
			Westslope Cutthroat	2	172	139-205	0.26	2
14.0	3	115	Westslope Cutthroat	3	187	171-200	0.31	3
			Cut-Bow	5	143	90-240	0.53	8

Patches Where Bull Trout Were Not Detected

Bull trout were not detected in Carrie, Bowns, Paradise Creeks in the S.F. Boise subbasin, and Pole, Iron, Goat, and Wickiup Creeks in the Upper Salmon subbasin. Sampling results and potential reasons bull trout have not been found are discussed in detail below.

Carrie Creek - Bull trout were not detected despite 10 100m electrofishing sites (probability of detection 0.99) suggesting that this 5,420 acre patch (8.29 accessible miles) continue to not support a reproducing population. Survey results are similar to what was found by Sawtooth N.F. surveys in 2000 (10 100m sites), and 2006 (4 100m sties). However, one subadult bull trout (175mm) was observed in Carrie Creek, below the Little Smoky Bridge, by the Sawtooth NF fisheries crew during electrofishing surveys in 2001. Redband trout were present in all sampled stream reaches of Carrie Creek, while sculpin were also present in the lower reaches of the streams. No bull trout were detected at any sites documented by Partridge et al. (2000), but redband trout were captured, while sculpin were recorded at most of the sites.

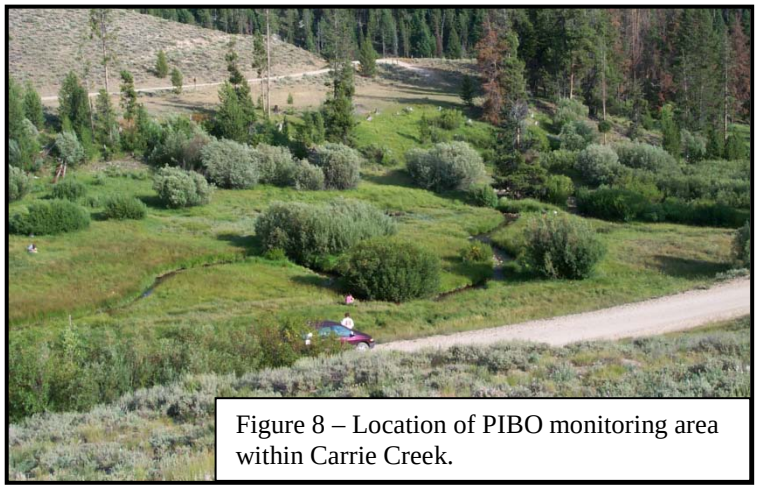

Figure 8 – Location of PIBO monitoring area within Carrie Creek.

Although this patch appears to have water temperatures in the headwaters (MWMT 11.6°C) that are cold enough to support bull trout, water temperatures are marginal in the lower 2.5 miles of Carrie Creek, below King of the West tributary (MWMT 15.3°C to 18.9°C).

A PIBO integrator reach is located approximately 0.20 miles below the Little Smoky confluence (Figure 8). The habitat index score from 2002 survey is 32.2 and in 2007 33.4 indicating poor

habitat conditions within this site compared to reference streams. Impaired conditions may be the result of a lack of large woody debris and large pools due to management activities and/or natural sites conditions that may not support these habitat features compared to reference areas. It also may be due to elevated sediment from management activities. The 227 Ketchum-Featherville road parallels most of Carrie Creek. There has also been heavy historic mining, cattle and sheep grazing, and dispersed recreation along many of the stream channels within this drainage.

Bowns Creek - Bull trout were not detected despite 6 100m electrofishing sites (probability of detection 0.98) suggesting that this 1,556 acre patch (0.77 accessible miles) continues to not support a reproducing population. Brook trout were captured in the lower 0.5 mile and redband trout in the lower 1.5 miles. Findings are similar to surveys completed by IDFG (Partridge et al. 2000) in 1994 and 1998 (at 5,500 and 5,720 feet), and the Sawtooth N.F in 2004.

Habitat conditions are believed to be "functioning at risk" from increased sediment from roads, trails, and current/historic sheep grazing. Peak temperature in Bowns Creek near its mouth was 13°C in 2005.

Paradise Creek – Bull trout were not detected despite 13 100m electrofishing sites (probability of detection 0.99) suggesting that this 7,213 acre patch (8.02 accessible miles) continue to not support a reproducing population. One subadult bull trout (197 mm) was found in 2009 in the lower reaches of the patch. But this is the only bull trout ever observed in this patch. IDFG records (Partridge et al. 2000) show three electrofishing sites on Paradise Creek in 1993, one site in 1995, one in 1996 and two sites in 1997, at elevations ranging from 5,570 to 6,760 feet. No bull trout were observed, but brook trout were captured at six of the seven sites (at 6,590 feet, in 1997). Mottled sculpin were recorded at all of the sites, and redband trout at all but the most downstream sampling reach.

Bull trout are believed to not occupy this patch because of elevated summer water temperatures (MWMT 17.1^{o}C to 18^{o}C) at the mouth, high natural sediment levels, presence of brook trout, and historic sheep grazing. However, the stream habitat within the headwaters of this patch is considered in relatively good condition with adequate water temperature for bull trout (less than 15 ^{o}C). Since habitat is slowly recovering from historic management activities, this patch has a high potential to support bull trout if the brook trout population was extirpated.

Pole Creek - Bull trout were not detected despite 13 100m electrofishing sites (probability of detection 0.99) in the mainstem of the Pole Creek, Twin and Rainbow Creeks within this 13,023 acre patch. Only brook trout, westslope cutthroat and sculpin were observed. This suggests there is a high probability that this patch does not support a reproducing bull trout population despite 10.1 miles of habitat above the diversion. No bull trout were observed above the PC7 diversion during a 2004 IDFG or 2009 Forest Service surveys. However, bull trout were observed above the PC7 diversion in prior years.

Bull trout are believed to not occupy this patch because of warm summer water temperatures (MWMT 16°C to 20°C) on private property and the historic/current effects of water withdrawals lower in the drainage. Prior to 1982, Pole Creek was seasonally isolated by seven irrigation diversions in the lower 4.5 miles of the drainage. During the irrigation season, these water diversions severely reduced the available fish habitat and, in very low water years, prevented upstream migration by fish to unaffected habitat above the diversions. These diversion points were also sources of fish entrainment from Pole Creek to irrigation ditches. Since consolidation into one diversion in 1983, dewatered conditions have occurred less frequently. However, passage issues and habitat impacts still persist. IDFG recently concluded that the presence of a

low water barrier upstream of the hydro-power plant return flow and the irrigation diversion structure may be a key reason for the absence of fluvial bull trout in the Pole Creek (IDFG 2005a).

Other conditions that may have contributed to bull trout absence include: (1) impaired habitat conditions on private due to grazing and irrigation pivots; (2) complete and partial culvert barriers (one on private property and three barriers on the Forest above the PC7 diversion); (3) elevated instream sediment from historic mining, high route density and sheep grazing; and (4) high brook trout densities (6.1 fish/100m^2).

Stream habitat in the headwaters of this patch is in relatively good condition. Stream temperature (MWMT) measured in Pole Creek (approx. 25 miles below Twin Creek) by the USFS in 2005 was well within the optimal range for bull trout (11.6ºC). Although some localized impacts from sheep grazing, system and non-system roads, and developed and dispersed recreation occur.

A PIBO integrator reach is located 4.57 miles upstream of the Salmon River confluence just above the PC7 water diversion. The habitat index score from 2005 survey is 66.8 and in 2010 50.3 indicating moderate habitat conditions within this site compared to reference streams. Changes in PIBO scores between 2005 and 2010 appear to be from an increase in fine sediment in pool tailouts.

Iron Creek – Bull trout were not detected despite 11 100m electrofishing sites (probability of detection 0.99) in the mainstem of the Iron Creek within this 5,055 acre patch. However, wandering subadults or migratory adult bull trout were found in 1993 below and just above the Highway 21 culvert. Brook trout and sculpin were found at all sites during the 2011 surveys. This suggests there is a high probability this patch does not support a reproducing bull trout population despite this patch supporting 5.28 miles of habitat.

Idaho Fish and Game surveys in 2004 completed five 100m multiple pass surveys on the Sawtooth NF (IDFG 2005b). Results documented the presence of Chinook salmon (Oncorhynchus tshawytscha) just above the private property boundary, westslope cutthroat trout (O. clarki lewisi), steelhead/rainbow trout, brook trout and golden trout (O. mykiss aguabonita). Brook trout were widespread throughout the watershed, possibly suppressing the density or presence of native fish species, including bull trout. The highest brook trout densities over 70 mm was 3.6 fish/100m^2 below Alpine Lake (site SVCIC-05). Brook trout distributions are likely the result of extensive stocking efforts in streams and high mountain lakes, and downstream movement into mainstem or adjacent tributary habitat. No bull trout were observed from any of the Iron Creek electrofishing sites.

Bull trout are believed to be absent from this patch due to warm summer water temperatures (season max of 27.2°C with a MWMT of 24.8°C) below the lowest diversion on private property, historic/current effects of water withdrawals that dewater habitat lower in the drainage, culvert barriers on Highway 21 and road #619 to the Iron Creek subdivision that are seasonal barriers to 5.7 miles of habitat, passage barriers from water diversion weirs, localized impacts to riparian areas from roads and dispersed recreation sites, and stream/riparian impacts from grazing on private lands.

Habitat in the headwaters (upstream of the highest diversion) of this patch is in a moderate condition with adequate water temperatures peaking at 14°C to 16°C. Fine sediment is moderate to high in many areas due to natural granitic geology.

Goat Creek – Bull trout were not detected in the 3 100m electrofishing sites (probability of detection 0.87) in the mainstem of the Goat Creek within this 3,379 acre patch. Only brook trout (*Salvelinus fontinalis*) and sculpin were detected. Idaho Fish and Game completed three 100m electrofishing single pass surveys on the Forest above private land in 2004. Brook trout were sampled at all three sites with densities ranging from 2.4 fish/100m^2 to 3.9 fish/100m^2. No Chinook salmon or bull trout were observed at any of the sample sites. Two juvenile O. mykiss (126-127mm total length) were found just above the private property boundary and six westslope cutthroat (*O. clarki lewisi*) (0.8 fish/100m^2) were found in the two upper most sites. The low densities or complete absence of some native salmonids may in part be due to the prevalence of brook trout in Goat Creek. Chinook salmon have been found at times lower in the drainage, just above or below Highway 21 near the Valley Creek confluence.

Overall watershed condition is "functioning at risk" due to warm summer water temperatures (20 °C in late July and early August in reaches influenced by water diversions) on private property, historic/current effects of water withdrawals that dewater habitat lower in the drainage, high brook trout densities, passage barriers associated with some of the 14 water diversions lower in the drainage, high levels of fine sediment from granitic origins and management influences, and stream/riparian impacts from grazing on private lands.

Habitat above the upper most diversion is believed to be in better condition and supports cooler water temperatures (MWMT < 16 °C). The mean daily average water temperature at the mid-Goat Creek site was 10.3°C and the maximum instantaneous temperature recorded was 15.9°C as measured on August 15, 2004.

A PIBO sentinel site is located on the Forest 3.37 miles upstream of the Valley Creek confluence. This site is measured annually to evaluate annual variability and rate of change of each measured attribute (Figures 9 and 10). The habitat index score from 2002 to 2010 has ranged from 41.8 (2007) to 23.3 (2009) indicating poor to moderate habitat conditions within this site compared to reference streams. Changes in PIBO scores between 2002 and 2010 appear to be from a decrease in large woody debris, decrease in pool frequency, and an increase in fine sediment in pool tailouts. It is unknown to what degree changes are caused by natural changes (e.g. high flows, etc.)

Figure 9 – PIBO Sentinel Site 7/26/2006

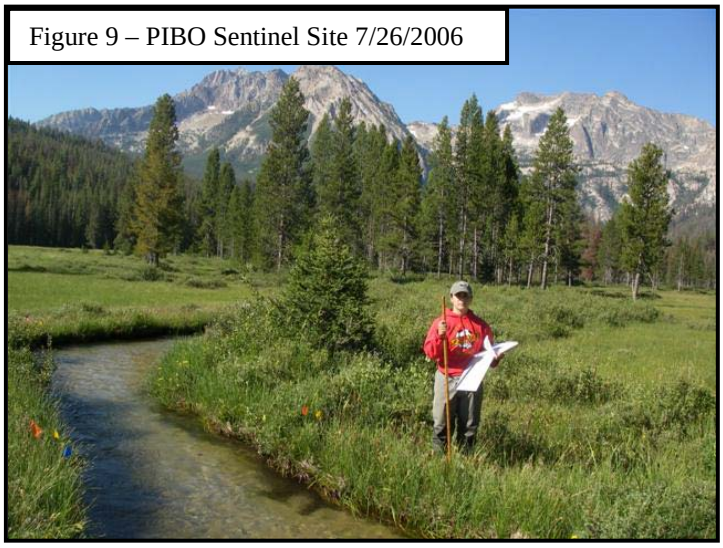

Figure 10 – PIBO Sentinel Site 8/4/2010

Wickiup Creek – Bull trout were not detected in the 9 100m electrofishing sites (probability of detection 0.99) in the mainstem of the Wickiup Creek within this 4,191 acre patch. Only a few westslope cutthroat trout (60-179mm) were found at one site. Westslope cutthroat was also the only species found in 2004 surveys completed by the Sawtooth N.F. A culvert barrier just above the confluence at Wickiup Creek prevents juveniles and adult salmonids from the E.F. Salmon River accessing habitat upstream. A small water diversion upstream of the culvert may also create passage issues. There are also several high gradient sections (>19%) lower in the drainage that may inhibit fish from the E.F. Salmon River from accessing most of this drainage. Due to these factors it is unlikely Wickiup Creek historically supported a migratory bull trout population.

Watershed condition in Wickiup Creek is believed to be slightly departed from natural conditions. Many of the riparian habitats within accessible areas are small and often tightly confined, and as such have in the past been intensively grazed by livestock. Stream habitats have been altered through mechanisms such as bank trampling, and chiseling, and, with a reduction in integrity, channels have become entrenched. During May to mid-August 1994-1996 temperatures in Wickiup Creek remained below 16°C.

Summary – The 2011 data continues to show that occupied juvenile bull trout patches are larger (15,994) than unoccupied patches (5,691) (Table 8). Occupied patches also have more accessible miles (9.99 vs. 3.47), better connectivity within and to the patch, no brook trout present, colder MWMT (16.2°C vs. 19.3°C), better watershed conditions as determined by the matrix of pathways and indicators, but comparable PIBO index scores (37.6 vs. 41.9) than unoccupied patches.

Although the factors that influence which patches are occupied or unoccupied are complex, other studies have made similar conclusions to the observations stated above. Rieman and McIntyre (1995) found that patch size was highly significant in determining bull trout presence. Subwatersheds whose overall aquatic conditions are "functioning appropriately" generally have good water quality; lower route densities or no roads; fewer grazing impacts; and fewer dispersed recreation opportunities. Subwatersheds whose overall aquatic conditions are considered "functioning at unacceptable risk" generally have poorer water quality; more culverts or water diversion barriers, simplified habitat conditions, higher route densities, more grazing impacts, and more dispersed recreation. These conditions, coupled with the presence of non-native brook trout in some patches, appear to have made it more difficult for bull trout to maintain or reestablish a local population within a patch.

Table 8 – Important indicators within occupied and unoccupied patches

Patch Name	Patch Acres	Accessible Habitat Miles	Connectivity	% of Miles with Brook Trout	MWMT °C	PIBO Integrity Index	Watershed Condition
Occupied Patches							
Boardman Creek	12,561	10.90	Unimpaired	0.00	10-17.9	29.5 (2010)	**FA**
Deadwood Creek	4,558	2.22	Unimpaired	0.00	15-16	--	**FA**
Skeleton Creek	13,108	11.02	Unimpaired	0.00	9.9-16	44.4 (2010)	**FR**
Germania Creek	32,033	18.16	Unimpaired	0.00	9.3-15.3	27.0 (2010)	**FR**
Big Boulder Creek	17,712	7.64	Unimpaired	0.00	13.5-16	49.4 (2010)	**FR**
Average or Range	15,994	9.99	--	0.00	11.5-16.2	37.6	**FA-FR**
Unoccupied Patches							
Carrie Creek	5,420	8.29	Unimpaired	0.00	11.6-18.9	33.4 (2007)	**FUR**

Bowns Creek	1,557	0.05	Impaired	33.00	12.2	--	**FUR**
Iron Creek	5,055	1.00	Impaired	100.00	14-24.8	--	**FR**
Paradise Creek	7,213	8.02	Unimpaired	58.00	12.1-18	--	**FR**
Pole Creek	13,023	4.57	Impaired	90.00	12-20	66.8 (2010)	**FR**
Goat Creek	3,379	2.31	Impaired	100.00	14.8-21.9	25.5 (2010)	**FR**
Wickiup Creek	4,191	0.03	Impaired	0.00	10.8-12.2	--	**FR**
Average or Range	5,691	3.47	--	33-100	12.5-19.3	41.9	**FUR-FR**

Table 9 - Fish species detected during 2011 MIS sampling on the Sawtooth N.F.

		Species Observed						
Subbasin	**Patch**	**Bull Trout**	**Brook Trout**	**Rainbow Trout**	**Westslope Cutthroat Trout**	**Chinook Salmon**	**Sculpin**	**Whitefish**
Upper Salmon	Pole Creek		+		+		+	
Upper Salmon	Wickiup Creek				+			
Upper Salmon	Iron Creek		+				+	
Upper Salmon	Goat Creek		+				+	
Upper Salmon	Big Boulder Creek	+		+	+			
Upper Salmon	Germania Creek	+			+			
S.F. Boise	Boardman Creek	+		+			+	
S.F. Boise	Deadwood Creek	+		+				
S.F. Boise	Skeleton Creek	+		+			+	
S.F. Boise	Carrie Creek			+			+	
S.F. Boise	Bowns Creek		+	+				
S.F. Boise	Paradise Creek		+	+			+	

Bull Trout Detection Probabilities

Electrofishing data collected since 2004 allows for an empirical estimate of probability of detection that is independent from detection probabilities that are modeled by the Western Division of the American Fisheries Society (WDAFS) protocol. Empirical estimates are derived by randomly sampling in patches known to support a local bull trout population and then dividing the number of sites where juvenile bull trout were detected by the number of sites where juvenile bull trout were not observed (Table 10). This estimate can then be used to assess the level of uncertainty associated with a patch where no juvenile bull trout are observed.

When monitoring began in 2004 probabilities of detection at a patch scale typically ranged from 0.21 (3-100m sites) to 0.52 (8-100m sites) using the WDAFS estimates. This implied that we could only be 21-52% confident that bull trout densities in patches where juveniles were not detected were lower than others observed in the Salmon, Clearwater and Boise subbasins in Idaho.

After eight years of sampling every bull trout patch on the Forest it appears that the densities, sampling efficiencies, and site level detection probabilities are higher than those estimated by WDAFS. This has been noted by other sampling efforts in the Boise and Payette subbasins (Rieman and Kellett, personal communication). We have found that when juvenile bull trout are present, they were usually observed during the first electrofishing pass of the first sample site within a patch when there is good electrofishing efficiency. This suggests that in occupied

patches, bull trout are relatively easy to detect. With current empirical site-level estimates of detection probabilities, cumulative patch level probabilities approach 0.49 per site or 0.87 when 3 sites are sampled within a patch. This implies that we have a higher level of confidence that juvenile bull trout are either at extremely low densities or are not present within the patch. However, absence can never be 100% certain unless perhaps the stream is dewatered.

Table 10 - Overall site-level empirical estimate of bull trout detection probabilities.

Subbasin	Patch	# of Sites Sampled	# with BLT	# with Juv. BLT
Upper Salmon	West Pass	6	4	2
Upper Salmon	Bowery Creek	13	5	5
Upper Salmon	Big Boulder	38	20	13
Upper Salmon	Little Boulder	4	4	3
Upper Salmon	Slate	6	2	0
Upper Salmon	Warm Spring (Pigtail/Martin/Garland)	28	13	9
Upper Salmon	E.F. Valley Creek	5	5	5
Upper Salmon	Fishhook	4	4	3
Upper Salmon	Crooked	7	1	1
Upper Salmon	Champion Creek	3	1	1
Upper Salmon	Germania Creek	7	6	5
S.F. Payette	Trail Creek	4	3	2
M.F./N.F. Boise	Queens River	7	4	1
S.F. Boise	Boardman Creek	14	11	8
S.F. Boise	Skeleton Creek	16	14	10
S.F. Boise	Deadwood Creek	11	10	10
S.F. Boise	Willow Creek	5	5	4
S.F. Boise	Big Peak	8	8	7
S.F. Boise	N.F. Big Smoky	5	4	4
S.F. Boise	Bluff	2	2	2
S.F. Boise	Upper Big Smoky	4	4	4
S.F. Boise	W.F. Big Smoky	3	2	1
S.F. Boise	Bear	5	3	3
S.F. Boise	Upper S.F. Boise	11	3	2
S.F. Boise	Emma Creek	6	4	4
Total		222	142	109
Empirical Estimate of Probability of Detection				**109/222 = 0.49**

Table 11 - Summary of results from 2011 aquatic MIS sampling on the Sawtooth N.F.

Subbasin	Patch	Strata Designation in 2010	Bull Trout Detected	# Sites sampled	# Sites where Bull Trout < 150mm were found	Empirical Probability Of Detection
Upper Salmon	Pole Creek	3	-	13	0	0.99
Upper Salmon	Iron Creek	3	-	11	0	0.99
Upper Salmon	Goat Creek	3	-	3	0	0.87
Upper Salmon	Big Boulder Creek	1	+	10	3	NA
Upper Salmon	Wickiup Creek	3	-	9	0	0.99
Upper Salmon	Germania Creek	1	+	7	5	NA
S.F. Boise	Boardman Creek	1	+	14	8	NA
S.F. Boise	Deadwood Creek	1	+	4	3	NA

S.F. Boise	Paradise Creek	2	-	13	0	0.99
S.F. Boise	Skeleton Creek	1	+	16	10	NA
S.F. Boise	Carrie Creek	2	-	10	0	0.99
S.F. Boise	Bowns Creek	3	-	6	0	0.98

Bull Trout Trends on the Sawtooth National Forest Since 2004

In 2004, fisheries staff identified and stratified 97 bull trout patches on the Sawtooth NF. Since that time six additional patches have been identified in the Upper Salmon subbasin and one dropped in the S.F. Boise subbasin resulting in 102 patches on the Forest. During the 2004 to 2011 field seasons, crews completed MIS protocol surveys in 100% of the category 1-2 patches. Bull trout presence was confirmed in 36 patches; habitat was determined to be suitable but no bull trout were detected in 17 patches; and habitat was determined to be unsuitable in 50 patches.

Data collected over the past eight years were compared with information collected prior to 2004 to provide a preliminary indication of bull trout trend across the planning unit. Results from this comparison indicate a slight increase in bull trout distribution in the S.F. Boise, M.F./N.F Boise, and Upper Salmon subbasins. Bull trout were probably present, but previously undetected, in many of the patches that are now reclassified as occupied (category 1). Still, the data indicates that bull trout presence is more robust than previously thought in 2004 and that bull trout are still occupying most patches where previously detected. Table 12 shows an increase in the number of unsuitable/inaccessible patches in the S.F. Boise and Upper Salmon subbasins. These patches were reclassified as unsuitable based on recently acquired data that documented unfavorable existing conditions such as streams with culvert barriers, maximum weekly maximum temperature that exceed 15 °C over most of the available habitat, abundant brook trout populations, and no strong bull trout populations in adjacent streams.

Table 12 - Comparison of bull trout patch strata 2004-2011.

Category	S.F. Boise Subbasin		N.F. and M.F. Boise Subbasin		S.F. Payette Subbasin		Upper Salmon Subbasin	
	# Patches 2004	# Patches 2011	# Patches 2004	# Patches 2011	# Patches 2004	# Patches 2011	# Patches 2004	# Patches 2011
1 – Occupied	11	13	4	4	0	2	6	17
2 – Suitable/Unoccupied	22	7	1	1	4	2	28	7
3 – Unsuitable/Inaccessible	10	22	0	0	0	0	3	28
4 - Unsurveyed	0	0	0	0	0	0	8	0
Total	43	42	5	5	4	4	45	52

Conclusion

A variety of factors influences the distribution of bull trout populations across the Sawtooth NF. As has been reported in the literature, results from our MIS sampling indicate that patch size, stream temperature, patch connectivity, habitat condition, and the occurrence of brook trout can all influence the presence or absence of reproducing bull trout populations. Information collected over the past eight years has better defined bull trout distributions within patches and across each subbasin. At the subbasin scale it appears bull trout local populations have remained stable since 2003 with the exception of the loss of a hybridized population in Crooked Creek. We have also found more occupied patches than previously thought. However, this doesn't imply bull trout have expanded their range. Only that we have confirmed their presence in streams that likely supported them all along. In 2011, bull trout populations continue to occupy Boardman,

Deadwood, Skeleton, Big Boulder, and Germania patches and are absent in Paradise, Bowns, Carrie, Wickiup, Pole, and Iron patches with detection probabilities ranging from of 0.87 to 0.99.

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2011 Sawtooth National Forest Yellowstone Cutthroat Trout – Recommended Aquatic Management Indicator Species - Monitoring Report

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Introduction

In order to evaluate the effects of management practices on fisheries and wildlife resources, the U.S. Forest Service monitors select species whose population trends are believed to reflect the effects of management activities on Forest ecosystems. These species are termed "management indicator species" (MIS) and the rationale for MIS monitoring is outlined in federal regulation 36 CFR 219.19.

> *"In order to estimate the effects of each alternative on fish and wildlife populations, certain vertebrate and/or invertebrate species present in the area shall be identified and selected as management indicator species and the reasons for their selection will be stated. These species shall be selected because their population changes are believed to indicate the effects of management activities."*
>
> *"Population trends of the management indicator species will be monitored and relationships to habitat changes determined."*

An important principal to the MIS foundation is that monitoring results must allow managers to answer questions about population trends. Historically, monitoring of habitat was used as a surrogate for direct quantification of MIS populations. However, court cases (*Sierra Club v. Martin*, 168 F.3d 1 (11th Cir. 1999)) have ruled that assessing changes in habitat will no longer be accepted as a substitute for direct monitoring of populations. The Forest Service has an obligation to collect and analyze quantitative population trend data at both the Forest-plan and project level.

In 2010 Yellowstone cutthroat trout (YCT) (*Oncorhynchus clarkii bouvieri*) was recommended as an aquatic management indicator species. This recommendation was made to better understand the impacts of Forest management activities that had not been completely captured by monitoring our other aquatic MIS species, bull trout that occur on the Fairfield Ranger District and Sawtooth NRA but not on the Minidoka Ranger District. Yellowstone cutthroat met much of the MIS criteria when aquatic species were being selected in 2002. However, they were not selected because at the time we did not know the distribution of hybridized YCT populations. Hybridized fish are also challenging to identify in the field making tracking of population trends difficult. Since this time, all Yellowstone cutthroat populations have been genetically tested and we now know which populations are pure to conduct trend monitoring. The addition of YCT allows the Forest to evaluate the effects of authorized and unauthorized activities on watershed, riparian and stream habitat conditions, and ultimately population status.

Protocol

Monitoring is focused on evaluating patterns of occurrence, abundance, and densities of juvenile (<100 mm) and older (>100mm) YCT. Presence of juvenile YCT is an important indicator that spawning and rearing is occurring within a drainage. These areas represent habitats that are essential for YCT population viability. Other habitats within stream networks may be important for migrating individuals, but tracking fish in these areas is cost prohibitive and time consuming. Key metrics for monitoring trends will be the number of drainages occupied in each subbasin, distribution of YCT within each drainage, and changes in abundance and densities over time.

Methods

Sample allocation – Sample sites were allocated in each YCT drainage on the Sawtooth National Forest (NF). Within each drainage, only suitable habitat will be inventoried. Suitable habitat is defined according to wetted width (greater than 2 meters), stream gradient (less than 20%), and water temperatures (15.5 °C or less).

Sampling unit - The fundamental sampling unit will be a 100 meter length of stream.

Sampling method - Daytime electrofishing was used to capture fish, with a variable number of passes, depending on site conditions. At the majority of sites a minimum of three passes were conducted, unless it was deemed by the crew leader that the site was likely absent of fish due to a downstream barrier or the amount of stream flow at the site. In the aforementioned case, a one pass effort was conducted and if fish were observed, subsequent passes were carried out. If no fish were observed the sampling effort was ended. Block nets were installed at the upper and lower ends of the sites to meet the population estimate modeling assumption that the fish populations were closed.

Sampling occurred during low to moderate flow conditions (i.e., late June to mid-October) to facilitate effective fish capture and standardize sampling conditions. Fish were identified, enumerated, measured to the nearest millimeter (total length, TL), and eventually released. Fish abundance in small streams (i.e., less than about 8 m wide) was determined with depletion electrofishing, using one or more backpack electrofishers with pulsed DC. Habitat variables were also measured to estimate sampling efficiencies. When possible, stream survey locations were chosen as closely as possible to previous Utah Division of Wildlife Resources (UDWR), Idaho Fish and Game (IDFG), or Forest Service survey locations.

Depletion estimates were calculated for sites sampled where bull trout were captured using Microfish 3.0 population parameter calculation software (www.MicroFish.org 2005) (Van Deventer, 1989). In the future once we begin to accumulate enough multiple-pass information, we plan to analyze the relationship between first pass catches and population estimates from three-pass removals.

Sampling sites

Sample sites within each sampled watershed were created in one of two ways. If historical sites were monumented within a watershed by IDFG or UDWR we tried to navigate as closely as we could to the previous sites using UTM coordinates and photos. Most of the points were created within ARCGIS using the Create Random points tool.

Create Random Points in ARCGIS randomly places a specified number of points within an identified area. The identified area can be either a given extent or within a polygon or multiple polygons.

Conceptually, Create Random Points places the points as described here. Regardless of how the area is specified within which to place the points, a random number stream is created from a random number generator and seed. The random number generator creates a stream of numbers between 0 and 1. With the extent option, a random point on the x-axis and another on the y-axis of the extent are identified, which become the x and y for a point that is placed within the extent. To randomly select the point on the x-axis, the next unused value on the random number stream is

selected and transformed into a Uniform distribution with a Minimum and Maximum being the minimum and maximum for the x extent. The same is done for the y-axis. The two values identify the first random point. This process is repeated until the specified number of points is reached.

If these randomly created sites resided above a known barrier or on a creek with insufficient flow to support fish they were deleted.

Each of these sites was monumented by placing metal tags at the beginning of the reach and GPS coordinates were recorded. Several photo points (beginning, middle, and end of transect) were also established. Each monumented site will be resampled either annually in our sentinel patches or every 3 to 5 years.

Sampling schedule - From 2010-2018 all sites within each YCT drainages will be sampled twice.

Table 1 - Yellowstone cutthroat streams on the Sawtooth NF by subbasin.

Subbasin	Stream	YCT Confirmed	Last Year Sampled
Goose Creek	Trout Creek	Unknown	2010
	Goose Creek	Yes	2006
	Big Cottonwood Creek	Yes	2007
Middle Snake	Dry Creek	Yes	2006
Raft River	Almo Creek	Yes	2011
	Edwards Creek	Yes	2011
	Grape Creek	Yes	2007
	Upper Cassia Creek	Yes	2006
	Dry Creek	Yes	2011
	Clyde Creek	Yes	2001
	Cottonwood Creek	Yes	2011
	Sixmile	Yes	2009
	Eightmile	Yes	2005
	Sublett Creek	Unknown	Unknown
	Lake Fork Creek	Unknown	Unknown
	N.F. Sublett Creek	Unknown	Unknown
	S.F. Sublett Creek	Unknown	Unknown
	Wildcat Creek	Yes	2011
	Johnson Creek	Yes	2006
	George Creek	Yes	2008
	Onemile - Sawmill Canyon	Yes	2011
	Clear Creek	Yes	2008

PIBO Monitoring Sites - To evaluate trends in habitat and watershed condition, the Sawtooth NF has worked with the PACFISH/INFISH Biological Opinion (PIBO) monitoring program located in Logan, Utah. This monitoring approach evaluates the trend of select Watershed Condition Indicators (WCIs) across subwatersheds where PIBO integrator reaches have been established. An integrator reach is the lowest stream reach within the subwatershed that has greater than 50% federal ownership upstream of the sample reach, contains no tributary junctions or beaver activity, and has a stream gradient less than 3%. It is assumed that integrator reaches will be responsive to management activities that occurred upstream or around the reach. Each integrator reach has been sampled during one of the first five years (2001 to 2005), and will be resampled on a five-year rotation after 2006.

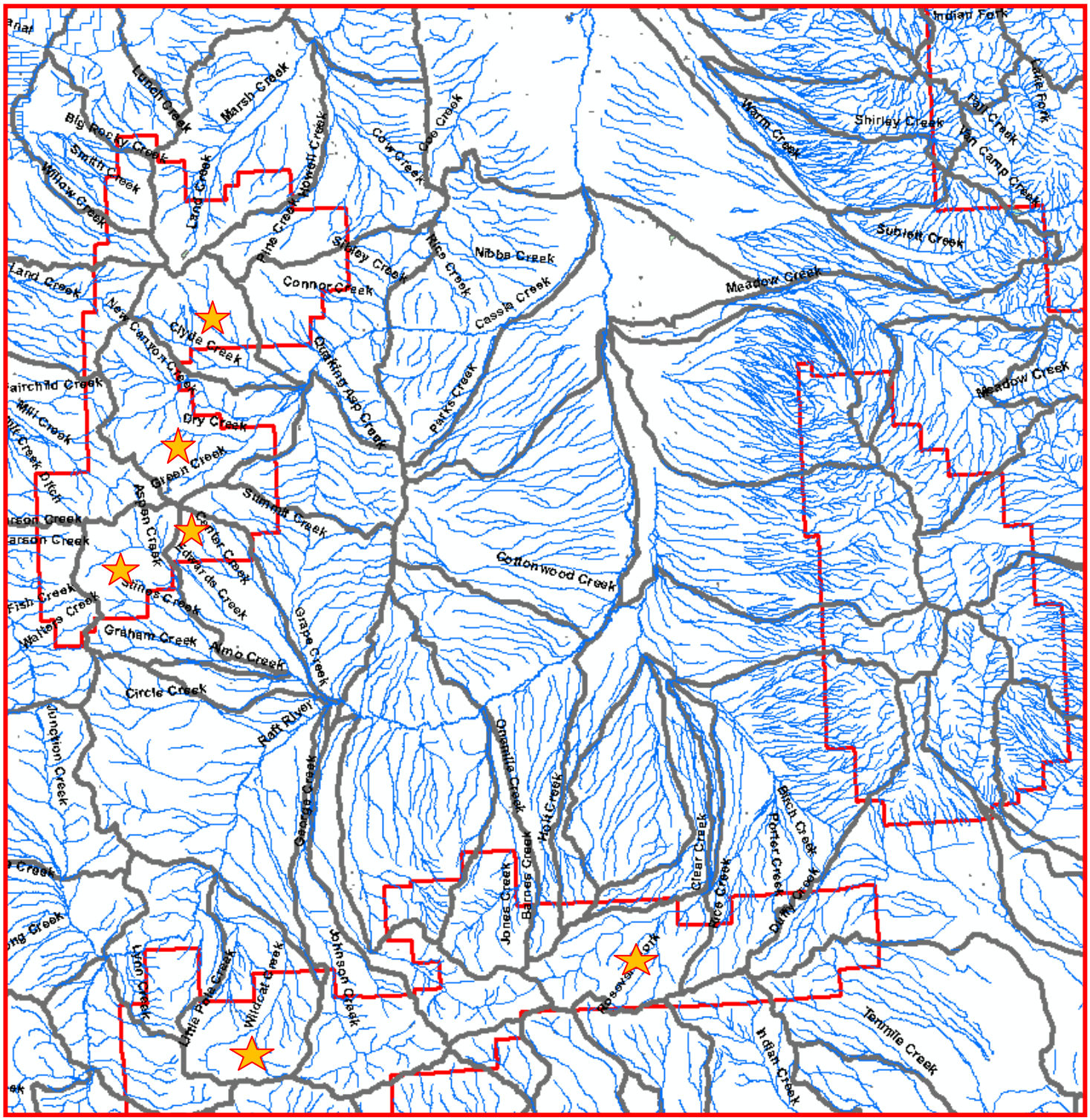
To evaluate select WCIs, an integrity index of physical habitat indicators was used. Physical stream habitat and landscape data from reference reaches were used to develop an index of physical habitat condition. PIBO identified candidate attributes from the 17 total attributes collected at PIBO sample sites using a three-step sequence. First, PIBO selected those physical habitat attributes that exhibited relatively low sampling variation based on reaches repeat-sampled within a year, which enabled empirical estimates of signal/noise (Kaufmann 1999). Next, PIBO tested whether attributes with low sampling variation were responsive to management actions. As such, PIBO evaluated the responsiveness of each attribute to management activities by comparing the means of each candidate attribute from reference reaches and managed reaches. Finally, PIBO minimized redundancy of those attributes that met the specific criteria in the first two steps to avoid over-weighting certain components of the physical instream habitat represented in the overall index. Here, PIBO calculated Pearson correlation coefficients for all remaining candidate attributes and considered attributes redundant if correlation coefficients exceeded 0.70.

Once attributes were selected, PIBO used the Forests reference sites to construct the index. Specifically, PIBO incorporated landscape and climatic covariates into multiple linear regression analyses to control for inherent differences in physical habitat attributes among reaches. PIBO used the residuals from these analyses to score individual attributes and summed the 7 attributes (i.e. d50, average bank angle, the percent of fine sediment in pool tails, the frequency of large woody debris (pieces/km), the volume of LWD, the percent of pool habitat, and the average residual pool depth) retained in the index for an overall index of abiotic condition (range = 0-100). PIBO incorporated the data from managed sites (both landscape and field data) into the regression models used to develop the index (from reference sites) to calculate and score the residuals and overall index for managed sites (again ranging from 0-100).

2011 Results and Discussion

Monitoring for YCT on the Sawtooth NF occurred in 6 drainages in 2011 (Figure 1). YCT were observed in Cottonwood, Dry, Edwards, Almo, and Onemile/Sawmill Canyon Creeks.. Discussion of changes in YCT distribution within a patch or abundance is discussed below for each drainage.

Figure 1 – Yellowstone cutthroat trout stream surveyed on the Sawtooth NF in 2011.



Streams Where Yellowstone Trout Were Detected

Almo Creek – YCT continue to be well distributed (Figure 2) occupying approximately 3.5 miles of habitat on National Forest administered lands. However, this represents just a small portion of the historic habitat in this drainage. Water diversions just upstream of the Forest boundary have seasonally dewatered the lower 4.2 miles of habitat to the confluence of Lone Rock Creek. A total of 85 YCT were captured at the 5 electrofishing transects. Abundance estimates ranged from 5-18 for fish >100mm and 3-16 <100mm (Table 1), with the highest estimates observed just 0.37 miles above the Almo Creek diversion headgate. Fish densities were also highest in this area. YCT ranged from 74mm to 251mm total length. Findings from the 2011 survey are consistent with abundance and density estimates for fish >100mm when compared to the 2005 Forest Service surveys (Table 2). However, far more juvenile YCT were observed in 2011 than in 2005.

Figure 2 – YCT distribution in Almo Creek as indicated by green lines and points.

Stream temperatures measured in the headwaters of Almo Creek at the PIBO integrator site in 2005 and 2010 averaged 12.9 to 13.5°C with MWMT ranging from 20.5 to 21.8°C (Table 3). MWMT may be higher and not reflective of temperatures lower in the drainage as a portion of the PIBO site is in an open meadow (Figure 3) and more exposed to solar radiation than reaches further downstream. Still the warm water temperatures are of concern since they are much higher than optimum water temperatures of 15.5 ºC for YCT (Gresswell and Varley 1989). An annual thermograph was installed in 2011 above the Almo water diversion. Data will be retrieved annually to evaluate temperature trends.

Figure 3 – PIBO monitoring sites in the headwaters of Almo Creek in 2010

In general, stream habitat is considered in good condition across the drainage. Although cattle grazing in headwater areas near the PIBO site and a few accessible areas downstream have resulted in localized bank instability and channel widening. This may result in elevated fine sediment in stream habitat downstream. At the PIBO site, pool frequency and percent pools decreased slightly and residual pool depth, and D50 (diameter of the 50th percentile streambed particle) remained the same between 2005 and

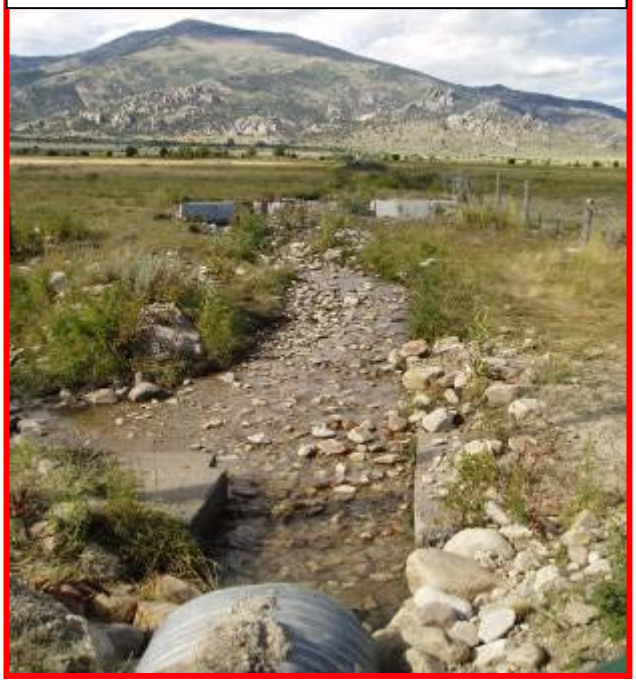
2010. However, the percent fines, bank angle, bank stability, and woody debris demonstrated an upward trend (Table 4). Based on the photo interpretation (Figures 4 and 5), changes appear to be from less intensive cattle grazing, resulting in greater streambank stability and a lower percent of fine sediment and higher baseflows that transported finer sediments downstream.

Figure 4 – Riparian and channel conditions in PIBO site in 2005

Figure 5 – Riparian and channel conditions in PIBO site in 2010

The PIBO integrator site had a habitat index score from 2005 survey of 34.2 and in 2010 34.9 indicating poorer habitat conditions within this site compared to reference streams. PIBO concluded that habitat in good condition had scores 70 and above, habitat in a moderate condition averaged a 40-70 score, and habitat in poor condition averaged less than a 40 score for streams within the Southwest Idaho Ecogroup. However, there is some uncertainty about the Almo Creek index scores because some habitat indicators may be outside of the range used to develop the index.

Figure 6 – Almo Creek on private property



PIBO also collects data on macroinvertebrates at the integrator site and has developed a macroinvertebrate index. This index looks at the ratio of observed-to-expected taxa richness, O/E, where E is the sum of predicted occurrence probabilities across the taxa covered by the River Invertebrate Prediction and Classification System (RIVPACS) model, and O is the number of those taxa that occurred in the observed assemblage (Clarke et al. 1996, Parsons and Norris 1996, Hawkins et al. 2000). The ratio of the number of taxa observed at each monitored test site that were expected to occur to the number of taxa expected (O/E ratio) is used as a measure of biological impairment. Values can range from 1 (no difference between observed and expected) to 0 (none of the expected taxa were observed). For sites that deviate further and further (e.g., 0.90, 0.85….) from this value of 1.00, there is more and more evidence that these sites are degraded (temperature, fines, etc.). The O/E score for Almo Creek in 2005

was 0.93 indicating this site supports relatively good macroinvertebrate taxa and habitat conditions they depend on.

Habitat conditions below the Almo water diversion are considered poor because the entire stream is dewatered numerous times throughout each summer. There are also no fish screens on the diversion headgate and an unknown number of YCT are likely stranded in the dewatered habitat each summer. The stream eventually gets divided into a number of low flow channels into irrigated pastures on private property (Figure 6).

Table 1 – 2011 Yellowstone cutthroat trout densities and population estimates in Almo Creek

Transect (rivermile)	#of Passes	Transect Length (m)	Species	# Caught	Total Length (mm)		Density >100mm (fish/100m^2)	Density <100mm (fish/100m^2)	Pop Estimates (>100 mm)	Pop Estimates (<100 mm)
					Mean	Range				
17.12	3	90	Yellowstone Cutthroat Trout	23	117	74-220	2.43	3.79	9	16
17.41	3	100	Yellowstone Cutthroat Trout	28	132	65-190	5.00	3.24	18	11
18.12	3	98	Yellowstone Cutthroat Trout	11	123	64-226	1.24	1.49	5	6
18.36	3	94	Yellowstone Cutthroat Trout	15	147	67-209	2.61	0.65	12	3
21.26	1	98	Yellowstone Cutthroat Trout	8	150	86-251	4.08	1.36	--	--

Table 2 – 2005 Yellowstone cutthroat trout densities and population estimates in Almo Creek

Transect (rivermile)	# of Passes	Transect Length (m)	Species	# Caught	Total Length (mm)		Density >100mm (fish/100m^2)	Density <100mm (fish/100m^2)	Pop Estimates (>100 mm)	Pop Estimates (<100 mm)
					Mean	Range				
17.12	1	50	Yellowstone Cutthroat Trout	4	141	106-202	3.48	0	4	0
17.82	3	50	Yellowstone Cutthroat Trout	24	130	35-250	16.80	2.40	24	3
17.98	2	50	Yellowstone Cutthroat Trout	8	147	125-226	4.85	0	8	0
18.12	1	50	Yellowstone Cutthroat Trout	29	125	116-132	5.59	1.12	10	19
18.36	2	50	Yellowstone Cutthroat Trout	1	241	--	1.00	0	1	0

Table 3 – Water temperatures monitored in Almo Creek at the PIBO site

Site ID	Stream	Year	Elev.	Temp Days	WMT Days	Start Date	End Date	Avg Temp	MDMT	MWMT
1503	Almo	2005	2373.8	48	42	7/15/05	8/31/05	13.46	22.90	21.81
1503	Almo	2010	2373.8	48	42	7/15/10	8/31/10	12.88	21.80	20.46

Table 4 – Select habitat variables in Almo Creek at the PIBO site

Year	Pooldp	PoolPct	PoolFrq	D50	PlFn6	BnkAngl	Stab	LWfreq	LWvol
2005	0.15	37.85	145.35	0.062	29.34	122	78.57	162.8	18.19
2010	0.15	29.06	127.07	0.03	7.9	137	93.18	209.9	42.49

Edwards Creek – YCT occupy only approximately 1.5 miles of this drainage between headwater waterfall barriers and irrigated pasture lands on private property (Figure 7). Only about 0.25 miles of this habitat occurs within the National Forest boundary. This occupied habitat represents a small portion of the historic habitat in this drainage which once connected with the Raft River many miles downstream. This small population is further fragmented by a stream ford that creates a year round fish barrier just below the National Forest boundary (Figure 8). Fish can move downstream, but then can't move back into cooler headwater habitat. A total of 24 YCT were captured at 2 electrofishing transects. Abundance estimates ranged from 4-9 for fish >100mm and 0-12 <100mm (Table 5), with the highest abundance estimates and densities observed just below the National Forest boundary. YCT ranged from 70mm to 200mm total length. Three additional 100m transects were surveyed in 2011. One occurred below the main road crossing (12T 283144 4666620), while the other two occurred on National Forest administered lands. No YCT were observed at any of these transects. The lower most transect had almost no water and is channelized between irrigated cropland. The upper two sites (12T 279885 4670674 and 280014 4670992) have good flows and habitat, but occur above natural fish barriers.

Figure 7 – YCT distribution in Almo Creek as indicated by green lines and points.

Observations at the lowest most transect on private property, are consistent with 2001 IDFG and 2005 IDEQ surveys in which no fish were observed due to low flow or dry conditions. IDFG also surveyed a location (12T 0280895 east and 4669171 north) in 2001 within 0.08miles of transect 8.7 (IDFG 2004). Both surveys captured 15 YCT and abundance estimates were similar for both size classes. However, density estimates were higher in 2001 because more fish were captured in a shorter transect.

Spot stream temperatures measured by IDFG in 2001 and IDEQ in 2005 on private property were 16°C and 12°C respectively. An annual thermograph was installed in 2011 at transect 10.07. Data will be retrieved annually to evaluate temperature trends.

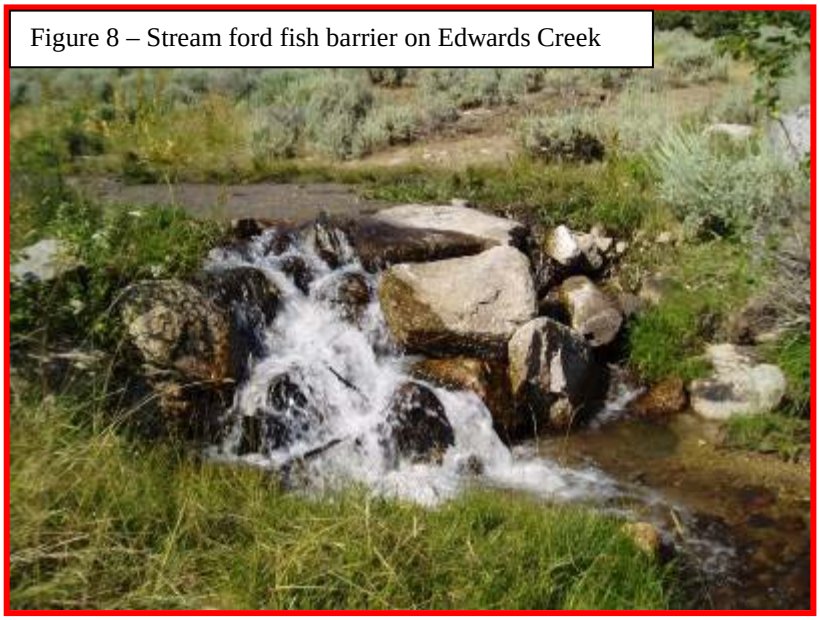


Figure 8 – Stream ford fish barrier on Edwards Creek

In general, habitat is considered in good condition upstream of the stream ford. The riparian area within the National Forest boundary is no longer grazed and there is very little use other than a few unauthorized ATV trails in the headwaters. Stream Habitat downstream of private property is influenced by several water withdrawals, grazing, and hay pastures and is considered in moderate to poor condition.

Table 5 – 2011 Yellowstone trout densities and population estimates in Edwards Creek

Transect (rivermile)	Number of Passes	Transect Length (m)	Species	Number Caught	Total Length (mm)		Density >100mm (fish/100m^2)	Density <100mm (fish/100m^2)	Pop Estimates (>100 mm)	Pop Estimates (<100 mm)
					Mean	Range				
5.8	3	168	--	0	--	--	--	--	--	--
8.7	3	89	Yellowstone Cutthroat Trout	9	119	109-136	6.74	0.00	9	0
IDFG (2001)	2	74.4	Yellowstone Cutthroat Trout	15	89	80-115	7.55	15.1	5	10
10.07	3	95	Yellowstone Cutthroat Trout	15	104	70-200	2.63	7.24	4	12
10.66	3	79	--	0	--	--	--	--	--	--
10.97	1	80	--	0	--	--	--	--	--	--

Onemile Creek and Sawmill Canyon – YCT occupy approximately 2.3 miles in Onemile Creek from an irrigation pond on private property to the Onemile spur road A crossing (Figure 9). A total of 17 YCT were captured at 2 electrofishing transects and abundance estimates were 5 for fish >100mm and 14 <100mm (Table 6) just below the Onemile bridge crossing. YCT total length averaged 84mm (52-200). One additional transect was surveyed in 2011 just above the spur road A crossing, but no fish were detected. Extrapolating 2011 abundance estimates for age-1 YCT into fish/mile estimates 80 fish/mile.

Onemile Creek had been sampled once in 1975 by Utah Division of Wildlife Resources (UDWR) and YCT were detected. Abundance of YCT > one year old was estimated to be 40 fish/mile and average total length was 141mm (105-203). Extensive surveys were completed by UDWR in 2001 to determine the extent of YCT. Onemile Creek upstream from the confluence with Sawmill

Fork was visually examined on August 23, 2001 at four sites: 0296559E 4646734N, 0296841E 4647840N, 0297543E 4648317N, and 0297903E 4648683N. Onemile Creek was not electrofished, however, due to insufficient flows upstream of the Sawmill Canyon confluence and lack of access on private property. UDWR again electrofished Onemile Creek on June 13, 2006 just downstream of the Onemile bridge crossing. A three pass electrofishing survey resulted in the capture of 19 >age-1 YCT (Avg TL 101mm {56-218}) an estimated 306 yct/mile. It appears average size has decreased from the 1975 survey deviating from 141mm to 84mm in 2011. However, estimated fish/mile is highly variable (40 to 306) in each year sampled.

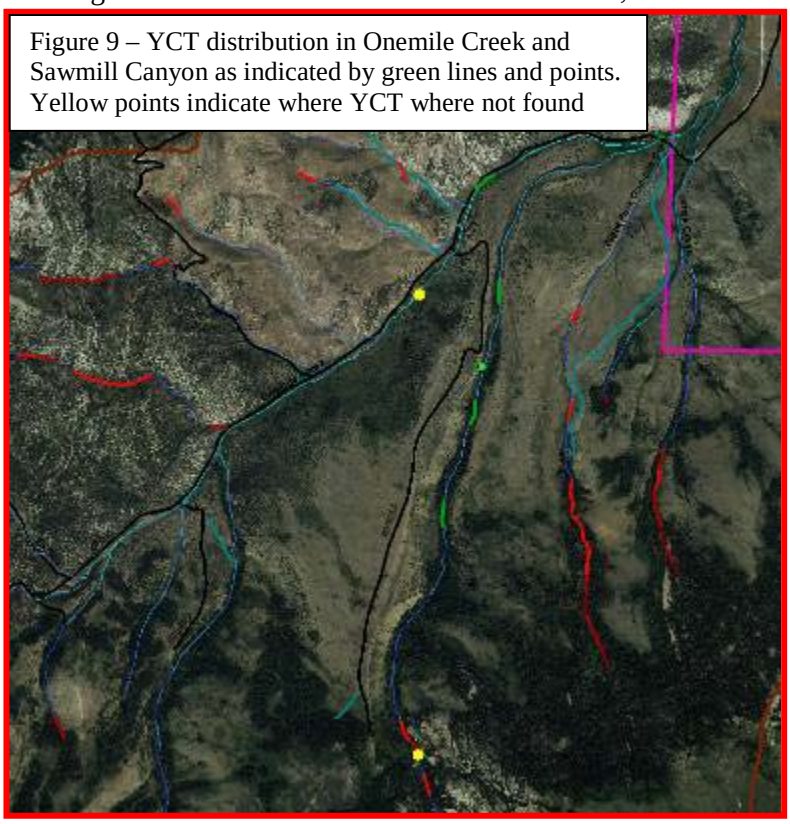


Figure 9 – YCT distribution in Onemile Creek and Sawmill Canyon as indicated by green lines and points. Yellow points indicate where YCT where not found

YCT are believed to occupy approximately 2.1 miles in Sawmill Canyon (Figure 9). A total of 42 YCT were detected in 3 transects in Sawmill Canyon. Abundance estimates ranged from 5-12 for fish >100mm and 1-12 <100mm (Table 6), with the highest abundance and densities observed 0.75 miles above the National Forest boundary. YCT averaged 154mm and ranged from55mm to 420mm total length. One additional transect (12T 297653 4646340) was surveyed in 2011 in the headwaters above several high gradient (>15%) stream reaches, but no fish were detected. Converting 2011 abundance estimates for age-1 YCT into fish/mile estimates80-192 fish/mile.

UDWR electrofished a 100m transect in Sawmill Canyon on August 23, 2001 (UDWR 2001). This transect was located approximately 0.11 miles downstream of 2011 transect 1.83 (12T 298040 and 4648083). Two-pass electrofishing resulted in the capture of 32 age-1 and older YCT (370/mile) and 20 age-0 YCT. More age-0 YCT were caught on the second electrofishing pass;, a population estimate was not available for this age group. No other fish species were observed.

The 2001 stream survey was replicated on June 13, 2006 (UDWR 2006). The three-pass electrofishing resulted in the capture of 12 > age-1 YCT (193/mile and Avg TL 101mm {54-150}). Based on these two collection efforts for Sawmill Canyon, UDWR concluded that the YCT population had decreased. This may be accurate between 2001 and 2006. However, fish/mile estimates, at least in the lower portions of Sawmill Canyon, appear to have remained stable from 2006 to 2011.

Preliminary genetic results have been completed on the Yellowstone cutthroat trout in Sawmill Fork. Nuclear DNA indicates that the YCT in Sawmill Fork do not have any rainbow trout influence. The UDWR has no stocking records for Onemile Creek; consequently, the Yellowstone cutthroat trout in Onemile Creek/Sawmill Canyon are likely 100% pure.

Table 6 – 2011 Yellowstone cutthroat trout densities and population estimates in Sawmill and Onemile Creek

Transect (rivermile)	Number of Passes	Transect Length (m)	Species	Number Caught	Total Length (mm)		Density >100mm (fish/100m^2)	Density <100mm (fish/100m^2)	Pop Estimates (>100 mm)	Pop Estimates (<100 mm)
					Mean	Range				
Sawmill Canyon Creek										
1.26	3	104	Yellowstone Cutthroat Trout	22	143	55-231	6.07	5.06	12	12
1.83	3	97	Yellowstone Cutthroat Trout	14	170	90-420	2.95	2.21	8	6
2.34	3	96	Yellowstone Cutthroat Trout	6	150	121-167	2.17	0.43	5	1
3.68	3	71	--	0	--	--	--			--
Onemile Creek										
11.93	3	106	Yellowstone Cutthroat Trout	16	85	52-200	1.81	4.00	5	14
12.93	3	111	Yellowstone Cutthroat Trout	1	82	--	0.60	0.00		--
13.61	3	123		0	--	--	--			--

Stream temperatures taken at the PIBO integrator site in 2009 averaged 11.87°C with MWMT of 16.8°C (Table 7). Spot measurements taken during the 2011 surveys found stream temperatures of 6-7°C in Sawmill Canyon and 11°C in Onemile in late June. IDFG in 2001 recorded spot temperatures of 12 °C in late September. An annual thermograph was deployed in 2011 in Sawmill Canyon. Data will be retrieved annually to evaluate temperature trends.

Figure 10 – Headcuts and potential fish barriers in Onemile Creek (12T 4648775 297732)

Habitat conditions in Onemile Creek are believed to be fair to poor. Fish habitat on National Forest lands has always been limited by a lack of summer flow above the Sawmill Canyon confluence. Most flow above the confluence comes from a tributary feed by springs 0.97 miles above the spur road A crossing. However, water depth is marginal until an additional spring adds flow just above the spur road crossing. Seasonal use by YCT may occur above the spur road crossing, but a series of headcuts likely create fish barriers to stream habitat above (Figure 10).

Conditions along Onemile Creek also continue to be impacted by cattle grazing and dispersed camping. These activities have impacted riparian vegetation, caused increased streambank erosion and compacted riparian soils (Figure 11) in specific areas.

Figure 11 – Dispered recreation and grazing impacts in Onemile Creek in Sept. 2011

Headcuts are a result of lingering effects from an intense thunderstorm in 2004 that caused debris flows from a prescribed burn the previous year and continued impacts from cattle grazing. A prescribed burn on 1,250 acres on Bally Mountain was implemented in the fall of 2003 to reduce fuel build-up of Juniper. As a result of unexpected weather conditions, south facing slopes burned more intensely than anticipated and did not meet prescription. The fire in some locations caused soils to become hydrophobic (water repellant). All vegetation, primarily juniper, along ephemeral stream channels was burned.

A high intensity thunderstorm occurred over the project area on July 19, 2004 (downstream landowners recorded a rainfall level of 7” in one hour). The lack of overstory and consumption of soil organic material resulting from the burn project, compounded by inherently shallow, highly erosive soils, led to significant erosion on the south facing slopes. The burn caused a more heightened response to the thunderstorm resulting in a debris flows that overtopped stream banks and scoured most ephemeral channels to bedrock. The storm surge affected approximately 1.5 miles of Onemile Creek on National Forest lands (Figure 12) and 4 miles downstream. Effects included toppled riparian vegetation, channel downcutting up to 6 feet and sections of the channel being buried from bedload aggradation. Sediment could be seen downstream as far as county roads in Township 26 East, Range 16 South, Sections 28 and 21.

Figure 12 – Bedload deposition from debris flow in Onemile Creek in 2004

Within the PIBO site percent fines in pool tailouts increased, bank stability decreased, pool and woody debris frequency improved, and residual pool depth, woody debris volume, and D50 (diameter of the 50th percentile streambed particle) remained the same between 2004 and 2009 (Table 8). Based on the photo interpretation (Figures 13 and 14) the 2004 data was collected just after sediment laden runoff occurred from the prescribed burn, but before the larger debris flows occurred in July. It is surprising that sediment in pool tailouts increased in 2009 since turbidity and ash deposits were high during the 2004 sampling. However, increased sediment and stream bank instability in 2009 may be the result of continued channel adjustments and localized impacts from cattle grazing. The good news is that it appears residual pool depth has recovered to pre-debris flow conditions.

Figure 13 – PIBO site in 6/21/2004

Figure 14 – PIBO site in 6/10/2009

The PIBO integrator site had a habitat index score from the 2004 survey of 5.51 and in 2009 1.90 indicating poorer habitat conditions within this site compared to reference streams. However, there is some uncertainty about the Onemile Creek scores because some habitat features may be outside of the range used to develop the index.

PIBO also collects data on macroinvertebrates at the integrator site and has developed a macroinvertebrate index. Values can range from 1 (no difference between observed and expected) to 0 (none of the expected taxa were observed). For sites that deviate further and further (e.g., 0.90, 0.85….) from this value of 1.00, there is more and more evidence that these sites are degraded (temperature, fines, etc.). The O/E score for Onemile Creek in 2009 was 0.47 indicating that macroinvertebrate taxa and habitat conditions at this site are departed from what is expected to be present.

Figure 15 – Localized area impacted by cattle grazing in Sawmill Canyon in September 2011.

Very little information is available on habitat in Sawmill Canyon. Visual observations show that much of the riparian area is well vegetated with mature willows and conifers, streambanks are stable, and there is an abundance of instream cover. However, areas where cattle linger have impacted streambanks and riparian vegetation, and widen the channel in localized areas lower in the drainage (Figure 15). Habitat conditions on private property are unknown. But are considered to be impaired in locations where riparian vegetation has been removed and the stream channelized for agriculture and pasture production.

Table 7 – Water temperatures monitored in Onemile Creek at the PIBO site

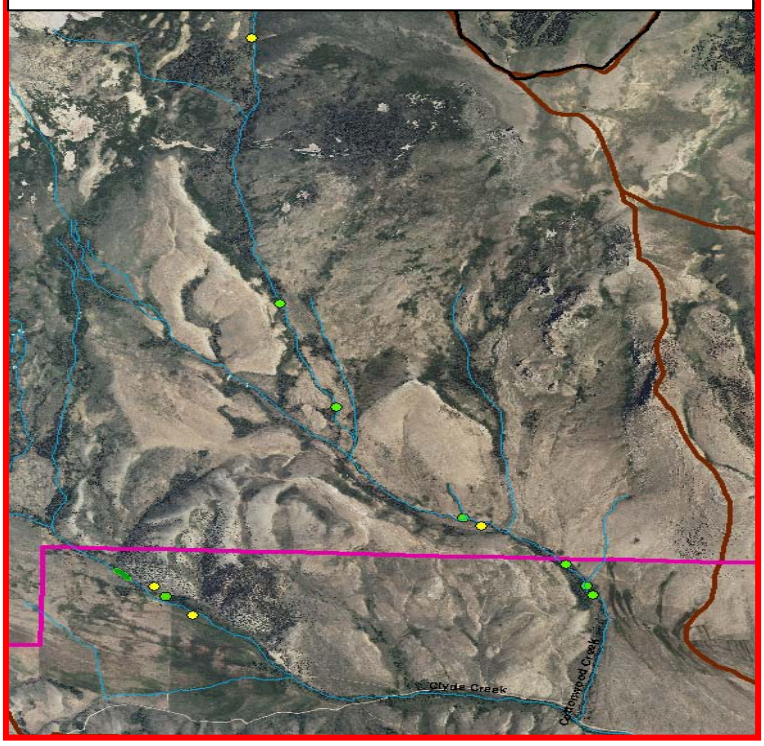
Site ID	Stream	Year	Elev.	Temp Days	WMT Days	Start Date	End Date	Avg Temp	MDMT	MWMT
1169	Onemile	2009	1877.3	39	33	7/15/09	8/31/09	11.87	17.4	16.8

Table 8 – Select habitat variables in Onemile Creek at the PIBO site

Year	Pooldp	PoolPct	PoolFrq	D50	PlFn6	BnkAngl	Stab	LWfreq	LWvol
2004	0.14	15.28	25.13	0.018	19.67	127	98	15.1	0.58
2009	0.13	11.46	57.28	0.018	38.85	115	84.62	23.9	0.56

Cottonwood Creek – YCT are well distributed (Figure 16) occupying approximately 2.6 miles of habitat on National Forest administered lands and 3.7 miles within this drainage. A total of 66 YCT were captured at four 100m electrofishing transects by IDFG and IDEQ in late September and early October of 2011. Abundance estimates ranged from 1-14 for fish >100mm and 6-41 <100mm (Table xx), with the highest estimates observed just 2.2 miles above the Clyde Creek confluence. YCT ranged from 62mm to 118mm total length. Brook trout were also widely distributed occupying habitat well into the headwaters. A total of 86 brook trout were captured. Abundance estimates ranged from 4-35 for fish >100mm and 0-7 <100mm (Table 9), with the highest estimates observed in headwater transects. IDFG in 2001 surveyed two transects in Cottonwood Creek finding brook trout and YCT in one of them just above the Forest Service boundary (IDFG 2004). Density and abundance estimated in 2001 were much higher than those in 2011. However, capture efficiency could have been higher in the earlier survey.

Figure 16 - YCT distribution in Cottonwood Cr. as indicated by green points. Yellow points indicate where YCT where detected.



Stream habitat is considered in good condition over most of the drainage; however cattle impacts increase lower in the drainage resulting in localized bank erosion, widening, and loss of younger woody species (Figure 17). Habitat on private property is considered in moderate condition because part of the stream is diverted in order to irrigate pastures in the summer. There are no fish

screens on the diversion headgate and an unknown number of fish are likely stranded within ditchlines.

Figure 17 – Localized cattle impacts in lower Cottonwood Creek October 2011.

Stream temperatures have been collected at the PIBO integrator site located 0.11 miles above the Forest boundary in 2004 and 2009 averaged 14.7 to 14.6°C with MWMT ranging from 19.9 to 20.9°C (Table 10).

Within the PIBO site residual pool volume, pool frequency and percent, streambank stability, woody debris frequency and volume all increased between 2004 and 2009. Bank angle, D50 (diameter of the 50th percentile streambed particle), and percent fines in pool tailouts remained the same (Table 11). Based on the photo interpretation, changes appear to be from more woody debris from mature cottonwood and willows resulting in more pools.

The PIBO integrator site had a habitat index score from the 2004 survey of 47.56 and in 2009 63.09 indicating moderate habitat conditions within this site compared to reference streams. However, there is some uncertainty about these scores because some habitat features may be outside of the range used to develop the index.

PIBO also collects data on macroinvertebrates at the integrator site and has developed a macroinvertebrate index. Values can range from 1 (no difference between observed and expected) to 0 (none of the expected taxa were observed). For sites that deviate further and further (e.g., 0.90, 0.85….) from this value of 1.00, there is more and more evidence that these sites are degraded (temperature, fines, etc.). The O/E score for Cottonwood Creek in 2004 was 0.61 indicating that macroinvertebrate taxa and habitat conditions at this site are departed from what is expected to be present.

Table 9 – Yellowstone cutthroat trout densities and population estimates in Cottonwood Creek

Transect	# of Passes	Transect Length (m)	Species	# Caught	Total Length (mm)		Density >100mm (fish/100m^2)	Density <100mm (fish/100m^2)	Pop Estimates (>100 mm)	Pop Estimates (<100 mm)
					Mean	Range				
CW-2 (2011)	2	100	Yellowstone Cutthroat Trout	12	62	40-120	0.33	3.66	1	11
			Brook Trout	13	95	85-105	2.00	2.33	7	7
Lower Cottonwood	3	100	Yellowstone Cutthroat	39	112	79-192	8.98	5.56	24	15

(2001)			Trout							
			Brook Trout	62	88	42-250	7.82	24.59	21	66
CW-3 (2011)	2	100	Yellowstone Cutthroat Trout	29	71	50-130	0.94	12.68	2	41
			Brook Trout	4	185	160-240	2.35	0	4	0
CW-5 (2011)	3	100	Yellowstone Cutthroat Trout	17	110	50-160	3.74	1.56	14	6
			Brook Trout	33	166	70-260	9.35	0.94	30	3
CW-6 (2011)	4	100	Yellowstone Cutthroat Trout	18	118	60-170	5.00	2.92	11	7
			Brook Trout	36	143	80-250	12.08	2.92	35	7

Table 10 – Select habitat variables in Cottonwood Creek at the PIBO site

SiteID	Year	Pooldp	PoolPct	PoolFrq	D50	PlFn6	BnkAngl	Stab	LWfreq	LWvol
1166	2004	0.24	16.05	30.86	0.046	28.46	112	90.91	166.7	8.22
1166	2009	0.32	25.6	47.09	0.062	23.57	110	100	306.1	17.36

Table 11 – Water temperatures monitored in Cottonwood Creek at the PIBO site

Site ID	Stream	Year	Elev.	Temp Days	WMT Days	Start Date	End Date	Avg Temp	MDMT	MWMT
1166	Cottonwood	2004	1775.7	48	42	7/15/04	8/31/04	14.7	20.9	19.47
1166	Cottonwood	2009	1775.7	48	42	7/15/09	8/31/09	14.62	19.9	19.11

Dry Creek - YCT are well distributed (Figure 18) occupying approximately 2.6 miles of habitat on National Forest administered lands and 3.5 miles within this drainage. A total of 27 YCT were captured at two 100m electrofishing transects by IDFG and IDEQ in late September 2011. Abundance estimates ranged from 1-43 for fish >100mm and 3-14 <100mm (Table 12), with the highest estimates observed in the upper most transect. YCT ranged from 72mm to 126mm total length. Brook trout were also widely distributed occupying habitat well into the headwaters. A total of 82 brook trout were captured. Abundance estimates ranged from 18-28 for fish >100mm and 20-35 <100mm (Table 9), with the highest estimates observed in the upper most transect. IDFG in 2001 surveyed two transects in Dry Creek, observing a large number of brook trout (11at the first and 23 at second transect) and just one YCT at each transect. Abundance estimates were not calculated due to poor electrofishing efficiencies due to the large size of the stream.

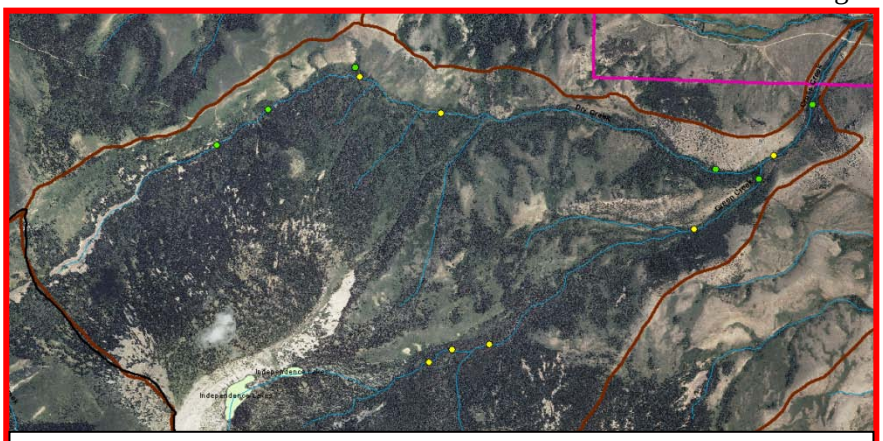


Figure 18 – Electrofishing sites in Dry and Green Creeks. Green dots indicate where YCT were detected in IDFG/IDEQ 2011 or IDFG 2001 surveys. Yellow dots indicate where no YCT were detected.

Spot measurements taken during the 2011 surveys found stream temperatures of 13°C in late September. IDFG in 2001 recorded spot temperatures of 11°C in late June. Stream habitat is considered in good condition over most of the drainage because streambanks are well armored by large cobble and boulder substrate. However, cattle have caused localized sediment sources through streamside trailing and crossings and have impacted some streamside springs and seeps (Figure 19). Habitat on private property is in moderate to poor condition because a large portion of the stream is diverted to irrigated pastures in the summer. There are no fish screens on the diversion headgate and an unknown number of fish are likely stranded within ditchlines.

Figure 19 – Stream conditions in a portion of Dry Creek October 2011

Table 12 – 2011 Yellowstone cutthroat trout densities and population estimates in Dry Creek

Transect	Number of Passes	Transect Length (m)	Species	Number Caught	Total Length (mm)		Density >100mm (fish/100m^2)	Density <100mm (fish/100m^2)	Pop Estimates (>100 mm)	Pop Estimates (<100 mm)
					Mean	Range				
DC-4	2	100	Yellowstone Cutthroat Trout	4	72	51-131	0.27	0.80	1	3
			Brook Trout	36	140	76-214	4.53	5.07	18	20
DC-5	4	100	Yellowstone Cutthroat Trout	23	126	65-220	4.22	1.33	43	14
			Brook Trout	46	125	80-230	5.56	4.22	28	35

Streams Where Yellowstone Trout Were Not Detected

Yellowstone cutthroat trout were not detected in Wildcat and Green Creeks. Sampling results and potential reasons YCT have not been found are discussed in detail below.

Wildcat Creek – Despite seven 100m electrofishing transects, no YCT were detected in Wildcat Creek in 2011 (Figure 20). This is surprising since UDWR captured 4 age-1 and older YCT in a two-pass 96m electrofishing site (12T 282906 4642075) and 32 YCT in a 400m spot shocking transect on August 23, 2001 (UDWR 2001). However, UDWR electrofished two additional sites (12T 0284619 and 4645826 and 0284287 and 4643906) on June 13, 2001 and did not detect any fish. This suggests that YCT distribution may have been extremely limited at this time within this drainage.

The Prospect fire burned approximately 925 acres in 2002 including the entire portion of Wildcat Creek occupied by YCT during the 2001 surveys. Spot electrofishing by UDWR during 2003 verified that YCT still persisted in the burned reach, though the area was virtually devoid of riparian vegetation and stream substrate consisted of large of silt. The 2001 stream survey was replicated on June 13, 2006. Two-pass electrofishing resulted in the capture of 12 >age-1 YCT with a 197mm Avg TL (109-235).

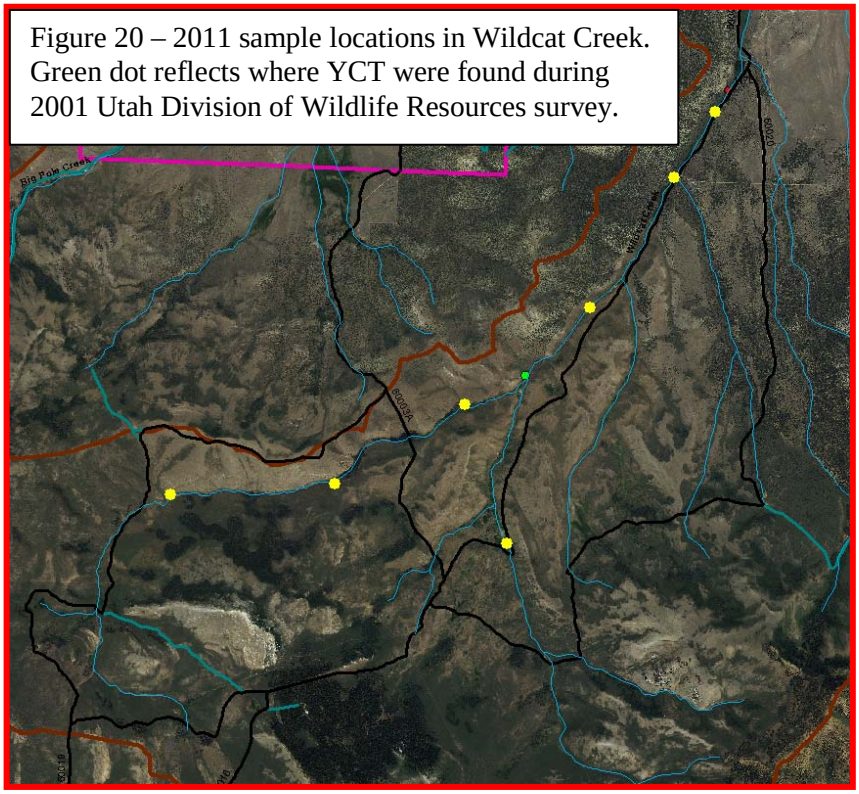


Figure 20 – 2011 sample locations in Wildcat Creek. Green dot reflects where YCT were found during 2001 Utah Division of Wildlife Resources survey.

Based electrofishing surveys, UDWR concluded that the YCT were doing better after the fire because population numbers were nearly triple those observed in 2001. While this may have been true initially after the fire, it appears changed habitat conditions from the fire and lingering management impacts may have eliminated those few fish that remained. Population estimates by IDFG based on the 2001 survey estimated that the entire YCT population in Wildcat consisted of only 42 fish. This is compared to a population estimate of 2,874 YCT in Onemile and 2,038 YCT in Almo Creeks. UDWR also concluded that the small stream size (0.7m width) coupled by a small reservoir at the Forest boundary and water diversions that isolated it from the Raft River, Wildcat Creek was unlikely to support a large YCT population.

Habitat conditions in Wildcat are recovering from the 2002 Prospect fire, historic grazing and rain-on-snow events that downcut the channel. Two large flood events caused by rain-on-snow on above average snowpacks occurred in 1983 and 1984. The flood event on May 30, 1983 and had a maximum discharge of 295 ft^3/s with a recurrence interval of >100 years (USGS –WSP 2502). The second peak flow occurred the following year on May 14, 1984 and had a maximum discharge of 170 ft^3/s with a recurrence interval of 20 years. These storm events caused extensive channel downcutting in Wildcat Creek. It is suspected that channel downcutting was aggravated by the removal of beavers, a legacy of cattle grazing along streams, and roads that concentrated flows in the area. Level II Riparian Evaluation assessments in 1990 found many breached beaver dams in Wildcat Creek. These surveys noted extensive (3-6 feet) downcutting and headcutting in both streams, and lowering of the water table resulting in the loss of riparian vegetation and the advancement of sagebrush to the edge of the present channel.

Pastures (e.g. West Wildcat, Wildcat riparian area, and Little Valley) were rested for a period of at least two seasons following the fire. However, some cattle were found within burned areas along Wildcat Creek in 2004 before the area was fully rested (personnel communication, Dena Santini). Allotment field notes from the 2007 and discussion with range staff indicate that cattle

have been in pastures when they should not be. However, permittees have been very responsive to these concerns, and typically move cattle within a few days.

Field observations from 2008 to 2011 walkthrough surveys show that the stream channel is recovering from past disturbances (Figures 21 and 22). Floodplains are rebuilding within entrenched channels, younger woody vegetation is colonizing some streamside areas, ecological status of riparian vegetation is within desired conditions (mid to late), and wetland ratings are believed to be in "Good" condition in all MIM sites, except W.F. Wildcat which are in a fair condition. This recovery, however, is very fragile and too much cattle grazing could easily reverse this trend. Narrow valley bottoms and lack of water with lush forage, concentrate livestock use along many streams within these allotments. Many sections of these channels are entrenched with vertical or unvegetated stream banks making them more prone to huff shear. The erosion resistance index (a measure of streambank protection based on the relative root strength of various plant species and combination of plant species) ranges from 4.11 to 7.21 at the MIM sites. Generally an average over 7 is considered adequate to protect the streambank and allow streams to function properly. Most MIM sites, with the exception of Upper Wildcat, are well below this threshold suggesting that there is currently not enough vegetation with adequate root strength to protect stream banks. Willows or water birch that could provide better root strength are not well dispersed along some portions of Wildcat Creek.

Figure 21 – Wildcat Creek in August 2008

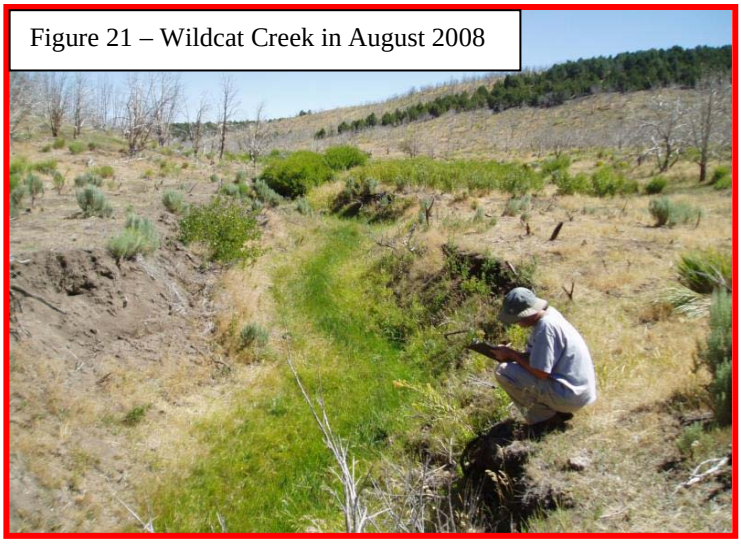


Figure 22 – Wildcat Creek on September 29, 2011

Stream temperatures measured at the PIBO integrator site in 2009 averaged 14.56ºC with a MWMT of 18.7ºC (Table 13). Spot measurements taken during the 2011 surveys found stream temperatures of 14-20ºC in late June. IDFG in 2001 recorded spot temperatures of 9ºC in June and 11ºC in late September. MWMT and spot measurements are of concern since they are much higher than the 'optimum' water temperatures of 15.5 ºC for YCT (Gresswell and Varley 1989).

At the PIBO site select habitat variables remained relatively the same between 2004 and 2009 (Table 14). Percent pools and stream bank stability decreased slightly and woody debris frequency and volume decreased quite a bit. However, all other variables remained unchanged. Percent surface fines in pool tailouts remained very high at over 85%. The PIBO integrator site had a habitat index score from the 2004 survey of 0.00 and in 2009 0.00 indicating poorer habitat conditions within this site compared to reference streams. However, there is some uncertainty about the Onemile Creek scores because some habitat features may be outside of the range used to develop the index.

PIBO also collects data on macroinvertebrates at the integrator site and has developed a macroinvertebrate index. Values can range from 1 (no difference between observed and expected) to 0 (none of the expected taxa were observed). For sites that deviate further and further (e.g., 0.90, 0.85….) from this value of 1.00, there is more and more evidence that these sites are degraded (temperature, fines, etc.). The O/E score for Wildcat Creek in 2009 was 0.38 indicating that macroinvertebrate taxa and habitat conditions at this site are departed from what is expected to be present.

Given the impaired baseline within these allotments it will take diligent implementation of the annual operating instructions by the permittees to continue recovery. Cattle have been found to linger too long in pastures, be in pastures when they should not be, or be in pastures that should be rested. The district will need to continue to invest time to check compliance with grazing timeframes and utilization within each pasture if desired conditions are to be achieved over enough of the riparian areas and stream channel in a reasonable amount of time.

Table 13 – Select habitat variables in Onemile Creek at the PIBO site

Year	Pooldp	PoolPct	PoolFrq	D50	PlFn6	BnkAngl	Stab	LWfreq	LWvol
2004	0.12	16.75	47.85	0.002	87.33	119	100	101.7	5.87
2009	0.14	10.46	48.78	0.002	85.18	123	93.48	32.5	0.96

Table 14 – Water temperatures monitored in Wildcat Creek at the PIBO site

Site ID	Stream	Year	Elev.	Temp Days	WMT Days	Start Date	End Date	Avg Temp	MDMT	MWMT
1170	Wildcat	2009	1847.9	48	42	7/15/09	8/31/09	14.56	19.7	18.71

Green Creek – Idaho Fish and Game surveyed four 100m transects on Green Creek on September 27 and 28, 2011. No fish were observed in the lower two transect, but one hybrid cutthroat and seven brook trout (Avg TL 136mm {103-169}) were captured at the upper two most sites (0.75 miles below lower Independence Lake). Idaho Fish and Game surveyed two 100m transects in Green Creek in 2001 (IDFG 2004). No fish were observed in the upper transect (12T 281890 4675559), however 20 brook trout (Avg TL 103mm {39-196}) and 5 YCT (Avg TL 143mm {136-147}) were captured at the lower site (12T 284711 4677143) ,approximately 150 feet above the Dry Creek confluence.

Habitat information is limited in Green Creek, but is believed to be in relatively 'good' condition. Spot measurements taken during the 2011 surveys found stream temperatures of 7-8ºC in late September. IDFG in 2001 recorded spot temperatures of 7ºC to 13ºC in late June. An Idaho Department of Environmental Quality BURP site is located just above the Dry Creek confluence. Data generally shows low amounts of surfaces fines and good streambank stability due to the high gradient, and boulder dominated channel.

Conclusion

A variety of factors influence the distribution of YCT populations across the Sawtooth NF. As has been reported in the literature, results from our MIS sampling indicate that drainage size, stream temperature, connectivity, habitat condition, and the occurrence of brook trout can all influence the presence or absence of reproducing YCT populations. Information collected has better defined YCT distributions within drainage and identified uses that threaten habitat conditions and the viability of some YCT populations. In 2011, YCT populations continue to occupy Cottonwood, Dry, Edwards, Almo, and Onemile/Sawmill Canyon and are absent in

Wildcat and Green Creeks. At the subbasin scale it appears YCT populations have remained stable since last surveyed with the exception of the loss of the population in Wildcat Creek.

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