Attachment 3

Payette National Forest Effectiveness Monitoring Program for Streams and Riparian Areas within the Upper Columbia River Basin 2001-2006 Annual Summary Report.

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Effectiveness Monitoring Program
For Streams And Riparian Areas Within
The Upper Columbia River Basin

Payette National Forest

2001-2006 Annual Summary Report

Prepared by:
PIBO Effectiveness Monitoring Staff

Funding provided by:

SUMMARY REPORT

2001– 2006

EFFECTIVENESS MONITORING PROGRAM

FOR

STREAMS AND RIPARIAN AREAS WITHIN THE

UPPER COLUMBIA RIVER BASIN

PAYETTE NATIONAL FOREST

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Forest Service & BLM Personnel

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Large Scale Monitoring Groups

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ABSTRACT

The primary objective of this program is to answer the question: “Are key biological and physical components of aquatic and riparian communities improved, degraded, or restored within the range of steelhead and bull trout?” The study area covers the portion of the Columbia River Basin with Forest Service lands designated within INFISH and PACFISH (21 National Forests), and BLM lands within PACFISH or containing bull trout (9 BLM districts). We conducted a pilot study from 1998 through 2000 and concluded that the approach was logistically feasible, successfully measured reach conditions, and provided an effective foundation to guide future sampling efforts. In 2001, we began the first 5-year sampling cycle with the program at half implementation. Approximately 150 sub-watersheds were sampled in both 2001 and 2002. At full implementation (which began in 2003), we sample approximately 250 sub-watersheds per year or 1250 every 5 years. An additional 50 sub-watersheds (sentinel reaches) are sampled annually when possible. To date, a total of 1069 integrator sites have been established including 425 in Region 1, 310 in Region 4, 268 in Region 6, 50 on ID BLM land, 13 on OR/WA BLM land, and three on Montana BLM land. Approximately 20% were in reference sub-watersheds, the remaining were in managed sub-watersheds. The program has also established 307 grazing DMA reaches including 28 in Region 1, 86 in Region 4, 118 in Region 6, 38 on ID BLM land, and 37 on OR/WA BLM land. In addition to our normal sampling, the PIBO program completed special projects / additional sampling for Forest Service Regions 1 and 4 and for both Idaho and OR/WA BLM state offices. The 2006 field season marks the first year of return visits to sites originally sampled in 2001. These data will allow us to begin addressing our objective of assessing change in resource conditions given current land management practices. Preliminary analysis suggests that present management is meeting the intent of the 1998 Biological Opinion for bulltrout, salmon, and steelhead. A favorable trend during the 5-year period was examined for 7 of 12 variables. This information is based on preliminary analysis and should be viewed as such until more complete analyses and scientific review are completed.

CONTENTS

INTRODUCTION

This report summarizes the aquatic and riparian habitat data collected between 2001 and 2006 by The PACFISH INFISH Biological Opinion (PIBO) Effectiveness Monitoring Program (EMP). The report includes an overview of the sampling design, description of methods, and summarized data for each Forest Service Region, National Forest, Bureau of Land Management (BLM) State Office, and BLM District within the Upper Columbia River Basin. Box and whisker plots show the distribution of each variable for both managed and reference sub-watersheds. A section on preliminary trend data is included using re-visit data for 197 sites that were originally sampled in 2001. Additional data summaries, analyses, and interpretation are presented in peer reviewed publications. The special projects section outlines sampling efforts outside of the PIBO EMP rotating panel sample design. The appendices include data definitions and descriptions of summary variables, summary tables, a sample reach description page, a sample topographic map, and a sample reach photograph page. Finally, we have included a CD containing this report, the Effectiveness Monitoring Plan, sampling protocols, publications, and summary data for all sites sampled since 2001. The CD(s) also contain photograph pages (2001, 2006), reach descriptions (2006), and topographic maps (2006). The reports for Forest Service Regions 1, 4, and 6 include additional CDs, which contain all photograph pages pertinent to each Forest Service Region for sites sampled in 2001 and 2006 to facilitate visual comparisons wherever possible.

The information provided in this report is intended to assist land managers from the National Forests and BLM offices in their monitoring efforts. However, this report is not intended to be a complete interpretation of the results and we recognize that further analyses needs to be conducted. We make no attempt to evaluate the implications of the data. When using the data it is the responsibility of the reader to understand the limitations of the data imposed by the study design and sampling techniques. Please contact any of the personnel listed on the back page with any comments or questions.

Background

The decline of the steelhead trout (Onchorynchus mykiss gairdneri) and bull trout (Salvelinus confluentus) in the upper Columbia River Basin has prompted interest in the current condition of habitat throughout the range of these species. The effect of forest management activities on spawning and rearing habitat is under increased scrutiny. Forest management activities such as timber harvest, road construction, and livestock grazing have all been shown to negatively influence stream habitat. However, recent large-scale conservation strategies may protect habitat and promote recovery of degraded habitat throughout the range.

There are several documents that provide guidance for protecting anadromous fish habitat in the Columbia River Basin. Each National Forest within the range of steelhead trout in the Columbia River Basin has completed a forest plan that guides the protection and management of aquatic and riparian resources on the forest (USDA NFMA 1976). Due to increased concern over the status of anadromous salmonids, the United States Department of Agriculture (USDA) Forest Service and United States Department of Interior (USDI) BLM developed an aquatic and riparian area management strategy to protect habitat for Pacific anadromous salmonids (PACFISH 1994). The purpose of this strategy was to provide consistent, interim guidance to National Forests, and to develop interim management objectives for fish habitat prior to the revision of forest plans. The Interior Columbia Basin Ecosystem Management Plan (ICBEMP) was developed to provide a long-term strategy to manage resources within the Columbia River Basin. As part of this plan, aquatic and riparian management guidelines were developed that would replace the more general guidance of PACFISH and provide direction for the restoration of habitats throughout the basin.

The 1998 listing of steelhead and bull trout under the Endangered Species Act prompted a review of current habitat management practices on federal lands by the United States Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), and USDI, United States Fish and Wildlife Service (USFWS). As part of the Section 7 consultation process with the BLM and FS, the NMFS and USFWS issued Biological Opinions on the adequacy of land and resource plans to protect anadromous fish habitat. One of the commitments identified in the Biological Opinions was to monitor managed lands, specifically those grazed by livestock, to determine if current management practices were meeting PACFISH riparian management objectives.

The interagency effectiveness monitoring team (FS, BLM, NMFS, and USFWS) convened in April 1998 to develop a plan for monitoring the condition of steelhead and bull trout habitat in grazed lands (Kershner et al. 2004a). The team developed a draft monitoring plan in May 1998. The team has met annually since then to update the draft, using information from the previous sampling efforts and peer reviews of the plan. In 2001, the effort was expanded from sampling on grazed and unmanaged lands only, to include all managed lands within the study area. Goals for this plan (from the Biological Opinions) include developing a coordinated effort with a defensible sample design, maximizing the effectiveness of limited monitoring funds, identifying appropriate scales and levels of monitoring, and identifying how monitoring results should be used to make management adjustments. The group recognized that a variety of management activities affect aquatic and riparian systems and effects from one or more activities can be cumulative. An approach to monitoring that considers these relationships and attempts to track their effects will ultimately provide the kind of feedback needed to adapt specific management activities on federal lands.

At the request of FS Region 4, the FS National Fish and Aquatic Ecology Unit conducted pilot efforts in 1998 and 1999 within the Salmon River drainage of central Idaho. Since 2000, we have expanded the study area and now sample throughout the upper Columbia River Basin in FS Regions 1, 4, and 6 and BLM lands within PACFISH or containing bull trout. The primary goal was to determine the feasibility of an extensive approach to address the following question: *Are key biological, chemical, and physical attributes, processes, and functions of riparian and aquatic systems degraded, maintained, or restored in the range of the steelhead and bull* *trout as a result of land management within the upper Columbia River Basin* (Kershner et al. 2004a). We defined the effectiveness monitoring component of this program with the following three objectives:

1) Determine whether key biological and physical attributes, processes, and functions of upland, riparian, and aquatic systems are being degraded, maintained, or restored across the PIBO EMP study area.
2) a) Determine the direction and rate of change in riparian and aquatic habitats over time as a function of management practices.
   b) Determine whether riparian and aquatic habitat conditions at integrator sites are reflective of conditions throughout the watershed.
3) Determine whether specific Key Management Practices (KMPs) for livestock grazing are effective in maintaining or restoring riparian structure and function.

METHODS

Study Area

The study area includes portions of eastern Oregon and Washington, Idaho, and western Montana (Figure 1). It is bordered by the Cascade Mountains on the West, Canada to the North, the continental divide on the East from Canada south to the Beaverhead Mountains, and the headwaters of the Snake, John Day, and Deschutes Rivers to the south. The Snake River Basin upstream of American Falls, Idaho was excluded. The study area includes major spawning areas for steelhead and bull trout, as well as chinook (<u>Oncorhynchus tshawytscha</u>) and sockeye salmon (<u>Oncorhynchus nerka</u>), which are also listed under the Endangered Species Act.

The lands within the study area are highly diverse and include the high mountains in central Idaho and western Montana, basalt plateaus in eastern Oregon and Washington, and high desert in southern Idaho. The landscape has been heavily influenced by continental ice sheets, mountain glaciers, and several cataclysmic floods (Quigley and Arbelbide 1997). Elevations range from less than 500m along the lower Columbia River to over 3000m in the mountains.

Precipitation in the study area predominately falls as snow from October to May (Quigley and Arbelbide 1997). Some precipitation falls as rain during the spring, summer, and fall months. Temperatures within the study area are highly variable with short, cool summers in the mountainous areas and longer, extended growing seasons in the montane valleys and lower elevations. Winters are typically cold with sub-freezing temperatures from mid-November to April being the norm.

Valley bottom types are characterized as steep confined valleys, moderately steep/moderately confined valleys, and flat moderately confined valleys (Quigley and Arbelbide 1997). Streams within grazed systems represent a full variety of stream types from steep, confined streams to highly braided, meandering meadow streams.

Forest vegetation within the study area is dominated by dry forests (douglas fir, ponderosa pine, grand fir, white fir) and cold forest (mountain hemlock, spruce-fir, aspen, white bark pine, lodgepole pine, alpine larch). Range vegetation groups include dry grass (fescue, wheatgrass), dry shrub (bitterbrush, sagebrush, juniper), cool shrub (mountain big sage, mountain shrub), riparian shrub (willows), riparian herb (sedges), and riparian woodlands (cottonwood, aspen) (Quigley and Arbelbide 1997).

Livestock grazing has occurred in the study area since the late 19th century. Range integrity ratings are low-moderate throughout most of the study area (Quigley and Arbelbide 1997).

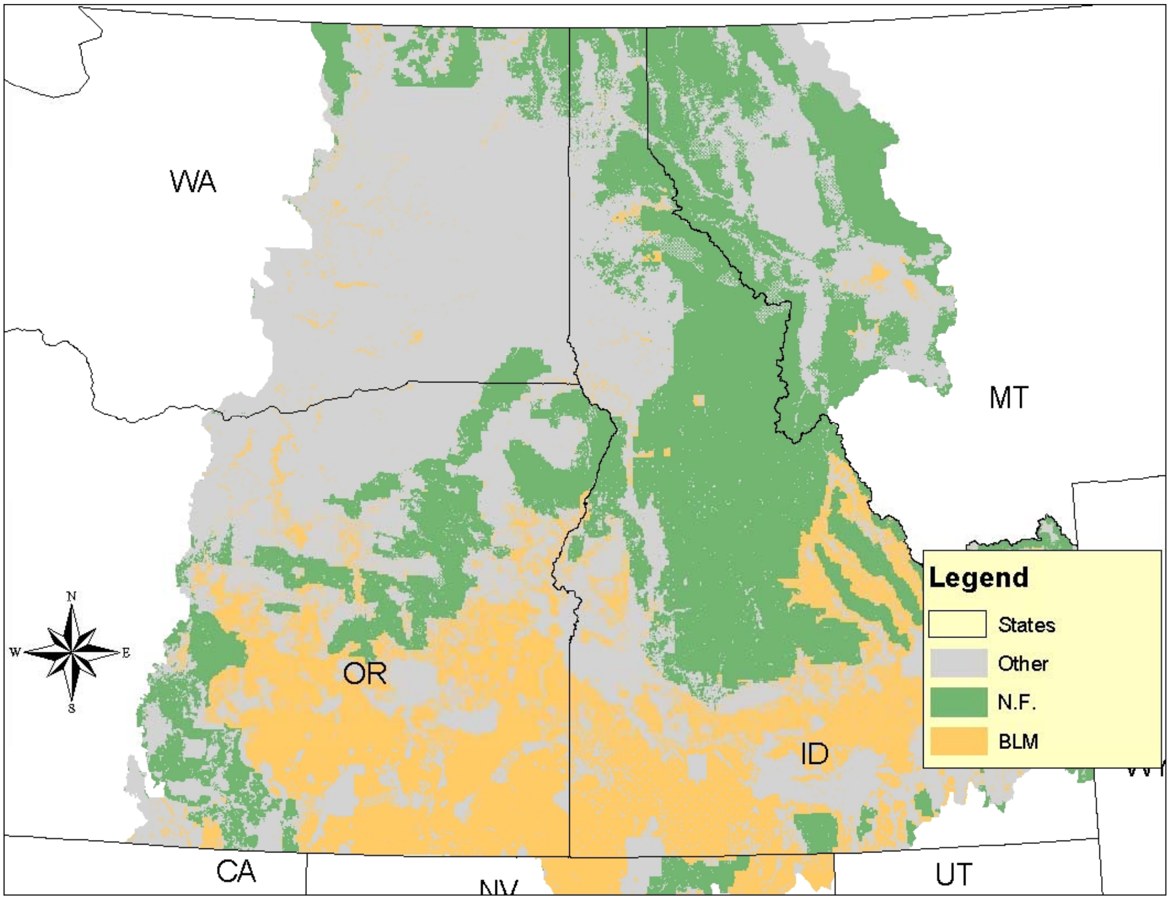


Figure 1. Map of the upper Columbia River Basin with the study area shaded. Specifically, the program includes USFS land within INFISH and PACFISH and BLM land within PACFISH or containing bull trout.

Sample Site Selection and Description

Site Selection: Integrator - In 2001 we began implementing the study design described in the PIBO Monitoring Plan (Kershner et al. 2004a). We used a 5-year, alternating, rotating panel sampling design (Table 1). With this design, one third of the sub-watersheds would be sampled between 2001 and 2005 (assuming full funding) and sites will be re-sampled on a 5 year rotation. A generalized random tessellation stratified design (GRTS) (Stevens 1997) was used to select sub-watersheds to achieve a random, nearly regular sample pattern.

We used the 3547 U.S. Geological Survey, Hydrologic Unit - 6th field sub-watersheds within the study area as a list of potential sample sub-watersheds (Quigley and Arbelbide 1997). These sub-watersheds were first combined geographically into 177 groups of approximately 20 sub-watersheds. The groups were then randomly assigned a sampling year (GRTS design) such that 35 or 36 groups (20% of groups) will be sampled each year. Either seven or eight sub-watersheds are sampled within each group.

Within each group, a sub-watershed must meet two criteria in order to be sampled. First, it must contain a “response” site with a gradient less than 3%. This site type was chosen because it displays the greatest response to upstream impacts from management activities (Montgomery and McDonald 2002). Secondly, the watershed upstream of the sample site must contain greater than 50% FS / BLM ownership. Sub-watersheds that meet these two criteria were then stratified as “managed” or “reference”. Sub-watersheds were categorized as “reference” if: 1) they had minimal timber harvest, 2) they were not grazed by livestock within the last 30 years, 3) watershed road densities were less than 0.5km / km^2, 4) riparian road densities were less than 0.25km / km^2, and 5) no historic dredge or hardrock mining is associated with riparian areas. Biologists, hydrologists, and range conservationists from local USFS and BLM offices were contacted to help categorize each watershed within their management area. We then randomly selected managed and reference sub-watersheds to sample, using the GRTS design. In addition, 50 sub-watersheds were randomly chosen and will be sampled annually if possible. These “sentinel watersheds” are an integral component of the analyses by defining both annual variability and the rate of change for each variable sampled (objective 2a).

We used stream sites as our primary sampling unit within each sub-watershed. A field supervisor began at the downstream end of the ICBEMP 6th Field HUC and established the site at the first location that contained a response site with no side-channels, tributaries, or current beaver activity. Sample sites were at least 20 bankfull channel widths and a minimum of 80 m long as measured along the thalweg.

In 2003, we began adding “integrator” sites with stream gradients greater than 3% because approximately one third of the sub-watersheds within the study area do not contain a response channel. Also, including steeper gradient sites is necessary for combining information and comparing results with other large-scale monitoring efforts. Therefore, one integrator site with a gradient of 3 to 5% was sampled within each group of 20 sub-watersheds. Thus, approximately 15% of our integrator sites are located in steeper gradient channels. An additional benefit will be our ability to test the assumption that response sites are more sensitive to management activities (more likely to change) than steeper gradient sites. We also increased the minimum length of sample sites to 160 m.

Site Selection: Grazing Designated Monitoring Area - The third objective of the program specifically questions effectiveness of grazing management strategies. Designated monitoring areas (DMAs) are sampled within grazed sub-watersheds that are selected for integrator sites. The interagency team only wanted to measure variables that are altered by livestock grazing at that site and not by other management activities. Therefore, we only measure a subset of the variables sampled at integrator sites. These variables include all vegetation and streambank parameters, gradient, sinuosity and bankfull width.

Table 1. Alternating, rotating panel sampling design showing the number of sub-watersheds sampled each year for the first five years and then repeating. The sampling schedule for the 50 sentinel sites is also displayed. The actual number of sub-watersheds sampled at half implementation in 2001 and 2002 are shown in parentheses.

	2001	2002	2003	2004	2005	2006	2007
Sentinel	50(41)	50(27)	45	50	24	50	50
Group 1	250(150)					244	
Group 2		250(106)					250
Group 3			232				
Group 4				241			
Group 5					249		

Sites Sampled 2001 through 2006 – Within the PIBO study area, PIBO EMP sampled sites in 21 National Forests, five Oregon-Washington (OR-WA) BLM districts, three Idaho BLM Districts and one Montana BLM district. To date, a total of 1069 integrator sites have been established including 425 in Region 1, 310 in Region 4, 268 in Region 6, 50 on Idaho BLM land, 13 on OR-WA BLM land, and three on Montana BLM land. Approximately 20% are in reference sub-watersheds, the remaining are managed sub-watersheds. The program has also established 307 grazing DMA sites including 28 in Region 1, 86 in Region 4, 118 in Region 6, 38 on ID BLM land, and 37 on OR-WA BLM land. An additional 50 sites are sampled annually (sentinel sites) when possible. The number of PIBO EMP sites (sample locations) and reaches (one site visit) sampled by Forest Service District and BLM Field Office/Resource Area is shown in Table 3. Maps of the integrator and sentinel sites sampled 2001 through 2006 are depicted in Figure 3 and DMA sites are depicted in Figure 4.

Reach Descriptions - We used several methods to describe the location of each site to ensure future relocation. An example of this information is presented in Appendix C. Written directions were recorded and a map was drawn that included both the stream and riparian area for each reach. Maps described the shape of the stream channel, major in-channel features, vegetation, location of tributaries, roads and other recognizable features (Harrelson et al. 1994). The Universal Transverse Mercator (UTM) coordinates using North American Datum (NAD) 1927 at the bottom of each reach were acquired using a handheld Global Positioning System (GPS) recorder (accuracy of +/- 30 m).

Photographs were taken of the top and bottom of each reach facing upstream and downstream. Additional photographs were taken of channel cross-sections and representative views of pools, riffles, marker location, and any unique characteristics occurring within the reach. The location and orientation of photographs were recorded so that they can be repeated during subsequent sampling. One example is included in this report (Appendix C). The CD(s) provided contain 2001 and 2006 photograph documents for sites that were re-visited to provide visual comparisons wherever possible.

Beginning in 2003, a marker tag was installed at each site. Marker tags were not placed at sites within wilderness areas; rather a distinct natural feature was used as the marker. The distance and compass bearing from the natural feature to the beginning of the reach were recorded and a photo of the marker was taken in perspective to the reach start.

After a site is established, a map program is used to create a topographic map of the site location. This map along with the other reach description details is kept in a folder that will be given to the crew that will resample the site 5 years after the initial sampling. These topographic maps are included on the accompanying CD(s).

Watershed Characteristics - In past years a variety of variables were computed to help describe the watersheds sampled using existing GIS layers. These include watershed area, percent Federal ownership, stream density, road density, road crossings, elevation, average precipitation, and geology. However, because of inconsistent and changing data layers, the PIBO program has decided to compute all watershed characteristics at one time using consistent layers as they become available. Consequently, this information is incomplete in the tables for this year.

Table 2. Summary of all PIBO EMP study design sites (sample locations) sampled within the jurisdiction of each Forest Service Region and BLM State Office, from 2001 through 2006. The number of sites sampled in 2006 is in parentheses.

	Integrator managed	Integrator reference	DMA
Region 1	317 (81)	108 (37)	28 (7)
Region 4	239 (55)	71 (20)	86 (25)
Region 6	245 (71)	23 (6)	118 (14)
Idaho BLM	50 (9)	0	38 (15)
OR-WA BLM	13 (6)	0	37 (11)
MT BLM	3 (1)	0	0
Total	867 (223)	202 (63)	307 (72)

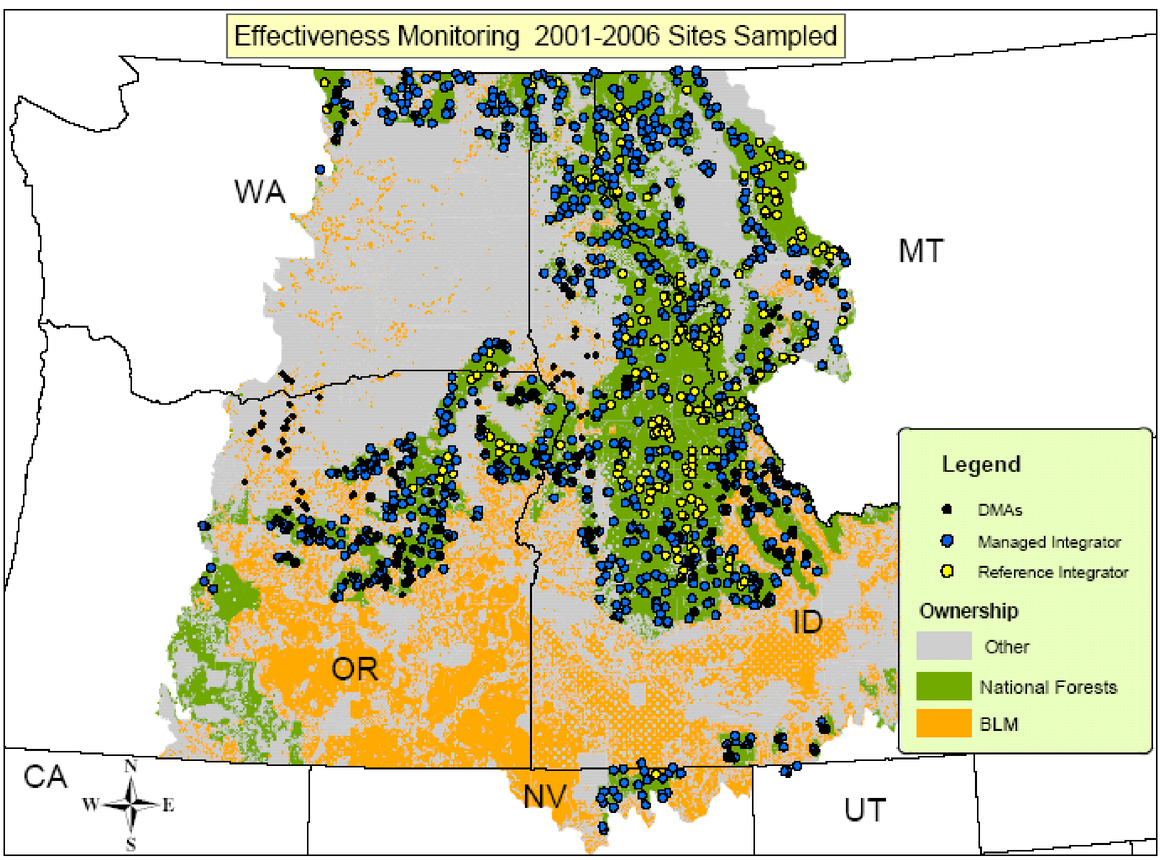


Figure 2. Map of the study area with sites sampled from 2001 through 2006.

Table 3. Summary of all PIBO EMP study design sites (sample locations) and reaches (one site visit) sampled in Region 4 by National Forest and District from 2001 through 2006. The number of sites and reaches sampled in 2006 is in parentheses.

		Site			Reach	
Forest	District	Integrator Managed	Integrator Reference	DMA	Integrator (Man & Ref)	DMA
Boise	Cascade	7 (5)	2 (1)	2 (1)	18 (6)	5 (3)
	Emmett	9 (8)	0	5 (4)	12 (8)	8 (6)
	Idaho City	12 (2)	0	0	16 (2)	0
	Lowman	9 (5)	0	2 (2)	20 (5)	6 (4)
	Mountain Home	12 (0)	0	2 (0)	12 (0)	2 (0)
Humboldt-Toiyabe	Jarbidge	10 (0)	1 (0)	0	11 (0)	0
	Mountain City	13 (1)	0	0	17 (1)	0
Payette	Council	8 (1)	0	5 (0)	8 (1)	5 (0)
	Krassel	11 (0)	24 (10)	0	46 (10)	0
	McCall	8 (1)	2 (0)	0	20 (1)	0
	New Meadows	9 (6)	0	6 (5)	24 (6)	0
Salmon-Challis	Challis	5 (3)	0	5 (2)	6 (3)	7 (2)
	Leadore	8 (0)	0	6 (0)	8 (0)	6 (0)
	Lost River	20 (7)	2 (1)	11 (4)	31 (8)	13 (6)
	Middle Fork	3 (1)	14 (5)	1 (1)	22 (6)	2 (1)
	North Fork	6 (0)	11 (1)	0	23 (1)	0
	Salmon/Cobalt	19 (3)	3 (0)	7 (1)	24 (3)	9 (3)
	Yankee Fork	11 (1)	5 (1)	8 (0)	26 (2)	9 (0)
Sawtooth	Fairfield	8 (0)	0	2 (0)	8 (0)	2 (0)
	Ketchum	11 (0)	0	0	11 (0)	0
	Minidoka	21 (8)	0	13 (5)	32 (8)	19 (5)
	SNRA	19 (3)	7 (1)	11 (0)	47 (4)	19 (0)

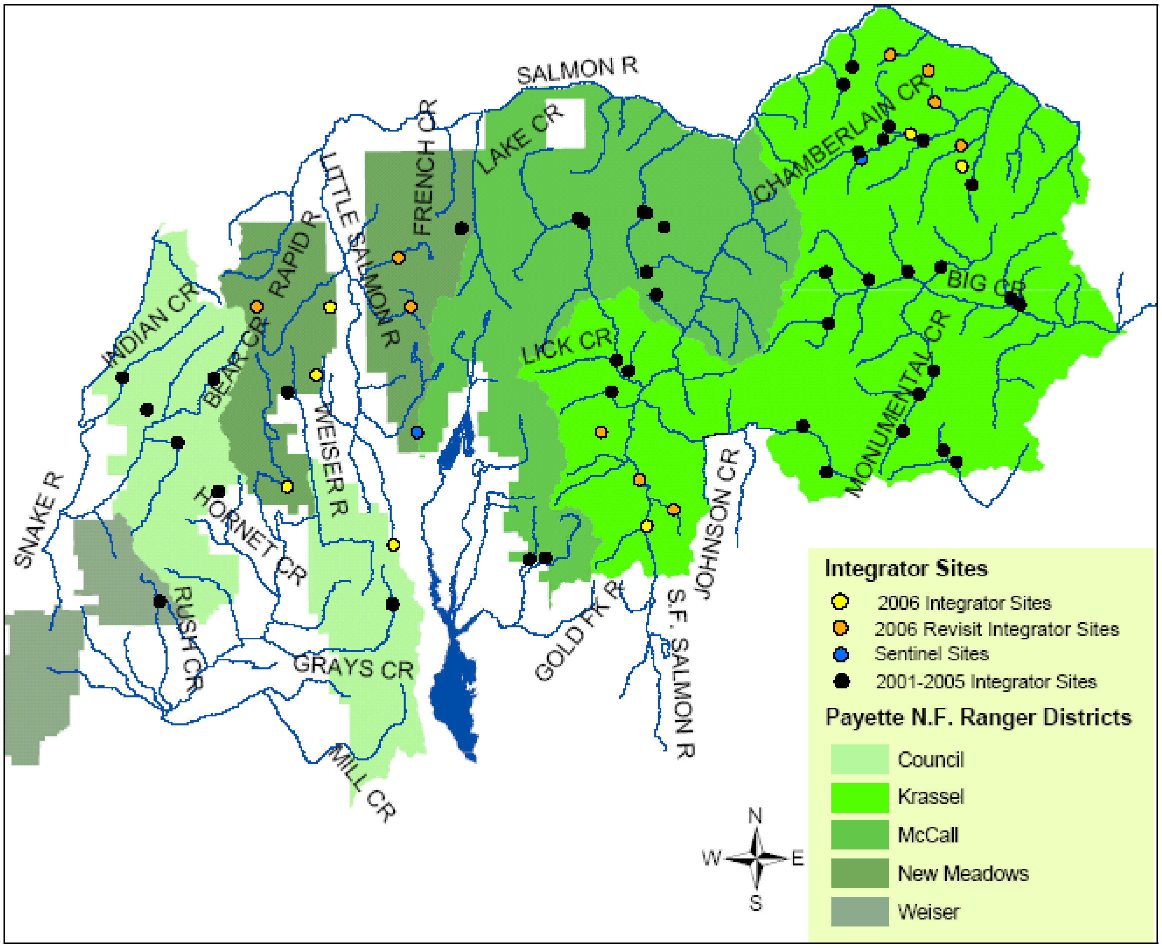


Figure 3. Integrator and sentinel sites in Payette N.F., sampled 2001 through 2006.

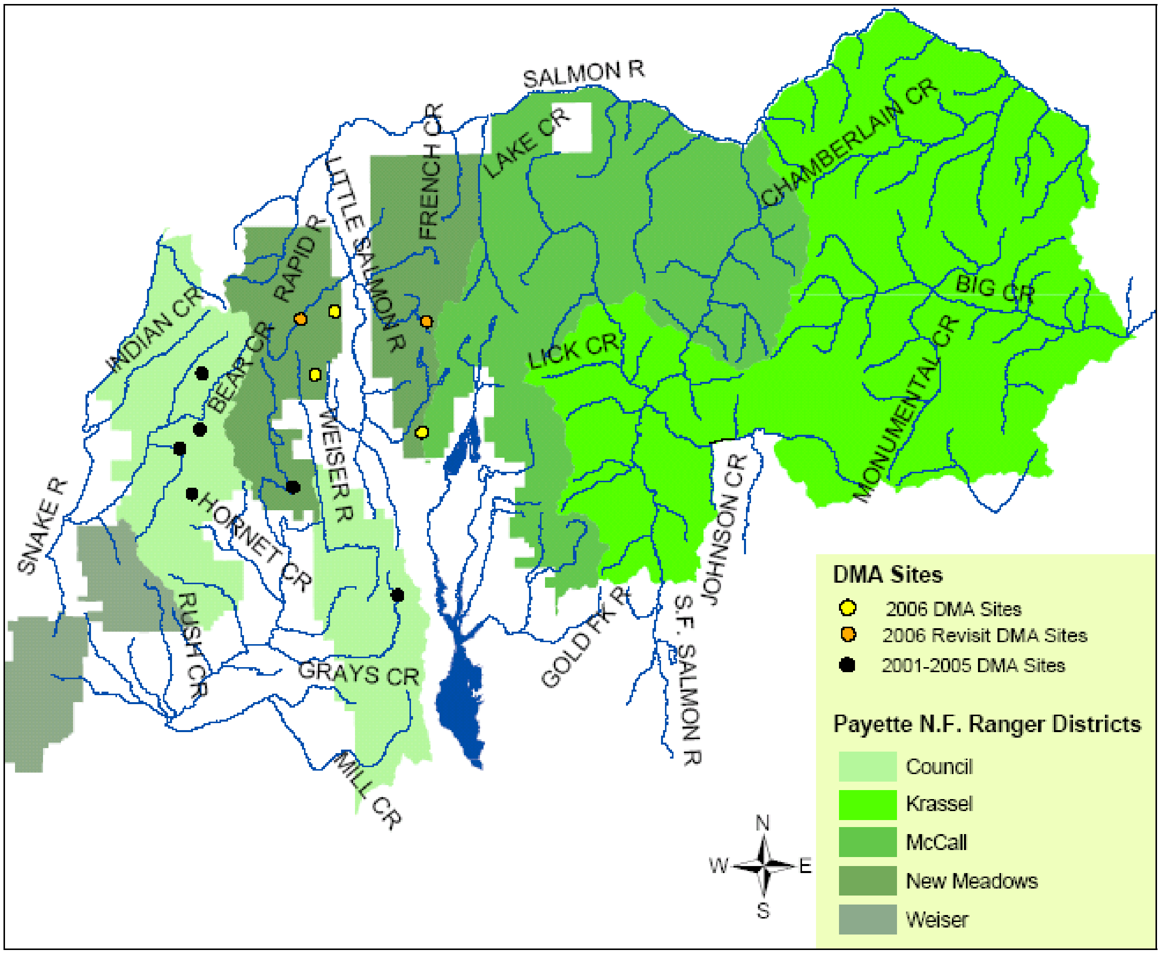


Figure 4. DMA sites in Payette N.F., sampled 2001 through 2006.

Data Collection

A combination of 21 commonly measured in-channel, 11 riparian vegetation, and nine macroinvertebrate variables are reported for each integrator reach (Karr and Chu 1997, Kauffman et al. 1983, Platts et al. 1983, Myers and Swanson 1991, 1992, Winward 2000). Appendix A describes each summary variable and how they were computed. For more information, the sampling protocols are available on the included CD and at our website: http://www.fs.fed.us/biology/fishecology/emp.

Since 1998, when the Effectiveness Monitoring program began, many of the methods have been modified from their original description. Many of the modifications were done to decrease observer variability by removing subjectivity and potential observer bias. We recognize that additional modifications to our present methods may become necessary with further research into stream and riparian monitoring.

Standardizing Sampling Methods - As part of our continued evolution we have worked with the Northwest Forest Plan - Aquatic and Riparian Effectiveness Monitoring Program (AREMP) to standardize sampling methods between our programs. Starting in 2004, both programs began using the same sampling methods for a core set of physical habitat attributes. These attributes include reach length, gradient, sinuosity, pool habitat delineation and depth, bankfull width, surface particle counts, pool-tail fines, large wood, and macroinvertebrates. These methods are also consistent with the Forest Service National Aquatic Ecological Unit Inventory guidelines. In spring of 2005, both programs worked towards common data summary variables, calculations, and metadata files, and discussed modifications needed in the methods. The overall result is that consistent information will be collected at approximately 425 sites annually on FS and BLM lands throughout the Pacific Northwest and Columbia River Basin.

Stream Channel Measurements - Stream gradient and sinuosity were measured to characterize the stream channel at each site. The channel gradient at the water surface was recorded for each reach. Elevations were measured to the nearest centimeter using a surveyor's level with tripod and a stadia rod. When the entire reach could not be surveyed from one location, we divided the reach into sections.

Bank characteristics were measured at a series of transects within the stream reach. The location of the first transect was derived by choosing a random number (k) between zero and seven. The first transect was then established (k) meters upstream of the start of the reach. Subsequent transects were located at intervals of one bankfull width category working upstream for a total of 20 to 27 transects (see protocols). All bank characteristic variables were measured on both the right and left banks.

Bank angle was measured using the procedures described by Platts et al. (1987). A clinometer and rod were used to measure the angle formed by the downward sloping stream bank as it met the stream bottom. The angle of undercut banks extended from the deepest point of the undercut to the outer edge. All angles were measured to the nearest degree with undercut banks having values less than 90 degrees and non-undercut banks greater than 90 degrees. The depth of undercut banks was measured to the nearest centimeter and extended horizontally from the deepest point of the undercut to the outer edge. The average bank angle, percent undercut banks, and average undercut depth were calculated.

Bank stability measurements were collected at each transect by observing an area of the bank 15 cm to either side of the transect location and vertically from the scour line to either the crest of the first flat depositional feature above bankfull, or to twice maximum bankfull depth. The methodology was developed by Platts et al. (1987) and modified by Bauer and Burton (1993). This method uses bank cover and the presence of instability indicators to describe bank stability. The bank is considered "covered" if it contains greater than 50 percent live vegetation, litter, roots, rocks greater than 15 cm, wood greater than 10 cm in diameter, or any combination of the above. Banks were considered stable if they do not show indications of breakdown, slumping, or fracturing, or consist of bare soil but have an angle greater than 100 degrees. A dichotomous key was used to categorize each location into one of six categories: covered stable, uncovered stable, false banks, covered unstable, uncovered unstable, or unclassified. The percent of stable banks was calculated using two different methods.

We measured the bankfull width of the channel at each transect. The information is summarized as the average transect bankfull width.

The length, maximum depth, and tail crest depth were measured for each "primary" pool in the sample reach (Kershner et al. 2004a). These methods were modified versions of those described by Lisle (1987) for residual pool depth, and the original method described by Overton et al. (1997) for pool length. Primary pools are defined as: 1) concave depressions in the streambed bound by a head and tail crest; 2) the thalweg runs through the pool; 3) the pool feature must occupy at least half of the wetted channel; 4) the maximum depth is at least 1.5 times the pool-tail crest depth; and 5) the pool feature must be as long as it is wide. Pool lengths were measured by stretching a measuring tape along the thalweg from the pool-tail crest to the head of the pool. Measurements were recorded to the nearest 0.1 m. Maximum depths were measured by locating the deepest point of the pool and recording the depth to the nearest cm, while pool-tail crest depths were determined by measuring the deepest point on the pool-tail. Residual depths were calculated as the difference between the maximum depth and the pool-tail crest depth. The results were summarized as the percent of the reach composed of primary pool habitats and average residual pool depth.

Channel cross-sections were measured to determine bankfull widths and width to depth ratios. One cross section was measured in each of the first four riffles/runs that contained a relatively straight channel and clearly defined bankfull indicators. Cross-sections were located at the widest part of the riffle (excluding human or animal crossings). A minimum of ten depth measurements were taken at equal distances along each cross-section. Additional depths were measured at the left and right wetted edges and the deepest point. When islands existed that were higher than the bankfull elevation, the two channels were measured separately. Entrenchment width was measured as the width of the valley at twice the maximum bankfull elevation, which is two times the distance from the deepest point in the stream channel along the cross section to the bankfull elevation.

The average bankfull width, bankfull width to depth ratio, wetted width to depth ratio, and entrenchment ratio were calculated. Rosgen channel type was also computed for each reach (Rosgen 1996).

Substrate composition was measured using modified Wolman pebble counts (Wolman 1954). From 2001 to 2003 particles were selected from the first four riffles/runs that were at least half as long as the width category. At least 25 particles were sampled in each riffle/run for a minimum of 100 particles in each reach. Sampling was conducted across the streambed and throughout the entire length of the habitat unit. Starting in 2004, particles were sampled at channel transects. They were collected at evenly spaced intervals across the bankfull channel. The D50, D84, and percent of particles less than six mm were calculated excluding bedrock.

The percent surface fines (less than six mm) were measured at a subset of pool-tails in each reach using methodologies originally described in the USFS R5 SCI Guidebook Procedures (1998) and Bauer and Burton (1993) in all years except 2001. Beginning in 2003, we also measured the percent surface fines less than two mm. Measurements were recorded for the wetted, flowing area of the first four scour pools between 2001 and 2003. In 2004, we increased the minimum number of pool-tails in which fines were measured from four to ten. The sampling area in all years extended from the pool-tail crest upstream a distance equal to 10% of the pool length, but no more than one m. A 49-intersection grid was placed at 25%, 50%, and 75% of the distance across the pool-tail. The number of intersections (and one corner) underlain with fine sediments was recorded for a total possible count of 50. The percent surface fines was calculated for each pool-tail and then averaged for the reach. In 2001 we used particle counts to assess the percent fines in pool-tails. This information is not reported because we feel the data did not accurately reflect the amount of fines.

Large wood (LW) was tallied and the volume computed for all pieces greater than or equal to one m in length and 0.1 m in diameter that extended into the bankfull channel. The length and diameter was measured with a staff rod or tape in order to calculate large wood volume. In addition, pieces were grouped into two categories. Category one pieces extended below the bankfull elevation and were considered actively involved in channel forming processes. Category two included pieces that were elevationally above bankfull. In 2001 all pieces were measured. In 2002 and 2003 a subset of the pieces were measured and the rest tallied and categorized. Starting in 2004, a subset of the pieces was measured, while all pieces were estimated. The results were summarized as counts and volumes of large wood per 100 m, for category one and category one and two.

Water Temperature - We collected water temperature measurements with continuous recording temperature loggers during low flow, long day length periods when maximum temperatures were most likely to occur. Temperatures were measured hourly in degrees Celsius from July 15 to September 1. Temperature data were summarized using the seven-day moving average maximum temperatures at all reaches and a variety of other procedures specific to Clean Water Act requirements of each state (Appendix B). While data is summarized following state criteria, no impaired / unimpaired determinations are given at this time. Many states allow for an exclusion of exceedence days with high ambient air temperature; however those analyses have not been completed at this time.

Macroinvertebrates - Macroinvertebrates were sampled using the protocol recommended by the Center for Monitoring and Assessment of Freshwater Ecosystems, Utah State University (Hawkins et al. 2003). Two kick net samples were collected at randomly chosen locations within the first four fast-water habitats in the reach. The sample area extended the width of the net 31.12 cm (12.25 inches), and 31.12 cm (12.25 inches) upstream of the net, and to a depth of 10 cm (4 inches). All eight samples were combined for each reach for a total sample area of 0.744 m^2. Samples were analyzed by the BLM/USU National Aquatic Monitoring Center and summarized using nine metrics (Karr and Chu 1997, Table 4). In addition, the Center for Monitoring and Assessment of Freshwater Ecosystems developed a predictive model that provides a water quality assessment score for each reach. The RIVPACS score describes the similarity of the invertebrate species composition at a reach to the species composition found at similar reference reaches. The model was developed using 112 reference reaches and developed a range of similarity scores between these reaches with a mean value of 1.0 and a standard deviation of 0.14. Similar models developed elsewhere have then drawn cutoffs at the 10^{th} and 90^{th} percentiles, and consider all scores outside this range as being different from reference condition. In relating this approach to the model, all values below a threshold of 0.78 have a high probability of being biologically impaired. We provide the results from this model for all reaches as one additional approach to summarizing the invertebrate composition information.

Table 4. Aquatic invertebrate community and diversity indices and their general categories used in the analysis.

Metric	Taxa Richness	Tolerance	Feeding / Other Habits
Ephemeroptera taxa	X		
Plecoptera taxa	X		
Trichoptera taxa	X		
Clinger taxa			X
Total operational taxa	X		
Long lived taxa	X		
Number intolerant taxa		X	
RIVPACS		X	
Community Tolerance Quotient (CTDq)		X	

Riparian Vegetation Data Collection 2001 to 2002 - The sampling protocol described by Winward (2000) was used to collect riparian vegetation data during the 2001 and 2002 field seasons. Those methods used community types in published classifications to describe the vegetation along 110 m of stream (the greenline) and along five cross-sections across the entire riparian area. Counts of woody plants were performed along the greenline. The percentage of the riparian area with effective ground cover was determined by recording the number of steps that had bare ground in front of the technician's toe as he/she walked the riparian cross-section.

There were limited ways to summarize the reach-level community type data that would allow comparisons of all sites. Therefore, a method was developed to convert the reach-level community type data to a wetland rating using the wetland indicator status of Reed (1996). Community type wetland ratings were calculated using the average species cover values from the published community types and wetland rating values assigned to each species based on the wetland indicator status (Coles-Ritchie et al. in press). The community type wetland ratings were used to calculate reach wetland ratings based on the extent of each community type at a reach. The wetland rating facilitated comparisons of all reaches, regardless of what community type classification had been used at a reach. No other methods were identified to summarize community type data in a manner that would allow comparison of all sites. Due to that limitation (and in order to obtain more detailed information about the vegetation at each reach), species cover data were collected beginning in 2003 and a reach wetland rating was calculated using those species data.

While the calculation of the wetland rating is practically the same with species and community type data, there are differences in what the data represent: community types represent average species composition from many sites; and species data represent a single site. While a wetland rating can be calculated with community types or with species data, it is unclear how informative it is to compare a site's wetland rating based on community type data in 2001 to the wetland rating with species data in 2006.

Riparian Vegetation Data Collection 2003 to Present – Plant species data were collected along the streambank (greenline) and along riparian cross sections at each stream reach.

Greenline species cover data were recorded using Daubenmire quadrat frames (0.5 x 0.2 m) at 21 (up to 25) stream channel transects on both sides of the stream, resulting in a minimum of 42 greenline quadrats per reach. At each quadrat the foliar cover of plant species was recorded for all species with greater than 5 percent cover. Specimens of unknown plants with greater than 5 percent cover were collected for identification in the office. Greenline species data were summarized by calculating the average cover based on all the quadrats at the reach.

Riparian cross-section species data were recorded along transects perpendicular to the valley direction at five channel transects (numbers one, five, ten, 15, and 20). At each transect, species cover data were collected on each side of the stream (similar to the greenline data collection) in quadrats located at 3 m intervals (i.e. meters 3, 6, and 9) in addition to the greenline quadrat. Those four quadrats were used to calculate the average cover of species for each cross-section on each bank. Those cover values were then summarized for the entire reach. Tree species and diameter-at-breast-height (DBH), and effective ground cover data were also recorded in association with the riparian cross-sections.

The species cover data were used to calculate the following summary variables:

1) Wetland ratings (for greenline and riparian cross-sections)
2) Noxious weed cover by species (for greenline and riparian cross-sections)
3) Woody species cover along stream (greenline)

Wetland Ratings - Reach wetland ratings were calculated using the average species cover for the reach and values assigned to each wetland indicator status, as described above for community types (Coles-Ritchie et al. in press). The species cover data were relativized to sum 100 percent so that the maximum wetland rating for a reach would be 100. This provides a representation of the type (in terms of wetland indicator status) of vegetation present at the reach, not the amount of vegetative cover (which can be calculated separately).

As noted above, the calculation of the wetland rating is similar for community types and species, but the data used (community types vs. species) are different, therefore comparing a wetland rating based on community types for 2001 to a wetland rating from species data in 2006 is an imperfect comparison. The problem is that community types are a much more general representation of a site than species.

Periodically some species names are changed or have updates in the wetland indicator status on the USDA Plants database, which can change wetland ratings. Each year all data (from all years) are updated with the current information so that appropriate comparisons of sites can be made.

Tree Data - Trees were counted in 3-m belt transects along the five riparian cross-sections described above, and four additional cross-sections. The species and DBH were recorded for each tree greater than four cm DBH and taller than 1.4 m. The tree data were summarized as small (less than 50 cm DBH) and large (greater than 50 cm DBH) trees per acre and basal area per acre, for live trees and for standing dead trees. Trees were considered to be species listed as only "Trees" (not "Trees, Shrubs") in the USDA Plants Database (http://plants.usda.gov/) or species that we considered to typically grow as single-stemmed individuals, like pines, spruces, firs, and cottonwoods, and not the shrub-like willows (natives), juniper, mountain alder, or water birch.

Effective Ground Cover - Effective ground cover was estimated by recording the type of ground cover at each of the 30 cross-section quadrats. The observer recorded the ground cover at the four corners of the quadrat frame to determine whether it was vegetation, litter, rock (greater than 2.5 cm) or bare soil. This report presents the percentage of the riparian area with effective ground cover (i.e. not bare soil).

Quality Assurance Program

A challenge of assessing changes in stream and riparian habitat condition is accounting for the major sources of variability associated with the PIBO study design. To address this challenge we have conducted a series of studies to quantify the magnitude of these major variability types (Roper et al. 2002, Archer et al. 2004, Coles-Ritchie et al. 2004). Major sources of variability result from data gathered: by different crews (observer variability), at different times (temporal variability) across a diverse geographical area (stream heterogeneity variability). An example of observer variability is two crews measuring bank angles at the same site and getting different values; the first crew's average bank angle is 100 degrees, while the second crew's is 110 degrees. Temporal variability is defined as within and among year variation. An example of within year variability is a crew sampling a site twice in one year, first in May, and later in June, and arriving at different pool percentages. Among season temporal variability is random fluctuation of a variable from one year to another, and can result from changing environmental factors or flow characteristics (run-off for example). Stream heterogeneity refers to the range of environmental conditions encountered. For example, pool percentages may range from 0 percent to 100 percent (high stream heterogeneity), while the range of sinuosity we encountered was from 1 to 3.5 (lower stream heterogeneity).

The relationship between observer and stream heterogeneity variability is termed the "signal to noise ratio" (stream heterogeneity variability /observer variability), and is one tool for assessing how useful a variable is for detecting change through time. A high signal to noise ratio is desirable (Kaufmann et al. 1999). For example, bank stability has a relatively high signal (stream heterogeneity) to noise (observer variability); consequently, a 10 percent change in bank stability can be detected with 20 samples. In contrast, residual pool depth has a lower signal to noise ratio, requiring approximately 200 samples to detect a 10% change. The wider the range of environmental conditions encountered (signal), the higher observer variability (noise) can be while maintaining the ability to detect change with reasonable sample sizes. Understanding variability sources associated with sampling and their relationship with environmental variability enables us to accomplish two objectives critical to long term monitoring. First, we are able to determine when differences are due to actual changes in habitat conditions versus when differences are due to sampling variability. Second, we are able to determine how many samples will be required to detect changes in resource conditions given an expected amount of change. Accomplishing these two objectives allows us to make informed decisions about how useful each variable is as a long term monitoring parameter.

Field Sampling Methods - Most large scale monitoring programs have stressed the need for a quality assurance program to insure that the information collected is technically sound, legally defensible, and useful for long-term monitoring (Mulder et al. 1999, Lazorchak et al. 1998). Our program has included quality assurance sampling since 2000.

Assessment of Crew and Temporal Variability, and Measurement Precision - During 2000 and 2001, we conducted three separate studies to describe the precision of individual measurement techniques, variability between crews (repeatability), and temporal (seasonal) variation throughout the summer sampling season. The measurement study isolated the different components of each method to determine where errors or variability occurred. The repeatability study was conducted by having six crews sample the same exact reaches on six streams. Summary statistics were compared between crews at each reach for all variables. An overall 95 percent confidence interval and sample sizes needed to detect changes were calculated for each variable. For the seasonal study we sampled the same reach on eight streams in June, August, and September to determine whether the measured value for each variable had changed throughout the summer sampling season. The results for stream channel (Roper et al. 2002, Archer et al. 2004) and riparian vegetation (Coles-Ritchie et al. 2004) attributes were published as Forest Service General Technical Reports and are on our website http://www.fs.fed.us/biology/fishecology/emp.

Inter-Agency Protocol Test Pilot Effort - In 2002 our quality assurance sampling was conducted as part of a graduate research project (Whitacre 2004). This study compared six protocols used by the USDA Forest Service and the Environmental Protection Agency to determine whether differences in protocol affect reported values for 11 physical stream attributes. At each of the six sites evaluated in the study, each protocol had three independent crews collect data. This allowed for a comparison of mean estimates and observer variability among the protocols. A copy of the thesis is on our website.

Assessment of Observer and Temporal Variability - In 2003 and 2004 we used a sampling design where approximately 25 of the 50 sentinel sites were sampled by two separate crews. This approach allows us to assess observer variability across the broad range of ecological conditions encountered within our study area. In 2004 revisits occurred at two different time scales to allow us to examine both observer and temporal variability. Half were revisited by a second crew within 7 days, and the other half were revisited within 30 to 40 days.

Inter-Agency Protocol Test - In 2005 our quality assurance consisted of single visits to 24 sentinel sites and participation in an inter-agency comparison of stream habitat sampling protocols in the John Day River basin. Twelve sites were sampled by three crews for this protocol comparison and were used as a substitution for the additional 26 sentinel sites that are normally sampled each year.

PRELIMINARY TREND DATA

In 2006 PIBO performed re-visits to 197 sites that were originally sampled in 2001. These re-visits allow us to evaluate trends for many in-channel attributes. The evaluation of trend will continue each year when approximately 250 sites are re-visited per year until 2010 when the first full rotation will be complete (n = 1,300 sites). Results from preliminary analysis suggest that present management is meeting the intent of the 1998 Biological Opinion for bulltrout, salmon, and steelhead. For seven of twelve variables examined there was a favorable trend during the five-year period (Figure 5). This information is based on preliminary analysis and should be viewed as such until more complete analyses and scientific review are completed.

The following stream variables showed improvement over the five-year period (* indicates statistical significance at $p < 0.10$):

- Pool depth (deepened) *
- Width:depth (decreased) *
- Bank stability (increased) *
- Large wood frequency (increased) *
- Large wood volume (increased)
- Bank angle (decreased, or steepening of banks)
- D84 (increased)

The following stream variables showed an unfavorable change, although none were statistically significant ($p < 0.10$) over the five-year period:

- D16 (decreased)
- D50 (decreased)
- Pool abundance (decreased)
- Undercut abundance (decreased)
- Undercut depth (decreased)

Table 5. Results from paired t-tests comparing data for 2006 and 2001 at the same sites.

Variable	p-value	Mean difference (2006-2001)	Unit
Bank angle	0.3623	-1.211	degrees
Bank stability (1)	0.0036	5.187	%
D16	0.4585	-0.001	m
D50	0.2883	-0.001	m
D84	0.3562	0.003	m
Large wood frequency	0.0390	0.024	pieces per m
Large wood volume	0.1863	0.012	m^3 per m
Pool abundance	0.8853	-0.234	%
Pool depth	0.0002	0.032	m
Undercut abundance	0.6467	-0.519	%
Undercut depth	0.4465	-0.003	m
Width:depth	0.0007	-3.222	ratio

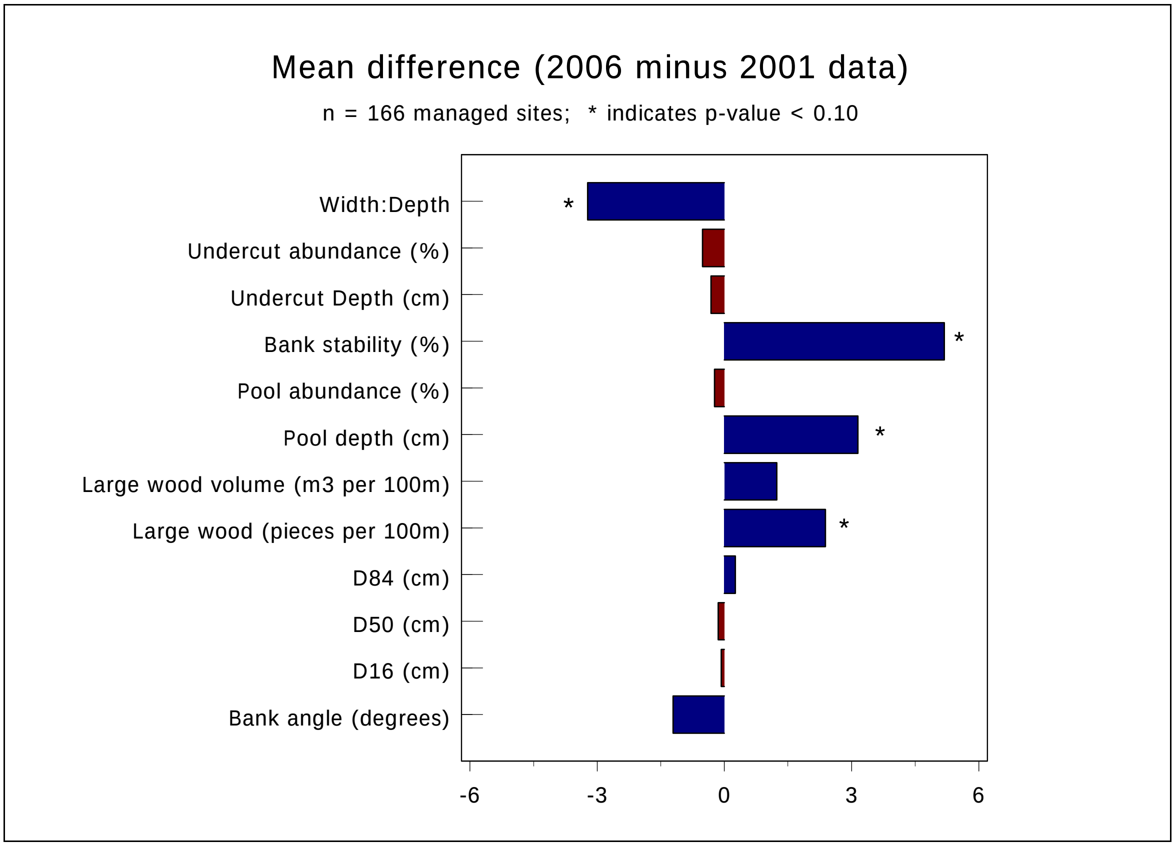


Figure 5. Mean difference between data from 2006 and 2001 at the same sites. Blue indicates a favorable change and red indicates an unfavorable change.

SPECIAL PROJECTS

Supplementary Sampling Sawtooth and Boise N.F, Region 4 – In 2006, we sampled seven additional sites in both the Sawtooth and Boise National Forests in order to supplement the 24 additional sites sampled in 2005. These additional sampling locations were established to increase sample sizes in the three management categories used in the new Forest Plan. These sites will increase our power to detect change at the Tri-Forest (Sawtooth, Boise, Payette) plan scale. Additional funding was provided by the Sawtooth and Boise N.F. and these sites will be re-sampled on a five year rotation.

Upper Missouri River Drainage Sampling for the East Side of Region 1 - During the 2006 field season, the PIBO study design and sampling effort was expanded to forests on the East side of Region 1. This will add the eastern portions of the Helena and Beaverhead-Deerlodge National Forests and will be the first sampling undertaken on the Gallatin, Custer, and Lewis and Clark National Forests. A total of 49 sites were sampled in seven different clusters, on all five National Forests.

OR-WA BLM Category 1 DMA Sampling – In 2006, PIBO sampled 18 additional Category 1 DMA's on BLM lands within Oregon and Washington. These sites will increase sample sizes and allow further analysis of grazing trends related to management actions in these areas.

Random Site Locations – As part of our continued efforts to compare results with AREMP and EPA, we sampled random sites in 23 sub-watersheds with an established Integrator site. These additional sample locations will be used to examine the relationships between the lowest response site and a randomly selected point.

PIBO and MIM Comparisons – During the 2006 field season the PIBO EM team conducted a comparison between PIBO protocols and the MIM method (Monitoring Streambanks and Riparian Vegetation - Multiple Indicators; Cowley and Burton 2005). The goals of this study were to explore the degree of variability in data generated by the two protocols as well as the variability of data when different crews use the same protocol. This will provide useful information to managers of riparian areas for which there are both MIM and PIBO data.

The study design included 18 sites that where sampled using both methods. Seven of the 18 were sampled by three different observers using both protocols. This design will allow us to make comparisons between the two protocols as well examine the variability for each method. This project was funded by BLM ID state office.

Bear Valley study – During September of 2006, the PIBO team sampled nine sites in Bear Valley, ID. The objectives of this study were to compare PIBO methods and data with two other types of data on these sites. We first compared PIBO EMP information to Green Lidar data, which is generated from over-flights of the area. The second source of data that will be compared is high resolution total station data collected by RMRS Boise. This information will be used to examine the relationship between the two on the ground data sets (high resolution and lower resolution) and those generated using Green Lidar over-flight data. This work was funded by the Fish and Aquatic Ecology unit of the Washington Office.

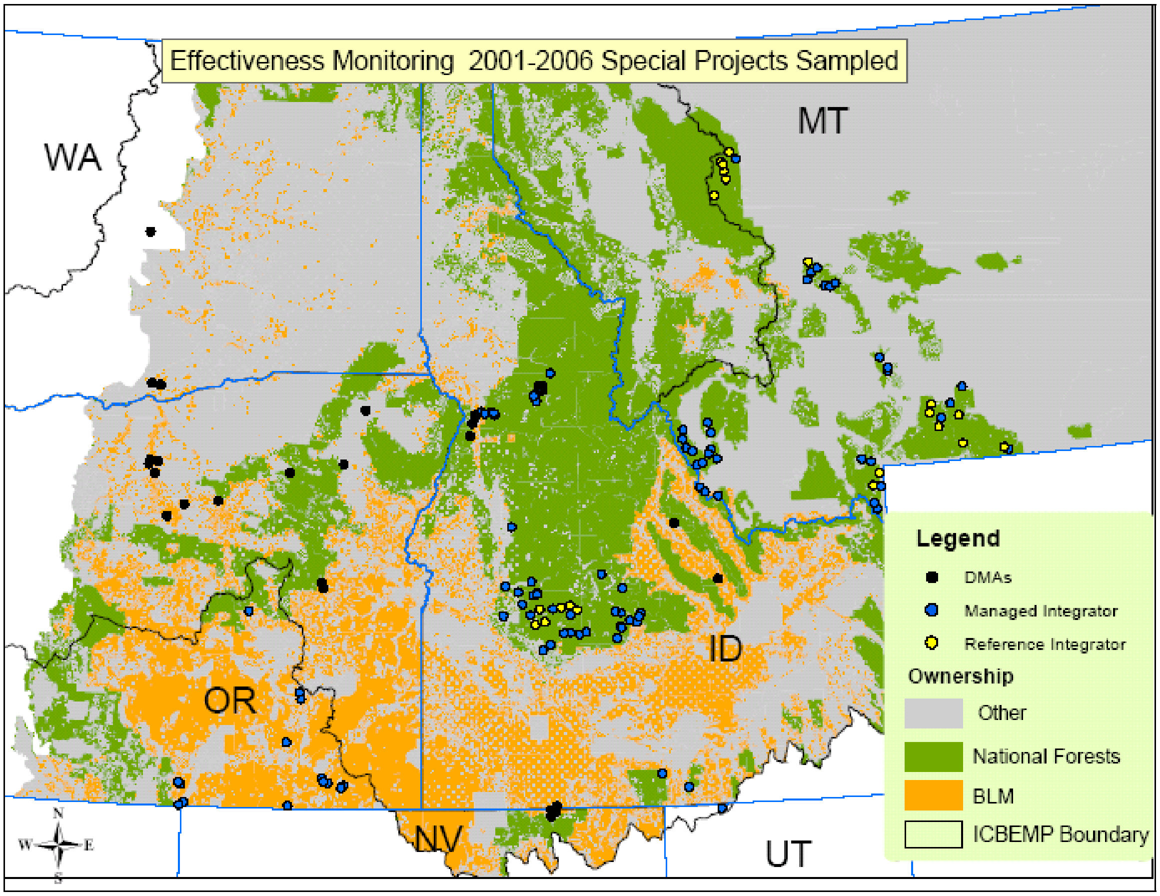


Figure 6. Integrator and DMA special project sites sampled 2001 through 2006.

Table 6. Summary of all PIBO EMP special project sites (sample locations) sampled by Forest Service Region, Forest, District, and by ID and OR-WA BLM by District and Field Office or Resource Area from 2001 through 2006. The number of sites sampled in 2006 is in parentheses.

			Site type		
Region	Forest	District	Integrator Managed	Integrator Reference	DMA
1	Beaverhead-Deerlodge	Wisdom	5 (5)	0	0
		Dillon	9 (9)	0	0
	Custer	Beartooth	1 (1)	3 (3)	0
		Sioux	1 (1)	0	0
	Gallatin	Big Timber	2 (2)	4 (4)	0
		Bozeman	3 (3)	0	0
		Hebgen Lake	6 (6)	1 (1)	0
	Helena	Helena	3 (3)	1 (1)	0
		Townsend	3 (3)	0	0
	Lewis & Clark	Rocky Mountain	1 (1)	6 (6)	0
	Nez Perce	Moose Creek	1 (0)	0	0
		Red River	5 (1)	0	0
		Salmon River	8 (0)	0	3 (0)
4	Boise	Cascade	1 (1)	0	0
		Idaho City	7 (0)	2 (0)	0
		Lowman	3 (3)	0	0
		Mountain Home	3 (3)	2 (0)	0
	Sawtooth	Fairfield	4 (0)	0	0
		Ketchum	8 (5)	0	0
		Minidoka	3 (1)	0	0
		SNRA	4 (2)	2 (0)	0
ID BLM	Coeur dAlene	Cottonwood	0	0	4 (0)
	Idaho Falls	Challis	0	0	1 (0)
		Upper Snake	0	0	1 (0)
	Twin Falls	Jarbidge	0	0	5 (0)
OR-WA BLM	Burns	Three Rivers	4 (0)	0	0
		Andrews	1 (0)	0	0
	Lakeview	Lakeview	4 (0)	0	0
	Prineville	Central Oregon Resource Area	0	0	7 (7)
	Spokane	Wenatchee	0	0	4 (4)
	Vale	Vale	0	0	3 (3)
		Jordan	5 (0)	0	0
		Baker	0	0	2 (2)

SUMMARIZED DATA

This annual report provides the summarized data collected by the PIBO monitoring program. There are no rigorous statistical analyses presented here, but some analyses can be found in papers listed in the “Publications” section of this document. The data presented here describe the current status or baseline condition for each attribute measured. This report also graphically displays the results for most variables using box and whisker plots (Figures 7 through 15). Plots were constructed for integrator managed, integrator reference and grazing DMA sub-watersheds using data from all reaches within a region and then separately for each Forest, BLM State Office, and BLM District. Grazing DMA plots were not constructed for Region 1 due to low sample sizes. Box-Plots show the distribution of the data by depicting the median, first and third quartile (25^{th} and 75^{th} percentile) and the 10^{th} and 90^{th} percentile of the data.

We stress that samples sizes in some field units are low, so the plots should be interpreted with caution. Data summary tables are provided in Appendix B, which display all summary variables for each reach. The reaches are grouped by Forest Service District and BLM Field Office/Resource Area.

PACFISH / INFISH Comparisons - Reach data were summarized for comparisons with seven PACFISH / INFISH Riparian Management Objectives (RMOs; PACFISH 1994). Pools per mile and wetted width to depth ratios were calculated for all reaches, except for those that were sampled dry. Bank stability and lower bank angle (percent undercut banks) were compared for meadow reaches. We defined “meadow” as having less than five pieces of large wood per 100 m of stream length and “wooded” reaches as having five or more pieces of large wood per 100 m. We defined large wood for this criterion as having a minimum size of 3 m in length and 0.1 m in width, which includes smaller pieces than the RMOs large wood criteria. Therefore, while a reach may be classified as “wooded”, no wood under the RMO classification may occur. The number of large wood pieces per mile as defined in the PACFISH and INFISH documents was compared for wooded reaches. Water temperature data were summarized for reaches using the 7-day moving average maximum temperature (AMT). We report the number of days for which the AMT was higher than 15.5° C and 17.8° C.

Website - One of our primary goals is to provide the information that we collect to the field units as quickly as possible. In past years this has been in the form of annual reports delivered during our spring meetings with the field units (February to April). In response to comments from many of you, we have developed a website where all summary information, original data, and associated metadata can be viewed and downloaded. We hope this will provide a quick and convenient approach to access this information. The latest information will be posted by May of the following year and reach photos with reach description pages will also be available within the next year. We will be refining the website throughout 2007, so please send us suggestions on how to modify or improve it. The information can be accessed from our website at: http://www.fs.fed.us/biology/fishecology/emp.

Reach Summary Graphs

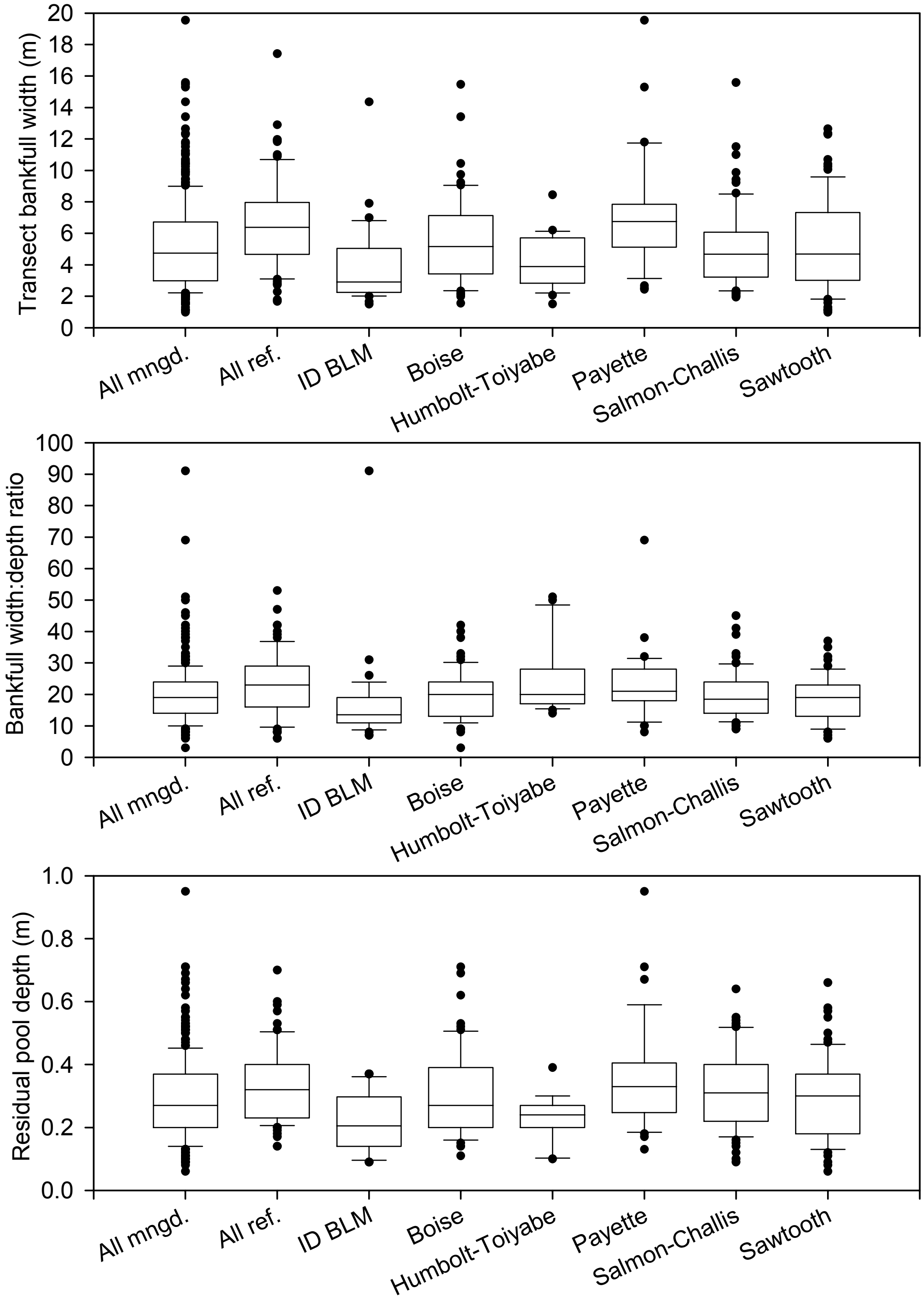


Figure 7. Box-whisker plots for all managed (Mngd.) and reference (Ref.) integrator reaches in Region 4 and Idaho BLM, and all managed reaches by National Forest and Idaho BLM. Average of transect bankfull widths (top), average bankfull width:depth ratio (middle), and average residual pool depth (bottom).

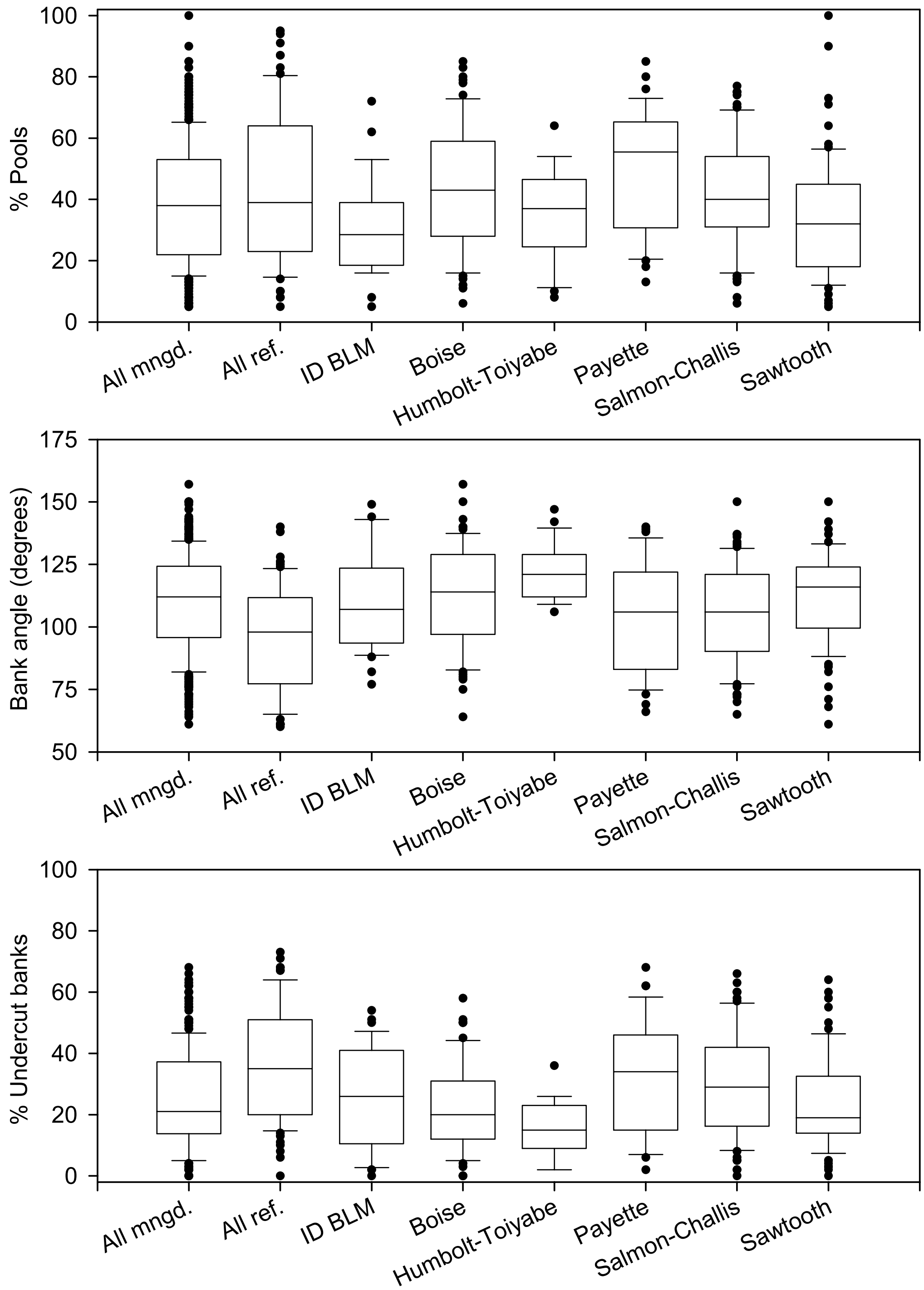


Figure 8. Box-whisker plots for all managed (Mngd.) and reference (Ref.) integrator reaches in Region 4 and Idaho BLM, and all managed reaches by National Forest and Idaho BLM. Percent of the reach containing pools (top), average bank angle (middle), and percent undercut banks (bottom).

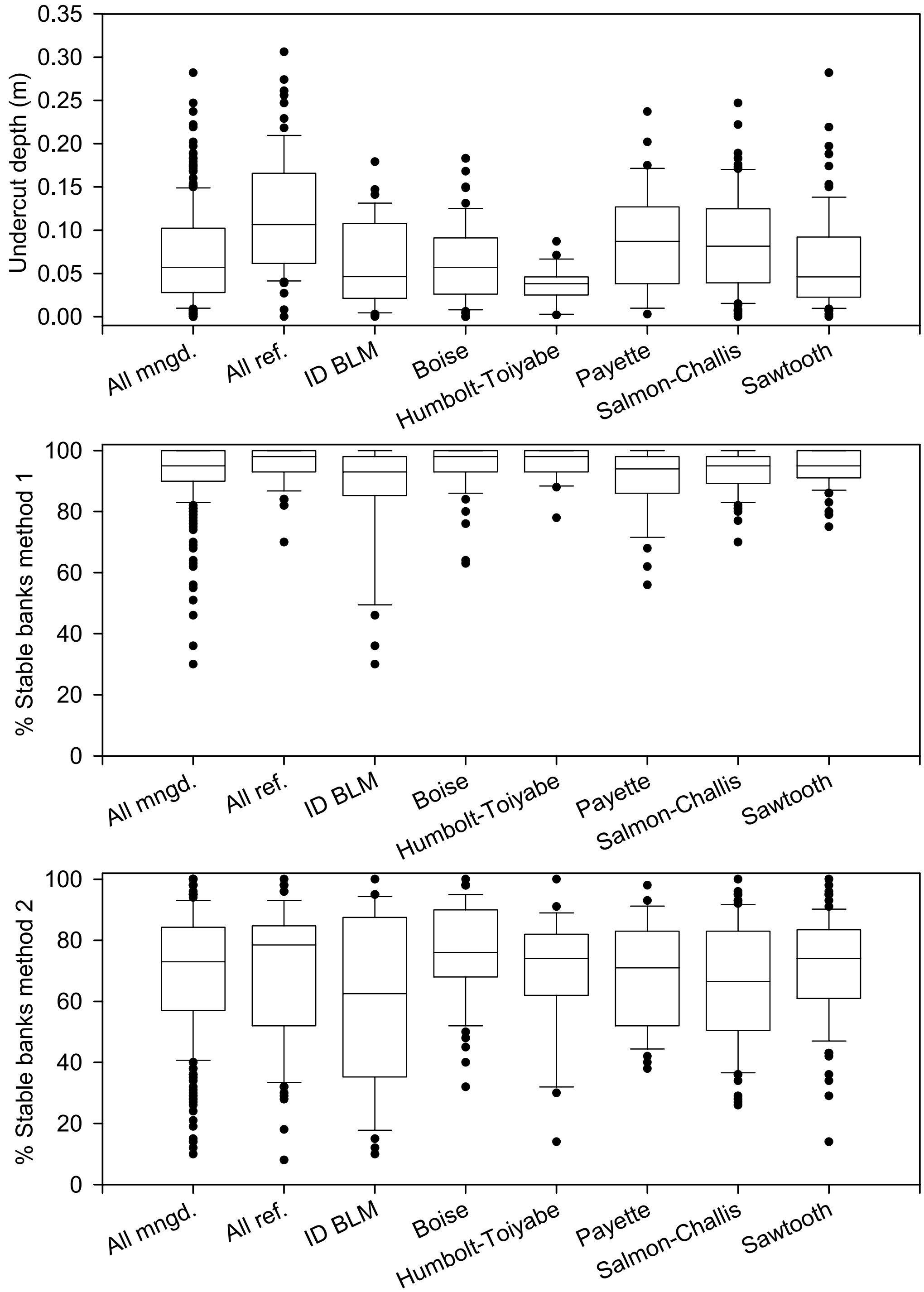


Figure 9. Box-whisker plots for all managed (Mngd.) and reference (Ref.) integrator reaches in Region 4 and Idaho BLM, and all managed reaches by National Forest and Idaho BLM. Average depth of undercut banks (top), percent stable banks method 1 (middle), and percent stable banks method 2 (bottom).

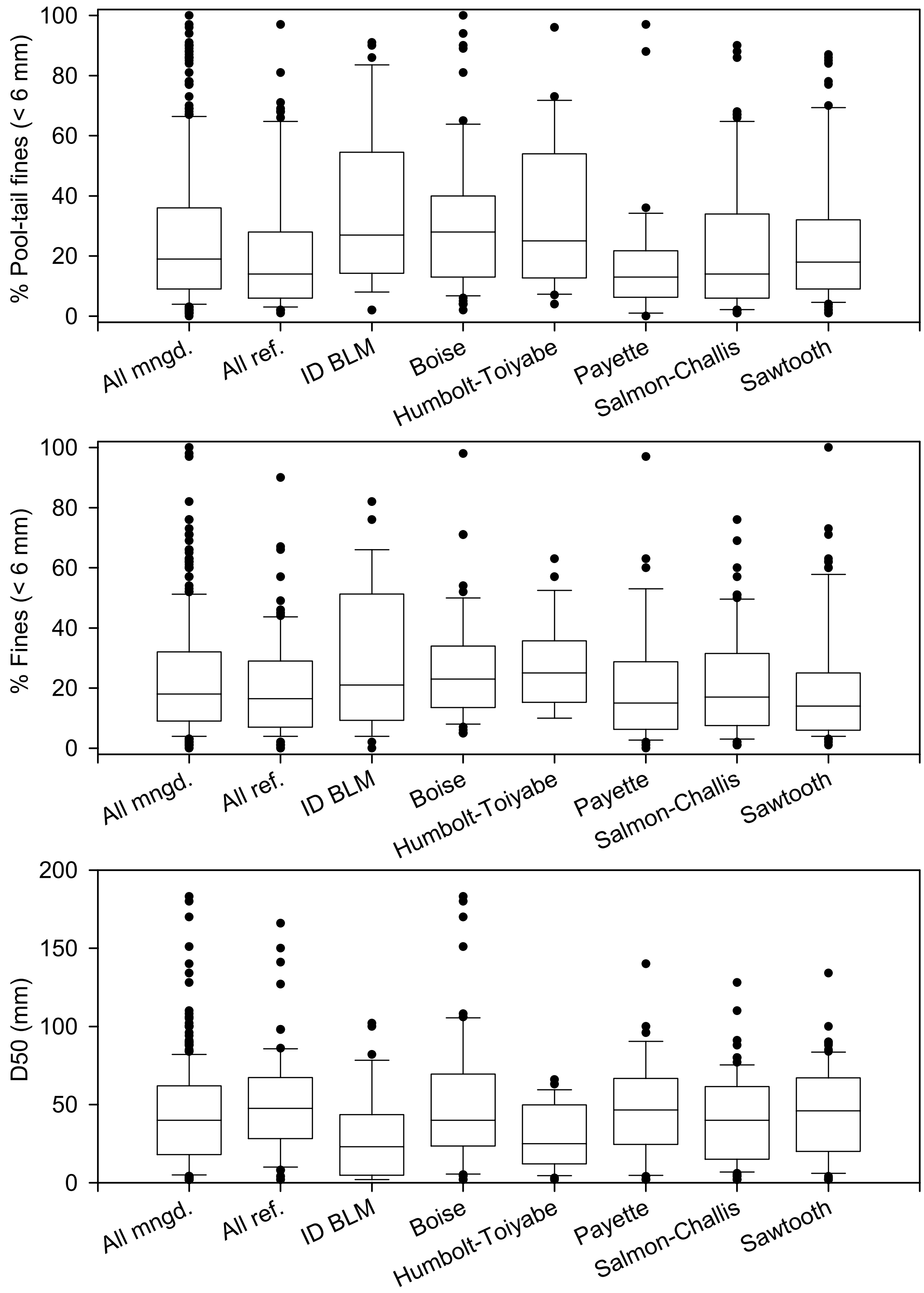


Figure 10. Box-whisker plots for all managed (Mngd.) and reference (Ref.) integrator reaches in Region 4 and Idaho BLM, and all managed reaches by National Forest and Idaho BLM. Percent pool-tail fines <6 mm (top), percent fines <6 mm (middle), and median particle size (bottom).

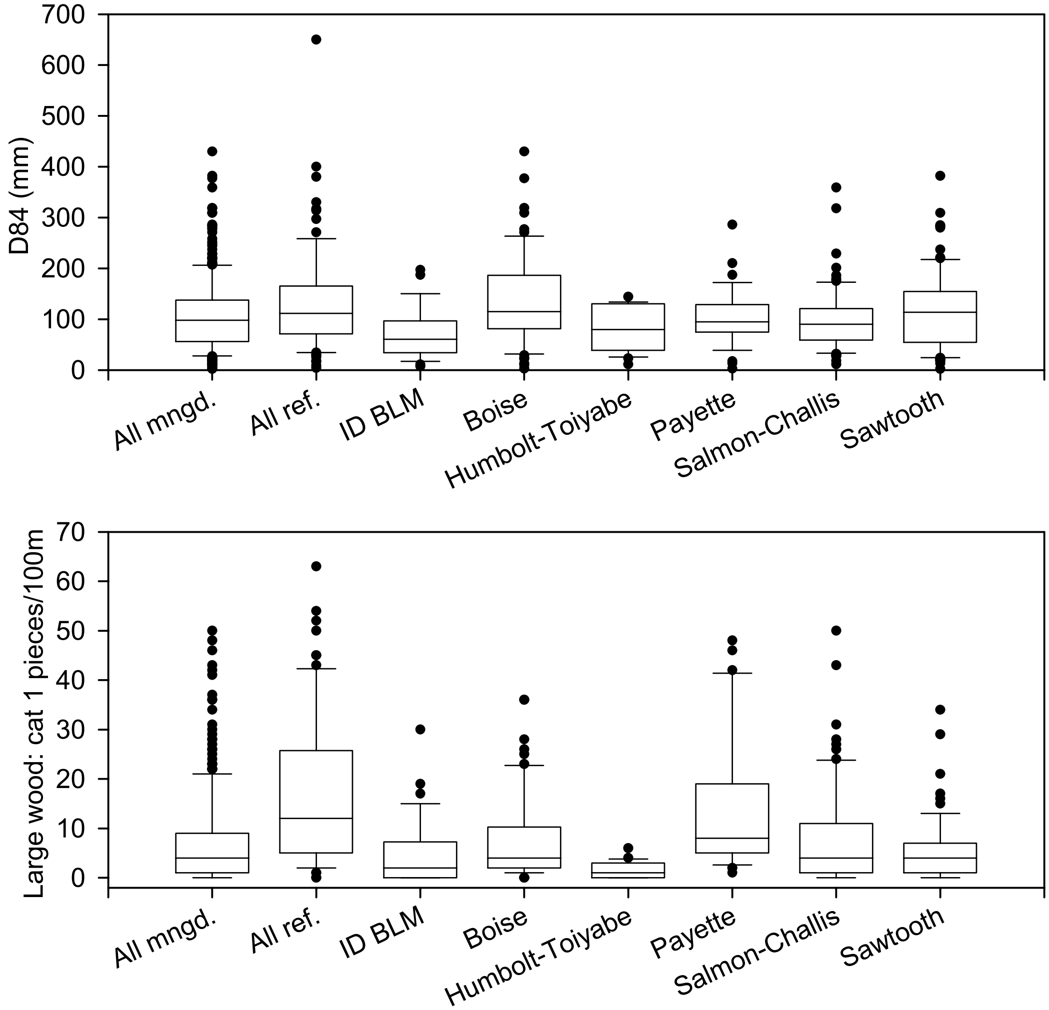


Figure 11. Box-whisker plots for all managed (Mngd.) and reference (Ref.) integrator reaches in Region 4 and Idaho BLM, and all managed reaches by National Forest and Idaho BLM. Eighty fourth percentile particle size (top) and pieces of category 1 large wood (length ≥3 m, diameter ≥0.1 m) per 100 m (bottom).

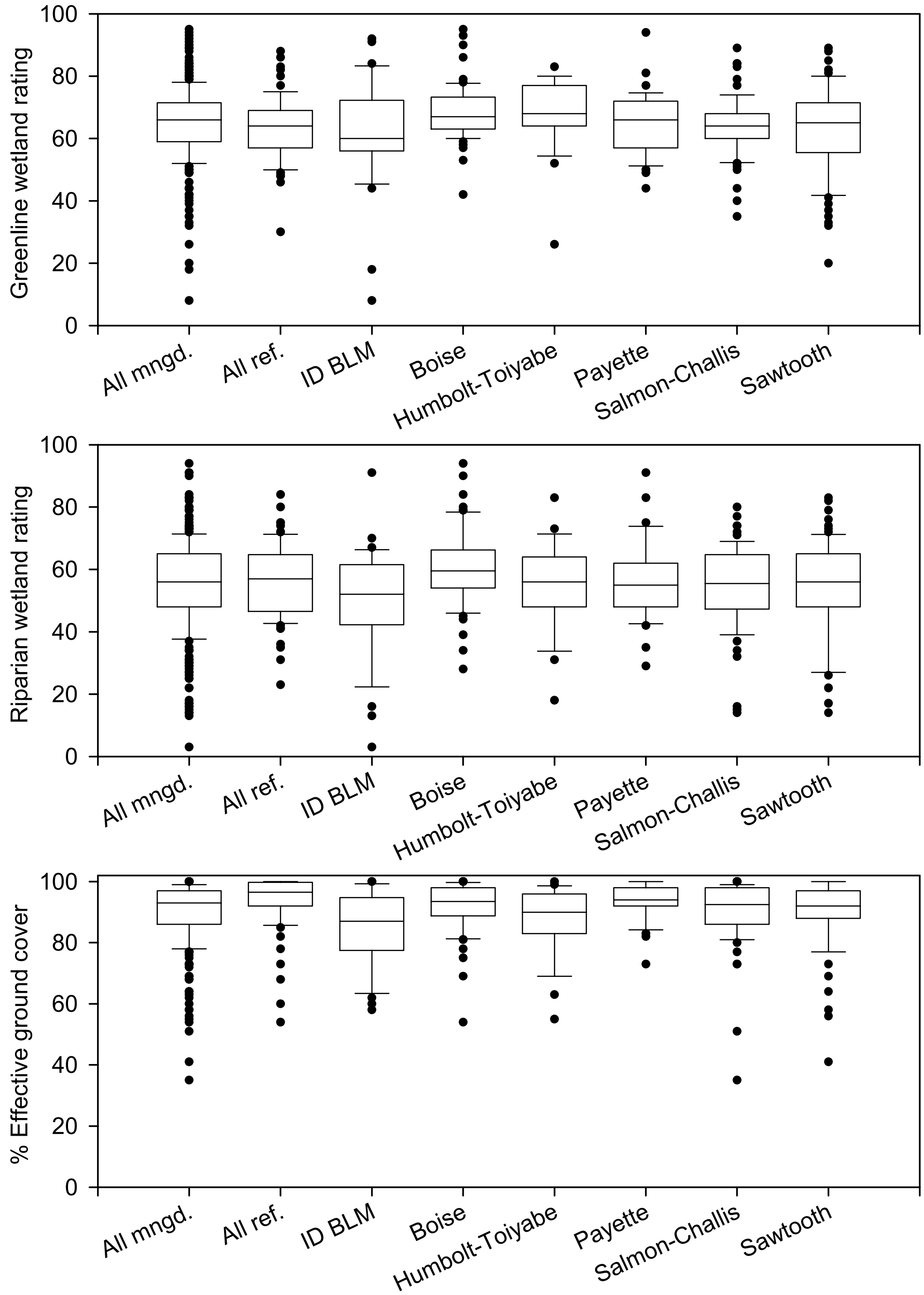


Figure 12. Box-whisker plots for all managed (Mngd.) and reference (Ref.) integrator reaches in Region 4 and Idaho BLM, and all managed reaches by National Forest and Idaho BLM. Greenline wetland rating (top), riparian wetland rating (middle), and percent effective ground cover (bottom).

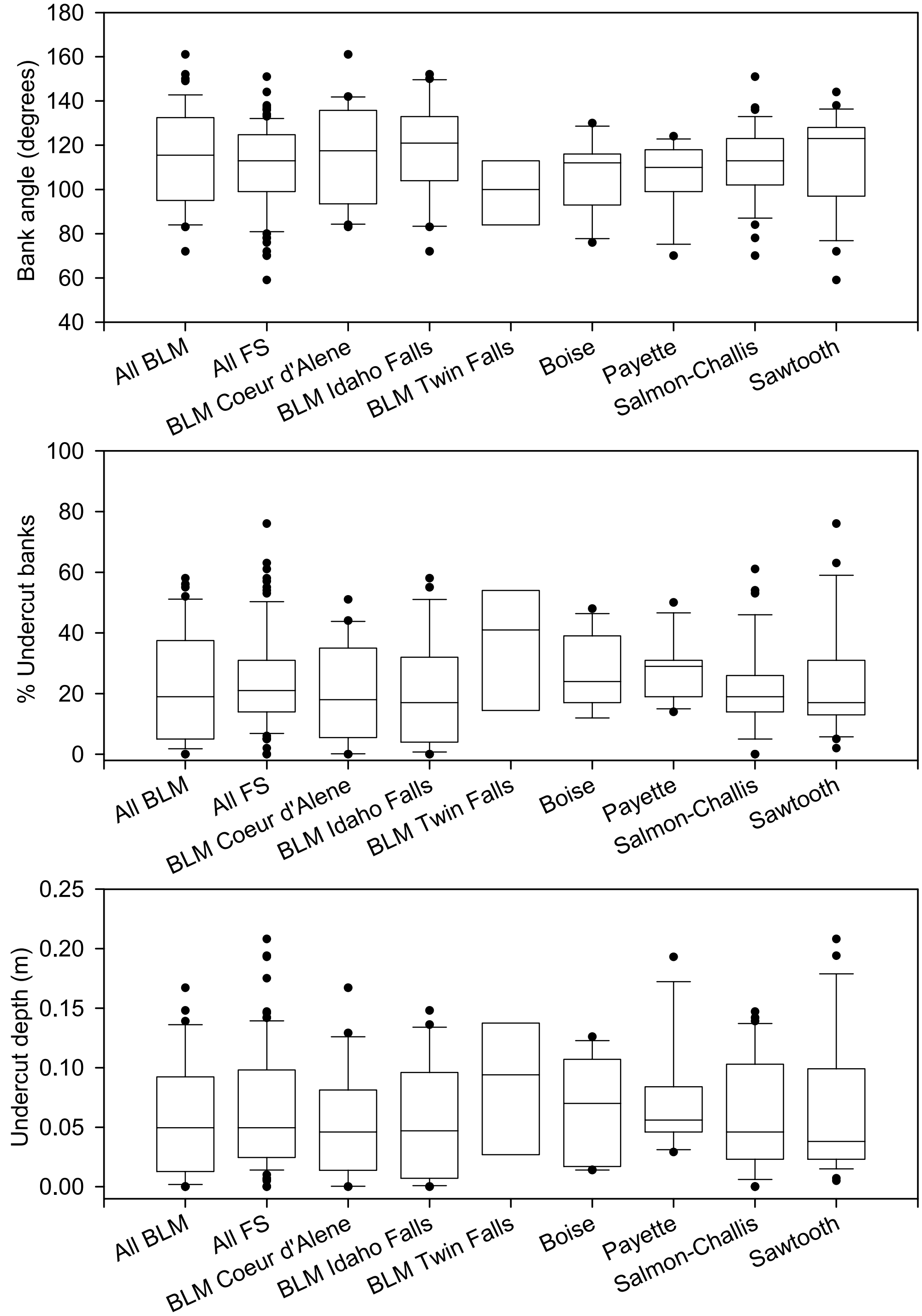


Figure 13. Box-whisker plots for DMA reaches in Idaho BLM (all BLM) and Forest Service Region 4 (All FS) by BLM District and National Forest. Average bank angle (top), percent undercut banks (middle), and average depth of undercut banks (bottom).

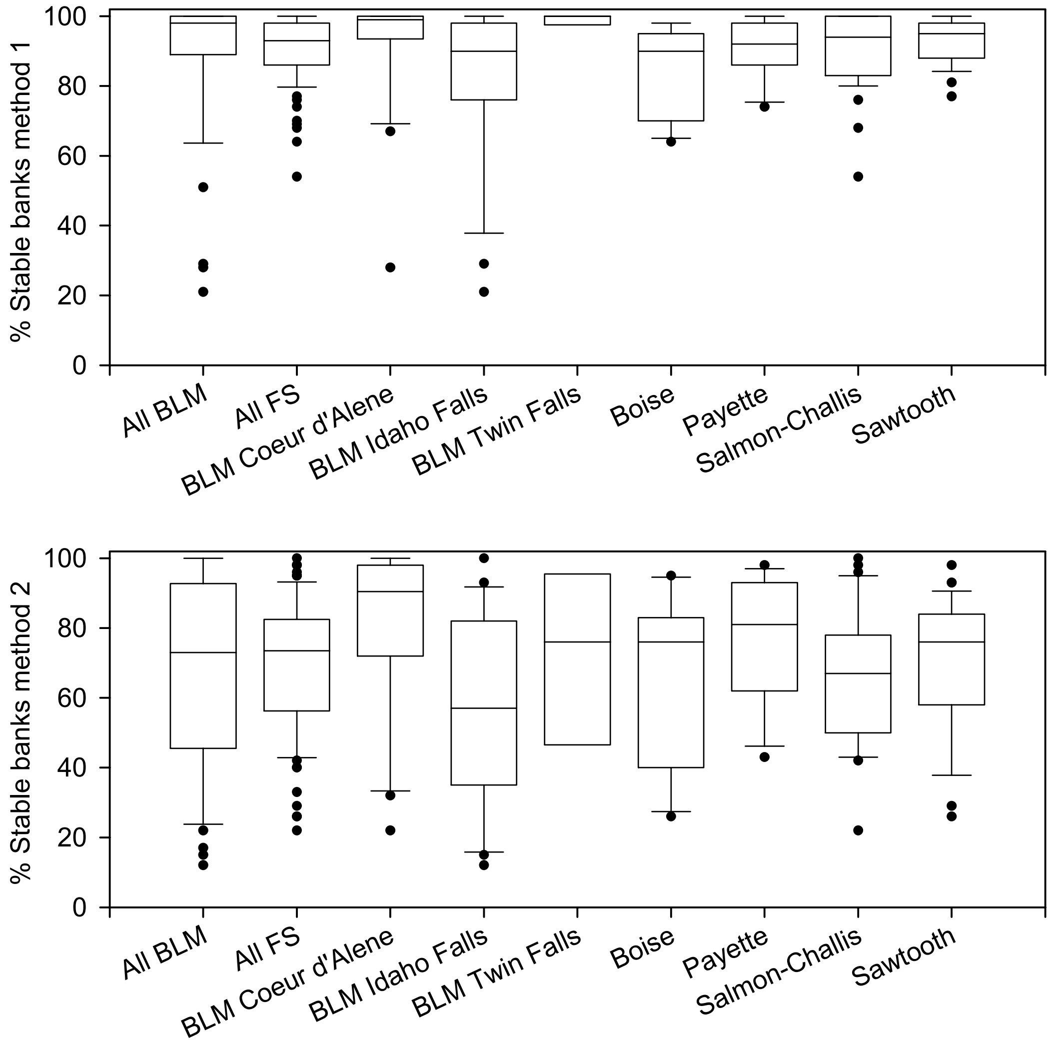


Figure 14. Box-whisker plots for DMA reaches in Idaho BLM (All BLM) and Forest Service Region 4 (All FS) by BLM District and National Forest. Percent stable banks method 1 (top) and percent stable banks method 2 (bottom).

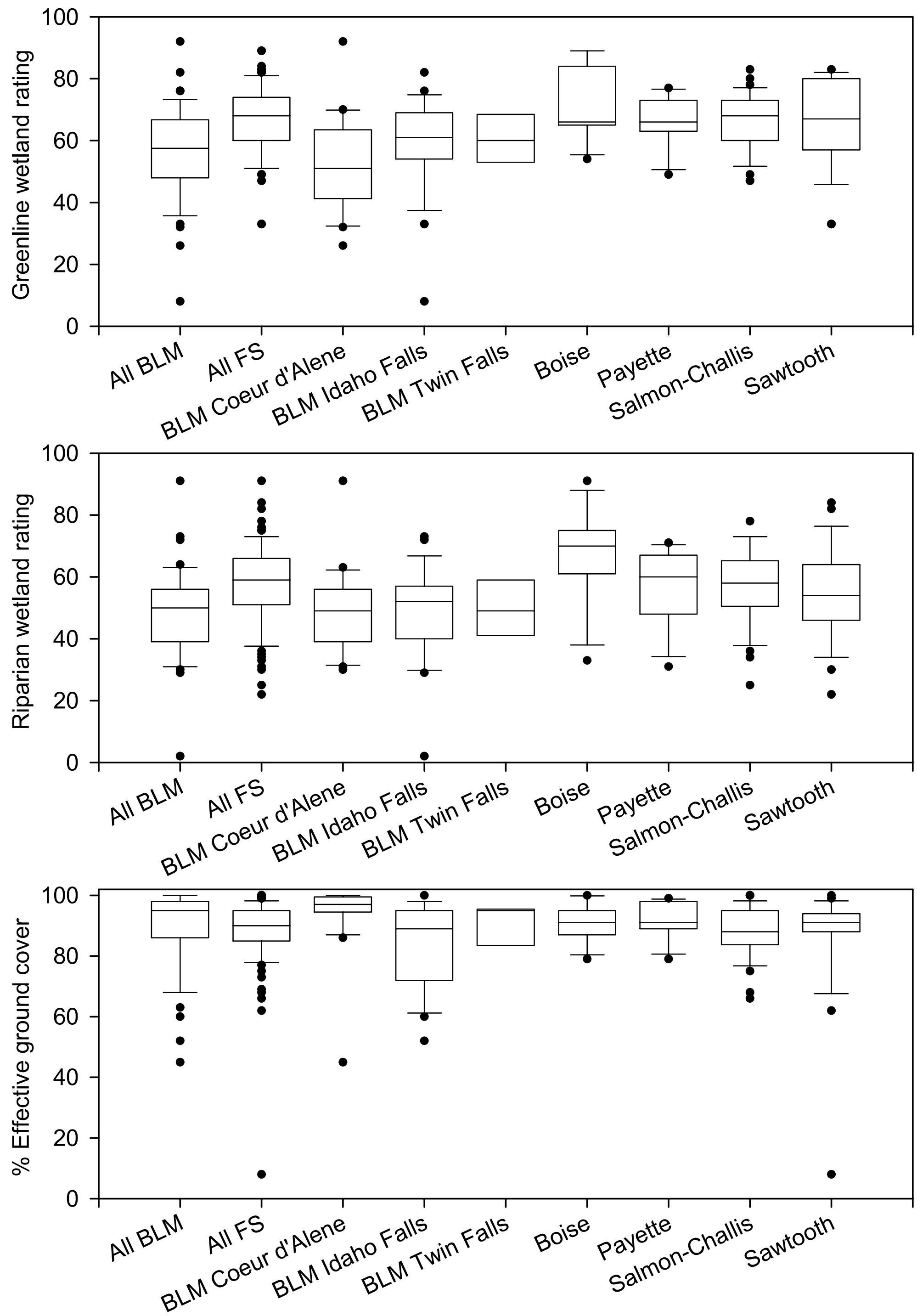


Figure 15. Box-whisker plots for DMA reaches in Idaho BLM (All BLM) and Forest Service Region 4 (All FS) by BLM District and National Forest. Greenline wetland rating (top), riparian wetland rating (middle), and percent effective ground cover (bottom).

PUBLICATIONS

The PIBO EM program, and associated scientists and graduate students have produced numerous publications to disseminate results to personnel of land management and regulatory agencies, other monitoring programs, and the scientific community. As of December 2006, 10 articles have been published and two are in review or in press.

The PIBO monitoring plan outlines the foundation and design of the program:

- Guide to effective monitoring of aquatic and riparian resources. (Kershner et al. 2004a)

Other articles focus on efforts to assess observer variability in sampling methods:

- Testing common stream sampling methods for broad-scale, long-term monitoring. (Archer et al. 2004)
- Repeatability of riparian vegetation sampling methods: how useful are these techniques for broad-scale, long-term monitoring? (Coles-Ritchie et al. 2004)
- An evaluation of physical habitat attributes used to monitor streams. (Roper et al. 2002)

Sources of variability associated with particle counts:

- Sources of variability of pebble counts: their potential influence on the results of stream monitoring programs. (Olsen et al. 2005)

Evaluations of riparian vegetation data:

- Evaluation of riparian vegetation data and associated sampling techniques. (Coles-Ritchie 2005)
- A wetland rating system for evaluation riparian vegetation. (Coles-Ritchie et al. in press)

Comparisons of different sampling methods:

- Comparison of USFS and EPA stream protocol methodologies and observer precision for physical habitat on Oregon and Idaho streams (Whitacre 2004)
- Comparison of three streambank alteration assessment methods (Heitke et al. submitted)

The benefits of sampling permanent sites:

- The value of using permanent sites when evaluation stream attributes at the reach scale. (Roper et al. 2003)

Comparison of physical habitat attributes at managed and reference reaches:

- An analysis of stream habitat conditions in reference and managed watersheds on some federal lands within the Columbia Basin (Kershner et al. 2004b).

A "Seven-Year Status Report" provides an overview of the program and summarizes accomplishments from 1998 through 2004:

- PACFISH/INFISH Biological Opinion (PIBO): Effectiveness monitoring program seven-year status report 1998 through 2004. (Henderson et al. 2005)

All publications are included on the accompanying CD and our website http://www.fs.fed.us/biology/fishecology/emp.

PIBO Reports

Coles-Ritchie, M. C. 2005. Effectiveness monitoring for streams and riparian areas: sampling protocol for riparian vegetation parameters. Unpublished paper at: http://www.fs.fed.us/biology/fishecology/emp. 30 p.

Dugaw, D. D.; Heitke, J. D.; Archer, E. K.; Henderson, R. C.; Kershner, J. L. 2005. Effectiveness monitoring for streams and riparian areas: sampling protocol for stream channel parameters. Unpublished paper at: http://www.fs.fed.us/biology/fishecology/emp. 72 p.

Dugaw, D. D.; Heitke, J. D.; Kliewer, G.; Bouwes, B. B. 2004. Effectiveness monitoring program for streams and riparian areas within the upper Columbia River basin: annual summary reports. Unpublished reports at: http://www.fs.fed.us/biology/fishecology/emp. 30 p.

Heitke, J. D.; Archer, E. J.; Kliewer, G.; Bouwes, B. B. 2005. Effectiveness monitoring program for streams and riparian areas within the upper Columbia River basin: annual summary reports. Unpublished reports at: http://www.fs.fed.us/biology/fishecology/emp. 50 p.

Presentations

Archer, E. K.; Bouwes, B. B. 2005. Over 30 presentations were given to individual National Forests and BLM Resource Areas. Presentations provided an overview of the program, presented data from previous years, answered field unit questions, and facilitated distribution of annual reports.

Coles-Ritchie, M. C. 2005. Vegetation and streambanks. American Waters Resources Association. Seattle, WA.

Coles-Ritchie, M. C. 2005. Assessment of plant identification accuracy and implications for riparian monitoring. Ecological Society of American. Montreal, Canada.

Coles-Ritchie, M. C.; Henderson, R. H. 2005. Riparian vegetation sampling methods & comparison of streambank alteration assessment methods. Forest Service Region 6 Annual Range Managers Meeting. Pendleton, OR.

Henderson, R. C. 2005. Understanding annual variability in stream habitat attributes. Statistics for Aquatic Monitoring, Corvallis, OR.

Henderson, R. C. 2005. Large scale monitoring programs and the Clean Water Act. Forest Service Regional Hydrologist Meeting. Biloxi, MS.

Henderson, R. C. 2005. Procedural and design methods to monitor habitat gains. BLM Aquatic habitat restoration and enhancement. Eugene, OR

Henderson, R. C. 2005. PIBO effectiveness monitoring program and the Sawtooth NF. Sawtooth National Forest leadership team. Ketchum, ID.

Henderson, R. C. 2005. Selecting attributes and design questions for aquatic and riparian monitoring. Bonneville and Colorado River cutthroat trout coordination team. Salt Lake City, UT.

Henderson, R. C. 2004. Can sampling methods adequately detect changes in resource conditions. North Pacific International Chapter American Fisheries Society. Stevenson, WA.

Henderson, R. C. 2004. Working towards common habitat sampling protocols. North Pacific International Chapter American Fisheries Society. Stevenson, WA.

Henderson, R. C.; Heitke, J. 2005. Comparison of streambank alteration methods 03 & 04. Montana Chapter American Fisheries Society annual meeting. Missoula, MT.

Trainings

Coles-Ritchie, M. C. 2005. Riparian ecology and management. Course at Utah State University. Logan, UT.

Coles-Ritchie, M. C. 2005. PIBO vegetation sampling methods. Beaverhead-Deerlodge National Forest. Dillion, MT.

Archer, E. K.; Coles-Ritchie, M. C.; Heitke, J. D.; Dugaw, D. D. 2005. PIBO stream and vegetation sampling methods. Forest Service Region 1 Aquatic and Ecological Unit Inventory team. Helena, MT.

Henderson, R. C. 2005. Procedural and design methods to monitor habitat gains. BLM Aquatic habitat restoration and enhancement. Eugene, OR.

Henderson, R. C. 2005. Large scale monitoring designs and issues. Forest Service Region 1 monitoring workshop. Missoula, MT.

REFERENCES

Archer, E. K.; Roper, B. B.; Henderson, R. C.; Kershner, J. L.; Mellison, S. C. 2004. Testing common stream sampling methods: how useful are these techniques for broad-scale, long-term monitoring? Gen. Tech. Rep. RMRS-GTR-122. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 15 p.

Bauer, S. B.; Burton, T. A. 1993. Monitoring protocols to evaluate water quality effects of grazing management on Western rangeland streams. EPA 910/R-9-93-017. Seattle, WA: U.S. Environmental Protection Agency, Water Division, Surface Water Branch, Region 10. 179 p.

Coles-Ritchie, M. C. 2005. Evaluation of riparian vegetation data and associated sampling techniques. Logan: Utah State University: 183 p. Dissertation.

Coles-Ritchie, M. C.; Henderson, R. C.; Archer, E. K.; Kennedy, C.; Kershner, J. L. 2004. Repeatability of riparian vegetation sampling methods: how useful are these techniques for broad-scale, long-term monitoring? Gen. Tech. Rep. RMRS-GTR-138. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 18 p.

Coles-Ritchie, M. C.; Roberts, D. W.; Kershner, J. L.; Henderson, R. C. [In press]. A wetland index for evaluating riparian vegetation. Journal of the American Water Resources Association.

Cowley, E. R. and T. A. Burton. 2005. Monitoring Streambanks and Riparian Vegetation – Multiple Indicators. Tech. Bull. No. 2005-002. USDI, BLM, Idaho State Office. Boise, ID.

Harrelson, C. C.; Rawlins, C. L.; Potyondy, J. P. 1994. Stream channel reference sites: an illustrated guide to field techniques. Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experimental Station. 61 p.

Hansen, P.L.; Pfister, R.D.; Boggs, K.; Cook, B.J.; Joy, J.; and Hinckley, D.K. 1995. Classification and Management of Montana's Riparian and Wetland Sites. University of Montana School of Forestry, Missoula, Montana.

Hawkins, C.P.; Ostermiller, J.; Vinson, M.; Stevenson, R.J.; Olsen, J. 2003. Stream algae, invertebrate, and environmental sampling associated with biological water quality assessments: filed protocols. Department of Aquatic, Watershed, and Earth Resources, Utah State University, Logan, UT 84322-5210.

Heitke, J. D.; Henderson, R. C.; Roper, B. B.; Archer, E. K. (submitted). Comparison of three streambank alteration assessment methods. Journal of Rangeland Ecology and Management.

Henderson, R. H.; Archer, E. K.; Bouwes, B. A.; Coles-Ritchie, M. C.; Kershner, J. L. 2005. PACFISH/INFISH Biological Opinion (PIBO): Effectiveness monitoring program seven-year status report 1998 through 2004. Gen. Tech. Rep. RMRS-GTR-162. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 16 p.

Karr, J. R.; Chu, E. W. 1997. Biological monitoring: essential foundation for ecological risk assessment. Human and Ecological Risk Assessment. 3(6): 993-1004.

Kauffman, J. B.; Krueger, W. C.; Vavra, M. 1983. Impacts of cattle on stream banks in northeastern Oregon. Journal of Range Management: 36(6): 683-691.

Kaufmann, P. R., P. Levine, E. G. Robison, C. Seeliger, and D. V. Peck, 1999. Quantifying Physical Habitat in Wadable Streams. EPA/620/R-99/003, U.S. Environmental Protection Agency, Washington D.C.

Kershner, J. L.; Archer, E. K.; Coles-Ritchie, M. C.; Cowley, E. R.; Henderson, R. C.; Kratz, K.; Quimby, C. M.; Turner, D. L.; Ulmer, D. L.; Vinson, M. R. 2004a. Guide to effective monitoring of aquatic and riparian resources. Gen. Tech. Rep. RMRS-GTR-121. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 57 p.

Kershner, J. L.; Bouwes, N.; Roper, B. B.; Henderson, R. C. 2004b. An analysis of stream habitat conditions in reference and managed watersheds on some federal lands within the Columbia basin. North American Journal of Fisheries Management. 24(4): 1363–1375.

Lazorchak, J. M.; Klemm, D. J.; Peck, D. V. 1998. Environmental monitoring and assessment program – surface waters: field operations and methods for measuring ecological condition of wadeable streams. EPA/620/R-94/004F. Washington, DC: U.S. Environmental Protection Agency.

Lisle, T. E. 1987. Using “residual depths” to monitor pool depths independently of discharge. Res. Note PSW-394. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station. 4 p.

Meyers, T. J.; Swanson, J. 1991. Aquatic habitat condition index, stream type, and livestock bank damage in Northern Nevada. Water Resources Bulletin. 27(4): 667-677.

Meyers, T. J.; Swanson, J. 1992. Variation of stream stability with stream type and livestock bank damage in Northern Nevada. Water Resources Bulletin. 28(4): 743-754.

Montgomery, D. R.; MacDonald, L. H. 2002. Diagnostic approach to stream channel assessment and monitoring. Journal of the American Water Resources Association. 38: 1-16.

Mulder, B. S.; Noon, B. R.; Spies, T. A.; Raphael, M. G.; Palmer, C. J.; Olsen, A. R.; Reeves, G. H.; Welsh, H. H. 1999. The strategy and design of the Effectiveness Monitoring Program for the Northwest Forest Plan. Gen. Tech. Rep. PNW-GTR-437. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Station. 61p.

Olsen, D. S.; Roper, B. B.; Kershner, J. L.; Henderson, R. C. Archer, E. K. 2005. Sources of variability in conducting pebble counts: Their potential influence on the results of stream monitoring programs. Journal of the American Water Resources Association 41(5): 1225-1236.

Overton, C. K.; Wollrab, S. P.; Roberts, B. C.; Radko, M. A.; 1997. R1/R4 (Northern and Intermountain regions) fish and fish habitat standard inventory procedures handbook. Gen. Tech. Rep. INT-GTR-346. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 142p.

PACFISH (Pacific Anadromous Fisheries Habitat), U.S. Forest Service and U.S. Bureau of Land Management. 1994. Environmental assessment for the implementation of interim strategies for managing anadromous fish-producing watersheds in Eastern Oregon, Washington, Idaho, and portions of California. Washington, D.C: U.S. Department of Agriculture, Forest Service. 68p.

Platts, W. S.; Nelson, R. L.; Casey, O.; Crispin, V. 1983. Riparian stream habitat conditions on Tabor Creek, Nevada, under grazed and ungrazed conditions. Proceedings of the Annual Conference Western Association of Fish and Wildlife Agencies 63: 162-174.

Platts, W.S.; Armour, C.; Booth, G. D.; Bryant, M.; Bufford, J. L.; Cuplin, P.; Jensen, S.; Lienkaemper, G. W.; Minshall, G. W.; Monsen, S. P.; Nelson, R. L.; Sedell, J. R.; Tuhy, J. S. 1987. Methods for evaluating riparian habitats with applications to management. Gen. Tech. Rep. INT-221. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 177p.

Quigley, T. M.; Arbelbide, S. J. (tech. Eds) 1997. An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-405. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 4 vol.

Reed Jr., P. B. 1996. Draft revision of 1988 national list of plant species that occur in wetlands: national summary. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service. 215p.

Rice, P.M. . INVADERS Database System (http://invader.dbs.umt.edu). Division of Biological Sciences, University of Montana, Missoula, MT 59812-4824.

Roper, B. B.; Kershner, J. L.; Archer, E. K.; Henderson, R. C.; Bouwes, N. 2002. An evaluation of physical stream habitat attributes used to monitor streams. Journal of the American Water Resources Association. 38: 1637-1646.

Roper, B. B.; Kershner, J. L.; Henderson, R. C. 2003. The value of using permanent sites when evaluating steam attributes at the reach scale. Journal of Freshwater Ecology 18(4): 585-592.

Rosgen, D. L. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, CO.

Stevens, D. L. 1997. Variable density grid-based sampling designs for continuous spatial populations. Environmetrics 8:167-195.

U.S. Department of Agriculture, Forest Service. 1976. National Forest Management Act (NFMA).

U.S. Department of Agriculture, Forest Service, Region 5. 1998. R5 SCI Stream Condition Inventory Guidebook. Version 4.0.

Whitacre, H. 2004. Comparison of USFS and EPA stream protocol methodologies and observer precision for physical habitat on Oregon and Idaho streams. Logan, UT. Utah State University: 72p. M.S. Thesis.

Wingett, R. N.; Magnum, F. A. 1979. Biotic condition index: integrated biological, physical, and chemical parameters for management. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Region.

Winward, A. H. 2000. Monitoring the vegetation resources in riparian areas. Gen. Tech. Rep. RMRS-GTR-47. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 49p.

Wolman, M. G. 1954. A method of sampling coarse riverbed material. Transactions of the American Geophysical Union. 35(6): 951-956.

APPENDIX A – DEFINITIONS OF SUMMARY VARIABLES

REACH DEFINITIONS

Designated monitoring area (DMA) reach - Reach identified by field unit personnel as the location utilized for livestock grazing implementation monitoring.

Integrator reach – downstream-most low-gradient (< 3%) reach within ICBEMP 6^{th} field HUC. Integrator sites are randomly selected and sampled as part of the five-year rotating panel sampling design.

Sentinel reach – One of 50 integrator sites sampled annually.

WATERSHED CHARACTERISTICS

Average precipitation (mm) – Average precipitation (mm) for the sub-watershed as computed by the Interior Columbia Basin Ecosystem Management Project.

Elevation (m) – Integrator site elevation (m). Identified from 1:24000 topographic maps.

FS:BLM ownership (%) – Percent Forest Service and BLM land ownership upstream of integrator reach.

Geology – Primary geology for each sub-watershed upstream of sample reach. The dominant geology was determined by ICBEMP geologic layers, and categorized as sedimentary, metamorphic, granitic, or volcanic.

Management category – Integrator reaches designated as managed or reference. Reference reaches require road densities less than 0.5 km/km^2, riparian road densities less than 0.25 km/km^2, no grazing within 30 years, and no mining upstream of the integrator reach.

Rosgen channel type – Channel type computed from Figure 5-3 Classification Key for Natural Rivers in Applied River Morphology by Dave Rosgen.

Watershed area (km^2) – Total area of watershed upstream of integrator site.

STREAM CHANNEL VARIABLES

Average bank angle (degrees) – Average of all bank angle measurements (degrees).

Average bankfull width (m) – Average of the bankfull widths (m) from the channel cross-sections.

Average transect bankfull width (m) – Average of the bankfull widths (m) measured at each of the 20+ transects.

Average bankfull width:depth ratio – The average ratio of bankfull width / average bankfull depth, for all channel cross-sections. The average bankfull depth was calculated as the (bankfull width / total bankfull area).

Average residual pool depth (m) – Average of the residual pool depths for all pools.

Average undercut depth (m) - Sum of all undercut depths (m) / total number of transects.

Average wetted width:depth ratio (AWR) - The average ratio of wetted width / average water depth, for all channel cross-sections. The average water depth was calculated as the (wetted width / total wetted area).

Bedrock – Particles >4096mm.

Entrenchment ratio – The average of four cross-section entrenchment ratios. The ratio for each cross-section was calculated as valley width at twice maximum bankfull depth / bankfull width.

Gradient (%) – Elevation change of the water surface from the bottom of the reach to the top of the reach divided by the reach length (measured along the thalweg), expressed a percent.

Large wood: category 1 pieces / 100 m (≥3m * 0.1m) – Number of pieces per 100 meters of stream length. This was calculated as the total number of pieces (>3m in length and 0.1m in diameter) divided by the reach length, *100. Some portion of the piece must be within the bankfull channel and below the bankfull elevation.

Large wood: category 1 pieces / 100 m (≥1m * 0.1m) – Number of pieces per 100 meters of stream length. This was calculated as the total number of pieces (>1m in length and 0.1m in width) divided by the reach length, * 100. Some portion of the piece must be within the bankfull channel and below the bankfull elevation.

Large wood: category 1 volume / 100 m (≥1m * 0.1m) – Volume of category 1 pieces in m^3 per 100 meters of stream length.

Large wood: category 1 & 2 pieces / 100 m (≥1m * 0.1m) – Number of pieces per 100 meters of stream length. This was calculated as the total number of pieces (>1m in length and 0.1m in width) divided by the reach length, * 100. Includes all category 1 pieces plus pieces that are within the bankfull channel but above the bankfull elevation (category 2).

Large wood: category 1 & 2 volume / 100 m (≥1m * 0.1m) – Volume of category 1 & 2 pieces in m^3 per 100 meters of stream length.

Pools (%) - Sum of all pool lengths / reach length.

Pools/mile - Total number of pools / reach length * 1609.

Pool-tail fines <2 mm and <6 mm (%) - Percent surface fines for each pool were calculated as the average of (((fines grid 1 / total number of intersections) + (fines grid 2 / total number of intersections) + (fines grid 3 / total number of intersections)) * 100). All four pools were averaged for the reach. Fines were considered, 6 mm for all years except 2001 when this measurement was not conducted. Percent surface fines, 2 mm were also calculated 2003-2004.

Riffle D50 (2001-2003) - The D50 (millimeters) is derived from modified Wolman Pebble Counts. Fifty percent of the substrate particles sampled are less than this size. Values reported without bedrock (particles >4096mm).

Riffle D84 (2001-2003) - The D84 (millimeters) is derived from modified Wolman Pebble Counts. Eighty four percent of the substrate particles sampled are less than this size. Values reported without bedrock (particles >4096mm).

Riffle fines <6 mm (%) – The percentage of particles from modified Wolman Pebble Counts that were < 6 mm. Values reported without bedrock (particles >4096 mm).

Sinuosity – Reach length measured along the thalweg divided by the straight valley length from the bottom of the reach to the top of the reach.

Stable banks method 1 (%) – Each bank stability measurement is rated covered stable, covered unstable, uncovered stable, uncovered unstable, or false bank. The percent stable banks is calculated as (number of covered stable, uncovered stable, and false bank measurements / total number of measurements).

Stable banks method 2 (%) – Method 2 uses the same data as method 1. The percent stable banks is calculated as the (number of covered stable and false bank measurements / total number of measurements). The category uncovered stable is considered unstable using this method.

Transect D50 (2004) - The D50 (millimeters) is derived from modified Wolman Pebble Counts. Fifty percent of the substrate particles sampled are less than this size. Values reported without bedrock (particles >4096mm).

Transect D84 (2004) - The D84 (millimeters) is derived from modified Wolman Pebble Counts. Eighty four percent of the substrate particles sampled are less than this size. Values reported without bedrock (particles >4096mm).

Transect fines <6 mm (%) – The percentage of particles from modified Wolman Pebble Counts that were <6 mm. Values reported without bedrock (particles >4096mm).

Undercut banks (%) - Number of locations with bank angles < 90 degrees and an undercut depth of $\geq$ 5 cm / total number of bank measurements.

Wood/mile - Number of pieces per mile of stream length. This was calculated as the total number of pieces (>11m in length and 0.28m in diameter) divided by the reach length, *1609. Some portion of the piece must be within the bankfull channel.

RIPARIAN VEGETATION

Cross-section weed cover (%) – The percent cover, from the greenline to a distance of 9.5 m, of each species that is listed as a noxious weed as per Rice (2004) for the state where it was observed. Previous to 2003, community type cover data were collected, so information on weeds was not available.

Cross-section wetland rating – A measure of the abundance of obligate wetland species in the riparian area, with 100 indicating all obligate wetland species and 1 being all upland species. The rating is calculated for the reach by summing the product of the average cover of each species and a value corresponding to the species' wetland indicator status (1=upland, 25= facultative upland, 50=facultative, 75=facultative wet, 100=obligate wetland). Data through 2002 were based on a variable riparian width, which included only what was considered riparian, up to a maximum of 27.5 m on each side of the stream. Beginning in 2003 the sample area was a fixed width of 9.5 m on each side of the greenline (including the greenline).

Effective ground cover (%) – The percent of the riparian area (not including the greenline) with effective ground cover, which was defined as live vegetation, rock (> 2.5 cm), or litter. Data were collected along the riparian cross-sections and averaged for the reach. Data through 2002 were based on a variable riparian width, which included only what was considered riparian, up to a maximum of 27.5 m, on each side of the stream. Beginning in 2003 the sample area was a fixed width of 9.5 m on each side of the greenline (excluding the greenline because some bare ground is expected, such as on sand bars).

Greenline weed cover (%) – The percent cover along the greenline, of each species that is listed as a noxious weed, as with the "cross-section weed cover (%)" described above.

Greenline wetland rating – A measure of the abundance of obligate wetland species along the streambank, with 100 indicating all obligate wetland species and 0 being all upland species. The rating is calculated for the reach by summing the product of the average cover of each species and a value corresponding to the species' wetland indicator status (1=upland, 25= facultative upland, 50=facultative, 75=facultative wet, 100=obligate wetland).

Greenline woody cover – The sum of the percent cover of woody species along the greenline. These could be any woody species, such as willows or pines. Previous to 2003, community type cover data were collected, which did not provide accurate information about woody cover.

Large trees (>50 cm DBH) per hectare – The number of trees per hectare with a diameter of greater than 50 cm. This number is an extrapolation of the number of large trees observed at the sample reach within 9.5 m of the greenline (including the greenline). Tree data were collected beginning in 2004.

Live tree basal area (m^2/ha) – The sum of the basal areas (3.14 *[dbh/2]^2) for all live trees (>4 cm DBH) observed within 9.5 m of the greenline (including the greenline), extrapolated to a one hectare area. Tree data were collected beginning in 2004.

Small trees (<50 cm DBH) per hectare – The number of trees per hectare with a diameter between 4 and 50 cm. This number is an extrapolation of the number of small trees observed at the sample reach within 9.5 m of the greenline (including the greenline). Tree data were collected beginning in 2004.

Standing dead basal area (m^2/ha) – The sum of the basal areas (3.14 *[dbh/2]^2) for all dead trees (>4 cm DBH) observed within 9.5 m of the greenline (including the greenline), extrapolated to a one hectare area. Tree data were collected beginning in 2004.

Standing dead per hectare – The number of standing dead trees (>4 cm DBH) per hectare. This number is an extrapolation of the number of dead trees observed at the sample reach within 9.5 m of the greenline (including the greenline). Tree data were collected beginning in 2004.

MACROINVERTEBRATES

Community Tolerance Quotient (CTQd) – This index was developed by Winget and Mangum (1979) and has been widely used by the USFS and BLM throughout the western United States. Taxa are assigned a tolerant quotient from 2 to 108. Taxa assigned low tolerance quotients are found only in high quality unpolluted water and taxa assigned large tolerant quotients are found in severely polluted waters. The CTQd is a dominance weighted community tolerance quotient (CTQd).

Number of clinger taxa – Number of "clinger" taxa. These taxa typically cling to the tops of rocks and may be impacted by sedimentation or abundant algal growths.

Number of Ephemeroptera taxa – Number of mayfly taxa.

Number of intolerant taxa – Number of “intolerant” taxa. The number of intolerant taxa normally declines with decreasing water quality.

Number of long-lived taxa – Number of “long-lived” taxa. Long-lived taxa typically have 2-3 year life cycles and respond negatively to human disturbance.

Number of Plecoptera taxa – Number of stonefly taxa.

Number of Tricoptera taxa – Number of caddisfly taxa.

RIVPACS – Observed taxa at a site / expected taxa for that strata. RIVPACS employs a predictive model that compares the number of macroinvertebrate fauna to be expected in high quality habitat to the number found at a given site. Scores > 0.78 indicate good quality habitat whereas scores < 0.78 indicate poorer quality habitat.

Total OTU (Operational Taxonomic Unit) richness – Total number of taxa collected within a reach. Taxa richness normally decreases with decreasing water quality, although organic enrichment can cause an increase in the number of pollution tolerant taxa.

WATER TEMPERATURE

DAT (Daily average temperature) - The average temperature for each day from July 15th through August 31st (assuming a complete 48 day temperature data set). The number of days that exceed a specific temperature threshold is reported.

DMT (Daily maximum temperature) - The maximum temperature for each day from July 15th through August 31st. The number of days that exceed a specific temperature threshold is reported.

7D-AMT (7-day moving average maximum temperature) - For a particular day, the 7D-AMT is calculated by averaging the maximum temperature for that day with the maximum temperature from the 3 previous, and 3 following days. The number of days that exceed a specific temperature threshold is reported. The 7D-AMT cannot be calculated for the first three days or the last three days of the 48 day period. Therefore, these values are based on a 42 day period.

Water temperature variables and thresholds for individual states are listed below:

Oregon (DEQ) – We report the number of days for which the 7D-AMT was higher than 10.0° C, 12.8° C, and 17.8° C.

Washington (DOE) – We report the number of days where the DMT was above 16° C, 18° C, 21° C, and 22° C.

Idaho (DEQ) – We report the number of days for which the DMT is above 22° C and the DAT above19° C.

Montana (DEQ) – We report the number of days for which the 7D-AMT exceeds 10° C, 15° C, and 21° C.

Nevada (DEP) – We report the number of days for which the DMT is greater than 20° C.

Utah (DEQ) – We report the number of days for which the DMT exceeds 20° C. These data are only presented in the electronic data table 'Summ Table CD State Temp' on the CD provided.

APPENDIX B – REACH SUMMARY TABLES

This section includes data for a particular administrative unit and is provided for those who wish to view PIBO EM data in hard copy fashion. In addition, an excel spreadsheet is included on the accompanying CD, which includes data collected at all PIBO EM sites.

When using the data, it is the responsibility of the reader to understand the limitations of the data imposed by the study design and sampling techniques. Please contact any of the personnel listed on the back page with any comments or questions.

Watershed Characteristics - In past years a variety of variables were computed to help describe the watersheds sampled using existing GIS layers. These include watershed area, percent Federal ownership, stream density, road density, road crossings, elevation, average precipitation, and geology. However, because of inconsistent and changing data layers, the PIBO program has decided to compute all watershed characteristics at one time using consistent layers as they become available. Consequently, this information is incomplete in the tables for this year.

Rosgen Channel type - The reason some values are blank is that for some reaches it was not possible to work them through the Rosgen channel dichotomous key because some values were outside the ranges listed in the key.

Table B-1. Reach summary and watershed condition information for integrator reaches sampled on the Payette 2001 - 2006. In 2005 we used a method to calculate watershed area which has proven to be less reliable than the method used previously. Values derived using the 2005 method have been flagged with an asterisk (*).

Integrator Reaches

Stream	District/Field Office/Resource Area	Reach ID	Group Order	Sample year	ICBEMP HUC code	Geology	Management category	Elevation (m)	Watershed area (km^2)	FS:BLM ownership (%)	Average precipitation (mm)
Big	Council	2360	123-01	2006	170602100403		Managed	1763			884.062
Crooked	Council	1959	130-08	2005	170502010403	Volcanic	Managed	1288	28.1*	100	820.949
Indian	Council	1164	124-09	2003	170502010201	Volcanic	Managed	1036	67.5	88	826.981
Lick	Council	1950	130-01	2005	170502010303	Volcanic	Managed	1452	12.4*	100	1027.119
M.F. Weiser	Council	1211	129-12	2002	170501241402	Volcanic	Managed	1561	38.9	99	1082.237
North Hornet	Council	1952	130-02	2005	170501241003	Volcanic	Managed	1152	1.9*	100	759.62
Rush	Council	1961	130-10	2005	170501240802	Volcanic	Managed	1874	8.5*	100	808.595
Summit Gulch	Council	1956	130-04	2005	170502010301	Volcanic	Managed	1325	11*	100	770.466
Beaver	Krassel	1942	113-07	2005	170602061401	Granitic	Managed	1574	32.8*	100	970.295
Big	Krassel	1941	113-06	2005	170602061302	Volcanic	Managed	1728	24.7*	100	1050.914
Big Ramey	Krassel	1945	113-11	2005	170602061501	Granitic	Reference	1461	91*	91	881.144
Blackmare	Krassel	2352	121-03	2006	170602081006		Reference	1412			1162.292
Cabin	Krassel	1944	113-10	2005	170602061703	Granitic	Managed	1218	33.2*	98	812.603
Cave	Krassel	1940	113-03	2005	170602061603	Granitic	Reference	1264	10.1*	100	736.208
Chamberlain	Krassel	581	087-11	2003	170602071806	Granitic	Reference	1804	69.1	100	1000.736
Cougar	Krassel	1060	121-02	2001	170602081002	Granitic	Reference	1207	39.1	100	1003.305
Cougar	Krassel	2351	121-02	2006	170602081002	Granitic	Reference	1207	39.1		1003.305
Crooked	Krassel	1946	113-12	2005	170602061602	Granitic	Managed	1530	9.4*	100	742.265
Dillinger	Krassel	561	086-04	2001	170602071004	Granitic	Reference	1971	6.5	100	1043.914
Dillinger	Krassel	2281	086-04	2006	170602071004	Granitic	Reference	1971	6.5		1043.914
Dog	Krassel	2279	086-02	2006	170602071802		Reference	1632			843.323
Flossie	Krassel	570	087-03	2003	170602071804	Granitic	Reference	1722	14.7	100	845.565
Fourmile	Krassel	1065	121-05	2001	170602081003	Granitic	Managed	1726	19.9	100	1272.878
Hotspring	Krassel	562	086-06	2001	170602071201	Granitic	Reference	2082	4.5	100	763.714
Hotspring	Krassel	2282	086-06	2006	170602071201	Granitic	Reference	2082	4.5		763.714
Lick	Krassel	1059	120-18	2003	170602081302	Granitic	Managed	1225	88.8	100	1102.035
Little Cottonwood	Krassel	1050	119-07	2004	170602051204	Volcanic	Reference	1707	14.9	100	736
Lodgepole	Krassel	583	087-12	2003	170602071803	Granitic	Reference	1561	46.8	100	860.277
Marble	Krassel	1054	119-15	2004	170602051203	Volcanic	Managed	1774	32.7	98	965.857
Mccalla	Krassel	558	086-03	2001	170602071703	Granitic	Reference	1497	74.3	100	814.685
Mccalla	Krassel	2280	086-03	2006	170602071703	Granitic	Reference	1497	74.3		814.685

Table B-1. (Continued.)

Integrator Reaches

Stream	District/Field Office/Resource Area	Reach ID	Group Order	Sample year	ICBEMP HUC code	Geology	Management category	Elevation (m)	Watershed area (km^2)	FS:BLM ownership (%)	Average precipitation (mm)
Meadow	Krassel	1052	119-09	2004	170602080406	Granitic	Managed	1981	17.9	98	1262.721
Monumental	Krassel	1053	119-12	2004	170602061104	Volcanic	Managed	1878	45	99	1013.688
Moose	Krassel	586	087-13	2002	170602071805	Granitic	Reference	1847	33.4	100	955.781
Moose	Krassel	588	087-13	2003	170602071805	Granitic	Reference	1847	33.4	100	955.781
Moose	Krassel	589	087-13	2004	170602071805	Granitic	Reference	1847	33.4	100	955.781
Moose	Krassel	591	087-13	2001	170602071805	Granitic	Reference	1847	33.4	100	955.781
Moose	Krassel	2286	087-13	2006	170602071805	Granitic	Reference	1847	33.4		955.781
Mud	Krassel	1051	119-08	2004	170602061102	Volcanic	Reference	1682	11.2	98	765.833
N.F. Buckhorn	Krassel	1067	121-09	2001	170602081101	Granitic	Reference	1823	12.1	100	957.6
N.F. Buckhorn	Krassel	2359	121-09	2006	170602081101	Granitic	Reference	1823	12.1		957.6
N.F. Fitsum	Krassel	1057	120-04	2003	170602081203	Granitic	Reference	1329	34.9	100	1018.064
Queen	Krassel	563	086-13	2001	170602071801	Granitic	Reference	1941	8	100	805.988
Queen	Krassel	2284	086-13	2006	170602071801	Granitic	Reference	1941	8		805.988
Richardson	Krassel	575	087-05	2003	170602070809	Granitic	Reference	1951	12.7	100	1001.488
Smith	Krassel	1943	113-09	2005	170602061303	Sedimentary	Managed	1637	25.8*	100	1085.489
Tamarack	Krassel	1035	119-02	2004	170602080404	Volcanic	Reference	1704	47.1	100	1045.022
Trout	Krassel	573	087-04	2003	170602070810	Granitic	Reference	1914	21.1	100	991.094
W.F. Chamberlain	Krassel	578	087-09	2003	170602071807	Granitic	Reference	1695	52.3	100	965.352
W.F. Monumental	Krassel	1036	119-04	2004	170602061105	Volcanic	Reference	1786	53.7	100	1136.61
Wapiti	Krassel	2278	086-01	2006	170602071701		Reference	1893			643.108
Whimstick	Krassel	564	086-17	2001	170602071702	Granitic	Reference	1708	65.3	100	723.56
Zena	Krassel	1058	120-06	2003	170602081301	Granitic	Managed	1256	27.3	100	933.143
Bear	McCall	1055	120-01	2003	170602080207	Granitic	Reference	1975	8.7	100	1066.795
Grouse	McCall	1073	122-02	2002	170602081405	Granitic	Managed	1774	30.2	100	1173.811
Kennally	McCall	1195	127-06	2002	170501230803	Granitic	Managed	1652	81.4	100	1116.098
Little Goose	McCall	1094	123-11	2003	170602100402	Granitic	Managed	1518	18.8	84	1128.948
Little Goose	McCall	1100	123-11	2001	170602100402	Granitic	Managed	1518	18.8	84	1128.948
Little Goose	McCall	1104	123-11	2004	170602100402	Granitic	Managed	1518	18.8	84	1128.948
Little Goose	McCall	2366	123-11	2006	170602100402	Granitic	Managed	1518	18.8		1128.948
Piah	McCall	1084	122-17	2002	170602081401	Granitic	Reference	1756	9.8	100	1026.662
Pony	McCall	1056	120-03	2003	170602080104	Granitic	Managed	2225	1.1	100	809.613

Table B-1. (Continued.)

Integrator Reaches

Stream	District/Field Office/Resource Area	Reach ID	Group Order	Sample year	ICBEMP HUC code	Geology	Management category	Elevation (m)	Watershed area (km^2)	FS:BLM ownership (%)	Average precipitation (mm)
Rapid	McCall	1194	127-02	2002	170501230802	Granitic	Managed	1609	29.3	100	1102.783
Steamboat	McCall	613	088-16	2002	170602071903	Granitic	Managed	1786	37.9	99	1025.892
Stratton	McCall	612	088-14	2002	170602071904	Granitic	Managed	1780	19.6	100	958.892
Warren	McCall	611	088-12	2002	170602071902	Granitic	Managed	1829	27.1	98	974.148
Boulder	New Meadows	1135	123-20	2001	170602100601	Volcanic	Managed	1448	37.7	100	1002.451
Boulder	New Meadows	2374	123-20	2006	170602100601	Volcanic	Managed	1448	37.7		1002.451
Brush Trib	New Meadows	2372	123-19	2006	170602100203		Managed	1238			793.3
East Branch Weiser	New Meadows	1958	130-06	2005	170501241302	Volcanic	Managed	1271	7.8*	100	835.869
Hard	New Meadows	1086	123-04	2001	170602100202	Granitic	Managed	1795	21.6	100	1373.63
Hard	New Meadows	2361	123-04	2006	170602100202	Granitic	Managed	1795	21.6		1373.63
Hazard	New Meadows	1127	123-12	2001	170602100301	Granitic	Managed	1576	64.5	100	1336.473
Hazard	New Meadows	2368	123-12	2006	170602100301	Granitic	Managed	1576	64.5		1336.473
Little French	New Meadows	1074	122-04	2002	170602091602	Granitic	Managed	1841	47.3	100	1422.549
Lost	New Meadows	1223	130-03	2001	170501241202	Volcanic	Managed	1134	25.5	100	969.81
Lost	New Meadows	1954	130-03	2005	170501241202	Volcanic	Managed	1134	25.5	100	969.81
Mud	New Meadows	2370	123-16	2006	170602100502		Managed	1278			806.826
Rapid	New Meadows	1093	123-10	2001	170602100703	Volcanic	Managed	1790	9.9	100	1241.735
Rapid	New Meadows	2365	123-10	2006	170602100703	Volcanic	Managed	1790	9.9		1241.735

Table B-1. (Continued)

Integrator Reaches

Stream	Reach ID	Sinuosity	Gradient (%)	Entrenchment ratio	Rosgen channel type
Big	2360	1.1	6.254	2.2	B4a
Crooked	1959	1.4	1.462	2.2	B4c
Indian	1164	1.0	1.251	1.6	B4c
Lick	1950	1.3	1.787	2	B4c
M.F. Weiser	1211	1.1	1.79	4.5	C3
North Hornet	1952	1.3	1.714	2	B4c
Rush	1961	1.2	1.675	1.7	B3c
Summit Gulch	1956	1.1	2.114	1.5	B4
Beaver	1942	1.3	1.542	3	C3
Big	1941	1.1	0.93	2.3	C4
Big Ramey	1945	1.2	2.951	2	B3
Blackmare	2352	1.1	3.223	1.3	F3b
Cabin	1944	1.4	3.445	3.3	C3b
Cave	1940	1.4	2.591	1.6	B3
Chamberlain	581	1.8	0.454	4.1	C4
Cougar	1060	1.4	1.09	10.2	C4
Cougar	2351	1.4	1.245	2.5	C4
Crooked	1946	1.4	1.697	1.3	F4
Dillinger	561	2.2	0.488	2.7	E4
Dillinger	2281	1.9	0.55	23.9	E3
Dog	2279	1.2	8.402	3.3	E3b
Flossie	570	1.9	0.465	1.7	B4c
Fourmile	1065	1.1	1.121	12.1	C4
Hotspring	562	1.3	0.769	56.4	E4
Hotspring	2282	1.6	0.923	10.7	E3
Lick	1059	1.3	1.184	1.3	F3
Little Cottonwood	1050	1.2	3.713	1.3	F4b
Lodgepole	583	1.2	6.25	1.7	B4a
Marble	1054	1.1	1.151	2	B4c
Mccalla	558	2.0	0.748	27.2	C4
Mccalla	2280	1.4	1.227	7.1	E3

Table B-1. (Continued.)

Integrator Reaches

Stream	Reach ID	Sinuosity	Gradient (%)	Entrenchment ratio	Rosgen channel type
Meadow	1052	1.2	0.938	1.7	B4c
Monumental	1053	1.1	1.236	1.3	F4
Moose	586	2.2	0.842	17.3	C4
Moose	588	1.7	0.579	7.6	C4
Moose	589	1.7	0.607	2.6	C4
Moose	591	2.5	0.633		C4
Moose	2286	1.6	0.885	4.3	C4
Mud	1051	1.3	7.552	1.4	B4a
N.F. Buckhorn	1067	1.5	0.481	1.4	F4
N.F. Buckhorn	2359	1.5	0.616	1.3	F4
N.F. Fitsum	1057	1.2	1.762	1.8	B4c
Queen	563	1.4	1.812	1.6	B4c
Queen	2284	1.3	2.315	4	E3b
Richardson	575	1.1	2.804	6.1	C4b
Smith	1943	1.3	1.598	5.4	C4
Tamarack	1035	1.0	2	4.1	C4b
Trout	573	1.8		4.6	C4b
W.F. Chamberlain	578	2.0	0.628	6.6	C4
W.F. Monumental	1036	1.1	1.195	1.4	B3c
Wapiti	2278	1.2	1.86	14.2	E3
Whimstick	564	2.5	0.452	5.6	C4
Zena	1058	1.1	3.224	1.8	B3
Bear	1055	2.0	0.671	12.8	E4
Grouse	1073	1.2	0.537	10.2	C4
Kennally	1195	1.4	0.41	39.5	C4
Little Goose	1094	1.6	1.604	13.3	E4
Little Goose	1100	2.1	1.593	8.7	C4
Little Goose	1104	1.2	1.825	13.7	C4
Little Goose	2366	1.5	1.721	5.1	E3
Piah	1084	2.1	0.29	63.6	E4
Pony	1056	1.4	1.598	8	E4

Table B-1. (Continued.)

Integrator Reaches

Stream	Reach ID	Sinuosity	Gradient (%)	Entrenchment ratio	Rosgen channel type
Rapid	1194	1.2	1.673	3.9	C3
Steamboat	613	1.2	1.195	3.1	C4
Stratton	612	1.3	0.63	2	B4c
Warren	611	1.0	1.918	1.7	B3c
Boulder	1135	2.3	0.347	14.6	C4
Boulder	2374	2.2	0.363	4	C4
Brush Trib	2372	1.4	1.574	5.7	E3
East Branch Weiser	1958	1.3	0.049	1.6	B4c
Hard	1086	2.2	0.335	1.3	F4
Hard	2361	2.0	0.414	1.8	B4c
Hazard	1127	1.1	1.3	2.2	B4c
Hazard	2368	1.1	1.132	1.4	B3c
Little French	1074	1.7	0.057	1.3	F4
Lost	1223	2.2	0.808	1.4	F4
Lost	1954	1.1	0.402	3.2	C4
Mud	2370	1.4	0.734	3.9	C4
Rapid	1093	1.3	2.02	1.2	F4
Rapid	2365	1.4	1.261	1.3	F4

Table B-2. Channel characteristics and condition information for integrator reaches on the Payette 2001 - 2006.

Integrator Reaches														
				Channel Cross-Sections			Streambanks					Sediment		
Stream	Reach ID	Group Order	Sample Year	Average bankfull width (m)	Average bankfull width:depth ratio	Average transect bankfull width (m)	Stable banks method1 (%)	Stable banks method2 (%)	Average bank angle (degrees)	Undercut banks (%)	Average undercut depth (m)	Pool-tail fines <2mm (%)	Pool-tail fines <6mm (%)	Percent fines <6mm w/o bedrock
Big	2360	123-01	2006	3	10	2.52	100	90.5	79	51.2	0.113	5.7	6.5	25
Crooked	1959	130-08	2005	3.9	18	5.16	97.6	71.4	104	35.9	0.081	11.8	15.3	8
Indian	1164	124-09	2003	7.3	29	7.26	100	37.5	134	7	0.01	12.3	19.8	36
Lick	1950	130-01	2005	5.7	19	6.08	100	88.1	99	41.5	0.106	30.2	36	35
M.F. Weiser	1211	129-12	2002	7.7	28	7.37	68.2	63.6	107	34.1	0.082		3	5
North Hornet	1952	130-02	2005	4.9	27	4.42	95.2	40.5	130	6.1	0.018	0.7	2.1	6
Rush	1961	130-10	2005	7.2	29	6.91	97.7	54.5	80	45.5	0.112	0.9	3.9	2
Summit Gulch	1956	130-04	2005	5	31	5.12	95.2	52.4	138	7.3	0.02			18
Beaver	1942	113-07	2005	9.5	21	10.56	91.5	76.6	116	21.7	0.047	0.2	0.5	0
Big	1941	113-06	2005	10.7	20	11.08	95.2	92.9	76	61.9	0.145	1	1.3	1
Big Ramey	1945	113-11	2005	7.8	20	6.87	100	88.6	108	20.9	0.061	4.6	6.3	7
Blackmare	2352	121-03	2006	11.2	29	8.34	100	93.2	106	18.2	0.057	4.5	6.2	19
Cabin	1944	113-10	2005	4.9	12	5.59	90.5	76.2	120	14.6	0.047	7.1	11.6	14
Cave	1940	113-03	2005	5.3	18	4.7	84.1	75	108	29.5	0.073	15.2	21.4	9
Chamberlain	581	087-11	2003	8.9	24	8.82	95.5	34.1	69	53.8	0.19	1.8	3.2	7
Cougar	1060	121-02	2001	6.7	22	8.02	97.6	76.2	74	51.5	0.213			21
Cougar	2351	121-02	2006	7.5	26	7.48	97.7	93.2	86	53.7	0.229	15.6	17	20
Crooked	1946	113-12	2005	5.8	23	6.78	86	62	139	2.1	0.003	3.6	18.6	28
Dillinger	561	086-04	2001	3.1	11	2.78	97.9	97.9	65	64.6	0.156			50
Dillinger	2281	086-04	2006	2.9	8	2.93	93.2	88.6	76	54.5	0.175	10.8	33.4	45
Dog	2279	086-02	2006	3.4	9	2.71	97.6	97.6	78	40.5	0.144	15.9	24.5	23
Flossie	570	087-03	2003	2.3	11	2.28	95.5	95.5	95	37.2	0.107	13.1	15.6	23
Fourmile	1065	121-05	2001	8.3	23	8.54	95.2	85.7	89	51.2	0.169			61
Hotspring	562	086-06	2001	1.9	8	1.94	100	100	85	32.6	0.089			80
Hotspring	2282	086-06	2006	1.5	8	1.77	90.5	90.5	78	47.6	0.143	59.9	80.7	29
Lick	1059	120-18	2003	14.5	38	15.29	100	75	88	45.7	0.095	0.5	0.7	6
Little Cottonwood	1050	119-07	2004	4.2	27	4.06	100	54.8	121	17.1	0.059	9	31	25
Lodgepole	583	087-12	2003	5.5	20	4.84	97.5	90	87	35.1	0.114	6.5	9.7	22
Marble	1054	119-15	2004	4.6	18	4.71	93.8	62.5	124	15.6	0.07	8.2	15.4	18
Mccalla	558	086-03	2001	3.8	15	3.91	100	93.3	105	45.2	0.122			26
Mccalla	2280	086-03	2006	5.3	14	5.05	100	92.9	92	36.6	0.101	31.2	38.5	30

Table B-2. (Continued.)

Integrator Reaches															
				Channel Cross-Sections			Streambanks					Sediment			
Stream	Reach ID	Group Order	Sample Year	Average bankfull width (m)	Average bankfull width:depth ratio	Average transect bankfull width (m)	Stable banks method1 (%)	Stable banks method2 (%)	Average bank angle (degrees)	Undercut banks (%)	Average undercut depth (m)	Pool-tail fines <2mm (%)	Pool-tail fines <6mm (%)	Percent fines <6mm w/o bedrock	
Meadow	1052	119-09	2004	6.3	27	5.66	98	78	121	18.8	0.047	12.7	27.5	29	
Monumental	1053	119-12	2004	8.3	32	7.85	93.2	52.3	93	41.2	0.151	3	12.6	5	
Moose	586	087-13	2002	5.1	15	5.09	88.1	83.3	86	47.5	0.212		25.8	26	
Moose	588	087-13	2003	4.9	17	5.13	76.3	71.1	92	47.1	0.211	11.3	20.5	10	
Moose	589	087-13	2004	4.9	15	4.84	100	85.7	83	48.6	0.178	1.5	14.9	35	
Moose	591	087-13	2001				75	75	73	57.6	0.29			20	
Moose	2286	087-13	2006	6.6	18	5.74	100	93.2	91	36.6	0.156	23.9	34.5	25	
Mud	1051	119-08	2004	4.4	20	3.75	92.9	66.7	90	43.6	0.091	5	5.9	1	
N.F. Buckhorn	1067	121-09	2001	5.1	21	5.2	100	77.3	59	62.9	0.192			28	
N.F. Buckhorn	2359	121-09	2006	5.1	17	5.29	92.9	83.3	45	66.7	0.274	29	37.3	36	
N.F. Fitsum	1057	120-04	2003	9	34	8.82	81.8	52.3	88	26.5	0.122	1.5	3.8	18	
Queen	563	086-13	2001	2.8	14	3.13	100	100	67	50	0.188			47	
Queen	2284	086-13	2006	2	8	2.8	92.9	78.6	61	58.5	0.193	62.5	68.5	38	
Richardson	575	087-05	2003	4.9	24	5	92.5	85	117	20	0.072	11.2	14	18	
Smith	1943	113-09	2005	7.9	26	9.92	100	88.1	73	68.4	0.237	4.7	19.6	6	
Tamarack	1035	119-02	2004	12.8	53	8.95	94	84	140	8.2	0.049	3.3	13.3	6	
Trout	573	087-04	2003	7.3	21	7.9	88.1	47.6	110	17.9	0.063	59.7	96.8	90	
W.F. Chamberlain	578	087-09	2003	4.7	15	4.38	97.6	83.3	92	44.7	0.168	3.8	4.8	14	
W.F. Monumental	1036	119-04	2004	7.2	29	7.78	92.9	50	83	51.4	0.119	0.9	3.8	0	
Wapiti	2278	086-01	2006	1.6	6	1.67	100	100	66	52.4	0.169	62.3	70.9	57	
Whimstick	564	086-17	2001	5.7	23	4.61	90.2	73.2	102	29.4	0.086			17	
Zena	1058	120-06	2003	7.8	29	6.75	97.5	52.5	122	10.5	0.023	24.5	29.3	11	
Bear	1055	120-01	2003	4.2	10	4.67	95	90	63	66.7	0.182	10.6	21.3	44	
Grouse	1073	122-02	2002	5.8	14	5.4	81	69	76	56.1	0.145		26	22	
Kennally	1195	127-06	2002	12	22	11.7	81.5	46.3	89	45.7	0.102		6.9	21	
Little Goose	1094	123-11	2003	3.7	12	3.23	100	92.5	103	33.3	0.072	3	5.7	7	
Little Goose	1100	123-11	2001	3.4	16	2.92	93.5	93.5	89	47.8	0.098			14	
Little Goose	1104	123-11	2004	3.3	13	3.13	95.2	85.7	102	36.6	0.087	10.6	14.3	11	
Little Goose	2366	123-11	2006	4.1	13	3.99	92.9	83.3	99	33.3	0.101	15.5	23.6	24	
Piah	1084	122-17	2002	3.4	8	3.61	92.7	90.2	60	70.7	0.261		67.5	66	
Pony	1056	120-03	2003	2.3	8	2.43	100	83.3	83	45.2	0.127	4.7	21.5	50	

Table B-2. (Continued.)

				Integrator Reaches										
				Channel Cross-Sections			Streambanks					Sediment		
Stream	Reach ID	Group Order	Sample Year	Average bankfull width (m)	Average bankfull width:depth ratio	Average transect bankfull width (m)	Stable banks method1 (%)	Stable banks method2 (%)	Average bank angle (degrees)	Undercut banks (%)	Average undercut depth (m)	Pool-tail fines <2mm (%)	Pool-tail fines <6mm (%)	Percent fines <6mm w/o bedrock
Rapid	1194	127-02	2002	8.2	22	7.64	86.1	76.4	113	34.4	0.143		7.3	8
Steamboat	613	088-16	2002	6.9	26	7.62	81	50	129	9.4	0.01		11.9	10
Stratton	612	088-14	2002	6.1	23	6.03	90.7	79.1	121	14.6	0.038			19
Warren	611	088-12	2002	5.2	21	5.61	88.2	61.8	133	8.8	0.01		12.7	16
Boulder	1135	123-20	2001	6.9	27	7.05	86.4	54.5	113	24.4	0.057			19
Boulder	2374	123-20	2006	8.8	21	7.4	90.9	79.5	102	31	0.084	9.6	30.1	46
Brush Trib	2372	123-19	2006	2.7	10	2.67	100	92.9	116	17.1	0.026	90.8	96.6	97
East Branch Weiser	1958	130-06	2005	3.9	14	4.86	90.5	85.7	66	61.9	0.202	81.6	88.4	63
Hard	1086	123-04	2001	10.1	74	7.54	95.7	50	74	40.6	0.124			3
Hard	2361	123-04	2006	7	19	7.82	90.5	71.4	101	34.1	0.098	6.7	11.1	7
Hazard	1127	123-12	2001	10.1	46	12.94	95.6	55.6	106	17.2	0.043			5
Hazard	2368	123-12	2006	17.8	69	19.54	95.5	79.5	140	7.5	0.046	0	1	3
Little French	1074	122-04	2002	12.4	18	11.23	62.5	42.5	69	48.6	0.169			60
Lost	1223	130-03	2001	5.6	17	5.07	97.7	93.2	107	27.9	0.065			23
Lost	1954	130-03	2005	11	29	11.8	56.1	53.7	108	27.5	0.069	4	12.1	11
Mud	2370	123-16	2006	4.8	16	4.7	73.9	52.2	80	46.3	0.175	8.4	12.7	8
Rapid	1093	123-10	2001	4.5	22	5.1	97.7	86.4	94	43.6	0.128			15
Rapid	2365	123-10	2006	6.4	20	5.73	97.6	97.6	106	32.5	0.111	7.6	21	32

Table B-2. (Continued)

Integrator Reaches												
					Pools		Wood					
Stream	Reach ID	D50 w/o bedrock	D84 w/o bedrock	Bedrock present	Average residual pool depth (m)	Pools (%)	Category 1 large wood pieces/100m (>=3m*0.1m)	Category 1 large wood pieces/100m (>=1m*0.1m)	Category 1 large wood volume/100m (>=1m*0.1m)	Category 1&2 large wood pieces/100m (>=1m*0.1m)	Category 1&2 large wood volume/100m (>=1m*0.1m)
Big	2360	48	97		0.18	44.1	23	58	18.52	64	21.19
Crooked	1959	35	98		0.25	67.8	2	5	2.02	7	3.47
Indian	1164	24	63		0.23	55.1	6	11	0.81	18	2.98
Lick	1950	21	84		0.33	55.8	37	44	11	58	17.14
M.F. Weiser	1211	82	157		0.2	57.5	8	10	4.97	13	5.57
North Hornet	1952	45	110		0.24	20.3	8	17	2.82	35	11.2
Rush	1961	88	187		0.32	30.1	7	13	1.99	18	4.41
Summit Gulch	1956	37	92				3	8	1.94	10	2.61
Beaver	1942	68	130		0.34	17.9	8	14	9.36	18	11.95
Big	1941	64	126		0.34	66.2	8	19	4.05	22	5.38
Big Ramey	1945	98	217		0.32	18.6	13	32	8.16	40	15.48
Blackmare	2352	150	380		0.33	55	17	33	14.06	43	20.97
Cabin	1944	96	166		0.17	13.4	12	21	14.21	24	15.73
Cave	1940	80	141		0.19	18	14	19	6.81	25	10.97
Chamberlain	581	60	84		0.45	57.2	15	30	4.2	44	7.22
Cougar	1060	47	108		0.32	65.2	17	32	24.94	39	29.76
Cougar	2351	50	113		0.27	65.3	6	22	7.81	25	12.34
Crooked	1946	58	140		0.25	21.2	11	16	3.09	20	3.69
Dillinger	561	6	19		0.37	83.3	7	11	6.45	11	6.45
Dillinger	2281	10	30		0.32	87.2	8	16	5.53	18	9
Dog	2279	61	400		0.24	26	16	29	3.38	48	13.86
Flossie	570	42	78		0.28	79.1	4	8	1.2	11	2.06
Fourmile	1065	4	8		0.47	100	26	53	154.63	58	237.67
Hotspring	562	4	8		0.33	74.9	22	31	15.09	31	15.09
Hotspring	2282	14	25		0.32	83.1	5	8	6.33	9	11.08
Lick	1059	140	286		0.45	39.3	16	25	11.28	35	15.72
Little Cottonwood	1050	29	79		0.14	7.5	5	7	3.53	10	14.24
Lodgepole	583	36	317		0.4	22.4	31	78	123.31	98	148.33
Marble	1054	42	86		0.19	24.9	3	6	1.69	7	1.82
Mccalla	558	26	66		0.24	51.8	3	15	11.01	15	11.01
Mccalla	2280	32	70		0.22	38.6	5	13	8.77	13	8.81

Table B-2. (Continued.)

Integrator Reaches					Pools		Wood				
Stream	Reach ID	D50 w/o bedrock	D84 w/o bedrock	Bedrock present	Average residual pool depth (m)	Pools (%)	Category 1 large wood pieces/100m (>=3m*0.1m)	Category 1 large wood pieces/100m (>=1m*0.1m)	Category 1 large wood volume/100m (>=1m*0.1m)	Category 1&2 large wood pieces/100m (>=1m*0.1m)	Category 1&2 large wood volume/100m (>=1m*0.1m)
Meadow	1052	26	65		0.45	40.8	2	6	0.66	6	0.66
Monumental	1053	38	86		0.35	48.9	22	43	7.31	65	10.66
Moose	586	29	77		0.4	85.4	15	34	6.02	37	8.31
Moose	588	55	102		0.48	80	8	13	3.41	17	6.5
Moose	589	24	53		0.37	71.3	12	16	3.47	17	4.34
Moose	591	25	75		0.45	73.9	16	42	10.05	42	10.05
Moose	2286	36	65		0.43	83.1	17	27	5.46	31	8.35
Mud	1051	62	143		0.21	41	10	17	2.7	31	8.15
N.F. Buckhorn	1067	11	31		0.53	82.6	32	112	21.85	113	22.32
N.F. Buckhorn	2359	10	36		0.53	80.8	45	132	23.4	136	23.82
N.F. Fitsum	1057	60	155		0.5	33.8	12	31	14.58	49	19.05
Queen	563	9	78		0.25	55.8	42	65	20.45	68	22.6
Queen	2284	15	50		0.23	72.4	52	87	12.7	101	16.68
Richardson	575	38	220		0.2	22.7	26	34	17.29	40	20.65
Smith	1943	51	105		0.42	69.6	42	82	51.15	95	68.79
Tamarack	1035	58	165		0.37	4.6	3	4	2.35	5	2.92
Trout	573	4	4		0.59	91.2	42	67	81.77	79	104.33
W.F. Chamberlain	578	48	99		0.31	72.5	2	3	0.65	4	0.68
W.F. Monumental	1036	79	143		0.29	60.3	10	18	4.32	31	12.55
Wapiti	2278	2	110		0.22	32.4	3	6	0.57	22	6.33
Whimstick	564	26	47		0.34	65.1	2	10	7.25	19	47.53
Zena	1058	66	111		0.25	31.4	7	57	8.33	89	12.88
Bear	1055	14	44		0.36	64.6	28	74	14.05	75	14.17
Grouse	1073	28	53		0.48	60.9	4	11	1.17	12	1.18
Kennally	1195	52	81		0.36	57.3	46	64	22.77	78	31.24
Little Goose	1094	68	99		0.27	60.8	4	11	0.86	14	1.16
Little Goose	1100	50	86		0.32	54.9	10	21	2.1	23	2.29
Little Goose	1104	56	107		0.23	68.3	4	17	0.77	18	1.02
Little Goose	2366	41	79		0.26	43.7	7	17	1	22	1.71
Piah	1084	4	9		0.5	93.8	16	37	5.54	40	5.73
Pony	1056	5	100		0.21	63.2	8	34	2.62	54	15.17

Table B-2. (Continued.)

Integrator Reaches												
					Pools		Wood					
Stream	Reach ID	D50 w/o bedrock	D84 w/o bedrock	Bedrock present	Average residual pool depth (m)	Pools (%)	Category 1 large wood pieces/100m (>=3m*0.1m)	Category 1 large wood pieces/100m (>=1m*0.1m)	Category 1 large wood volume/100m (>=1m*0.1m)	Category 1&2 large wood pieces/100m (>=1m*0.1m)	Category 1&2 large wood volume/100m (>=1m*0.1m)
Rapid	1194	70	166		0.3	36	19	31	10.55	37	16.18
Steamboat	613	45	80		0.34	53.8	7	12	2.07	12	2.07
Stratton	612	24	69		0.4	64.7	7	13	1.02	14	1.04
Warren	611	67	157		0.13	26	3	7	0.65	8	0.94
Boulder	1135	28	64		0.56	83.1	16	34	19.96	37	20.39
Boulder	2374	6	48		0.51	76.1	10	34	7.16	47	14.07
Brush Trib	2372	2	3		0.28	64.6	5	6	4.45	8	11.93
East Branch Weiser	1958	2	13		0.67	84.7	22	38	14.66	39	14.75
Hard	1086	48	88		0.67	52.9	3	9	1.1	11	2.72
Hard	2361	50	80		0.71	57	7	17	5.1	17	5.1
Hazard	1127	61	118		0.3	40.6	6	14	7.74	22	17.3
Hazard	2368	100	210		0.25	35.5	16	31	23.69	46	33.25
Little French	1074	4	17		0.95	79.5	48	151	27.81	191	47.05
Lost	1223	28	76		0.24	47.1	19	34	4.77	40	5.92
Lost	1954	60	108		0.34	27.2	15	31	16.25	34	18.93
Mud	2370	42	87		0.37	65.8	1	6	0.92	6	0.96
Rapid	1093	50	98		0.3	79.2	40	72	39.37	76	44.37
Rapid	2365	19	73		0.33	67.4	41	69	30.75	73	37.3

Table B-3. Riparian vegetation summaries for integrator reaches on the Payette 2001 - 2006. Wetland ratings were based on community type cover data in 2001 - 2002 and on species data in 2003 - 2006. Blanks indicate no data collected.

Integrator Reaches													
Stream	Reach ID	Group Order	Sample year	Greenline wetland rating	Cross section wetland rating	Effective ground cover (%)	Greenline woody cover (%)	Small trees (<50cm dbh) per hectare	Large trees (>50cm dbh) per hectare	Live tree basal area (m^2/hectare)	Standing dead trees per hectare	Standing dead basal area (m^2/hectare)
Big	2360	123-01	2006	60	48	92	64	936	156	61	97	0
Crooked	1959	130-08	2005	66	56	93	62	39	0	1	0	0
Indian	1164	124-09	2003	60	43	92	97					
Lick	1950	130-01	2005	68	55	83	33	585	19	17	156	6
M.F. Weiser	1211	129-12	2002	66	62	85						
North Hornet	1952	130-02	2005	53	42	94	54	78	39	28	0	0
Rush	1961	130-10	2005	62	56	97	44	643	117	58	195	4
Summit Gulch	1956	130-04	2005	44	29	96	72	468	97	46	39	6
Beaver	1942	113-07	2005	72	61	100	75	429	19	15	117	8
Big	1941	113-06	2005	72	62	100	55	487	39	34	253	5
Big Ramey	1945	113-11	2005	65	57	96	97	175	39	19	117	5
Blackmare	2352	121-03	2006	54	48	100	63	468	39	38	97	8
Cabin	1944	113-10	2005	49	43	93	42	19	0	0	0	0
Cave	1940	113-03	2005	60	53	94	36	0	0	0	195	15
Chamberlain	581	087-11	2003	65	64	78	19					
Cougar	1060	121-02	2001	73	71	94						
Cougar	2351	121-02	2006	75	75	100	38	19	0	1	0	0
Crooked	1946	113-12	2005	68	52	92	45	78	0	6	39	1
Dillinger	561	086-04	2001	56	55	99						
Dillinger	2281	086-04	2006	60	49	98	39	858	0	17	0	0
Dog	2279	086-02	2006	62	43	96	39	253	0	9	234	5
Flossie	570	087-03	2003	71	68	99	21					
Fourmile	1065	121-05	2001	75	75	100						
Hotspring	562	086-06	2001	88	88	87						
Hotspring	2282	086-06	2006	88	84	98	9	117	0	1	0	0
Lick	1059	120-18	2003	68	43	94	72					
Little Cottonwood	1050	119-07	2004	57	48	96	60	234	39	24	0	0
Lodgepole	583	087-12	2003	57	43	91	50					
Marble	1054	119-15	2004	72	59	95	58	39	19	6	0	0
Mccalla	558	086-03	2001	78	73	99						
Mccalla	2280	086-03	2006	67	60	100	47	156	0	2	0	0

Table B-3. (Continued.)

Stream	Reach ID	Group Order	Sample year	Greenline wetland rating	Cross section wetland rating	Effective ground cover (%)	Greenline woody cover (%)	Small trees (<50cm dbh) per hectare	Large trees (>50cm dbh) per hectare	Live tree basal area (m^2/hectare)	Standing dead trees per hectare	Standing dead basal area (m^2/hectare)
Integrator Reaches												
Meadow	1052	119-09	2004	72	50	91	19	19	0	0	0	0
Monumental	1053	119-12	2004	57	50	99	56	1540	19	43	39	1
Moose	586	087-13	2002	76	77	99						
Moose	588	087-13	2003	81	66	96	9					
Moose	589	087-13	2004	77	74	100	6	156	0	7	195	4
Moose	591	087-13	2001	86	63	98						
Moose	2286	087-13	2006	85	82	99	18	97	0	2	234	6
Mud	1051	119-08	2004	67	55	98	60	546	19	22	58	3
N.F. Buckhorn	1067	121-09	2001	72	69	94						
N.F. Buckhorn	2359	121-09	2006	62	57	97	38	546	19	28	0	0
N.F. Fitsum	1057	120-04	2003	55	50	99	67					
Queen	563	086-13	2001	65	68	97						
Queen	2284	086-13	2006	68	65	99	57	253	19	10	0	0
Richardson	575	087-05	2003	68	43	91	39					
Smith	1943	113-09	2005	56	50	100	38	390	136	63	136	26
Tamarack	1035	119-02	2004	75	65	90	60	312	19	11	0	0
Trout	573	087-04	2003	56	35	60	59					
W.F. Chamberlain	578	087-09	2003	82	71	100	9					
W.F. Monumental	1036	119-04	2004	59	53	98	52	351	58	31	136	4
Wapiti	2278	086-01	2006	70	54	100	28	19	0	1	1014	23
Whimstick	564	086-17	2001	84	58	97						
Zena	1058	120-06	2003	52	35	98	100					
Bear	1055	120-01	2003	71	62	99	20					
Grouse	1073	122-02	2002	94	91	100						
Kennally	1195	127-06	2002	73	64	99						
Little Goose	1094	123-11	2003	69	64	96	34					
Little Goose	1100	123-11	2001	83	70	98						
Little Goose	1104	123-11	2004	71	54	100	20	117	0	2	0	0
Little Goose	2366	123-11	2006	71	60	98	33	156	0	4	0	0
Piah	1084	122-17	2002	70	74	100						
Pony	1056	120-03	2003	50	55	100	28					

Table B-3. (Continued.)

Integrator Reaches													
Stream	Reach ID	Group Order	Sample year	Greenline wetland rating	Cross section wetland rating	Effective ground cover (%)	Greenline woody cover (%)	Small trees (<50cm dbh) per hectare	Large trees (>50cm dbh) per hectare	Live tree basal area (m^2/hectare)	Standing dead trees per hectare	Standing dead basal area (m^2/hectare)
Rapid	1194	127-02	2002	65	59	91						
Steamboat	613	088-16	2002	59	68	92						
Stratton	612	088-14	2002	67	73	87						
Warren	611	088-12	2002	65	63	92						
Boulder	1135	123-20	2001	75	83	99						
Boulder	2374	123-20	2006	77	61	93	1	0	0	0	0	0
Brush Trib	2372	123-19	2006	73	75	92	49	234	19	8	0	0
East Branch Weiser	1958	130-06	2005	70	55	98	20	58	0	2	0	0
Hard	1086	123-04	2001	84	80	99						
Hard	2361	123-04	2006	71	73	99	16	390	0	6	0	0
Hazard	1127	123-12	2001	69	63	97						
Hazard	2368	123-12	2006	59	47	95	29	487	19	20	19	6
Little French	1074	122-04	2002	81	83	82						
Lost	1223	130-03	2001	73	51	94						
Lost	1954	130-03	2005	54	43	89	27	156	19	9	19	0
Mud	2370	123-16	2006	56	48	73	24	19	58	33	0	0
Rapid	1093	123-10	2001	63	58	99						
Rapid	2365	123-10	2006	62	52	98	53	370	117	62	117	6

Table B-3b. Weed species observed at integrator reaches on the Payette in 2003 - 2006. Species data were not collected in 2001 - 2002. Blanks indicate no data collected.

Integrator Reaches							
Stream	Reach ID	Group Order	Sample Year	Plant species	Common name	Greenline weed cover (%)	Cross-section weed cover (%)
Little Cottonwood	1050	119-07	2004	Cirsium arvense	Canada thistle	0.4	0.0
Little Goose	1094	123-11	2003	Cirsium arvense	Canada thistle	0.1	0.4
Indian	1164	124-09	2003	Cirsium arvense	Canada thistle	0.0	0.4
Summit Gulch	1956	130-04	2005	Cirsium arvense	Canada thistle	0.4	0.4
East Branch Weiser	1958	130-06	2005	Cirsium arvense	Canada thistle	0.0	0.9
Wapiti	2278	086-01	2006	Cirsium arvense	Canada thistle	0.9	4.3
Mccalla	2280	086-03	2006	Cirsium arvense	Canada thistle	0.0	0.4
Cougar	2351	121-02	2006	Cirsium arvense	Canada thistle	1.2	0.0
Hazard	2368	123-12	2006	Cirsium arvense	Canada thistle	0.7	3.7
Mud	2370	123-16	2006	Cirsium arvense	Canada thistle	0.3	0.4

Table B-4. Benthic macroinvertebrate metrics for integrator reaches on the Payette 2001 - 2003. Analysis of samples from 2004 is not yet complete. RIVPACS scores for 2003 have not been calculated.

Integrator Reaches

Stream	Reach ID	Group Order	Sample Year	Total OTU richness	Clinger taxa	Long-lived taxa	Ephemeroptera taxa	Plecoptera taxa	Tricoptera taxa	Intolerant taxa	Community tolerance quotient	RIVPAC Observed/ Expected(0.5)
Indian	1164	124-09	2003	37	18	10	11	6	6	14	72	
M.F. Weiser	1211	129-12	2002	38	19	6	13	11	7	20	54	1.1
Chamberlain	581	087-11	2003	42	22	10	12	8	7	17	53	
Cougar	1060	121-02	2001	45	21	4	12	8	7	17	59	0.99
Dillinger	561	086-04	2001	38	12	5	7	10	5	15	64	1.17
Flossie	570	087-03	2003	29	16	6	11	5	4	12	65	
Fourmile	1065	121-05	2001	37	16	6	10	7	5	13	55	1.03
Hotspring	562	086-06	2001	32	9	3	7	8	5	13	71	0.99
Lick	1059	120-18	2003	49	22	7	13	7	14	18	62	
Mccalla	558	086-03	2001	41	23	7	11	7	7	15	62	1.02
Moose	586	087-13	2002	32	15	3	9	10	4	16	56	0.9
Moose	588	087-13	2003	34	19	2	12	6	7	16	59	
Moose	591	087-13	2001	33	13	3	10	7	4	12	60	1.03
N.F. Buckhorn	1067	121-09	2001	37	15	3	10	9	6	16	53	1.1
N.F. Fitsum	1057	120-04	2003	34	21	2	10	8	9	19	45	
Queen	563	086-13	2001	32	13	3	8	6	4	13	69	1.09
Richardson	575	087-05	2003	46	22	6	12	12	11	25	50	
Trout	573	087-04	2003	39	12	2	9	6	7	13	67	
W.F. Chamberlain	578	087-09	2003	43	19	8	11	8	5	18	66	
Whimstick	564	086-17	2001	34	17	8	9	8	3	12	66	1.03
Zena	1058	120-06	2003	51	30	10	12	11	14	25	47	
Bear	1055	120-01	2003	28	11	3	9	7	3	13	56	
Grouse	1073	122-02	2002	46	20	4	17	7	8	18	58	1.04
Kennally	1195	127-06	2002	38	21	4	15	4	7	15	56	0.88
Little Goose	1094	123-11	2003	32	21	6	10	7	6	15	52	
Little Goose	1100	123-11	2001	33	18	4	11	4	6	13	59	0.96
Piah	1084	122-17	2002	41	17	4	11	6	9	15	63	0.77
Pony	1056	120-03	2003	20	2	2	3	3	2	5	69	
Rapid	1194	127-02	2002	36	17	4	11	8	6	16	57	0.88
Steamboat	613	088-16	2002	37	18	5	13	6	4	15	64	1
Stratton	612	088-14	2002	42	17	6	12	9	4	17	60	1

Table B-4. (Continued.)

Integrator Reaches

Stream	Reach ID	Group Order	Sample Year	Total OTU richness	Clinger taxa	Long-lived taxa	Ephemeroptera taxa	Plecoptera taxa	Tricoptera taxa	Intolerant taxa	Community tolerance quotient	RIVPAC Observed/ Expected(0.5)
Warren	611	088-12	2002	40	19	5	13	10	5	19	46	1.18
Boulder	1135	123-20	2001	31	16	7	7	8	4	11	57	1.13
Hard	1086	123-04	2001	40	21	8	10	8	8	16	55	0.91
Hazard	1127	123-12	2001	45	23	8	11	12	13	22	53	0.93
Little French	1074	122-04	2002	42	12	6	11	5	4	12	71	0.89
Lost	1223	130-03	2001	39	21	7	14	5	6	16	60	1.28
Rapid	1093	123-10	2001	40	17	3	14	9	7	17	53	1.12

Table B-5. Idaho DEQ Temperature Criteria

Daily Average Temperature (DAT) and Daily Maximum Temperature (DMT); Days of Exceedence

Idaho

Stream	Reach ID	Group Order	Sample Year	DAT (>19˚C)	DMT (>22˚C)
Big	2360	123-01	2006	0	0
Crooked	1959	130-08	2005	2	13
Lick	1950	130-01	2005	0	0
North Hornet	1952	130-02	2005	0	0
Rush	1961	130-10	2005	0	0
Beaver	1942	113-07	2005	0	0
Big	1941	113-06	2005	0	0
Big Ramey	1945	113-11	2005	0	0
Blackmare	2352	121-03	2006	0	0
Cabin	1944	113-10	2005	0	0
Cave	1940	113-03	2005	0	0
Chamberlain	581	087-11	2003	0	0
Cougar	1060	121-02	2001	0	0
Crooked	1946	113-12	2005	0	0
Dillinger	2281	086-04	2006	0	0
Dog	2279	086-02	2006	0	0
Flossie	570	087-03	2003	0	0
Hotspring	562	086-06	2001	0	0
Hotspring	2282	086-06	2006	0	0
Lick	1059	120-18	2003	0	0
Little Cottonwood	1050	119-07	2004	0	0
Lodgepole	583	087-12	2003	0	0
Marble	1054	119-15	2004	0	0
Mccalla	558	086-03	2001	0	0
Mccalla	2280	086-03	2006	0	0
Meadow	1052	119-09	2004	0	0
Monumental	1053	119-12	2004	0	0
Moose	586	087-13	2002	0	0
Moose	588	087-13	2003	0	0
Moose	2286	087-13	2006	0	0
Mud	1051	119-08	2004	0	0

Table B-5. (Continued.)

Daily Average Temperature (DAT) and Daily Maximum Temperature (DMT); Days of Exceedence

Idaho

Stream	Reach ID	Group Order	Sample Year	DAT (>19˚C)	DMT (>22˚C)
N.F. Buckhorn	1067	121-09	2001	0	0
N.F. Buckhorn	2359	121-09	2006	0	0
N.F. Fitsum	1057	120-04	2003	0	0
Queen	563	086-13	2001	0	0
Queen	2284	086-13	2006	0	0
Richardson	575	087-05	2003	0	0
Smith	1943	113-09	2005	0	0
Tamarack	1035	119-02	2004	0	0
Trout	573	087-04	2003	0	0
W.F. Chamberlain	578	087-09	2003	0	0
W.F. Monumental	1036	119-04	2004	0	0
Wapiti	2278	086-01	2006	0	0
Whimstick	564	086-17	2001	0	0
Zena	1058	120-06	2003	0	0
Bear	1055	120-01	2003	0	0
Kennally	1195	127-06	2002	0	0
Little Goose	1094	123-11	2003	0	0
Little Goose	1100	123-11	2001	0	0
Little Goose	2366	123-11	2006	0	0
Pony	1056	120-03	2003	0	0
Boulder	1135	123-20	2001	0	0
Boulder	2374	123-20	2006	0	0
Brush Trib	2372	123-19	2006	0	0
East Branch Weiser	1958	130-06	2005	0	0
Hard	1086	123-04	2001	0	0
Hard	2361	123-04	2006	0	0
Hazard	1127	123-12	2001	0	0
Hazard	2368	123-12	2006	0	0
Lost	1223	130-03	2001	0	0
Lost	1954	130-03	2005	39	37
Mud	2370	123-16	2006	1	3

Table B-5. (Continued.)

Daily Average Temperature (DAT) and Daily Maximum Temperature (DMT); Days of Exceedence

Idaho

Stream	Reach ID	Group Order	Sample Year	DAT (>19˚C)	DMT (>22˚C)
Rapid	1093	123-10	2001	0	0
Rapid	2365	123-10	2006	0	0

Table B-6. Comparison between PACFISH / INFISH Riparian Management Objectives (RMO) and all integrator reaches sampled 2001 - 2006 on the Payette. Symbols: + = met RMO, - = did not meet RMO; w = wooded reach, m = meadow reach.

Integrator Reaches

Stream	Reach ID	Group Order	Sample Year	RMO pools/mile	Pools/mile (PPM)	PPM>RMO	Average wetted width:depth ratio (AWR)	RMO<10; AWR<10	Undercut Banks (%)	RMO>75%; Undercut Banks (>75%)	Stable banks method1 (%)	RMO>80%; Stable banks method1 (>80%)
Big	2360	123-01	2006	96	259	+	46.5	-	w		w	
Crooked	1959	130-08	2005	56	107	+	109.6	-	35.9	-	97.6	+
Indian	1164	124-09	2003	56	95	+	131	-	w		w	
Lick	1950	130-01	2005	56	85	+	36.8	-	w		w	
M.F. Weiser	1211	129-12	2002	56	101	+	58.6	-	w		w	
North Hornet	1952	130-02	2005	96	58	-	126.6	-	w		w	
Rush	1961	130-10	2005	56	46	-	54.8	-	w		w	
Summit Gulch	1956	130-04	2005						7.3	-	95.2	+
Beaver	1942	113-07	2005	47	24	-	44.3	-	w		w	
Big	1941	113-06	2005	26	56	+	60	-	w		w	
Big Ramey	1945	113-11	2005	47	53	+	44.8	-	w		w	
Blackmare	2352	121-03	2006	26	82	+	127.6	-	w		w	
Cabin	1944	113-10	2005	56	48	-	24.1	-	w		w	
Cave	1940	113-03	2005	56	54	-	40.6	-	w		w	
Chamberlain	581	087-11	2003	56	43	-	46	-	w		w	
Cougar	1060	121-02	2001	56	75	+	50.4	-	w		w	
Cougar	2351	121-02	2006	47	66	+	99.8	-	w		w	
Crooked	1946	113-12	2005	56	49	-	40	-	w		w	
Dillinger	561	086-04	2001	96	91	-	30.7	-	w		w	
Dillinger	2281	086-04	2006	96	148	+	46.1	-	w		w	
Dog	2279	086-02	2006	96	118	+	23.4	-	w		w	
Flossie	570	087-03	2003	96	173	+	24.4	-	37.2	-	95.5	+
Fourmile	1065	121-05	2001	56	168	+	52.9	-	w		w	
Hotspring	562	086-06	2001	96	179	+	7.9	+	w		w	
Hotspring	2282	086-06	2006	96	188	+	6.8	+	w		w	
Lick	1059	120-18	2003	26	40	+	119.4	-	w		w	
Little Cottonwood	1050	119-07	2004	96	39	-	109.8	-	w		w	
Lodgepole	583	087-12	2003	56	70	+	75.1	-	w		w	
Marble	1054	119-15	2004	56	51	-	38.5	-	15.6	-	93.8	+
Mccalla	558	086-03	2001	56	86	+	29.8	-	45.2	-	100	+
Mccalla	2280	086-03	2006	56	76	+	50.1	-	w		w	

Table B-6. (Continued.)

Integrator Reaches

Stream	Reach ID	Group Order	Sample Year	RMO pools/mile	Pools/mile (PPM)	PPM>RMO	Average wetted width:depth ratio (AWR)	RMO<10; AWR<10	Undercut Banks (%)	RMO>75%; Undercut Banks (>75%)	Stable banks method1 (%)	RMO>80%; Stable banks method1 (>80%)
Meadow	1052	119-09	2004	56	50	-	65.9	-	18.8	-	98	+
Monumental	1053	119-12	2004	47	45	-	103.5	-	w		w	
Moose	586	087-13	2002	56	125	+	55.1	-	w		w	
Moose	588	087-13	2003	56	99	+	30.7	-	w		w	
Moose	589	087-13	2004	56	95	+	47.4	-	w		w	
Moose	591	087-13	2001		86				w		w	
Moose	2286	087-13	2006	56	103	+	82	-	w		w	
Mud	1051	119-08	2004	56	138	+	51.4	-	w		w	
N.F. Buckhorn	1067	121-09	2001	96	75	-	56.5	-	w		w	
N.F. Buckhorn	2359	121-09	2006	56	112	+	40.4	-	w		w	
N.F. Fitsum	1057	120-04	2003	47	42	-	83.5	-	w		w	
Queen	563	086-13	2001	96	175	+	25.5	-	w		w	
Queen	2284	086-13	2006	96	166	+	25.9	-	w		w	
Richardson	575	087-05	2003	56	59	+	38	-	w		w	
Smith	1943	113-09	2005	56	95	+	89	-	w		w	
Tamarack	1035	119-02	2004	26	7	-	122.9	-	8.2	-	94	+
Trout	573	087-04	2003	47	107	+	36.7	-	w		w	
W.F. Chamberlain	578	087-09	2003	56	98	+	46	-	44.7	-	97.6	+
W.F. Monumental	1036	119-04	2004	56	46	-	59.6	-	w		w	
Wapiti	2278	086-01	2006	96	90	-	13	-	52.4	-	100	+
Whimstick	564	086-17	2001	56	117	+	32	-	29.4	-	90.2	+
Zena	1058	120-06	2003	56	70	+	106	-	w		w	
Bear	1055	120-01	2003	96	110	+	39.7	-	w		w	
Grouse	1073	122-02	2002	56	75	+	45.8	-	56.1	-	81	+
Kennally	1195	127-06	2002	26	43	+	33.6	-	w		w	
Little Goose	1094	123-11	2003	96	120	+	24.4	-	33.3	-	100	+
Little Goose	1100	123-11	2001	96	88	-	28.5	-	w		w	
Little Goose	1104	123-11	2004	96	115	+	35.6	-	36.6	-	95.2	+
Little Goose	2366	123-11	2006	96	84	-	32.7	-	w		w	
Piah	1084	122-17	2002	96	175	+	23.8	-	w		w	
Pony	1056	120-03	2003	96	189	+	52.1	-	w		w	

Table B-6. (Continued.)

Integrator Reaches													
Stream	Reach ID	Group Order	Sample Year	RMO pools/mile	Pools/mile (PPM)	PPM>RMO	Average wetted width:depth ratio (AWR)	RMO<10; AWR<10	Undercut Banks (%)	RMO>75%; Undercut Banks (>75%)	Stable banks method1 (%)	RMO>80%; Stable banks method1 (>80%)
Rapid	1194	127-02	2002	56	52	-	38.2	-	w		w	
Steamboat	613	088-16	2002	56	86	+	42	-	w		w	
Stratton	612	088-14	2002	56	109	+	46.7	-	w		w	
Warren	611	088-12	2002	56	49	-	49.6	-	8.8	-	88.2	+
Boulder	1135	123-20	2001	56	65	+	113.7	-	w		w	
Boulder	2374	123-20	2006	56	81	+	30.1	-	w		w	
Brush Trib	2372	123-19	2006	96	182	+	14.4	-	w		w	
East Branch Weiser	1958	130-06	2005	96	49	-	22.8	-	w		w	
Hard	1086	123-04	2001	56	36	-	72.9	-	40.6	-	95.7	+
Hard	2361	123-04	2006	56	39	-	98.5	-	w		w	
Hazard	1127	123-12	2001	47	48	+	99.8	-	w		w	
Hazard	2368	123-12	2006	26	48	+	392.1	-	w		w	
Little French	1074	122-04	2002	26	28	+	41.4	-	w		w	
Lost	1223	130-03	2001	56	96	+	62.9	-	w		w	
Lost	1954	130-03	2005	26	19	-	42.7	-	w		w	
Mud	2370	123-16	2006	56	81	+	42.8	-	46.3	-	73.9	-
Rapid	1093	123-10	2001	56	146	+	149.4	-	w		w	
Rapid	2365	123-10	2006	56	114	+	66.7	-	w		w	

Table B-6. (Continued)

Integrator Reaches

Stream	Reach ID	Wood/Mile (>11m*>.28m)	RMO>20pieces; Wood/mile (>20pieces)	7-day moving average maximum temperature (>15.5˚C)	7-day moving average maximum temperature (>17.8˚C)	Days reported
Big	2360	77	+	0	0	42
Crooked	1959	m		42	37	42
Indian	1164	0	-			
Lick	1950	38	+	13	0	42
M.F. Weiser	1211	0	-			
North Hornet	1952	0	-	24	4	24
Rush	1961	9	-	6	0	42
Summit Gulch	1956	m				
Beaver	1942	36	+	0	0	42
Big	1941	16	-	37	0	42
Big Ramey	1945	9	-	0	0	42
Blackmare	2352	22	+	0	0	42
Cabin	1944	29	+	42	11	42
Cave	1940	9	-	42	20	42
Chamberlain	581	0	-	29	3	42
Cougar	1060	37	+	0	0	42
Cougar	2351	0	-			
Crooked	1946	0	-	40	17	42
Dillinger	561	55	+			
Dillinger	2281	55	+	0	0	42
Dog	2279	10	-	11	0	42
Flossie	570	m		22	5	42
Fourmile	1065	28	+			
Hotspring	562	54	+	0	0	42
Hotspring	2282	40	+	0	0	42
Lick	1059	0	-	21	0	42
Little Cottonwood	1050	19	-	28	0	42
Lodgepole	583	170	+	16	0	42
Marble	1054	m		10	0	42
Mccalla	558	m		0	0	42
Mccalla	2280	9	-	15	10	42

Table B-6. (Continued.)

Integrator Reaches						
Stream	Reach ID	Wood/Mile (>11m*>.28m)	RMO>20pieces; Wood/mile (>20pieces)	7-day moving average maximum temperature (>15.5˚C)	7-day moving average maximum temperature (>17.8˚C)	Days reported
Meadow	1052	m		0	0	42
Monumental	1053	15	-	3	0	42
Moose	586	0	-	0	0	42
Moose	588	20	-	2	0	42
Moose	589	9	-			
Moose	591	37	+			
Moose	2286	9	-	10	0	42
Mud	1051	10	-	0	0	42
N.F. Buckhorn	1067	0	-	0	0	42
N.F. Buckhorn	2359	0	-	0	0	42
N.F. Fitsum	1057	0	-	0	0	42
Queen	563	39	+	0	0	42
Queen	2284	10	-	9	0	42
Richardson	575	99	+	24	0	42
Smith	1943	101	+	0	0	42
Tamarack	1035	m		0	0	42
Trout	573	293	+	0	0	42
W.F. Chamberlain	578	m		35	5	42
W.F. Monumental	1036	0	-	0	0	42
Wapiti	2278	m		0	0	42
Whimstick	564	m		32	16	42
Zena	1058	0	-	2	0	42
Bear	1055	50	+	0	0	42
Grouse	1073	m				
Kennally	1195	73	+	1	0	42
Little Goose	1094	m		13	0	42
Little Goose	1100	0	-	5	0	42
Little Goose	1104	m				
Little Goose	2366	0	-	7	0	42
Piah	1084	0	-			
Pony	1056	0	-	0	0	42

Table B-6. (Continued.)

Integrator Reaches						
Stream	Reach ID	Wood/Mile (>11m*>.28m)	RMO>20pieces; Wood/mile (>20pieces)	7-day moving average maximum temperature (>15.5˚C)	7-day moving average maximum temperature (>17.8˚C)	Days reported
Rapid	1194	30	+			
Steamboat	613	0	-			
Stratton	612	0	-			
Warren	611	m				
Boulder	1135	19	-	22	0	42
Boulder	2374	9	-	10	0	42
Brush Trib	2372	10	-	0	0	42
East Branch Weiser	1958	49	+	42	28	42
Hard	1086	m		12	0	42
Hard	2361	10	-	39	19	42
Hazard	1127	27	+	15	6	42
Hazard	2368	79	+	13	9	42
Little French	1074	0	-			
Lost	1223	0	-	40	18	42
Lost	1954	32	+	42	42	42
Mud	2370	m		42	26	42
Rapid	1093	73	+	0	0	42
Rapid	2365	57	+	0	0	42

Table B-7. Reach summary information for grazing DMA reaches 2001 - 2006 on the Payette. Whenever a DMA site is located at an integrator site, we have presented the data in both tables.

Grazing DMA Reaches										
Stream	District/Field Office/Resource Area	Reach ID	Group Order	Sample year	ICBEMP HUC code	Livestock	Elevation (m)	Average precipitation (mm)	Gradient (%)	Sinuosity
Crooked	Council	1960	130-08	2005	170502010403	Cattle	1285	820.949	1.488	1.187
Deer	Council	1951	130-01	2005	170502010303	Cattle	1365	1027.119	3.779	1.218
M.F. Weiser	Council	1212	129-12	2002	170501241402	Cattle	1628	1082.237	4.145	1
Steves	Council	1957	130-04	2005	170502010301	Cattle	1656	770.466	6.411	1.145
Summit	Council	1953	130-02	2005	170501241003	Cattle	1353	759.62	1.468	1.667
Boulder	New Meadows	1135	123-20	2001	170602100601	Sheep	1448	1002.451	0.347	2.267
Boulder	New Meadows	2374	123-20	2006	170602100601	Sheep	1448	1002.451	0.363	2.236
Brush Trib	New Meadows	2373	123-19	2006	170602100203	Sheep	1239	793.3	1.128	1.705
E.F. Corral	New Meadows	1088	123-04	2001	170602100202	Sheep	2021	1373.63	0.644	1.271
E.F. Corral	New Meadows	2362	123-04	2006	170602100202	Sheep	2021	1373.63	0.816	1.102
Lost	New Meadows	1955	130-03	2005	170501241202	Sheep	1494	969.81	1.203	1.118
Mud	New Meadows	2371	123-16	2006	170602100502	Cattle	1298	806.826	0.857	1.599
Thorne	New Meadows	2367	123-11	2006	170602100402		1580	1128.948	0.804	1.873

Table B-8. Channel characteristics and condition information for grazing DMA reaches on the Payette 2001 - 2006. Only half of the reaches sampled in 2001 have streambank data.

Grazing DMA Reaches									
				Streambanks					
Stream	Reach ID	Group Order	Sample year	Average transect bankfull width (m)	Stable bank method1 (%)	Stable bank method2 (%)	Average bank angle (degrees)	Undercut banks (%)	Average undercut depth (m)
Crooked	1960	130-08	2005	4.64	86.4	59.1	124	21.4	0.04
Deer	1951	130-01	2005	3.14	97.6	42.9	106	28.9	0.055
M.F. Weiser	1212	129-12	2002	6.07	92.5	87.5	112	28.6	0.089
Steves	1957	130-04	2005	2.68	95.2	61.9	115	19	0.046
Summit	1953	130-02	2005	2.03	88.1	83.3	118	14.3	0.029
Boulder	1135	123-20	2001	7.05	86.4	54.5	113	24.4	0.057
Boulder	2374	123-20	2006	7.4	90.9	79.5	102	31	0.084
Brush Trib	2373	123-19	2006	2.43	100	97.6	96	29.3	0.052
E.F. Corral	1088	123-04	2001						
E.F. Corral	2362	123-04	2006	6.33	73.8	71.4	118	19	0.063
Lost	1955	130-03	2005	13.28	81	81	110	19	0.056
Mud	2371	123-16	2006	3.28	97.6	92.9	99	33.3	0.072
Thorne	2367	123-11	2006	3.5	100	92.9	70	50	0.193

Table B-9a. Riparian vegetation summaries for grazing DMA reaches on the Payette 2001 - 2006. Wetland ratings were based on community type cover in 2001 - 2002, and on species data in 2003 - 2005. Blanks indicate no data collected.

Grazing DMA Reaches													
Stream	Reach ID	Group Order	Sample Year	Greenline wetland rating	Cross section wetland rating	Effective ground cover (%)	Greenline woody cover (%)	Small trees (<50cm dbh) per hectare	Large trees (>50cm dbh) per hectare	Live tree basal area (m^2/hectare)	Standing dead trees per hectare	Standing dead basal area (m^2/hectare)
Crooked	1960	130-08	2005	71	67	91	44	19	19	6	0	0
Deer	1951	130-01	2005	57	48	89	49	624	136	55	117	2
M.F. Weiser	1212	129-12	2002	63	60	96						
Steves	1957	130-04	2005	49	31	87	39	565	117	38	19	6
Summit	1953	130-02	2005	63	47	79	69	253	39	16	39	0
Boulder	1135	123-20	2001	75	83	99						
Boulder	2374	123-20	2006	77	61	93	1	0	0	0	0	0
Brush Trib	2373	123-19	2006	73	71	99	51	351	39	20	0	0
E.F. Corral	1088	123-04	2001	75	79	90						
E.F. Corral	2362	123-04	2006	66	68	89	12	292	39	19	351	28
Lost	1955	130-03	2005	63	60	89	29	175	39	47	58	7
Mud	2371	123-16	2006	75	64	98	15	19	19	22	0	0
Thorne	2367	123-11	2006	66	54	98	25	136	58	21	0	0

Table B-9b. Weed species observed at grazing DMA reaches on the Payette in 2003 - 2004. Species data were not collected in 2001 - 2002. Blanks indicate no data collected.

Grazing DMA Reaches							
Stream	Reach ID	Group Order	Sample Year	Plant species	Common name	Greenline weed cover (%)	Cross-section weed cover (%)
Summit	1953	130-02	2005	Cirsium arvense	Canada thistle	0.4	0.8
Brush Trib	2373	123-19	2006	Conium maculatum	poison hemlock	0.7	0.0

APPENDIX C – REACH DESCRIPTION EXAMPLE

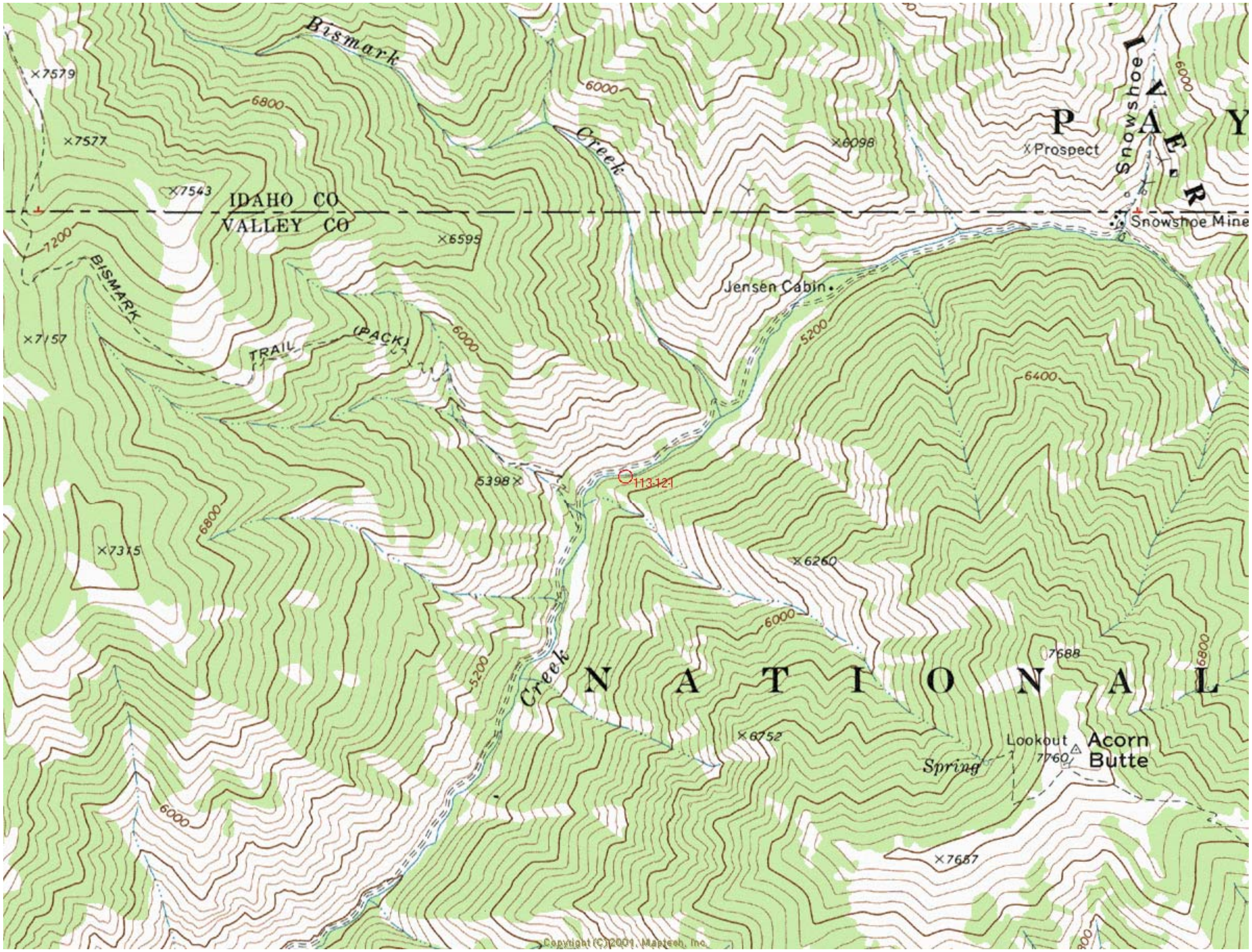
This section includes an example of our reach description pages, photograph documents, and topographic maps.

This section also includes a CD that contains:

- A digital version of this report
- The Effectiveness Monitoring Plan and sampling protocols
- Publications
- Summary data tables for all reaches sampled since 2001
- All reach descriptions for the current year
- Topographic maps for the current year
- 2001 and 2006 photograph pages

Additional photograph pages, reach descriptions, and topographic maps can be found by consulting previous reports or by contacting Eric Archer at (435) 755-3565 or by e-mail: earcher@fs.fed.us.

Please note that because the PIBO Effectiveness Monitoring program operated at half implementation in 2001, it was necessary to add additional sites in 2006 to fulfill our sample design. Consequently, you will find that about half of the 2006 photograph pages have comparable images originally taken in 2001. Additionally, the PIBO photograph protocol was developmental in 2001 and as a result, you will find that the naming convention for individual images is different between these two years.

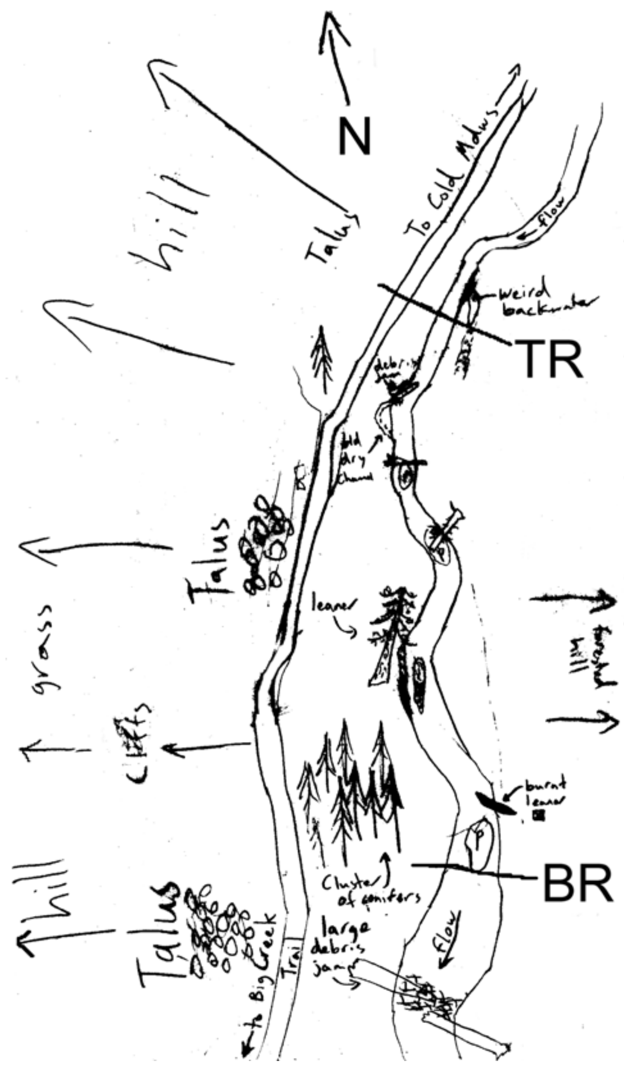


113-12-I Crooked Creek

Crooked Creek

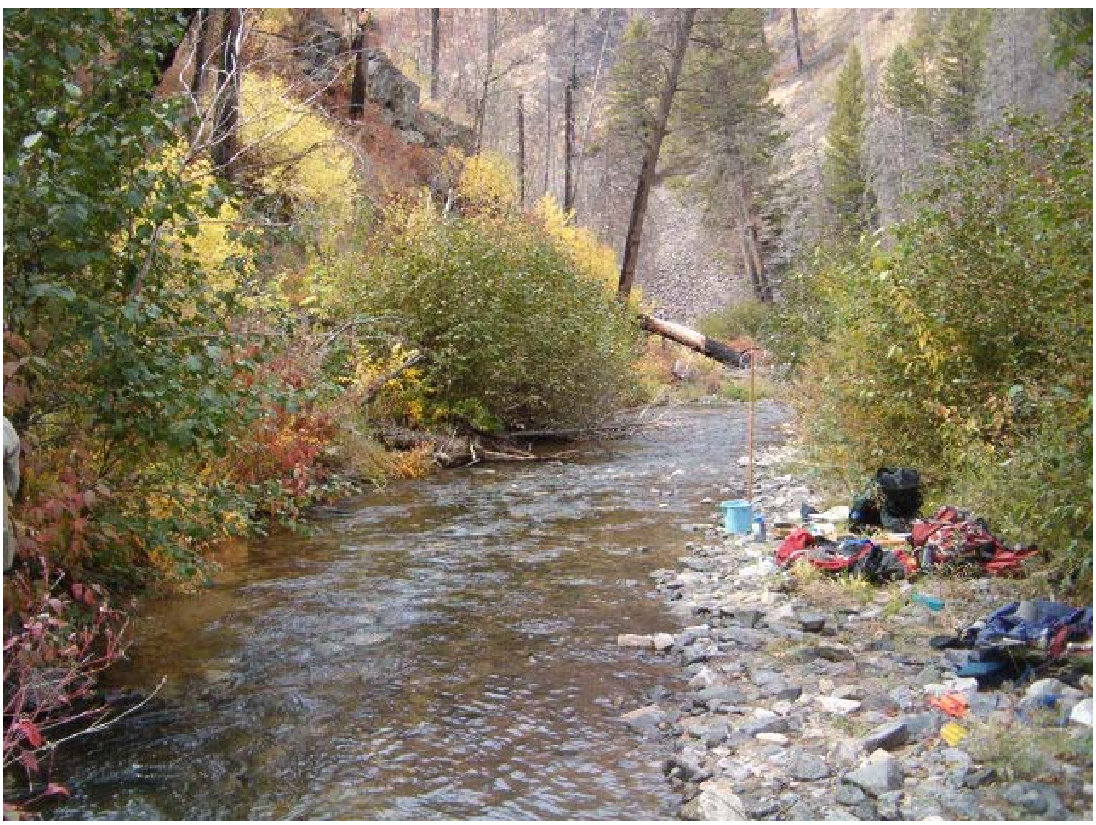
Integrator Reach: 1946, 113-12-I-I2-05 Payette N.F. / Krassel R.D.
UTM Zone: 11 649658 E 5005421 N
Width Category: 8

Reach Description: Fly into Cabin Creek located in the Frank Church Wilderness of no Return from either McCall or Salmon Idaho. From the Monumental Creek bridge (which is approximately 14 miles upstream from the Cabin Creek air strip) you will hike up Crooked creek about 2.2 miles. Hike up Crooked 1 hr. until you reach a flat some what open meadow. There will be a gravel bar that is next to the trail. Continue past this point another .25 mile to the next flat meadowy area with pine trees. There is a large talus slope/chute on the left side of the trail with a rock carin. Head to the creek. The reach begins about 50 meters above a large debris jam and is marked with a rock carin.



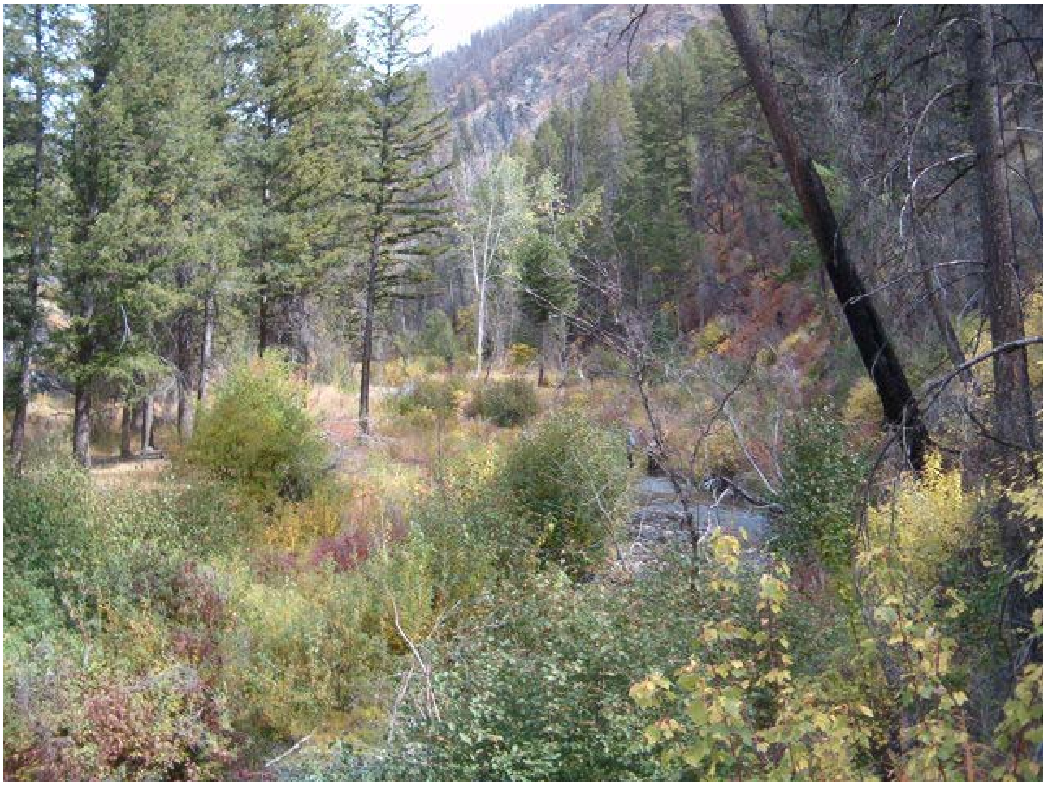
Crooked, RchID: 1946, RchName: 113-12-I-I2-05, 9/23/2005, Width Cat: 8, Random Start: 6m

Bottom of reach facing upstream. 7m to rod. Bearing to rod: 108°. Rod is on river left.



Bottom of reach facing downstream. 8m to rod. Bearing to rod: 260°. Rod is on river right.

Crooked, RchID: 1946, RchName: 113-12-I-I2-05, 9/23/2005, Width Cat: 8, Random Start: 6m



Reach Overview.

Stream XS 1. 2.5m upstream from transect 4, facing upstream. 8m to rod, bearing 40°. Rod is on river right.

Crooked, RchID: 1946, RchName: 113-12-I-I2-05, 9/23/2005, Width Cat: 8, Random Start: 6m

Distinct Feature. 25m downstream from transect 1, facing downstream. 7m to rod, bearing 280°. Rod is on river left.

Misc Stream. At transect 9, facing upstream. 20m to rod, bearing 20°. Rod is on river right.

Crooked, RchID: 1946, RchName: 113-12-I-I2-05, 9/23/2005, Width Cat: 8, Random Start: 6m


Top of reach facing downstream. 7m to rod. Bearing to rod: 234°. Rod is on river left.


Top of reach facing upstream. 10m to rod. Bearing to rod: 66°. Rod is on river left.

Crooked, RchID: 1946, RchName: 113-12-I-I2-05, 9/23/2005, Width Cat: 8, Random Start: 6m

Stream XS 3. 1m upstream from transect 21, facing downstream. 8m to rod, bearing 190°. Rod is on river left.

If you have any questions, please contact us:

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To view our annual report and effectiveness monitoring study plan,
Please visit our website:
http://www.fs.fed.us/biology/fishecology/emp