BOISE NATIONAL FOREST

ANNUAL SUMMARY REPORT

2000 – 2003

EFFECTIVENESS MONITORING PROJECT

FOR

STREAMS AND RIPARIAN AREAS WITHIN THE

UPPER COLUMBIA RIVER BASIN

PREPARED BY:

PIBO EFFECTIVENESS MONITORING PROJECT STAFF

If you have any questions, please contact us:

Fish & Aquatic Ecology Unit
860 North 1200 East
Logan, Utah 84321
(435)755-3578

Rick Henderson	Rhenderson01@fs.fed.us
Eric K. Archer	Earcher@fs.fed.us
Boyd Bouwes	Bbouwes@fs.fed.us
Marc Coles-Ritchie	Mcolesritchie@fs.fed.us
Dax Dugaw	Ddugaw@fs.fed.us

To view our annual report and effectiveness monitoring study plan, please visit our website:

http://www.fs.fed.us/biology/fishecology/emp

SUMMARY REPORT

2000–2003

EFFECTIVENESS MONITORING PROJECT

FOR

STREAMS AND RIPARIAN AREAS WITHIN THE

UPPER COLUMBIA RIVER BASIN

BOISE NATIONAL FOREST

PREPARED BY:

Alex Anderson

Greg Kliewer

Dax Dugaw

PIBO EFFECTIVENESS MONITORING PROGRAM STAFF

ACKNOWLEDGEMENTS

The authors wish to thank the large number of people who supported our effort throughout the last year. To begin, we would like to thank the Regional executives in Regions 1, 4, and 6 of the Forest Service and the Idaho and Oregon/Washington BLM for funding the project. We appreciate the guidance, energy, and input provided by Tim Burton, Gina Lampman, and other members of the IIT Monitoring Task Team. As always, a special thanks to Alma Winward for his enthusiasm in developing riparian vegetation sampling methods and analysis techniques.

We would like to thank the supervisors and sampling crews who are the backbone of the program. In particular, we thank the crews from the 2003 field season:

Field Supervisors: Alex Anderson, Tony Burrows, Ryan Colyer, Mae Culumber, Andy Hill, Ali Kelly and Heath Whitacre.

Crew Members: Luca Adelfio, Jade Alicandro, Erik Archer, Stefani Balison, Missy Barnes, Andrew Berger, Andrea Bixby, Keyna Bugner, Brian Cardall, Christina Craemer, Dax Dugaw, Samuel Finney, Rebecca Guenther, Gregg Hayward, Jeremiah Heitke, Sarah Klingsporn, Ryan Leary, Catherine Lee, Aaron Martin, Kipp Marzullo, Eric Matzen, Jamie McEvoy, Kate Metzger, Ralph Mitchell, Hans Millican, Brent Mueller, Sarah Quistberg, Tyler Ramaker, Jacob Riley, Ryan Salem, Paul Schwartz, William Sigler, Kasey Sirkin, Holly Truemper, Richard Wathen, Nicholas Weber, Kevin Weinner, Jennifer Woodward, and Benjamin Wright.

A special thanks to the graduate students associated with the project, Marc Coles-Ritchie, Derek Elverud, and Darrin Olsen. We would also like to recognize two new members to our staff in 2003. Greg Kliewer manages our database and Deanna Vinson is our budget manager and editor.

We received support from a large number of Forest Service and BLM personnel at the Forest, District, Resource Area, and Field Offices throughout the study area. The help from local personnel is invaluable to this effort. Given the large number of folks we had to forgo listing each individual separately, but would like to thank all of you as a group.

We appreciate the help and support from other large scale monitoring efforts. Gretchen Hayslip, Bob Hughes, Philip Kaufmann, Phil Larsen, and Tony Olsen from the EPA EMAP project have been extremely helpful in addressing study design and data analysis issues; Kirsten Gallo, Steve Lanigan, and Chris Moyer from the NWFP AREMP effort; Doug Drake, Rick Hafele and Shannon Hubler from Oregon DEQ; and Chris Mebane from Idaho DEQ.

In addition, Linda Baer, Michele Bills, Sheryl Ware, Julie Rowberry, and Patty Ybright-Jessop continue to do duty above and beyond to provide logistic and administrative support to keep the project running smoothly. We thank Dave Turner for directing our statistical analyses and Deanna Vinson for editing manuscripts and managing the budget. As always, thanks to the personnel from the National Aquatic Monitoring Center at USU for identifying and reporting the invertebrate

identifications. A special thanks to Chuck Hawkins and Yong Cao for developing a RIVPACS model for our invertebrate data.

We apologize if we've missed anyone.

ABSTRACT

The primary objective of this project is to answer the question: “Are key biological and physical components of aquatic and riparian communities improved, degraded, or restored in the range of steelhead and bull trout?” The study area occurs within the upper Columbia River basin on Forest Service lands within INFISH and PACFISH, and BLM lands within PACFISH or containing bull trout. We conducted a pilot study from 1998 to 2000 and concluded that the approach was logistically feasible, successfully measured site 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 both in 2001 and in 2002. At full implementation (which began in 2003), we will be sampling 250 sub-watersheds per year or 1250 every 5 years. An additional 50 sub-watersheds (sentinel sites) will be sampled annually. In 2006 we will begin sampling reaches that were originally sampled in 2001. At this time, we will begin addressing our objective of assessing change in resource conditions given current land management practices.

This report summarizes the information collected from 2000 to 2003. The project has sampled sites within all 20 National Forests, all Resource Areas within Oregon/Washington BLM, and four of the 6 Field Offices within Idaho BLM. A total of 634 sub-watersheds have been sampled including 189 in Region 1, 177 in Region 4, 173 in Region 6, 46 in Idaho BLM, and 49 in OR/WA BLM. Fifty of these sites are considered “sentinel” sites and will be sampled annually and 96 of the total number of sub-watersheds have been sampled at least twice. One hundred and five reaches (17%) were in reference sub-watersheds and 448 in managed sub-watersheds. In addition, the project sampled 184 grazing DMA’s with 27 having been sampled more than once.

The report includes an overview of the sampling design, description of methods, and summarized results by Region/BLM, state and National Forest. The appendices include data summary tables, reach description pages from 2003, and a sample of photo point pages. This report is not intended to be a complete interpretation of the results and we recognize that further analyses need to be conducted. We hope this report will stimulate comments and feedback to help improve the project in future years. Finally, we have included a CD with an electronic copy of this report, the Effectiveness Monitoring Plan and sampling protocols, publications, and summary data. The CD also contains photo points pages from 2002 and 2003, site maps, and topographic maps showing reach locations from 2003.

CONTENTS

INTRODUCTION 1
Study Area 2
METHODS 5
Sample Site Selection 5
Sampling Methods 7
RESULTS 14
Data Analyses 14
Quality Assurance Study 15
PACFISH / INFISH Comparisons 16
State DEQ / Clean Water Act Comparisons 16
Publications 17
What's New in 2003 18
FOREST SERVICE – REGION 4 21
Site Location Maps 22
Reach Summary Graphs 24
BOISE NATIONAL FOREST 30
Reach Location Maps 31
Approximate 5-Year Reach Location Map 33
REFERENCES 34
APPENDIX A 37
APPENDIX B 44
APPENDIX C 74

INTRODUCTION

The decline of the steelhead trout (Onchorynchus mykiss gairdneri) and bull trout (Salvelinus confluentus) in the upper Columbia River basin has prompted new interest in examining the current condition of habitat throughout the range of this species. In particular, the effect of forest management activities on spawning and rearing habitat is under increased scrutiny as to current conditions and perceived trend. 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 have prescribed habitat protection measures that may further protect habitat and promote recovery of degraded habitat throughout the range.

Currently there are a number of 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 (NFMA 1976). Due to increased concern over the status of anadromous salmonids, the United States Department of Agriculture (USDA) Forest Service (USFS) and United States Department of Interior (USDI) Bureau of Land Management (BLM) developed an aquatic and riparian area management strategy (PACFISH) to protect habitat for Pacific anadromous salmonids (PACFISH 1994). The purpose of this strategy was to provide consistent, interim guidance to national forests on appropriate management strategies, 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 recent 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 Marine Fisheries Service (NMFS), and United States Department of Interior, Fish and Wildlife Service (USFWS). As part of the Section 7 consultation process with the BLM and USFS, 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 livestock grazing, to determine if current management practices were meeting PACFISH riparian management objectives. The interagency effectiveness monitoring team (USFS, 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. 2004). The team developed a draft-monitoring plan in May 1998. The team has met annually since updating 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 cover 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 USFS Region 4, the USFS National Fish 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 sample throughout the upper Columbia River basin in USFS 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. 2004). We defined the effectiveness monitoring component of this project 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 landscape.
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 reaches 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.

We developed the following principles and assumptions: (1) Develop an effectiveness monitoring plan that is cost-effective, practical, and incorporates the principles of adaptive management; (2) Develop an effectiveness monitoring framework that incorporates measurable, repeatable methods that will be useful in answering monitoring questions on federal lands at different scales; (3) The implementation of KMPs will mitigate the grazing-related effects of human-caused stressors.

Study Area

For the 1998 and 1999 pilot studies we sampled Region 4 Forests within the Salmon River drainage, and beginning in 2000 throughout the upper Columbia River basin within the study area defined in the Effectiveness Monitoring Module – PIBO Monitoring Plan (Kershner et al. 2004). This includes USFS lands within PACFISH and INFISH and BLM lands that are within PACFISH or contain bull trout (Figure 1). The study area includes portions of eastern Oregon and Washington, Idaho, and western Montana. 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 and sockeye salmon, which are also listed.

The lands within the basin 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 500 m along the lower Columbia River to over 3000 m in the mountains.

Climatic conditions within the sub-basin are highly variable. 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 bottoms and stream types within the upper Columbia River basin are highly variable. 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.

Vegetation is variable and dominated by a variety of forest types, grasses, and shrubs. Forest vegetation groups within the study area are 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. Sheep and cattle grazing have occurred throughout the basin continuously since their introduction. Currently, range integrity ratings are low-moderate throughout most of the study area (Quigley and Arbelbide1997).

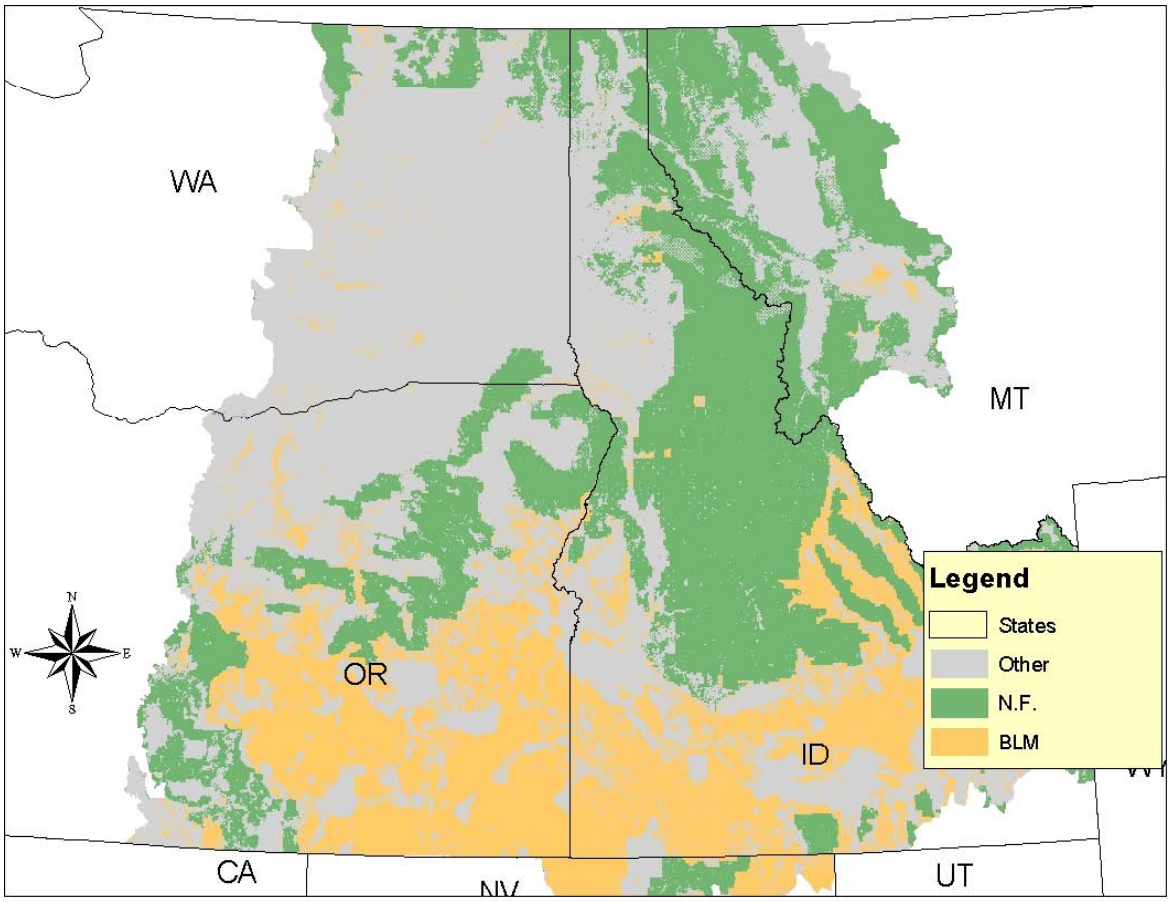

Figure 1. Map of the upper Columbia River basin with the overall study area shaded. Specifically, the project includes all USFS land and BLM land within the PACFISH boundary or that contains bull trout.

METHODS

Sample Site Selection

Integrator Reach Selection - We used the 3547 U.S. Geological Survey, Hydrologic Unit - 6th field sub-watersheds within the study area as a list of potential sample reaches (Quigley and Arbelbide 1997). We then developed two additional stratification criteria for sample sub-watersheds. First, we only included sub-watersheds that contained "response" reaches with gradients < 3%. This reach 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 response reach must contain > 50% FS / BLM ownership

From 1998 to 2000, we stratified sub-watersheds into those with livestock grazing (managed), reference, and managed but not grazed (other). Sub-watersheds were categorized as "reference" if they 1) were not grazed by livestock within the last 30 years, 2) road densities < 0.5km / km^2, 3) riparian road densities < 0.25km / km2 and 4) no historic dredge or hardrock mining associated with riparian areas. The "other" category sub-watersheds were not sampled. This category included sub-watersheds that were not grazed but had experienced extensive timber harvest, road building, mining activities, or contained inactive grazing allotments. Sample reaches were then randomly chosen within the managed and reference strata described above. 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.

Prior to the 2001 field season the sampling design was extensively reviewed and some modifications were made. First, the "managed" and "other" categories were combined such that all managed lands were included. Next, a 5-year, augmented serially alternating, rotating panel sampling design was adopted (Table 1). With this design, 1/3 of the sub-watersheds would be sampled between 2001 and 2005 (assuming full funding) and reaches 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 throughout the study area.

The 3547 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 groups (1/5) will be sampled each year. The sub-watersheds within each group are categorized as managed or reference and seven or eight are randomly chosen for sampling (again using the GRTS design). Forest maps that depict the sampling year for each group are included later in this document. In addition, 50 sub-watersheds were randomly chosen and will be sampled annually. These "sentinel watersheds" are an integral component of the analyses by defining both annual variability and the rate of change for each variable sampled.

We used stream reaches as our primary sampling unit within each sub-watershed. A crew supervisor began at the downstream end of the stream and

established the reach at the first site that contained a response reach with no side-channels, tributaries, or current beaver activity. Sample reaches were at least 20 bankfull channel widths and a minimum of 80 meters in length as measured along the thalweg.

In 2003, we began adding "integrator" reaches with stream gradients greater than 3%. In reviewing past information, we determined that approximately 1/3rd of the sub-watersheds within the study area do not contain a response channel. In addition, including steeper gradient reaches is necessary for combining information and comparing results with other large-scale monitoring efforts. Therefore, one integrator reach with a gradient between 3 to 5% was sampled within each group of 20 sub-watersheds. This resulted in ~16% of our integrator reaches being located in steeper gradient channels. An additional benefit will be our ability to test the assumption that response reaches are more sensitive to management activities (more likely to change) than steeper gradient reaches.

We also increased the minimum length of sample reaches to 160 meters. This was done to be consistent with other monitoring programs, specifically the Aquatic and Riparian Effectiveness Monitoring Program for the Northwest Forest Plan.

Table 1. Augmented serially alternating sampling design showing the number of sub-watersheds sampled each year for the first 5 years and then repeating. The sampling schedule for the 50 sentinel reaches 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(37)	50(26)	45	50	50	50	50
Group 1	250(183)					250	
Group 2		250(142)					250
Group 3			246				
Group 4				250			
Group 5					250		

Grazing Designated Monitoring Area Reach Selection - The third objective of this study specifically targets livestock grazing to address commitments made in the biological opinions related to the effectiveness of grazing management strategies. Designated monitoring areas (DMAs) are sampled within grazed sub-watersheds that are selected for integrator reaches. Once the sample sub-watersheds are selected, local range conservationists are contacted to describe the location(s) of DMA reaches. The interagency team specifically wanted to only 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 reaches. These variables include all vegetation and streambank parameters, gradient, sinuosity and bankfull width

Additional Reaches – A number of "additional" reaches have been sampled to test specific questions. These include testing the repeatability of sampling

methods, between-site variance estimates between low and high gradient reaches, within exclosure versus outside exclosure conditions, and between-site variability within a sub-watershed. In addition, many "integrator" reaches sampled during the 1998 to 2000 pilot effort do not meet current criteria and are now considered additional reaches.

Sampling Methods

A combination of in-channel, riparian vegetation, and macroinvertebrate characteristics were measured at each integrator reach. Twenty in-channel variables were used to describe the physical nature of the stream. Six vegetation variables described riparian vegetation with two additional variables calculated for reaches in Region 4 and Idaho BLM. Twelve metrics were used to describe the macroinvertebrate communities. All variables are commonly used by other researchers to evaluate land management effects (Kauffman et al. 1983a, 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 our website at http://www.fs.fed.us/biology/fishecology/emp.

Stream Channel and Water Quality Measurements - Stream gradient and sinuosity were measured to characterize the stream channel at each reach. Both the upstream and downstream boundaries of the sample reach were located at the tail of a pool to allow for accurate measurements of channel gradient. 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. Reach gradient was calculated by dividing the total change in elevation by the length of the channel. Sinuosity was calculated for each reach by dividing the channel length by valley length. Valley length was defined as the straight-line distance between the upper and lower boundaries of the reach.

Bank characteristics were measured at a series of transects located within the study reach. The location of the first transect was derived by choosing a random number (k) between 0 and 7. The first transect was then established (k) meters upstream of the start of the reach. Subsequent transects occurred in intervals of one bankfull width working upstream. All bank characteristic variables were measured on both the right and left banks. The total number of transects in a reach ranged from 20 to 27.

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 < 90 degrees and non-undercut banks > 90 degrees. The depth of undercut banks was measured to the nearest centimeter and extended 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 convex slope 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 > 50% live vegetation, litter, roots, rocks > 15 cm, wood > 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 > 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. In 2001, we began measuring bankfull widths at each transect. The information is summarized as the reach average bankfull width.

The length, maximum depth, pool crest depth, and residual pool depth were measured for each "primary" pool in the sample reach using the R1/R4 Fish Habitat Inventory Procedures (Overton et al. 1997). Primary pools were defined as occupying at least half the wetted width of the bankfull channel, the maximum depth is at least 1.5 times the pool crest depth, and at least as long as it is wide. Pool lengths were measured by stretching a 100 m tape along the thalweg from the beginning of the pool to the end. 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 2 cm, while pool crest depths were determined by measuring the deepest point in the pool tail. Residual depths were calculated as the difference between the maximum depth and the pool 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, wetted 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). Minimums of 10 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 and then combined for analysis. Entrenchment width was measured as the width of the valley at twice the maximum bankfull elevation. The average bankfull width, bankfull width to depth ratio, wetted width, wetted width to depth ratio, and entrenchment ratio were calculated.

Substrate composition was measured using modified Wolman pebble counts (Wolman 1954) in the four riffles/runs that are at least half as long as the width category. At least twenty-five 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. The D50, D84, and percent of particles less than 6 mm were calculated both excluding bedrock and

including bedrock.

The percent surface fines (< 6 mm) were measured at the pool tail using the R1/R4 Fish Habitat Inventory Procedures (Overton et al. 1997) in all years except 2001. In 2003, we also measured the percent surface fines <2mm. Measurements were recorded for the wetted, flowing area of the first four scour pools. Other pool types were not measured. The sampling area extended from the pool tail crest upstream a distance equal to 10% of the pool length. 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. The same sampling area was used with 25 particles measured from each pool-tail.

Large woody debris (LWD) were tallied and the volume estimated using the R1/R4 Fish Habitat Inventory Procedures (Overton et al. 1997) from 1998 to 2000. All pieces that extended into the bankfull channel, were greater than 3 meters in length, and had a diameter > 0.1 meter were tallied. The method was changed in 2001 to include all pieces > 1 m in length and 0.1 m in diameter. The length and diameter of each piece was measured with a staff rod or tape in order to calculate LWD volume. In addition, pieces were grouped into two categories. Category 1 pieces extended below the bankfull elevation and were considered actively involved in channel forming processes. Category 2 included pieces that were elevationally above bankfull.

Riparian Vegetation Measurements 2000 to 2002 - Measures of riparian vegetation were conducted using survey techniques described by Winward (2000). These methods were designed specifically to detect changes in riparian vegetative communities caused by livestock grazing.

Greenline composition surveys were used to describe the continuous line of vegetation along the stream. The survey began at the top of the reach and extended for 363 ft (110 m) along the right bank and then the corresponding distance along the left bank. The surveyor walked along the first line of perennial vegetation observing a 12-inch (30 cm) wide strip of vegetation and recorded the dominant plant community type for each step.

The greenline data were used to determine the successional status and relative stability of stream banks (Winward 2000) for reaches within Region 4 and the southern portion of Idaho BLM. Each community type had been assigned a successional rating of either “early” or “late” by Winward (2000). For each reach the percent of the area covered by community types with a “late successional” rating was calculated. Each community type also had been assigned a streambank stability class by Winward (2000). The stability classes ranged from 1 to 10 with higher values indicating root masses with a greater ability to hold the soil when exposed to moving water. A stability rating was calculated for each reach. The greenline successional and greenline stability ratings were only calculated for reaches within USFS Region 4 and BLM lands within the upper Salmon River drainage.

Riparian cross-sections describe the community types present throughout the riparian area. Five transects were established perpendicular to the valley floor. The first and fifth transect were located at the beginning and end of the greenline survey, respectively. The remaining transects were located at ¼, ½, and ¾ of the straight-line distance between the first and fifth cross sections. Each cross section began at the edge of the riparian vegetation on one side of the valley and stopped at the riparian edge on the opposite side. In systems with wide riparian areas, the transects ended 27.5 m from the streambank. A surveyor walked each transect and recorded the dominant community type for each step.

A problem with using sampling methods that utilize community types as the cover categories was that analysis techniques have only been developed for a small geographic area (greenline) or not at all (riparian cross-sections). The community type ratings used in the greenline analyses (Winward 2000) have been generated for the portions of Idaho, Utah, and Nevada covered by the Manning and Padgett (1995), Padgett et al. (1989), and Youngblood et al. (1985) community type classifications. However, they have not been generated for the other five classifications used in the study area. We were unable to find other standardized methods for analyzing community type cover data in a consistent manner with different classifications.

Therefore, it was necessary to develop a standardized, quantitative method to consistently rate community types throughout the entire study area. After discussions with a number of riparian ecologists, we developed a process that incorporates the original vegetation plot data used to develop each community type and the wetland indicator status defined in Reed (1988). The wetland ratings are commonly used nationwide in assessments of wetlands.

The wetland indicator status for each species within a community type was used to develop a wetland rating for the community type. To do that we first calculated an importance value for each species in the community type by multiplying the percent cover and constancy. The importance value was then multiplied by the wetland rating (ranging from 0 for upland species to 100 for obligate wetland species) for that species. This value for each species within the community type was then summed for an overall community type rating between 0 and 100. This process was conducted for each community type in each of the seven classifications used. A reach wetland rating for greenline and cross-sections was then calculated (community type wetland rating * percent of total steps for each community type). This is the same formula described in Winward (2000), but using the wetland rating instead of the successional or stability ratings.

Effective ground cover was measured throughout the riparian area using procedures from the USFS Intermountain Region, Soil Quality Monitoring Methods publication. Data were recorded along the five cross sections established for riparian status. At every step, a 2 cm circle in front of the toe was evaluated to determine if it had at least 50% cover of live vegetation, litter, or rock. If yes then the type of cover was recorded. If not, then it was recorded as bare ground. The percent of steps with cover was calculated for each reach.

Willow regeneration described the age classes of willows along the streambank as described in Winward (2000). Data were collected along the length

of the “greenline” and for a distance of 1 m to each side of the greenline. The species and age class were recorded for every willow. Age class was determined by the number of stems and grouped as sprout, young, mature, or decadent. Rhizomatous species of willow were not included since they cannot be aged using this method. A ratio of young to old shrubs was calculated for each reach.

Riparian Vegetation Measurements 2003 -The 2003 vegetation data were collected for the same general location as previous years, along the greenline and riparian cross sections. The sampling protocol was modified to obtain species, rather than community type, cover estimates. Data were collected at intervals along the streambank and the riparian cross sections. The standard Daubenmire quadrat frame (0.5 x 0.2 m) was used to define the area of consideration. Cover was recorded for all species that could be identified, or for unknown species with > 5% cover -- which were collected for identification in the office.

The sample area for an integrator reach was changed from 110 m to match the stream reach length of 160 m to 320 m, based on the bankfull width. At grazing DMAs the reach length was always 120 m, with the channel transects at 6 m intervals.

Greenline quadrat data were recorded at channel transects where stream data were collected. There were at least 20 greenline quadrats for each side of the stream, for a minimum of 40 greenline quadrats per reach. At each quadrat, both herbaceous and woody cover was recorded. The height of woody vegetation was also recorded as: <1m, 1 – 2 m, or > 2 m tall. This permitted the estimation of the amount of woody cover, and the general height of woody vegetation, along the streambank.

Riparian cross-section data were recorded at five channel transects at stream transects 1, 5, 10, 15, and 20. Data were collected in six quadrats for every cross section, within 10 m of the stream, on both banks. The quadrats were located at 3 m intervals, i.e. meters 3, 6, and 9. This resulted in 30 cross section quadrats per reach.

The abundance of each species at a reach was calculated by averaging the cover (using the cover class midpoint) for that species at the reach. The average cover values were used to calculate reach wetland ratings for the greenline and cross-sections. This is the same wetland rating method that was used to rate community types throughout the study area in previous years.

For reaches in Region 4, species data were used to determine community type cover at the reach. This was done to generate the greenline stability and successional status ratings of Winward (2000), which are based on community type cover. A Bray-Curtis dissimilarity metric was used to calculate the similarity between quadrat species data and each of the community types (using species constancy and cover data) in the riparian vegetation classifications for Region 4 (Padgett et al. 1989, Youngblood et al. 1985, and Manning et al. 1995). The most similar community type was determined for each quadrat. The percent of the reach (all quadrats) in each community type was used to calculate the greenline stability and successional status ratings, as with the 2000 to 2002 data (described above).

Effective ground cover was estimated by recording the amount of bare ground

at each of the 30 cross section quadrats. Bare ground was estimated by observing the cover at the four corners of the quadrat frame. A flag pin was inserted through a hole in the quadrat frame and the number of the 4 points where the pin did not contact vegetation, litter, or rock (> 2.5 cm) was recorded. The average number of bare points was calculated for each cross-section on each bank. The percent of the reach with effective ground cover was then calculated.

Macroinvertebrates - Macroinvertebrates were sampled using the protocol recommended by the BLM/FS Aquatic Monitoring Center, Logan, Utah during 1999 and 2000. One kick net sample was collected at a representative location within the four riffles/runs. The sample area extended the width of the net (1.5 ft), 1 ft (30 cm) upstream of the net, and to a depth of 4 in (10 cm). All four samples were combined for each reach. During 2001 we modified our sampling to be consistent with EPA sampling protocols. Two kick net samples were collected at randomly chosen locations within each riffle. All eight samples were again combined for each reach. Samples were analyzed by the Aquatic Monitoring Center and summarized using 12 metrics (Table 2).

Table 2. 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	

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 16 to September 2. Temperatures were summarized using the seven-day moving maximum temperatures at all reaches and a variety of other procedures specific to Clean Water Act requirements in each state.

Reach Descriptions - We used several methods to describe the location of each reach to insure future relocation. This information is summarized in the “Reach Descriptions and Data Summaries” section at the end of this document. Written directions to and a short description of the reach were recorded. A site map was drawn that included both the stream and riparian area. 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 at the bottom of each reach were determined by using a handheld Global Positioning System (GPS) recorder (accuracy of +/- 30 m).

Photographs were also taken facing upstream and downstream from the top and bottom of each reach. Additional photographs were taken of channel and vegetation cross-sections and representative views of pools, riffles, marker location, and any unique characteristics occurring within the reach. Locations were described for each photograph so that repeat pictures can be taken from close to the same point.

Beginning in 2003, a site marker tag was installed at each reach. Marker tags were not placed at reaches within wilderness areas; rather a distinct natural feature was used as the site marker. The distance and compass bearing to the beginning of the reach were recorded and a photo of the marker, in perspective to the reach start, was also taken. A complete file of photo point pages from 2002 and 2003 is included on the CD.

After a reach is established, a map program is used to create a topographic map of the reach location. Any other pertinent details are included in the map or added, such as private land boundaries, road numbers, trails, etc. This map is then included, along with the other reach description details, in a folder that will be given to the crew that will resample the site in five years from the initial sample. A power point presentation is included on the CD, by forest, that contains all 2003 reach maps.

RESULTS

This report summarizes the information collected from 2000 to 2003. The project has sampled reaches within all 20 of the National Forests, all Resources Areas within Oregon/Washington BLM, and four of the 6 Field Offices within Idaho BLM. A total of 634 sub-watersheds have been sampled including 189 in Region 1, 177 in Region 4, 173 in Region 6, 46 in Idaho BLM, and 49 in OR/WA BLM. (Table 3 and Figure 2) Fifty of these reaches are considered "sentinel" reaches and will be sampled annually and 96 of the total number of sub-watersheds have been sampled at least twice. One hundred and five reaches (17%) were in reference sub-watersheds and 448 in managed sub-watersheds. In addition, the project sampled 184 grazing DMA's with 27 having been sampled more than once. Finally, 71 additional reaches have been sampled, which include reaches surveyed for quality control purposes, enclosure/exclosure reaches, and test reaches.

This report displays the results of each variable for all reaches sampled and for each Forest Service Region and BLM State office. It is not intended to be a complete interpretation of the results. The subsequent sections describe some of the analysis techniques and other projects that we are conducting.

Table 3. Summary of all reaches sampled from 2000 to 2003. The number of reaches sampled in 2003 is in parentheses.

	6th Field HUCs	Integrator Managed	Integrator Reference	DMA's	Additional Reaches
Region 1	189(97)	136(70)	50(26)	9(1)	11(2)
Region 4	177(88)	129(67)	37(19)	48(23)	14(1)
Region 6	173(83)	142(72)	18(8)	66(41)	34(0)
BLM Idaho	46(12)	24(10)		33(7)	5(0)
BLM OR/WA	49(25)	17(16)		28(3)	7(6)
Total	634(306)	448(235)	105(53)	184(75)	71(9)

Data Analyses

This year's annual report provides data summaries without rigorous statistical analysis. In general, they describe the current status or baseline condition for each attribute measured. This report graphically displays the results for most variables using box and whisker plots (Figures 5 through 13). Plots were constructed for both managed and reference sub-watersheds using data from all reaches within a region and then separately for each Forest, Resource Area, and Field Office. Three sets of plots were developed for integrator reaches covering Region 1, Region 6 and OR/WA BLM, and Region 4 and ID BLM. Two sets of Grazing DMA plots were developed for Region 6 and OR/WA BLM, and Region 4 and ID BLM, but not for Region 1 due to low sample sizes. Box-Plots show the distribution of the data by

depicting the median, first and third quartile (25th and 75th percentile) and the 10th and 90th percentile of the data.

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

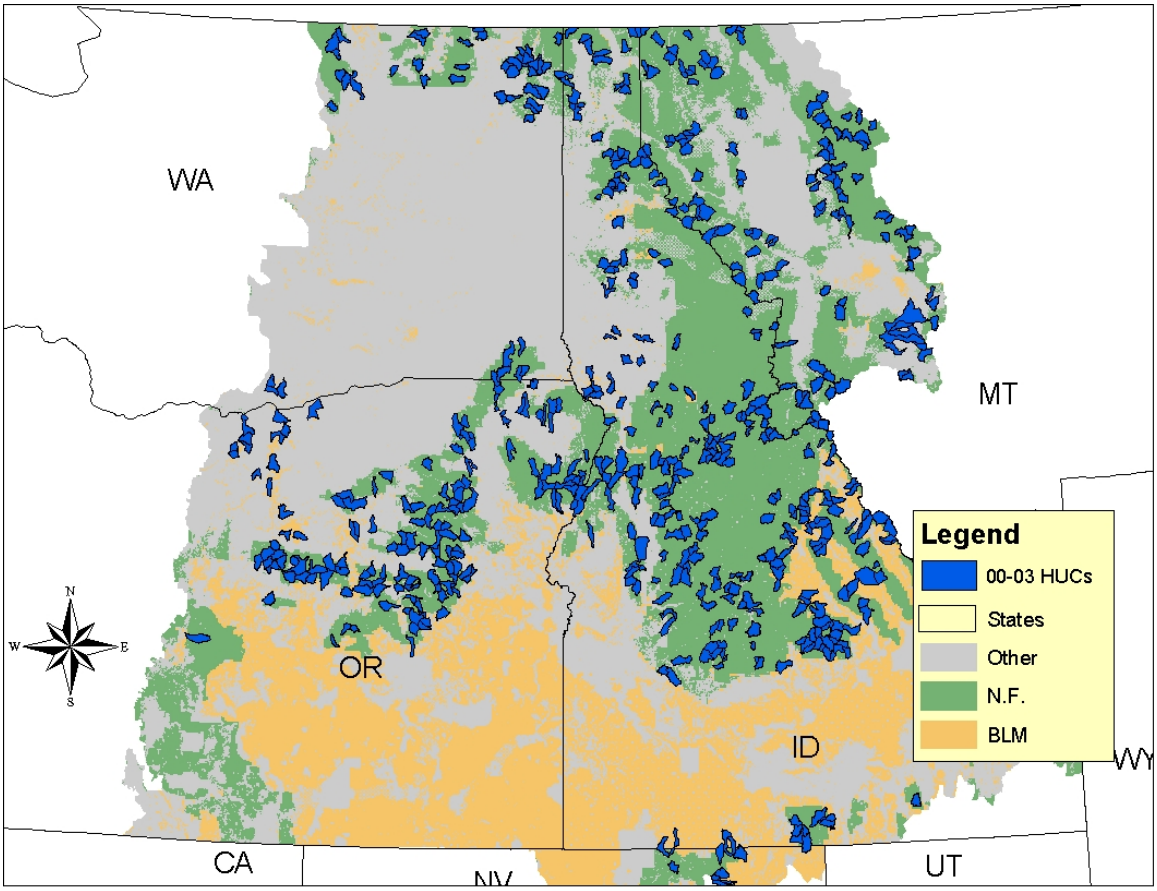

Figure 2. Map of study area with the 634 sub-watersheds sampled from 2000 through 2003 highlighted.

Quality Assurance Study

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). 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 all 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% confidence interval and samples 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 attributes are being published as Forest Service General Technical Reports. Draft copies of the two reports and a paper submitted to American Water Resources Association are on the CD and will be made available as soon as they are printed.
http://www.fs.fed.us/biology/fishecology/emp.

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 537 reaches from 2000 to 2003 except for 10 reaches that were sampled dry. Bank stability and lower bank angle (percent undercut banks) were compared for 161 meadow reaches. We defined "meadow" as having less than five pieces of large woody debris per 100 m of stream length and "wooded" reaches as having five or more pieces per 100 m. We defined LWD 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 LWD criteria. Therefore, while a reach may be classified as "wooded", no wood under the RMO classification may occur. The number of large woody debris per mile as defined in the PACFISH and INFISH documents was compared for 375 wooded reaches. Water temperature data were summarized for 419 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.

State DEQ / Clean Water Act Comparisons

We summarize water temperature information relative to the criteria used to determine "impairment" under the Clean Water Act. Information on impairment criteria was gathered from the four State regulatory agencies. Following is a description of how the data was summarized for each state.

Oregon DEQ – Water temperature data for reaches in Oregon are summarized using the 7-day moving average maximum temperature (AMT). We report the number of days for which the AMT was higher than 10.0^{o} C, 12.8^{o} C, and 17.8^{o} C.

Washington DOE – Water temperature data for reaches in Washington are summarized using the daily maximum temperature (DMT). We report the number of days where the DMT was above 16 ^{o} C, 18 ^{o} C, 21 ^{o} C, and 22 ^{o} C. Each stream in the state has been grouped into one of these four temperature classes, and is

considered in violation if the AMT exceeds the temperature criteria at any time.

Idaho DEQ – Water temperature data for reaches in Idaho are summarized using the DMT and daily average temperature (DAT). We report the number of days for which the AMT is above 22 ^{o}C and the DAT above19 ^{o}C. The site is considered impaired if the AMT or DAT is exceeded by 11 or more days.

Montana DEQ – Water temperature data for reaches in Montana are summarized using the 7-day AMT. We report the number of days for which the AMT exceeds 10 ^{o}C, 15 ^{o}C, and 21 ^{o}C. We are unable to assess impairment at a site, since the State requires a comparison with information from a similar reference site.

Nevada DEP- Water temperature data in Nevada are summarized using the DMT. We report the number of days for which the DMT is greater than or equal to 20° C. Temperature criteria have been established only for certain reaches, and no impairment criteria exists.

Publications

The program and associated scientists have been working on a number of publications. Four have been published and the others are either in press or in review. The first (Kershner et al. 2004) is the monitoring plan that outlines the foundation and design of this program. Three of the articles focus on studies we conducted to assess observer variability and how it affects our ability to detect changes. The paper by Olsen et al. takes an in-depth look at the sources of variability associated with particle counts. The final paper by Roper et al. 2003 describes the benefits of sampling permanent versus temporary reaches. All of these papers can be found at our website at http://www.fs.fed.us/biology/fishecology/emp.

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. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Coles-Ritchie, M.; Henderson, R. C.; Archer, E. K.; Roper, B. B.; Kennedy, C.; Kershner, J. L. In review. The repeatability of riparian vegetation sampling methods: how useful are these techniques for broad-scale, long-term monitoring? Gen. Tech. Rep. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Kershner, J. L.; Coles-Ritchie, M.; Cowley, E.; Henderson, R. C.; Kratz, K.; Quimby, C.; Ulmer, L. C.; Vinson, M. R. 2004. A plan to monitor the aquatic and riparian resources in the area of PACFISH/INFISH and the biological opinions for bull trout, salmon, and steelhead. Gen. Tech. Rep. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Olsen, D. S.; Roper, B.; Kershner, J. L.; Henderson, R. C. Archer, E. K.. In Press. Sources of variability in pebble counts: why differences among observers may not matter. Journal of the American Water Resources Association.

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 18:585-592.

Roper, B.; Kershner, J. L.; Archer, E.; Henderson, R.; Bouwes, N. 2002. An evaluation of physical habitat attributes used to monitor streams. Journal of the American Water Resources Association. 38: 1-10.

What's New in 2003

Standardizing Sampling Methods – We have worked extensively with the Northwest Forest Plan – Aquatic and Riparian Effectiveness Monitoring Program (AREMP) to standardize sampling methods between our programs. Changes made to our program are 1) the minimum reach length was extended to 160 meters 2) pools were separated into full channel and partial channel categories and 3) tests were conducted to describe the relationship between and precision of pebble counts conducted at equally spaced transects (AREMP) versus in riffle habitat (PIBO).

Steeper Gradient Reaches – Integrator reaches in past years have been located in response reaches with a gradient < 3%. In reviewing past information, we determined that approximately 1/3rd of the sub-watersheds within the study area to not contain response channels. In addition, sampling steeper gradient reaches will facilitate combining information and comparing results with other large-scale monitoring efforts. An additional benefit will be our ability to test the assumption that response reaches are more sensitive to management activities (more likely to change) than steeper gradient reaches. Beginning in 2003, one integrator reach with a gradient between 3 to 5% was sampled within each group of 20 sub-watersheds. This will result in 16% of our integrator reaches being located in steeper gradient channels.

Modified Riparian Vegetation Sampling Methods – We conducted numerous tests between 2000 and 2002 to define the ability of our riparian vegetation sampling methods to detect changes in vegetation (Coles-Ritchie et al. In press and Coles-Ritchie dissertation in press). One result was that using "community types" would not allow us to detect changes until a major shift in the species composition had occurred. In 2002 we collected both community type and plot (species and percent cover) information at 15 reaches. We concluded that plots gave comparable results for reach summary indices, provide additional information that will be more sensitive to change, and that the sampling time was comparable (about 1.5 times that of using community types).

Two vegetation sampling methods were discontinued in 2003. The "woody

regeneration" sampling method was dropped due to high observer variability and the lack of an ecologically meaningful way to summarize the data (Coles-Ritchie et al. in press). The effective ground cover method was also dropped, however an alternative method to estimate ground cover was added, based on the amount of bare ground recorded at quadrats.

Weeds and Rare Plant Species – The collection of species data provided the capability to do new data summaries, such as the abundance of weeds and rare plants. For each reach, the percent cover was reported for species listed as sensitive, threatened, or endangered in the National Forest or BLM area where it was observed. The percent cover was also reported for each weed species that is listed as a noxious weed in the USDA Invaders database (http://invader.dbs.umt.edu/Noxious_Weeds/) for the state where it was observed.

Invertebrate RIVPACS Scores – The western Bio-monitoring Center developed a predictive model that provides a water quality assessment score for each site. The RIVPACS score describes the similarity of the invertebrate species composition at a site to the species composition found at similar reference sites. The model was developed using 112 reference sites and developed a range of similarity scores between these sites with a mean value of 1.0 and a standard deviation of 0.14. Similar models developed elsewhere have then drawn cutoffs at the 10th and 90th 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 sites as one approach to summarizing the invertebrate composition information for each reach. In the next year, we will be testing how the model performs with 2003 reference sites. We are also concerned with the accuracy of the results in geographic areas where there are few reference sites to calibrate the model, and will be looking at new ways of defining reference conditions in these areas.

Additional projects – One of our goals is to find new ways to provide useful information to the field units. In 2003, we were asked to participate with four additional projects. Two of these involved gathering additional information, one was to conduct quality assurance testing, and the fourth was a comparison test of several riparian vegetation sampling methods.

- Oregon BLM – The OR / WA BLM received additional funding to expand the sampling to 16 sub-watersheds outside of the study area in southeastern Oregon. Sub-watersheds were chosen by Resource Area personnel, with sample sites selected following our normal protocol for integrator reaches. Reports will be produced and distributed to each field office.
- Lost River Ranger District – The Lost River RD was in the process of developing a grazing EIS and needed current condition information on grazing monitoring sites. Funding was provided by the Salmon-Challis NF and bank stability, greenline successional status, and woody regeneration methods were sampled at 20 sites.

- FS Region 1 streambank alteration method evaluation – Region 1 is in the process of developing a standardized streambank alteration methodology. We worked with regional personnel and conducted a test of the observer variability associated with this method and the Idaho BLM method. Funding was provided by the National Fish and Aquatic Ecology unit, Region 1, and our program.
- Comparison of riparian vegetation methods – We worked with the National Forest Service Terrestrial Ecological Unit Inventory team (TEUI), EPA Environmental Monitoring and Assessment Program, and Forest Service Forest Inventory and Analysis (FIA) program, to describe similarities and differences in the three riparian vegetation sampling methods. We sampled 23 of the ~ 30 sites sampled by the other two programs. This information will be helpful in moving towards a standardized National riparian sampling methodology.

New 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 are developing a website where all summary information, original data, photo pages, and reach description pages can be viewed and downloaded. We hope this will provide a quick (new year's information will be posted by May) and convenient approach to access this information. We will be refining the website throughout 2004, so please send us suggestions on how to modify or improve it. When the site is completed, we will install an access link on our website at http://www.fs.fed.us/biology/fishecology/emp.

FOREST SERVICE – REGION 4

One hundred and seventy-seven sub-watersheds were sampled within Region 4 from 2000 to 2003, including 129 integrator reaches in managed watersheds and 45 integrator reaches in reference watersheds. Sixty-five grazing Designated Monitoring Area reaches and 15 additional reaches were also sampled. The number and location of sites in each Forest are shown in Table 4 and Figures 3 and 4. Summary data for the variables measured at each integrator and key reach are displayed for both managed and unmanaged reaches in Region 4, and for managed integrator reaches in each Forest (Figures 5 through 10).

Table 4. Number of reaches sampled in each Forest and District within Region 4. Reaches sampled in 2003 are in parentheses.

		Reach Type			
		Integrator		DMA	Additional Reaches
Forest	District	Managed	Reference		
Boise	Cascade	4(0)	1(1)	2(0)	
	Emmett	6(0)		2(0)	5(0)
	Idaho City	3(2)	1(0)		
	Lowman	8(4)	1(0)	2(0)	2(0)
	Mountain Home	7(4)		2(0)	
Humboldt-Toiyabe	Jarbidge	7(7)			
	Mountain City	3(1)			
Payette	Council	3(1)		1(0)	
	Krassel	3(2)	15(8)		1(0)
	McCall	9(2)	2(1)	3(1)	2(0)
	New Meadows	6(1)	1(1)	4(0)	
Salmon-Challis	Challis	4(2)	2(2)	6(2)	
	Cobalt	1(0)	1(0)		1(0)
	Leadore	6(6)	1(1)	5(5)	
	Lost River	13(7)	2(1)	6(4)	
	Middle Fork		4(0)		
	North Fork	5(4)	4(3)		2(1)
	Salmon	6(5)	2(2)	4(3)	1(0)
	Yankee Fork	6(6)	4(3)	9(5)	
Sawtooth	Burley	1(1)	1(1)	4(1)	
	Fairfield	4(2)	1(1)	2(0)	
	Ketchum	8(7)			
	SNRA	8(6)	2(2)	11(2)	
	Twin Falls	8(0)		2(0)	1(0)

Site Location Maps

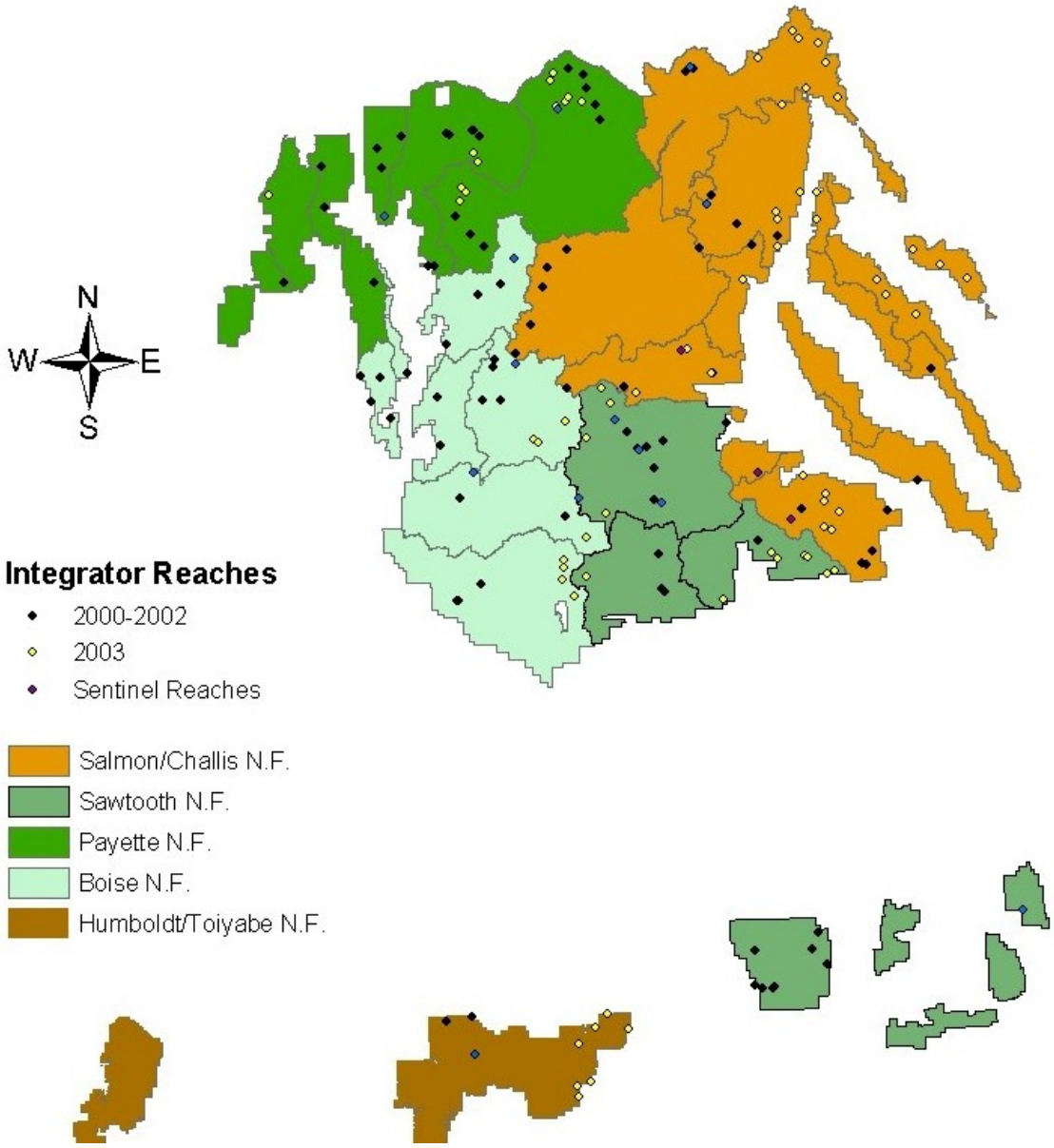

Figure 3. Integrator reaches sampled within Region 4, 2000-2003

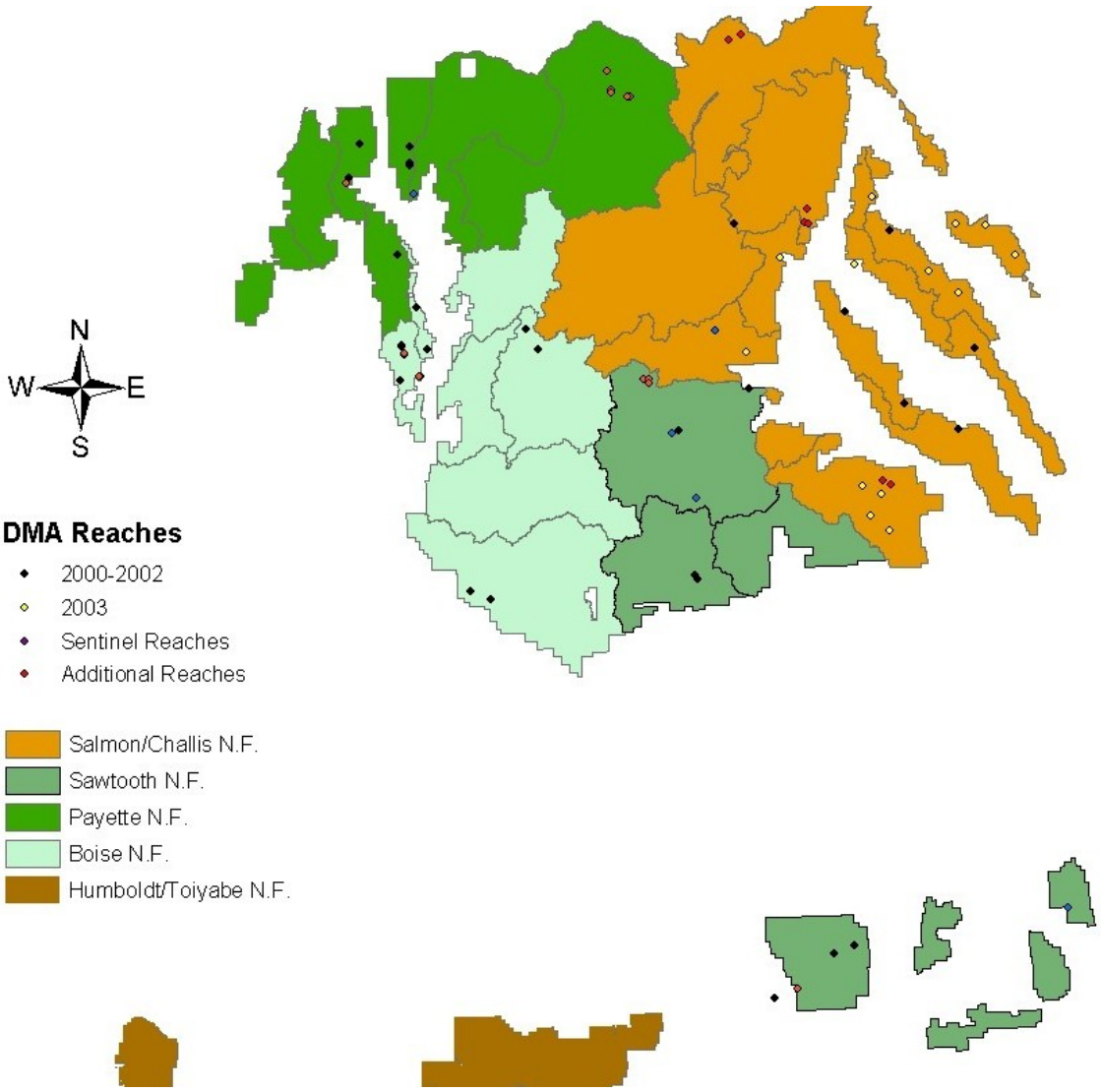

Figure 4. Grazing Designated Monitoring Area reaches and additional reaches sampled within Region 4, 2000-2003.

Reach Summary Graphs

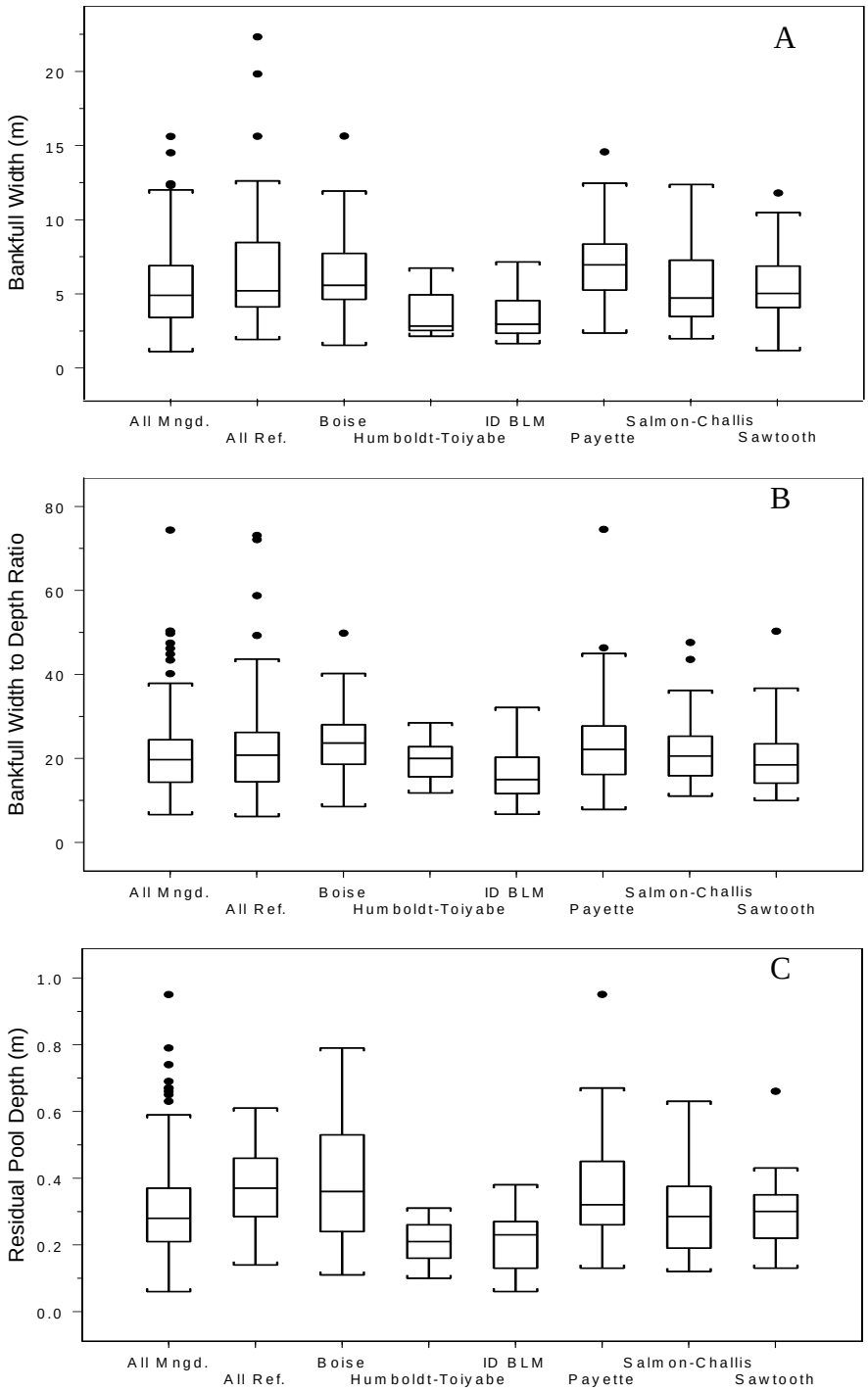

Figure 5. Box-whisker plots for all managed (Mngd.) and reference (Ref.) reaches in ID BLM and Forest Service Region 4, and all managed reaches by ID BLM and National Forest. (A) bankfull width, (B) bankfull width to depth ratio, (C) residual pool depth.

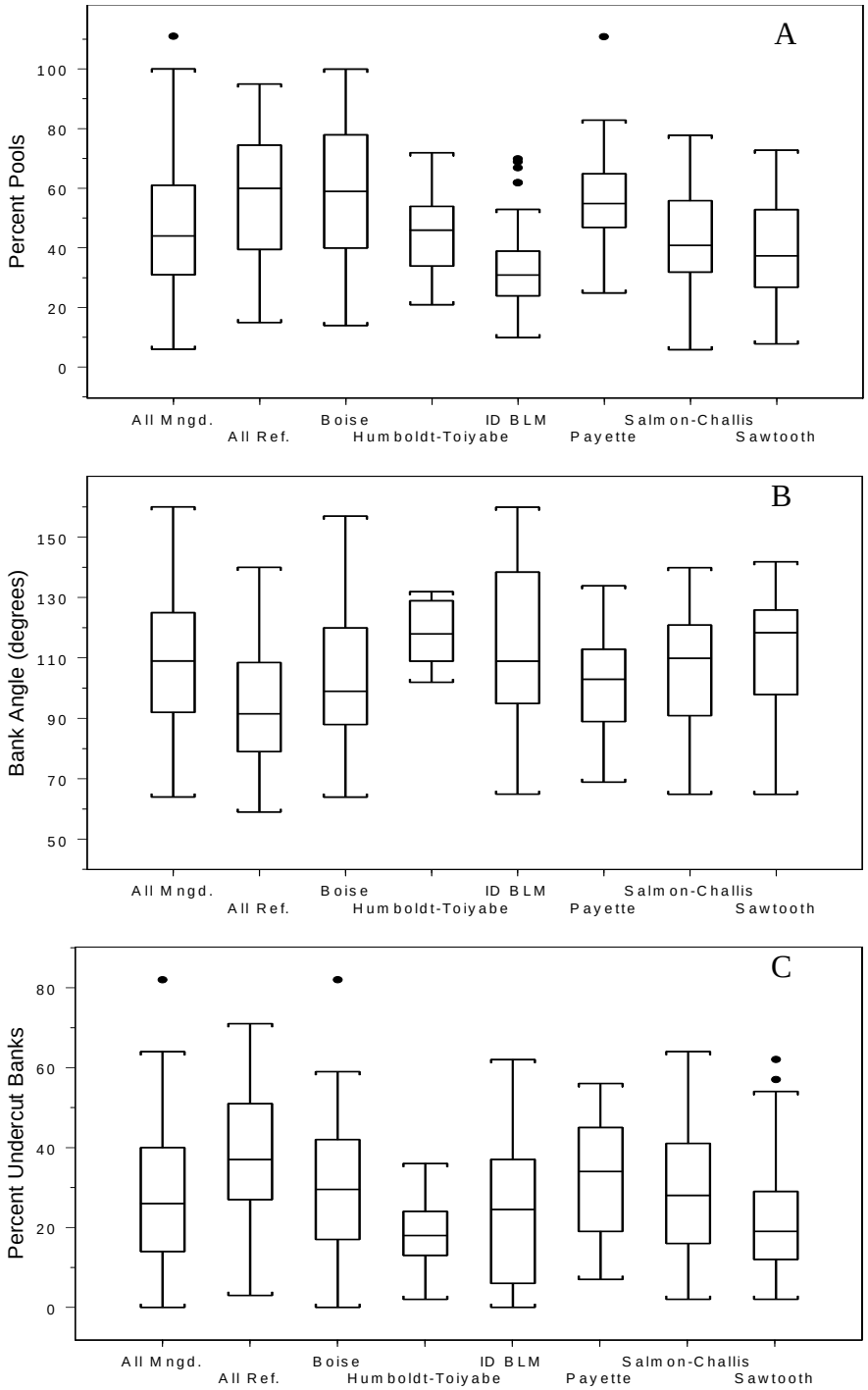

Figure 6. Box-whisker plots for all managed (Mngd.) and reference (Ref.) reaches in ID BLM and Forest Service Region 4, and all managed reaches by ID BLM and National Forest. (A) percent of the reach containing pools, (B) average bank angle, (C) percent undercut banks.

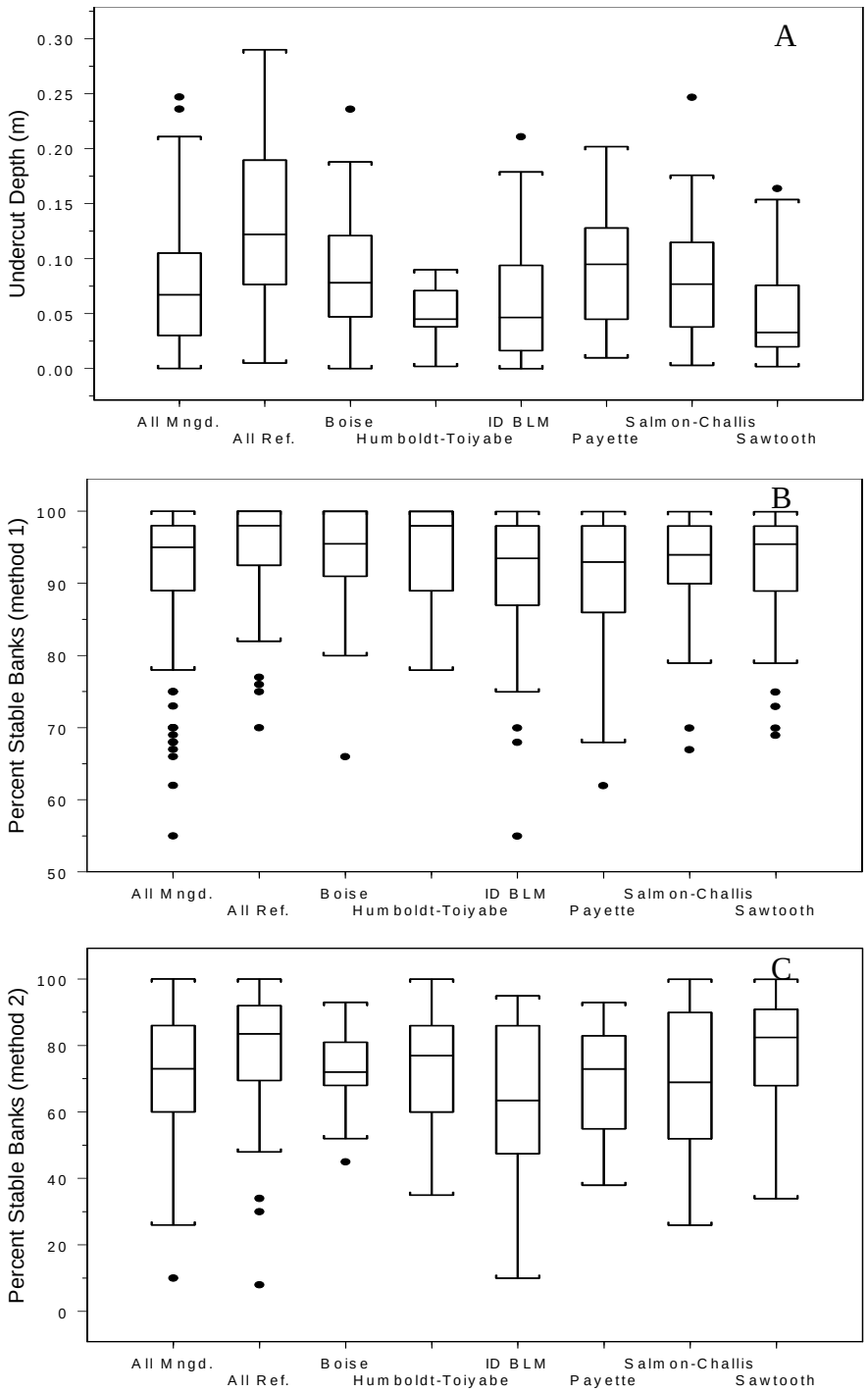

Figure 7. Box-whisker plots for all managed (Mngd.) and reference (Ref.) reaches in ID BLM and Forest Service Region 4, and all managed reaches by ID BLM and National Forest. (A) average depth of undercut, (B) percent stable banks - method 1, (C) percent stable banks - method 2.

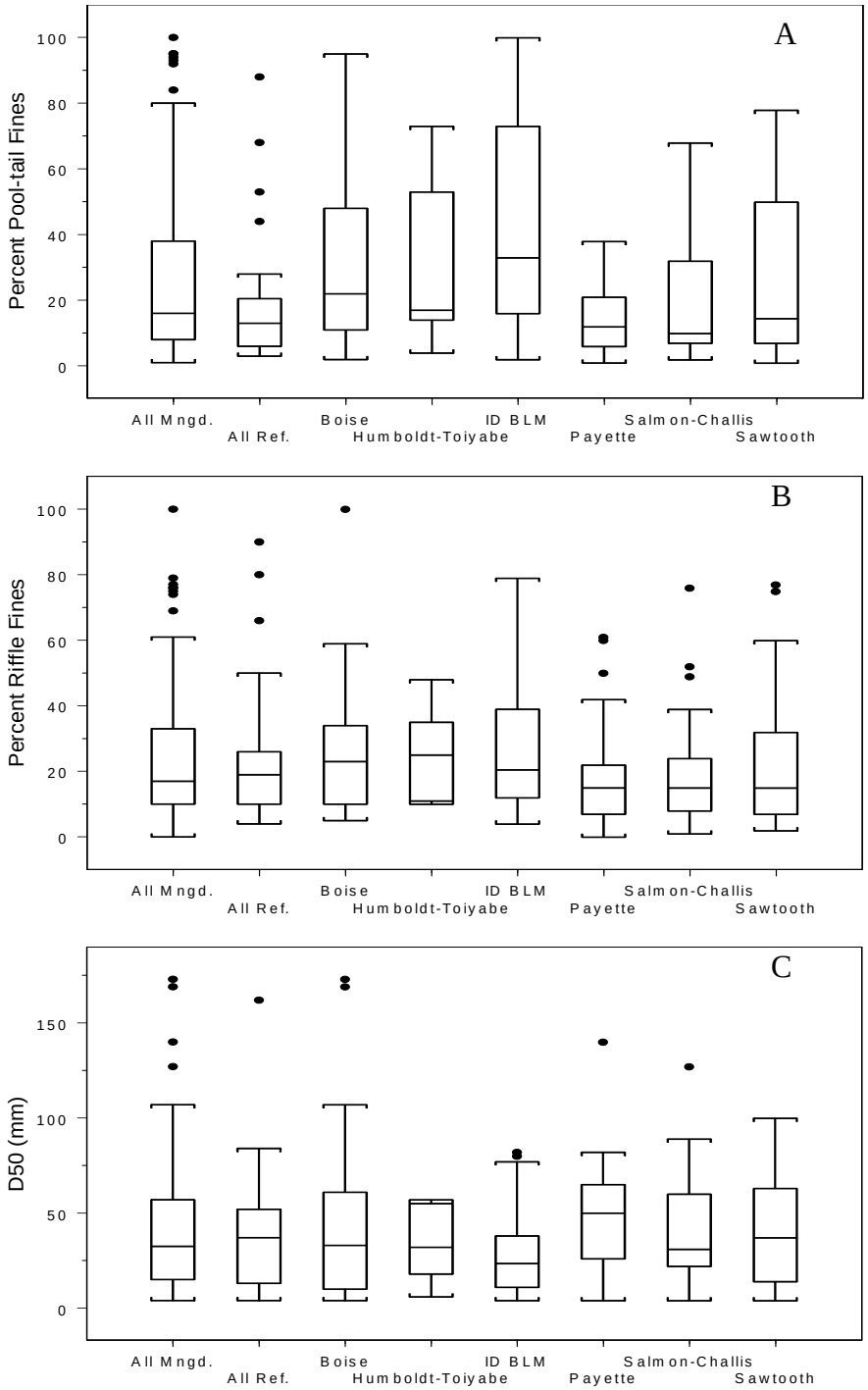

Figure 8. Box-whisker plots for all managed (Mngd.) and reference (Ref.) reaches in ID BLM and Forest Service Region 4, and all managed reaches by ID BLM and National Forest. (A) percent pool-tail fines, (B) percent fines in riffles, (C) median particle size in riffles (D50).

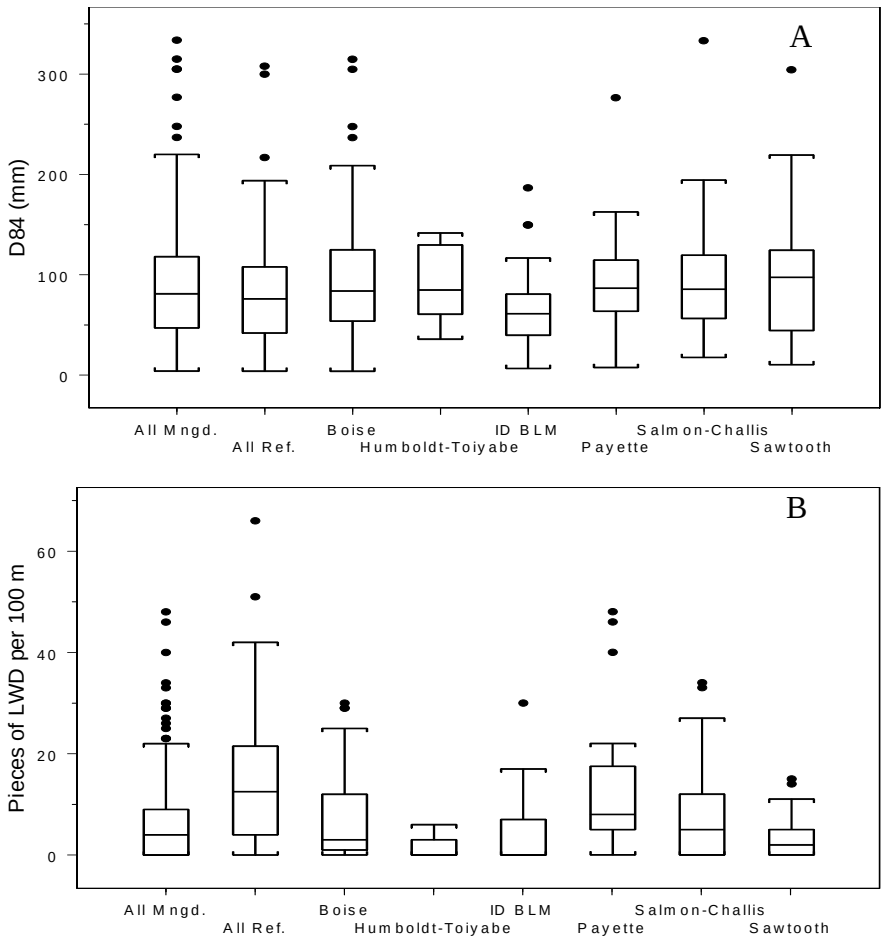

Figure 9. Box-whisker plots for all managed (Mngd.) and reference (Ref.) reaches in ID BLM and Forest Service Region 4, and all managed reaches by ID BLM and National Forest. (A) 84th percentile particle size in riffles, (B) pieces of LWD per 100 m.

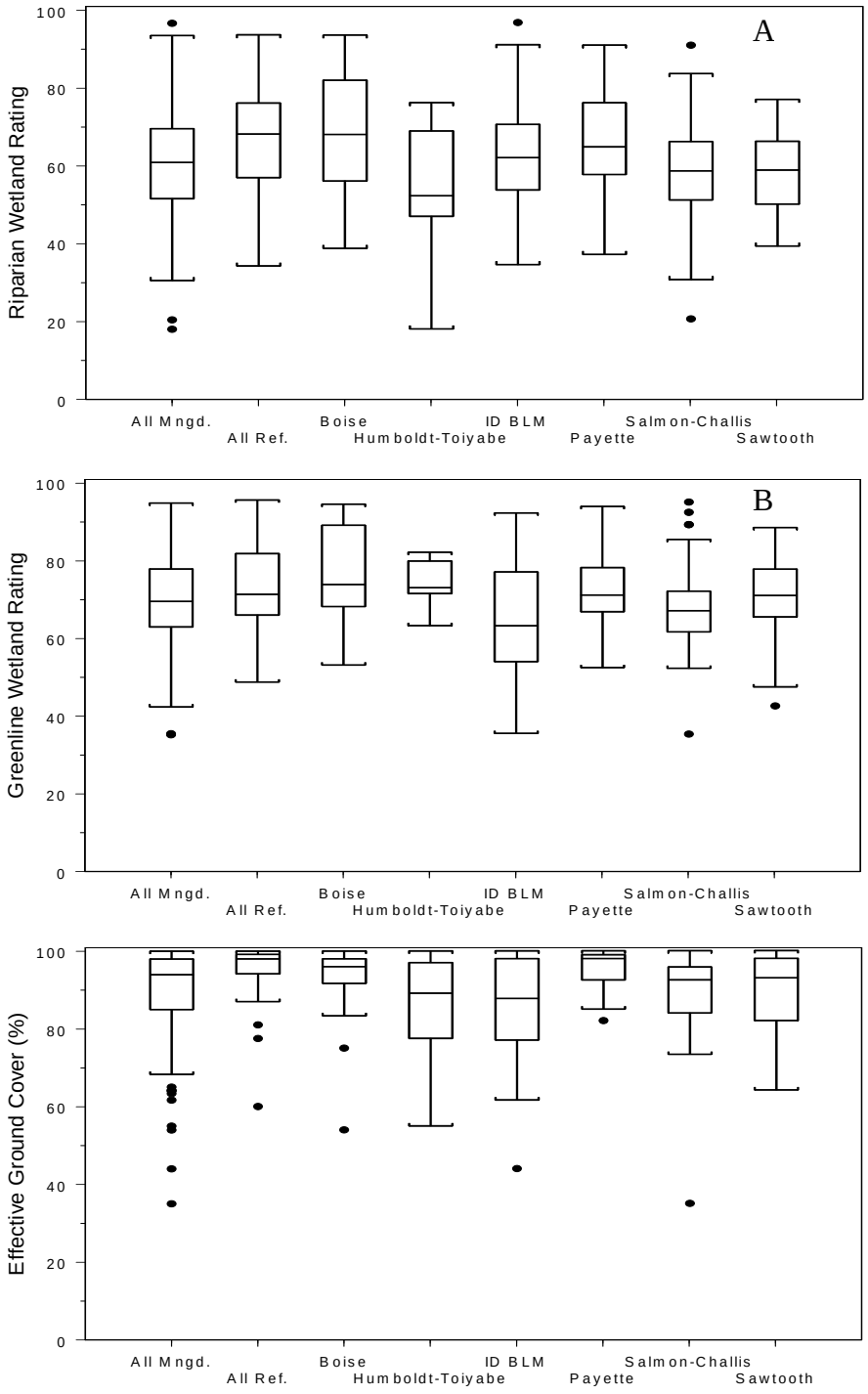

Figure 10. Box-whisker plots for all managed (Mngd.) and reference (Ref.) reaches in ID BLM and Forest Service Region 4, and all managed reaches by ID BLM and National Forest. (A) riparian wetland rating, (B) greenline wetland rating, (C) effective ground cover.

BOISE NATIONAL FOREST

Thirty-three sub-watersheds were sampled on the Boise NF from 2000 to 2003. This includes five integrator reaches on the Cascade RD, six on the Emmett RD, four on the Idaho City RD, nine on the Lowman RD, and seven on the Mountain Home RD. Eight grazing Designated Monitoring Area reaches were also sampled including two on the Cascade RD, two on the Emmett RD, two on the Lowman RD, and two on the Mountain Home RD. A total of seven additional reaches were sampled, five on the Emmett RD and two on the Lowman RD. Note that multiple reaches can be present in one sub-watershed. One integrator reach on the Cascade RD, one on the Idaho City RD, and one on the Lowman RD will also be sampled annually as part of our sentinel reach program. The following figures and tables include maps of the sample reaches (Figures 11 and 12), a 5-year projection of sample areas by year (Figure 13), summary tables of information collected at each reach (Appendix B), reach description pages from 2003 reaches and an example of photo points for one reach (Appendix C). The remainder of the reach description pages and reach photo points are included on the accompanying CD.

Beginning in 2002, field units were directed to conduct implementation monitoring on projects within the same sub-watersheds sampled that year by the effectiveness monitoring team. In order to help define the workload associated with this, we have projected the number of sub-watersheds that will be sampled at full funding for each Forest (Table 5). The EMP project was funded at ½ implementation during FY 2001 and 2002 (Year 1 & Year 2), thus actual numbers of sampled sub-watersheds do not match the projected numbers. Remaining reaches not sampled in 2001 and 2002 (Years 1 & 2) will be added in 2006 and 2007 (Years 6 & 7). We stress that these numbers are estimates (with the exception of 2003 which reports the actual number sampled) and will likely vary by ± 5 sub-watersheds, depending on the random order within sampling groups and the presence of appropriate sample reaches.

Table 5. Approximate number of sub-watersheds to be sampled on the Boise National Forest. Actual number sampled in 2003 is reported.

	Year 1 2001	Year 2 2002	Year 3 2003	Year 4 2004	Year 5 2005
Projected Number of Sub-watersheds	21	10	11	16	0

Reach Location Maps

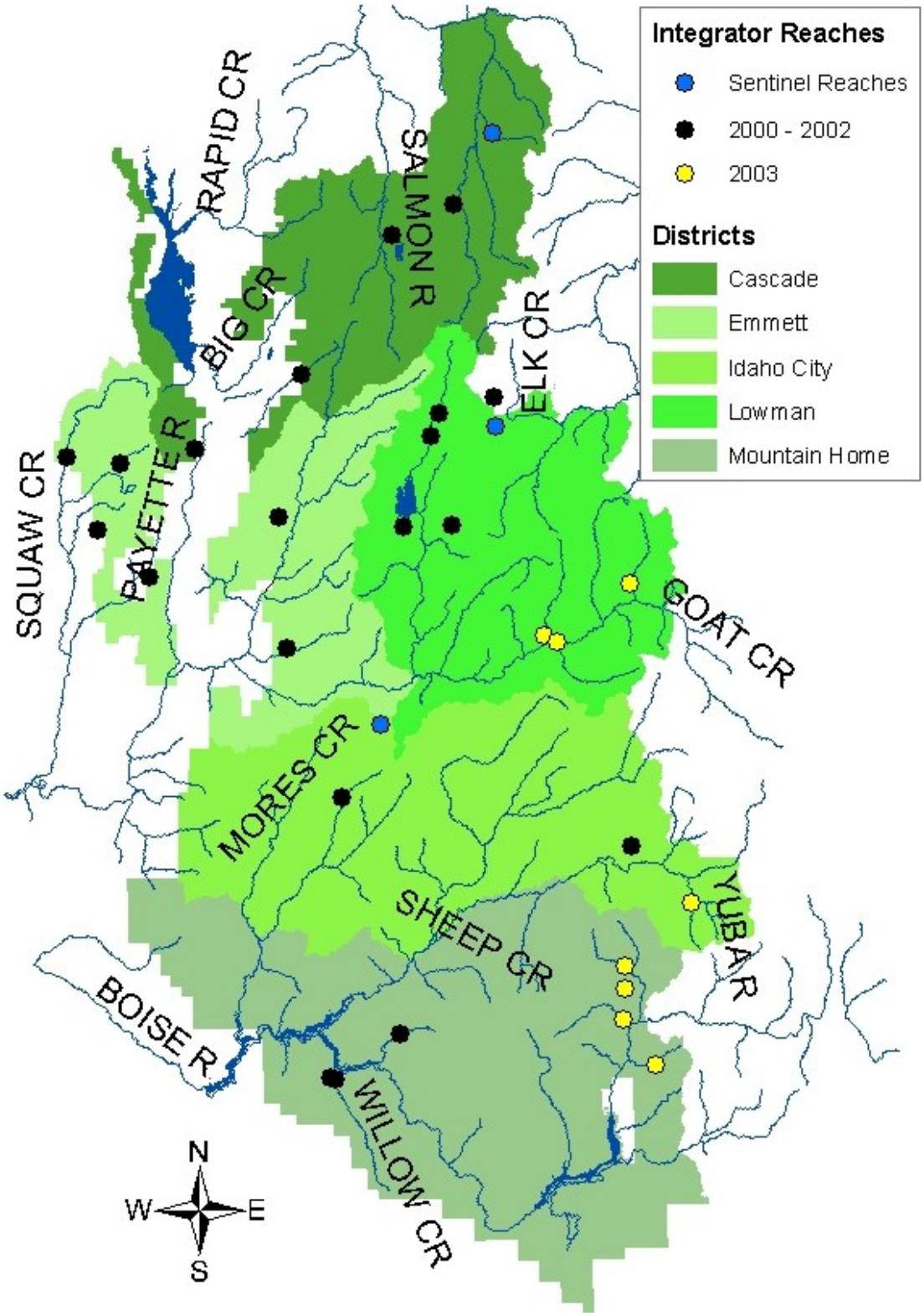

Figure 11. Boise National Forest integrator and sentinel reaches sampled 2000-2003.

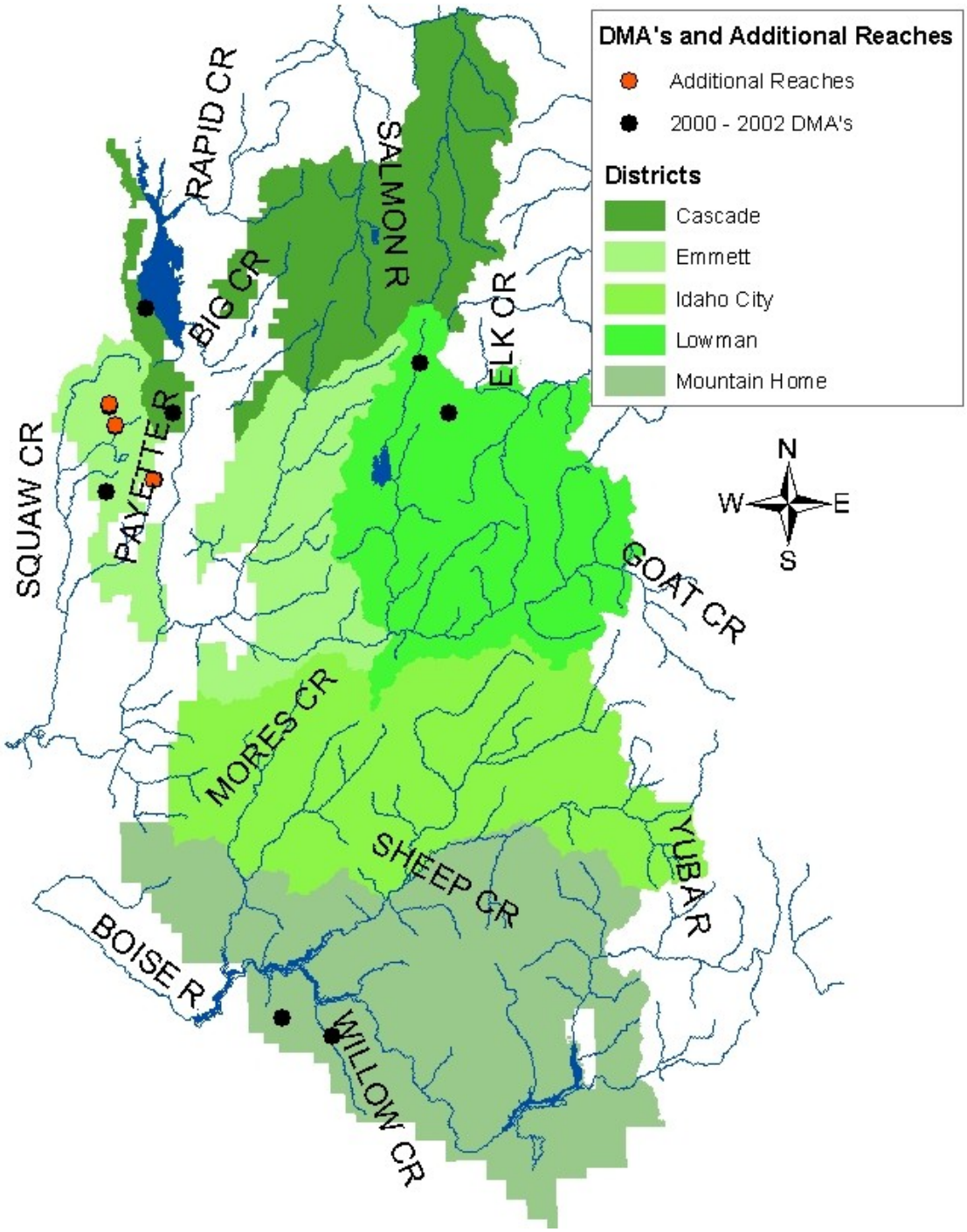

Figure 12. Boise National Forest grazing Designated Monitoring Area reaches and additional reaches sampled 2000-2003.

Approximate 5-Year Reach Location Map

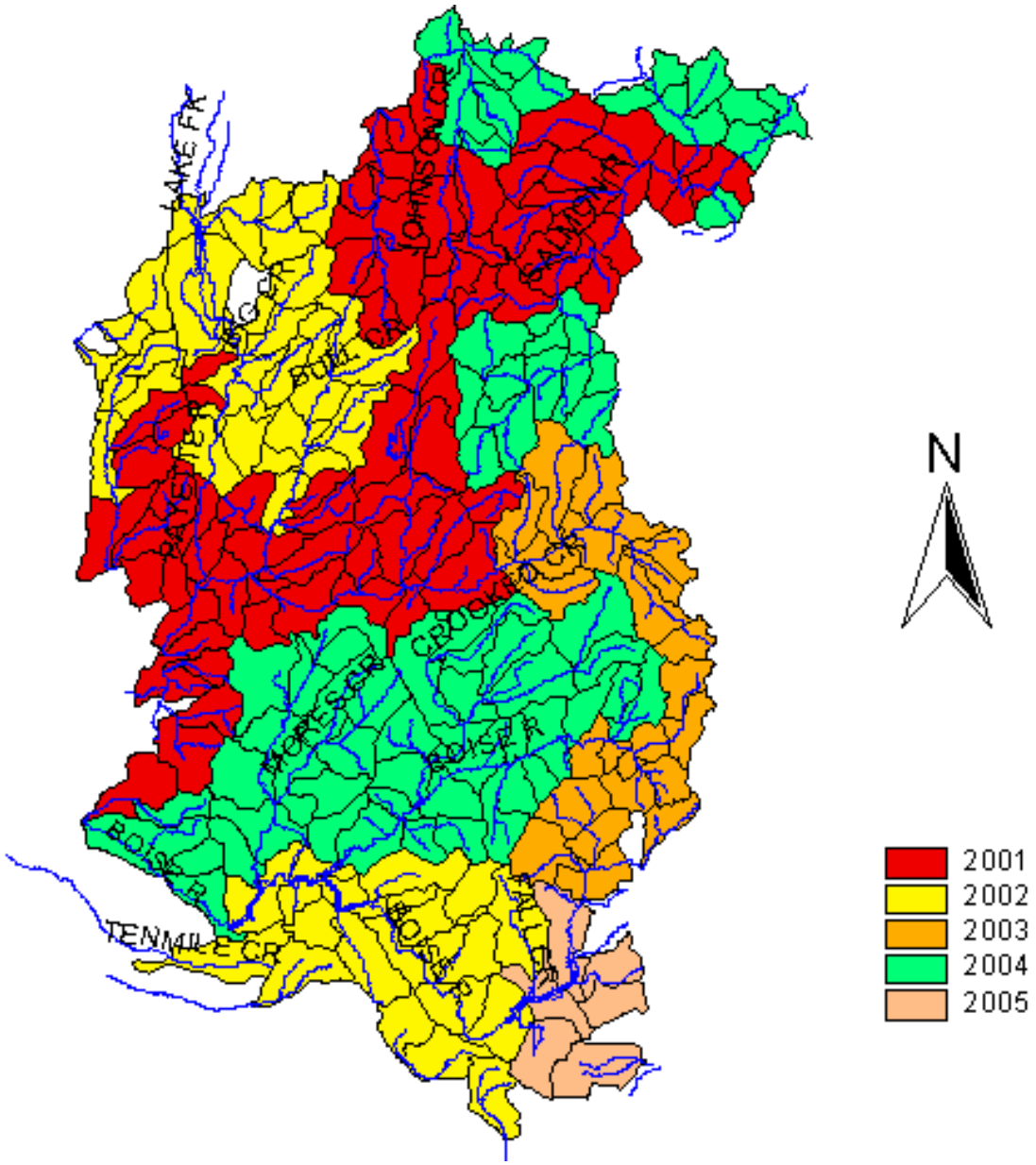

Figure 13. Sample area from 2001-2005 on the Boise National Forest. Numbered color blocks are groups of 20 6th Field HUCs (sub-watersheds). One-third of sub-watersheds within each group will be sampled during the indicated year.

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. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Bauer, S. B. and T. A. Burton. 1993. Monitoring protocols to evaluate water quality effects of grazing management on western rangeland streams. Idaho Water Resources Research Institute, University of Idaho, Moscow, Idaho.

Coles-Ritchie, M.; Henderson, R. C.; Archer, E. K.; Roper, B. B.; Kennedy, C.; Kershner, J. L. In review. The repeatability of riparian vegetation sampling methods: how useful are these techniques for broad-scale, long-term monitoring? Gen. Tech. Rep. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Coles-Ritchie, M. 2004. A Wetland Rating System for Evaluating Riparian Vegetation. Dissertation. Utah State University, Logan, UT.

Harrelson, C. C., C. L. Rawlins, and J. P. Potyondy. 1994. Stream channel reference sites: an illustrated guide to field techniques. Gen. Tech. Rep. RM-245. Portland, Oregon: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 138p.

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

Kershner, J. L. and ten co-authors. In press. Effectiveness monitoring of aquatic and riparian resources in the area of PACFISH/INFISH and the Biological Opinions for Bull trout, salmon, and steelhead. Draft plan. USDA Forest Service/USDI Bureau of Land Management. Logan, UT. 50p.

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

Manning, Mary E., and Wayne G. Padgett. 1995. Riparian Community Type Classification for Humboldt and Toiyabe National Forests, Nevada and Eastern California. R4-Ecol-95-01. U.S. Department of Agriculture, Forest Service, Intermountain Region.

Meyers, T. J. and S. Swanson. 1991. Aquatic Habitat Condition Index, stream type, and livestock bank damage in Northern Nevada. Water Resources Bulletin: Vol 27, No. 4:667-677.

Meyers, T. J. and S. Swanson. 1992. Variation of stream stability with stream type and livestock bank damage in Northern Nevada. Water Resources Bulletin: Vol 28, No. 4:743-754.

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

Mulder, B. S., and seven co-authors. 1999. The strategy and Design of the Effectiveness Monitoring Program for the Northwest Forest Plan. Gen. Tech. Rep. PNW-GTR-437. Fort Collin, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61p.

Olsen, D. S.; Roper, B.; Kershner, J. L.; Henderson, R. C. Archer, E. K.. In Press. Sources of variability in pebble counts: why differences among observers may not matter. Journal of the American Water Resources Association.

Overton, C. K., S. P. Wollrab, B. C. Roberts, and M. A. Radko. 1997. R1/R4 (northern and intermountain regions) fish and fish habitat standard inventory procedures handbook. United States Department of Agriculture, United States Forest Service General Technical Report INT-GTR-346.

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. U.S. Forest Service, Washington, D.C.

Padgett, Wayne G., Andrew P. Youngblood, and Alma H. Winward. 1989. Riparian Community Type Classification of Utah and Southeastern Idaho. R4-Ecol-89-01. U.S. Department of Agriculture, Forest Service, Intermountain Region.

Platts, W. S., R. L. Nelson, O. Casey, and V. Crispin. 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., and twelve co-authors. 1987. Methods for evaluating riparian habitats with applications to management. USDA Forest Service, Intermountain Research Station, General Technical Research INT-221.

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. (Quigley, T. M., tech ed.. The Interior Columbia Basin Ecosystem Management Project: Scientific Assessment).

Reed, P. B. Jr. 1988. National list of plant species that occur in wetlands: Northwest (Region 9). US Fish and Wildlife Service Biological Report 88 (26.9). USDI Fish and Wildlife service, Research and Development, Washington, DC. 89 p.

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 18:585-592.

Roper, B.; Kershner, J. L.; Archer, E.; Henderson, R.; Bouwes, N. 2002. An evaluation of physical habitat attributes used to monitor streams. Journal of the American Water Resources Association. 38: 1-10.

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

USDA Forest Service. 1976. National Forest Management Act.

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. 49 p.

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

Youngblood, Andrew P., Wayne G. Padgett, and Alma H. Winward. 1985. Riparian Community Type Classification of Eastern Idaho – Western Wyoming. R4-Ecol-85-01. U.S. Department of Agriculture, Forest Service, Intermountain Region.

APPENDIX A

Definitions and Descriptions of Variables

REACH DEFINITIONS

Additional Reach - Stream reaches not included in the five year rotating panel sampling design. Additional reaches include reaches surveyed for quality control purposes, enclosure/exclosure reaches, and test reaches.

Integrator Reach - Downstream-most low-gradient (< 3%) reach within ICBEMP 6th field HUC. Integrator reaches are randomly selected and will be sampled as part of the five year rotating panel sampling design.

DMA Reach - Reach identified by field unit personnel as the location utilized for livestock grazing implementation monitoring.

Sentinel Reach – One of 50 integrator or 12 DMA reaches sampled annually.

WATERSHED CHARACTERISTICS

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

Elevation – Integrator reach elevation in feet. Identified from 1:24000 topographic maps.

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.

# of Road Crossings – Number of road crossings upstream of integrator reach. Stream and road layers from Forest and BLM offices were used.

% Federal Ownership – Percent federal land ownership upstream of integrator reach.

Riparian Road Density – Total length of roads within 100 meters of a stream (km) / watershed area (km^2), upstream of integrator reach.

Road Density – Total length of roads (km)/ watershed area (km^2), upstream of integrator reach.

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

Stream Density – Total stream distance (km) / watershed area (km^2), upstream of integrator reach.

Watershed Area – Total area (ha) of watershed upstream of integrator reach.

STREAM CHANNEL VARIABLES

Average Bankfull Width (transects) – Average of the bankfull widths (meters) measured at each of the 20+ transects.

Average Undercut Depth - Sum of all undercut depths (meters) / total number of measurements.

Bank Angle – Average of all bank angle measurements.

Bankfull Width – Average of the bankfull widths (meters) from the four channel cross-sections.

Bankfull Width:Depth Ratio (2000) – Average of the ratios from the four channel cross-sections. The ratio for each cross-section was calculated as the (bankfull width / bankfull depth). Bankfull depth was calculated as the average of the 10 depth measurements.

Bankfull Width:Depth Ratio (2001 to present) – Same as in 2000, except that the average bankfull depth was calculated as the (bankfull width / total bankfull area). The change was made to improve accuracy.

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

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

Entrenchment Ratio – The average of the ratios from the four channel cross-sections. The entrenchment ratio for each cross-section was calculated as (valley length 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 Woody Debris Count / 100 m – All years. 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.

LWD Category 1 Count / 100 m – 2001 and 2002 sites. 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.

LWD Category 1 Volume / 100 m – 2001 and 2002 sites. Volume of category 1 pieces in m^3 per 100 meters of stream length.

LWD Categories 1, 2 / 100 m – 2001 and 2002 sites. Includes all category 1 pieces plus pieces that are within the bankfull channel but above the bankfull elevation.

LWD Categories 1, 2 / 100 m – 2001 and 2002 sites. Volume of all pieces in m^3 per 100 meters of stream length.

Percent Pools - Sum of all pool lengths / reach length.

Percent 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).

Percent 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.

Percent Undercut Banks - Number of locations with bank angles < 90 degrees and an undercut depth of > 5 cm / total number of bank measurements.

Pool-tail Fines - 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 in 2003.

Riffle Percent Fines – The percentage of particles from Wolman Pebble Counts that were < 6 mm. Values reported with and without bedrock (particles >4096mm).

Residual Pool Depth – Average of the residual pool depths for all pools.

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.

RIPARIAN VEGETATION

Effective Ground Cover – The percent of the riparian area 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 stream.

Greenline Stability Rating (Region 4 and Idaho BLM only) – A rating of streambank stability calculated by summing the product of the percent cover of each community type and the associated greenline stability value in Winward (2000). Through 2002 community types were recorded in the field to describe the vegetation cover. Beginning in 2003 species data were collected, which were converted to the most similar community type, in terms of species composition, to calculate this rating.

Greenline Successional Status (Region 4 and Idaho BLM only) – The percent of greenline vegetation considered late successional, based on community type successional ratings of Winward (2000). Through 2002 community types were recorded in the field to describe the vegetation cover. Beginning in 2003 species data were collected, which were converted to the most similar community type, in terms of species composition, to calculate this rating.

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.

Riparian 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 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. 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 stream.

Threatened and Endangered Species – The percent cover of each species at a reach that is listed as sensitive, threatened, or endangered in the National Forest or BLM area where it was observed. These methods were not intended to inventory all species, therefore rare species may not be well represented. Previous to 2003, community type cover data were collected, so no information on sensitive species

was reported.

Unidentifiable species – The percent cover, on the greenline or cross-sections, of taxa recorded as unknowns, and for which the specimens collected were not identifiable. This was a result of specimens which lacked parts essential for identification or were in poor condition.

Weeds – The percent cover of each species that is listed as a noxious weed in the USDA Invaders database (http://invader.dbs.umt.edu/Noxious_Weeds/) for the state where it was observed. These methods were not intended to inventory all species, therefore less abundant weed species may not be well represented. Previous to 2003, community type cover data were collected, so no information on weeds was reported.

Willow Regeneration Ratio – The ratio of sprout and young willow plants to the number of mature and decadent plants. Only non-rhizomatous willows were included. These data were collected through 2002, but not afterwards because of high variability among observers.

MACROINVERTEBRATES

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

There are many summary techniques in use for analyzing water temperature data. We have provided summary information that is tailored to the Clean Water Act criteria defined by the Department of Environmental Quality office for each State.

Idaho: The daily average (DAT) and daily maximum (DMT) temperatures were calculated for each site. We present the number of days where the DAT exceeded 19°C and the DMT exceeded 22°C. The site was "unimpaired" if the threshold was exceeded by fewer than 11 days and "impaired" if exceeded by 11 or more days.

Montana: The 7-day moving average maximum temperature (7D-AMT) was calculated for each site. We present the number of days where the 7D-AMT exceeded 10, 15, and 21°C.

Nevada: Water temperature data in Nevada are summarized using the DMT. We report the number of days for which the DMT is greater than or equal to 20° C. Temperature criteria have been established only for certain reaches, and no impairment criteria exists.

Oregon: The 7-day moving average maximum temperature was calculated for each site. We present the number of days where the 7D-AMT exceeded 10, 12.8, and 17.8^{o}C.

Washington: The daily maximum temperature was calculated for each site. We present the number of days where the DMT exceeded 16, 18, 21, and 22°C.

PACFISH / INFISH Riparian Management Objectives: The 7-day moving average maximum temperature was calculated for each site. We present the number of days where the 7D-AMT exceeded 15.5 and 17.8^{o}C. The data is presented in the PACFISH table.

APPENDIX B

Reach Summary Tables

Table B-1. Reach summary and watershed condition information for integrator and additional reaches sampled on the Boise National Forest 2000 - 2003.

Integrator and Additional Reaches

District	Stream	Reach	Reach type	ICBEMP HUC code	Year	Geology	Management category	Elevation (ft)	Gradient
CASCADE	CABIN	121-06-I-I2-01	INTEGRATOR	170602080902	2001	GRANITIC	MANAGED	6693	0.64
CASCADE	CLEAR	127-01-I-I1-02	INTEGRATOR	170501231102	2002	GRANITIC	MANAGED	5340	0.71
CASCADE	FAWN	128-08-I-I2-01	INTEGRATOR	170501230302	2001	GRANITIC	MANAGED	5201	0.71
CASCADE	SHEEP	121-04-I-I2-01	INTEGRATOR	170602081003	2001	GRANITIC	MANAGED	6476	0.83
CASCADE	TRAPPER	119-05-IS-I1-02	INTEGRATOR	170602080503	2002	GRANITIC	REFERENCE	6440	0.77
CASCADE	TRAPPER	119-05-IS-I1-03	INTEGRATOR	170602080503	2003	GRANITIC	REFERENCE	6440	0.7
CASCADE	TRAPPER	119-05-IS-I2-00	INTEGRATOR	170602080503	2000	GRANITIC	REFERENCE	6440	0.75
CASCADE	TRAPPER	119-05-IS-I2-01	INTEGRATOR	170602080503	2001	GRANITIC	REFERENCE	6440	0.66
EMMETT	ANDERSON	126-07-I-I2-01	INTEGRATOR	170501210701	2001	GRANITIC	MANAGED	3589	0.72
EMMETT	NO NAME	128-14-I-I1-01	INTEGRATOR	170501221302	2001	GRANITIC	MANAGED	4861	0.35
EMMETT	PINE	128-02-I-I1-01	INTEGRATOR	170501221201	2001	GRANITIC	MANAGED	3791	2.07
EMMETT	RAMMAGE	129-05-E-I2-00	ADDITIONAL	170501221004	2000	GRANITIC	MANAGED	5520	
EMMETT	SECOND FORK SQUAW	128-13-I-I2-01	INTEGRATOR	170501221101	2001	GRANITIC	MANAGED	4666	0.96
EMMETT	THIRD FORK SQUAW	129-05-I-I1-02	INTEGRATOR	170501221004	2002	GRANITIC	MANAGED	3680	1.93
EMMETT	TRIPOD	128-04-A-I1-01	ADDITIONAL	170501221102	2001		MANAGED	5094	0.48
EMMETT	TRIPOD	128-04-E-I2-01	ADDITIONAL	170501221102	2001		MANAGED	5087	0.25
EMMETT	W.F. SIXMILE	127-19-I-I1-00	INTEGRATOR	170501210302	2000	GRANITIC	MANAGED	4430	0.93
EMMETT	WOODY	128-13-A-I2-00	ADDITIONAL	170501221101	2000	GRANITIC	MANAGED	4810	
EMMETT	WOODY	128-13-E-I2-00	ADDITIONAL	170501221101	2000	GRANITIC	MANAGED	4810	
IDAHO CITY	BLACK WARRIOR	107-11-I-I1-00	INTEGRATOR	170501110902	2000	GRANITIC	REFERENCE	5080	2.31
IDAHO CITY	ELK	125-01-I-I2-00	INTEGRATOR	170501120601	2000	GRANITIC	MANAGED	4820	2.6
IDAHO CITY	GRIMES	125-16-IS-I3-00	INTEGRATOR	170501120502	2000	GRANITIC	MANAGED	6660	0.66
IDAHO CITY	GRIMES	125-16-IS-I3-03	INTEGRATOR	170501120502	2003	GRANITIC	MANAGED	6660	0.7
IDAHO CITY	GRIMES	125-16-IS-I4-01	INTEGRATOR	170501120502	2001	GRANITIC	MANAGED	6660	0.83
IDAHO CITY	YUBA	105-15-I-I2-03	INTEGRATOR	170501111106	2003	GRANITIC	MANAGED	5540	2.2
LOWMAN	BEARSKIN	117-12-IS-I1-00	INTEGRATOR	170602050806	2000	GRANITIC	MANAGED	6440	0.21
LOWMAN	BEARSKIN	117-12-IS-I1-01	INTEGRATOR	170602050806	2001	GRANITIC	MANAGED	6440	0.23
LOWMAN	BEARSKIN	117-12-IS-I1-02	INTEGRATOR	170602050806	2002	GRANITIC	MANAGED	6440	0.2
LOWMAN	BEARSKIN	117-12-IS-I3-03	INTEGRATOR	170602050806	2003	GRANITIC	MANAGED	6440	0.2
LOWMAN	BEARSKIN	117-12-O-I1-02	ADDITIONAL	170602050806	2002	GRANITIC	MANAGED	6560	0.27
LOWMAN	BEARSKIN	117-12-O-I2-01	ADDITIONAL	170602050806	2001	GRANITIC	MANAGED	6560	0.28
LOWMAN	CANYON	116-13-I-I2-03	INTEGRATOR	170501201001	2003	GRANITIC	MANAGED	5080	2.6
LOWMAN	DEADWOOD	126-03-I-I3-01	INTEGRATOR	170501200403	2001	GRANITIC	MANAGED	5557	0.24

Table B-1. (Continued.)

District	Stream	Reach	Reach type	ICBEMP HUC code	Year	Geology	Management category	Elevation (ft)	Gradient
Integrator and Additional Reaches									
LOWMAN	DEER	126-02-I-I3-01	INTEGRATOR	170501200404	2001	GRANITIC	MANAGED	5483	0.55
LOWMAN	EIGHTMILE	116-07-I-I4-03	INTEGRATOR	170501200701	2003	GRANITIC	MANAGED	4400	1.8
LOWMAN	PORTER	117-08-I-I1-00	INTEGRATOR	170602050807	2000	GRANITIC	REFERENCE	6580	0.69
LOWMAN	TENMILE	116-05-I-I3-03	INTEGRATOR	170501201301	2003	GRANITIC	MANAGED	4400	2.1
LOWMAN	TRAIL	126-10-I-I2-01	INTEGRATOR	170501200402	2001	GRANITIC	MANAGED	5361	1.04
LOWMAN	WHITEHAWK	126-16-I-I1-00	INTEGRATOR	170501200401	2000	GRANITIC	MANAGED	5800	0.51
LOWMAN	WHITEHAWK	126-16-I-I1-01	INTEGRATOR	170501200401	2001	GRANITIC	MANAGED	5800	0.7
MOUNTAIN HOME	BEAR	105-06-I-I4-03	INTEGRATOR	170501131002	2003	GRANITIC	MANAGED	5080	1.3
MOUNTAIN HOME	LINCOLN	105-07-I-I4-03	INTEGRATOR	170501131001	2003	GRANITIC	MANAGED	5320	2.4
MOUNTAIN HOME	LITTLE RATTLESNAKE	106-10-I-I1-02	INTEGRATOR	170501130201	2002	GRANITIC	MANAGED	3800	2.38
MOUNTAIN HOME	N.F. GROUSE	105-02-I-I4-03	INTEGRATOR	170501130804	2003	GRANITIC	MANAGED	5480	1.7
MOUNTAIN HOME	TRINITY	105-12-I-I4-03	INTEGRATOR	170501130901	2003	GRANITIC	MANAGED	4560	3
MOUNTAIN HOME	WILLOW	106-11-I-I1-02	INTEGRATOR	170501131801	2002	GRANITIC	MANAGED	3360	1.51
MOUNTAIN HOME	WOOD	106-12-I-I1-02	INTEGRATOR	170501131802	2002	GRANITIC	MANAGED	3400	1.36

Table B-1. (Continued)

Integrator and Additional Reaches									
Stream	Reach	Sinuosity	% FS:BLM ownership	Watershed area (ha)	Stream density (km/km^2)	Road density (km/km^2)	Riparian road density (km/km^2)	# road crossings	Average precipitation (mm)
CABIN	121-06-I-I2-01	2.1	100	3078	0.93	0.4	0.2	8	984
CLEAR	127-01-I-I1-02	1.2	95	4245	1.34	1.6	0.6	30	1014
FAWN	128-08-I-I2-01	1.5	99	2145	1.09	1.2	0.3	5	960
SHEEP	121-04-I-I2-01	1.4	100	1302	0.80	0.4	0.3	1	1143
TRAPPER	119-05-IS-I1-02	1.5	100	3251	1.05	0.6	0.2	6	1227
TRAPPER	119-05-IS-I1-03	1.4	100	3251	1.05	0.6	0.2	6	1227
TRAPPER	119-05-IS-I2-00	1.4	100	3251	1.05	0.6	0.2	6	1227
TRAPPER	119-05-IS-I2-01	1.6	100	3251	1.05	0.6	0.2	6	1227
ANDERSON	126-07-I-I2-01	1.2	100	6902	1.65	1.0	0.4	28	827
NO NAME	128-14-I-I1-01	1.3	93	542	1.87	3.9	1.8	14	773
PINE	128-02-I-I1-01	1.0	96	2564	1.55	3.7	1.5	49	660
RAMMAGE	129-05-E-I2-00	1.4	100	86	0.95	3.7	1.2	0	926
SECOND FORK SQUAW	128-13-I-I2-01	1.3	100	2580	1.26	0.9	0.4	14	794
THIRD FORK SQUAW	129-05-I-I1-02	1.0	100	5306	1.12	1.5	0.4	23	926
TRIPOD	128-04-A-I1-01	1.2							887
TRIPOD	128-04-E-I2-01	1.3							887
W.F. SIXMILE	127-19-I-I1-00	1.3	99	2612	1.27	2.6	1.1	23	660
WOODY	128-13-A-I2-00	1.6	100	433	1.32	2.3	1.2	7	794
WOODY	128-13-E-I2-00	1.5	100	433	1.32	2.3	1.2	7	794
BLACK WARRIOR	107-11-I-I1-00	1.1	100	3364	1.60	0.0	0.0	0	992
ELK	125-01-I-I2-00	1.4	98	2971	1.45	1.2	0.4	17	850
GRIMES	125-16-IS-I3-00	1.7	96	1324	1.30	1.1	0.5	7	998
GRIMES	125-16-IS-I3-03	1.7	96	1324	1.30	1.0	0.4	7	998
GRIMES	125-16-IS-I4-01	1.8	96	1324	1.30	1.1	0.5	7	998
YUBA	105-15-I-I2-03	1.1	100	4406	1.51	0.0	0.0	0	1061
BEARSKIN	117-12-IS-I1-00	1.8		2472	1.07				1089
BEARSKIN	117-12-IS-I1-01	1.8	100	2472	1.07	0.9	0.3	7	1089
BEARSKIN	117-12-IS-I1-02	1.9	100	2472	1.07	0.9	0.3	9	1089
BEARSKIN	117-12-IS-I3-03	1.9	100	2472	1.07	0.9	0.2	8	1089
BEARSKIN	117-12-O-I1-02	1.9							1089
BEARSKIN	117-12-O-I2-01	2.0							1089
CANYON	116-13-I-I2-03	1.1	100	8171	1.42	0.2	0.2	18	1062
DEADWOOD	126-03-I-I3-01	1.5	99	7893	1.01	0.2	0.1	10	1111

Table B-1. (Continued.)

Integrator and Additional Reaches									
Stream	Reach	Sinuosity	% FS:BLM ownership	Watershed area (ha)	Stream density (km/km^2)	Road density (km/km^2)	Riparian road density (km/km^2)	# road crossings	Average precipitation (mm)
DEER	126-02-I-I3-01	1.7	100	4348	1.21	0.6	0.1	12	1067
EIGHTMILE	116-07-I-I4-03	1.1	100	7196	1.32	0.0	0.0	0	939
PORTER	117-08-I-I1-00	1.6	100	1244	0.81	2.9	0.0	0	1161
TENMILE	116-05-I-I3-03	1.2	100	8533	1.32	0.1	0.0	7	961
TRAIL	126-10-I-I2-01	1.3	100	2449	1.07	0.7	0.1	1	924
WHITEHAWK	126-16-I-I1-00	1.7	100	2973	1.31	0.9	0.2	10	1017
WHITEHAWK	126-16-I-I1-01	1.6	100	2973	1.31	0.9	0.2	10	1017
BEAR	105-06-I-I4-03	1.0	97	4407	1.97	1.9	1.0	49	970
LINCOLN	105-07-I-I4-03	1.3	100	488	1.62	4.0	1.7	11	764
LITTLE RATTLESNAKE	106-10-I-I1-02	1.0	100	2275	2.05	0.3	0.3	11	809
N.F. GROUSE	105-02-I-I4-03	1.3	100	2208	1.63	1.9	1.1	28	747
TRINITY	105-12-I-I4-03	1.1	100	10271	1.58	1.1	0.4	58	977
WILLOW	106-11-I-I1-02	1.1	58	11760	1.76	0.6	0.2	31	593
WOOD	106-12-I-I1-02	1.3	91	5729	1.88	0.4	0.2	14	574

Table B-1. (Continued)

Integrator and Additional Reaches

Stream	Reach	Rosgen channel type
CABIN	121-06-I-I2-01	B4C
CLEAR	127-01-I-I1-02	C4
FAWN	128-08-I-I2-01	F4
SHEEP	121-04-I-I2-01	C4
TRAPPER	119-05-IS-I1-02	C4
TRAPPER	119-05-IS-I1-03	B4C
TRAPPER	119-05-IS-I2-00	E3
TRAPPER	119-05-IS-I2-01	F4
ANDERSON	126-07-I-I2-01	F4
NO NAME	128-14-I-I1-01	G4C
PINE	128-02-I-I1-01	F4B
RAMMAGE	129-05-E-I2-00	E3B
SECOND FORK SQUAW	128-13-I-I2-01	F4
THIRD FORK SQUAW	129-05-I-I1-02	C3
TRIPOD	128-04-A-I1-01	B4C
TRIPOD	128-04-E-I2-01	E3
W.F. SIXMILE	127-19-I-I1-00	C4
WOODY	128-13-A-I2-00	E3B
WOODY	128-13-E-I2-00	E3B
BLACK WARRIOR	107-11-I-I1-00	C3B
ELK	125-01-I-I2-00	C4B
GRIMES	125-16-IS-I3-00	E4
GRIMES	125-16-IS-I3-03	B4C
GRIMES	125-16-IS-I4-01	C4
YUBA	105-15-I-I2-03	F3B
BEARSKIN	117-12-IS-I1-00	
BEARSKIN	117-12-IS-I1-01	F4
BEARSKIN	117-12-IS-I1-02	C4
BEARSKIN	117-12-IS-I3-03	F4
BEARSKIN	117-12-O-I1-02	
BEARSKIN	117-12-O-I2-01	
CANYON	116-13-I-I2-03	F3B
DEADWOOD	126-03-I-I3-01	C4

Table B-1. (Continued.)

Integrator and Additional Reaches

Stream	Reach	
DEER	126-02-I-I3-01	C4
EIGHTMILE	116-07-I-I4-03	B3C
PORTER	117-08-I-I1-00	E4
TENMILE	116-05-I-I3-03	F3B
TRAIL	126-10-I-I2-01	F4
WHITEHAWK	126-16-I-I1-00	C4
WHITEHAWK	126-16-I-I1-01	C4
BEAR	105-06-I-I4-03	G3C
LINCOLN	105-07-I-I4-03	E4B
LITTLE RATTLESNAKE	106-10-I-I1-02	F4B
N.F. GROUSE	105-02-I-I4-03	B4C
TRINITY	105-12-I-I4-03	C3B
WILLOW	106-11-I-I1-02	B3C
WOOD	106-12-I-I1-02	B4C

Table B-2. Channel characteristics and condition information for integrator and additional reaches on the Boise National Forest 2000 - 2003.

Integrator and Additional Reaches										
		Channel x-sections		Pool Data			Bank characteristics			
Stream	Reach	Bankfull width (m)	Average width:depth ratio	Residual pool depth (m)	% pools	Average bankfull width (m)	% stable banks method1	% stable banks method2	Average bank angle	% undercut banks
CABIN	121-06-I-I2-01	5	14.39	0.37	77	4.87	100	90	66	59
CLEAR	127-01-I-I1-02	5.8	18.54	0.38	71	6.57	95	93	75	57
FAWN	128-08-I-I2-01	8	40.15	0.38	59	6.69	94	74	79	30
SHEEP	121-04-I-I2-01	5	18.89	0.3	100	4.75	98	69	108	31
TRAPPER	119-05-IS-I1-02	7.9	23.37	0.61	84	7.41	93	66	78	55
TRAPPER	119-05-IS-I1-03	8.6	23.29	0.51	81	7.64	98	93	76	51
TRAPPER	119-05-IS-I2-00	7.4	13	0.57	95		100	98	81	51
TRAPPER	119-05-IS-I2-01	7.3	28.01	0.41	89	6.78	100	91	63	58
ANDERSON	126-07-I-I2-01	7.7	32	0.46	58	6.64	96	79	129	13
NO NAME	128-14-I-I1-01	1.5	9.98	0.16	40	1.25	100	90	64	82
PINE	128-02-I-I1-01	4.6	27.99	0.15	37	3.71	84	63	124	20
RAMMAGE	129-05-E-I2-00	2.1	12	0.12	23		78	60	109	30
SECOND FORK SQUAW	128-13-I-I2-01	7.1	33.41	0.33	59	6.78	96	73	103	27
THIRD FORK SQUAW	129-05-I-I1-02	8.4	24.43	0.41	40	8.92	97	64	114	28
TRIPOD	128-04-A-I1-01	3.3	14.46	0.33	81	3.18	98	98	75	58
TRIPOD	128-04-E-I2-01	1.4	5.29	0.46	96	1.30	100	100	43	76
W.F. SIXMILE	127-19-I-I1-00	5.4	15	0.3	76		100	68	94	36
WOODY	128-13-A-I2-00	3.3	9	0.2	19		80	64	92	50
WOODY	128-13-E-I2-00	3.3	10	0.27	39		88	80	87	45
BLACK WARRIOR	107-11-I-I1-00	8.3	33	0.29	17		100	85	137	12
ELK	125-01-I-I2-00	5.1	12	0.31	57		100	93	108	24
GRIMES	125-16-IS-I3-00	3.7	13	0.54	81		95	83	85	46
GRIMES	125-16-IS-I3-03	4	25.65	0.57	81	3.76	88	71	88	46
GRIMES	125-16-IS-I4-01	4.9	49.71	0.58	91	4.93	66	64	78	53
YUBA	105-15-I-I2-03	8.5	31.48	0.24	17	7.36	95	76	120	17
BEARSKIN	117-12-IS-I1-00	7.2	19	0.79	82		93	77	82	46
BEARSKIN	117-12-IS-I1-01	6.7	28.65	0.67	80	6.49	100	75	91	28
BEARSKIN	117-12-IS-I1-02	7.5	25.45	0.74	78	6.15	91	67	93	38
BEARSKIN	117-12-IS-I3-03	6.6	23.56	0.65	76	5.78	93	64	90	33
BEARSKIN	117-12-O-I1-02				100	5.80	100	93	92	43
BEARSKIN	117-12-O-I2-01				100					

Table B-2. (Continued.)

Integrator and Additional Reaches										
		Channel x-sections		Pool Data		Bank characteristics				
Stream	Reach	Bankfull width (m)	Average width:depth ratio	Residual pool depth (m)	% pools	Average bankfull width (m)	% stable banks method1	% stable banks method2	Average bank angle	% undercut banks
CANYON	116-13-I-I2-03	11.9	24.21	0.69	28	10.44	100	71	128	8
DEADWOOD	126-03-I-I3-01	15.6	31.28	0.53	76	13.55	96	92	88	42
DEER	126-02-I-I3-01	6.6	30.73	0.51	79	8.14	95	68	84	43
EIGHTMILE	116-07-I-I4-03	10.6	24.05	0.42	24	9.04	89	64	114	14
PORTER	117-08-I-I1-00	4.3	11	0.44	58		88	73	79	49
TENMILE	116-05-I-I3-03	7.9	20.08	0.35	36	7.47	100	80	105	28
TRAIL	126-10-I-I2-01	5.2	23.92	0.37	74	5.78	100	86	90	36
WHITEHAWK	126-16-I-I1-00	5.1	19	0.35	66		90	81	95	30
WHITEHAWK	126-16-I-I1-01	4	23.39	0.34	80	5.01	96	76	109	29
BEAR	105-06-I-I4-03	4.6	11.71	0.22	35	4.34	100	52	130	7
LINCOLN	105-07-I-I4-03	1.9	8.77	0.17	27	1.98	90	81	95	31
LITTLE RATTLESNAKE	106-10-I-I1-02	3.5	23.18	0.11	45	2.96	80	68	157	0
N.F. GROUSE	105-02-I-I4-03	2.5	8.46	0.22	50	2.68	98	71	111	17
TRINITY	105-12-I-I4-03	10.8	25.82	0.27	14	8.59	93	45	134	8
WILLOW	106-11-I-I1-02	5.7	23.62	0.24	40	6.65	100	68	143	6
WOOD	106-12-I-I1-02	4.4	21.79	0.19	57	3.83	84	68	135	12

Table B-2. (Continued)

Integrator and Additional Reaches											
					Sediment characteristics						
Stream	Reach	Average undercut depth (m)	Pool-tail % fine (<2mm)	Pool-tail % fine (<6mm)	Riffle % fines (<6mm)	Riffle % fines w/o bedrock (<6mm)	Riffle D50	Riffle D50 w/o bedrock	Riffle D84	Riffle D84 w/o bedrock	Riffle % bedrock
CABIN	121-06-I-I2-01	0.236			10	10	48	48	89	89	0
CLEAR	127-01-I-I1-02	0.168		40	45	45	10	10	54	54	0
FAWN	128-08-I-I2-01	0.05			5	5	30	30	69	69	0
SHEEP	121-04-I-I2-01	0.107			28	28	21	21	45	45	0
TRAPPER	119-05-IS-I1-02	0.198		28	26	26	26	26	67	67	0
TRAPPER	119-05-IS-I1-03	0.188	9	18	23	23	26	26	70	70	0
TRAPPER	119-05-IS-I2-00	0.207		19							
TRAPPER	119-05-IS-I2-01	0.207			25	25	21	21	59	59	0
ANDERSON	126-07-I-I2-01	0.025			10	10	48	48	111	111	0
NO NAME	128-14-I-I1-01	0.188			100	100	4	4	4	4	0
PINE	128-02-I-I1-01	0.052			32	32	14	14	64	64	0
RAMMAGE	129-05-E-I2-00	0.063									
SECOND FORK SQUAW	128-13-I-I2-01	0.075			10	10	22	22	68	68	0
THIRD FORK SQUAW	129-05-I-I1-02	0.096		12	10	10	69	69	176	176	0
TRIPOD	128-04-A-I1-01	0.127			84	84	4	4	5	5	0
TRIPOD	128-04-E-I2-01	0.28									
W.F. SIXMILE	127-19-I-I1-00	0.128		95	57	57	4	4	36	36	0
WOODY	128-13-A-I2-00	0.119									
WOODY	128-13-E-I2-00	0.118									
BLACK WARRIOR	107-11-I-I1-00	0.036		3	9	9	70	70	157	157	0
ELK	125-01-I-I2-00	0.044		29	33	33	50	50	125	125	0
GRIMES	125-16-IS-I3-00	0.105		15	50	50	4	4	60	60	0
GRIMES	125-16-IS-I3-03	0.125	5	9	23	23	33	33	84	84	0
GRIMES	125-16-IS-I4-01	0.168			26	26	40	40	83	83	0
YUBA	105-15-I-I2-03	0.068	10	14	5	5	82	82	190	190	0
BEARSKIN	117-12-IS-I1-00	0.14		54	32		8		12		
BEARSKIN	117-12-IS-I1-01	0.088			34	34	7	7	11	11	0
BEARSKIN	117-12-IS-I1-02	0.11		72	59	59	5	5	10	10	0
BEARSKIN	117-12-IS-I3-03	0.121	36	84	51	51	5	5	10	10	0
BEARSKIN	117-12-O-I1-02	0.117									
BEARSKIN	117-12-O-I2-01										

Table B-2. (Continued.)

Integrator and Additional Reaches											
					Sediment characteristics						
Stream	Reach	Average undercut depth (m)	Pool-tail % fine (<2mm)	Pool-tail % fine (<6mm)	Riffle % fines (<6mm)	Riffle % fines w/o bedrock (<6mm)	Riffle D50	Riffle D50 w/o bedrock	Riffle D84	Riffle D84 w/o bedrock	Riffle % bedrock
CANYON	116-13-I-I2-03	0.028	4	5	8	8	173	173	315	315	0
DEADWOOD	126-03-I-I3-01	0.098			20	20	45	45	113	113	0
DEER	126-02-I-I3-01	0.116			10	10	40	40	88	88	0
EIGHTMILE	116-07-I-I4-03	0.049	8	11	11	11	78	78	160	160	0
PORTER	117-08-I-I1-00	0.153		9	15	15	40	40	66	66	0
TENMILE	116-05-I-I3-03	0.073	2	4	5	5	99	94	266	237	3
TRAIL	126-10-I-I2-01	0.123			11	11	61	61	112	112	0
WHITEHAWK	126-16-I-I1-00	0.079		22	33	33	32	32	72	72	0
WHITEHAWK	126-16-I-I1-01	0.075			23	23	29	29	61	61	0
BEAR	105-06-I-I4-03	0.013	6	11	16	16	107	107	248	248	0
LINCOLN	105-07-I-I4-03	0.077	81	94	52	52	4	4	41	41	0
LITTLE RATTLESNAKE	106-10-I-I1-02	0		12	23	23	36	36	117	117	0
N.F. GROUSE	105-02-I-I4-03	0.047	25	48	46	46	7	7	32	32	0
TRINITY	105-12-I-I4-03	0.022	0	2	5	5	169	169	305	305	0
WILLOW	106-11-I-I1-02	0.011		32	22	22	75	75	209	209	0
WOOD	106-12-I-I1-02	0.023		36	24	24	23	23	86	86	0

Table B-2. (Continued)

Integrator and Additional Reaches

Stream	Reach	Category 1 LWD pieces/100m (>=3m*0.1m)	Category 1 LWD pieces/100m (>=1m*0.1m)	Category 1 LWD volume/100m (>=1m*0.1m)	All LWD pieces/100m (>=1m*0.1m)	All LWD volume/100m (>=1m*0.1m)
CABIN	121-06-I-I2-01	9	33	2.83	39	4.14
CLEAR	127-01-I-I1-02	25	54	8.82	69	11.75
FAWN	128-08-I-I2-01	15	38	7.19	46	7.87
SHEEP	121-04-I-I2-01	29	56	14.71	73	32.77
TRAPPER	119-05-IS-I1-02	66	129	44.7	156	65.85
TRAPPER	119-05-IS-I1-03	51	131	16.11	158	24.08
TRAPPER	119-05-IS-I2-00	36				
TRAPPER	119-05-IS-I2-01	29	51	29.94	78	41.84
ANDERSON	126-07-I-I2-01	4	8	1.22	10	1.3
NO NAME	128-14-I-I1-01	0	1	0.02	1	0.02
PINE	128-02-I-I1-01	12	28	1.51	36	2.35
RAMMAGE	129-05-E-I2-00	12				
SECOND FORK SQUAW	128-13-I-I2-01	23	50	8.88	58	12.26
THIRD FORK SQUAW	129-05-I-I1-02	4	10	5.19	12	14.84
TRIPOD	128-04-A-I1-01	9	31	3.17	45	3.78
TRIPOD	128-04-E-I2-01	0	8	0.53	8	0.53
W.F. SIXMILE	127-19-I-I1-00	29				
WOODY	128-13-A-I2-00	24				
WOODY	128-13-E-I2-00	12				
BLACK WARRIOR	107-11-I-I1-00	3				
ELK	125-01-I-I2-00	2				
GRIMES	125-16-IS-I3-00	1				
GRIMES	125-16-IS-I3-03	1	3	0.28	3	0.32
GRIMES	125-16-IS-I4-01	1	4	0.51	4	0.51
YUBA	105-15-I-I2-03	3	5	5.31	11	12.39
BEARSKIN	117-12-IS-I1-00	0				
BEARSKIN	117-12-IS-I1-01	1	2	0.09	2	0.09
BEARSKIN	117-12-IS-I1-02	1	3	0.89	3	0.89
BEARSKIN	117-12-IS-I3-03	2	2	0.25	2	0.25
BEARSKIN	117-12-O-I1-02	0	0	0	0	0
BEARSKIN	117-12-O-I2-01	0	0	0	0	0

Table B-2. (Continued.)

Integrator and Additional Reaches						
Stream	Reach	Category 1 LWD pieces/100m (>=3m*0.1m)	Category 1 LWD pieces/100m (>=1m*0.1m)	Category 1 LWD volume/100m (>=1m*0.1m)	All LWD pieces/100m (>=1m*0.1m)	
CANYON	116-13-I-I2-03	11	20	10.38	35	12.96
DEADWOOD	126-03-I-I3-01	14	21	6.74	26	8.55
DEER	126-02-I-I3-01	19	48	10.47	51	11.07
EIGHTMILE	116-07-I-I4-03	7	17	3.56	22	4.4
PORTER	117-08-I-I1-00	0				
TENMILE	116-05-I-I3-03	2	5	4.15	8	7.9
TRAIL	126-10-I-I2-01	30	67	13.2	70	13.9
WHITEHAWK	126-16-I-I1-00	1				
WHITEHAWK	126-16-I-I1-01	3	4	0.12	4	0.12
BEAR	105-06-I-I4-03	2	5	0.36	6	0.46
LINCOLN	105-07-I-I4-03	1	5	0.35	6	0.37
LITTLE RATTLESNAKE	106-10-I-I1-02	2	2	0.44	2	0.44
N.F. GROUSE	105-02-I-I4-03	9	21	4.39	24	4.71
TRINITY	105-12-I-I4-03	2	9	2.35	15	2.92
WILLOW	106-11-I-I1-02	12	21	5.78	26	8.11
WOOD	106-12-I-I1-02	0	1	0.02	2	0.17

Table B-3a. Region 4 riparian vegetation summaries for integrator and additional reaches 2000 - 2003. Greenline and cross-section ratings were based on community type cover data 2000 - 2002 and on species data in 2003.

Integrator and Additional Reaches

Stream	Reach	Greenline wetland rating	Greenline stability rating	Greenline successional rating (% late seral)	Cross-section wetland rating	Effective ground cover (%)	Unidentifiable species (greenline %cover)
CABIN	121-06-I-I2-01	91	8.4	89	90	99	
CLEAR	127-01-I-I1-02	93	8.5	99	85	100	
FAWN	128-08-I-I2-01	75	7.7	81	67	98	
SHEEP	121-04-I-I2-01	73	7.8	96	79	94	
TRAPPER	119-05-IS-I1-02	69	7.6	89	65	99	
TRAPPER	119-05-IS-I1-03	66	7.3	74	53	94	9.1
TRAPPER	119-05-IS-I2-00	77	8.1	94	77	100	
TRAPPER	119-05-IS-I2-01	69	7.3	87	75	100	
ANDERSON	126-07-I-I2-01	60	6.7	80	61	98	
NO NAME	128-14-I-I1-01	82	8.2	80	81	96	
PINE	128-02-I-I1-01	61	5.7	55	51	90	
RAMMAGE	129-05-E-I2-00	82	7.8	68	84	97	
SECOND FORK SQUAW	128-13-I-I2-01	68	6.8	32	56	86	
THIRD FORK SQUAW	129-05-I-I1-02	62	7.4	75	52	96	
TRIPOD	128-04-A-I1-01	91	8.8	100	89	90	
TRIPOD	128-04-E-I2-01	97	9.0	100	93	95	
W.F. SIXMILE	127-19-I-I1-00	74	7.5	100	69	98	
WOODY	128-13-A-I2-00	66	5.7	42	68	90	
WOODY	128-13-E-I2-00	74	6.7	51	72	97	
BLACK WARRIOR	107-11-I-I1-00	71	8.8	100	70	99	
ELK	125-01-I-I2-00	71	7.2	83	69	97	
GRIMES	125-16-IS-I3-00	93	9.5	99	93	99	
GRIMES	125-16-IS-I3-03	89	8.0	71	80	99	0.0
GRIMES	125-16-IS-I4-01	93	9.5	100	94	98	
YUBA	105-15-I-I2-03	74	6.3	57	69	75	0.0
BEARSKIN	117-12-IS-I1-00	94	8.9	98	92	99	
BEARSKIN	117-12-IS-I1-01	94	8.9	97	93	98	
BEARSKIN	117-12-IS-I1-02	93	8.6	93	84	96	
BEARSKIN	117-12-IS-I3-03	89	8.3	93	66	94	0.0
BEARSKIN	117-12-O-I1-02	91	9.1	99	76	98	
BEARSKIN	117-12-O-I2-01	93	9.2	100	86	100	

Table B-3a. (Continued.)

Integrator and Additional Reaches							
Stream	Reach	Greenline wetland rating	Greenline stability rating	Greenline successional rating (% late seral)	Cross-section wetland rating	Effective ground cover (%)	Unidentifiable species (greenline %cover)
CANYON	116-13-I-I2-03	59	6.8	69	41	83	0.0
DEADWOOD	126-03-I-I3-01	79	7.1	57	62	90	
DEER	126-02-I-I3-01	74	7.1	74	66	98	
EIGHTMILE	116-07-I-I4-03	53	6.3	57	45	92	6.3
PORTER	117-08-I-I1-00	86	8.4	80	90	100	
TENMILE	116-05-I-I3-03	64	6.0	29	39	94	0.5
TRAIL	126-10-I-I2-01	72	8.2	81	64	98	
WHITEHAWK	126-16-I-I1-00	89	8.7	88	82	96	
WHITEHAWK	126-16-I-I1-01	88	8.3	82	87	95	
BEAR	105-06-I-I4-03	64	6.9	83	39	96	3.2
LINCOLN	105-07-I-I4-03	69	7.1	59	62	96	7.1
LITTLE RATTLESNAKE	106-10-I-I1-02	68	5.5	3	47	54	
N.F. GROUSE	105-02-I-I4-03	70	7.5	71	53	88	6.2
TRINITY	105-12-I-I4-03	63	6.9	76	60	93	1.1
WILLOW	106-11-I-I1-02	76	7.0	53	76	97	
WOOD	106-12-I-I1-02	69	6.4	35	72	87	

Table B-3a. (Continued)

Integrator and Additional Reaches

Stream	Reach	Unidentifiable species (cross-sections %cover)
CABIN	121-06-I-I2-01	
CLEAR	127-01-I-I1-02	
FAWN	128-08-I-I2-01	
SHEEP	121-04-I-I2-01	
TRAPPER	119-05-IS-I1-02	
TRAPPER	119-05-IS-I1-03	2.8
TRAPPER	119-05-IS-I2-00	
TRAPPER	119-05-IS-I2-01	
ANDERSON	126-07-I-I2-01	
NO NAME	128-14-I-I1-01	
PINE	128-02-I-I1-01	
RAMMAGE	129-05-E-I2-00	
SECOND FORK SQUAW	128-13-I-I2-01	
THIRD FORK SQUAW	129-05-I-I1-02	
TRIPOD	128-04-A-I1-01	
TRIPOD	128-04-E-I2-01	
W.F. SIXMILE	127-19-I-I1-00	
WOODY	128-13-A-I2-00	
WOODY	128-13-E-I2-00	
BLACK WARRIOR	107-11-I-I1-00	
ELK	125-01-I-I2-00	
GRIMES	125-16-IS-I3-00	
GRIMES	125-16-IS-I3-03	0.0
GRIMES	125-16-IS-I4-01	
YUBA	105-15-I-I2-03	0.0
BEARSKIN	117-12-IS-I1-00	
BEARSKIN	117-12-IS-I1-01	
BEARSKIN	117-12-IS-I1-02	
BEARSKIN	117-12-IS-I3-03	0.0
BEARSKIN	117-12-O-I1-02	
BEARSKIN	117-12-O-I2-01	

Table B-3a. (Continued.)

Integrator and Additional Reaches

Stream	Reach	
CANYON	116-13-I-I2-03	0.0
DEADWOOD	126-03-I-I3-01	
DEER	126-02-I-I3-01	
EIGHTMILE	116-07-I-I4-03	0.2
PORTER	117-08-I-I1-00	
TENMILE	116-05-I-I3-03	3.6
TRAIL	126-10-I-I2-01	
WHITEHAWK	126-16-I-I1-00	
WHITEHAWK	126-16-I-I1-01	
BEAR	105-06-I-I4-03	8.6
LINCOLN	105-07-I-I4-03	0.9
LITTLE RATTLESNAKE	106-10-I-I1-02	
N.F. GROUSE	105-02-I-I4-03	3.5
TRINITY	105-12-I-I4-03	3.1
WILLOW	106-11-I-I1-02	
WOOD	106-12-I-I1-02	

Table B-3b. Weed species observed at integrator reaches on the Boise National Forest in 2003. Species data were not collected 2000 - 2002.

Integrator Reaches					
Stream	Reach	Plant species	Common name	Greenline %cover	Cross-section %cover
TENMILE	116-05-I-I3-03	CENTAUREA BIEBERSTEINII	SPOTTED KNAPWEED	0.1	0.0

Table B-4. Benthic macroinvertebrate metrics for integrator reaches on the Boise National Forest 2000 - 2002. Analysis of samples from 2003 is not yet complete.

Integrator and Additional Reaches

Stream	Reach	Reach type	Total OTU richness	# of clinger taxa	# of long-lived taxa	# of ephemeroptera	Plecoptera taxa	Tricoptera taxa
CABIN	121-06-I-I2-01	INTEGRATOR	32	13	4	9	5	6
CLEAR	127-01-I-I1-02	INTEGRATOR	47	23	6	14	6	8
FAWN	128-08-I-I2-01	INTEGRATOR	38	22	6	14	5	7
SHEEP	121-04-I-I2-01	INTEGRATOR	44	22	5	12	11	8
TRAPPER	119-05-IS-I1-02	INTEGRATOR	41	19	3	15	8	4
TRAPPER	119-05-IS-I2-00	INTEGRATOR	38	20	3	12	10	6
TRAPPER	119-05-IS-I2-01	INTEGRATOR	38	17	3	10	9	5
ANDERSON	126-07-I-I2-01	INTEGRATOR	38	18	7	8	5	8
NO NAME	128-14-I-I1-01	INTEGRATOR	37	7	9	4	1	5
PINE	128-02-I-I1-01	INTEGRATOR	51	30	10	10	8	14
RAMMAGE	129-05-E-I2-00	ADDITIONAL	36	15	9	8	6	2
SECOND FORK SQUAW	128-13-I-I2-01	INTEGRATOR	37	19	6	9	6	5
THIRD FORK SQUAW	129-05-I-I1-02	INTEGRATOR	43	21	9	9	6	12
TRIPOD	128-04-A-I1-01	ADDITIONAL	32	10	4	7	2	4
TRIPOD	128-04-E-I2-01	ADDITIONAL	38	15	7	7	7	5
WOODY	128-13-A-I2-00	ADDITIONAL	23	11	5	3	2	4
WOODY	128-13-E-I2-00	ADDITIONAL	39	13	8	5	8	5
BLACK WARRIOR	107-11-I-I1-00	INTEGRATOR	45	23	7	14	8	9
ELK	125-01-I-I2-00	INTEGRATOR	32	20	6	11	3	7
GRIMES	125-16-IS-I3-00	INTEGRATOR	32	16	4	11	4	5
GRIMES	125-16-IS-I4-01	INTEGRATOR	42	19	6	11	8	7
BEARSKIN	117-12-IS-I1-01	INTEGRATOR	20	6	3	4	2	2
BEARSKIN	117-12-IS-I1-02	INTEGRATOR	16	6	3	3	3	2
DEADWOOD	126-03-I-I3-01	INTEGRATOR	27	14	7	9	2	3
DEER	126-02-I-I3-01	INTEGRATOR	41	20	8	11	8	7
PORTER	117-08-I-I1-00	INTEGRATOR	33	14	3	7	6	5
TRAIL	126-10-I-I2-01	INTEGRATOR	43	22	7	13	7	6
WHITEHAWK	126-16-I-I1-00	INTEGRATOR	37	15	7	8	13	5
WHITEHAWK	126-16-I-I1-01	INTEGRATOR	40	20	8	12	8	6
LITTLE RATTLESNAKE	106-10-I-I1-02	INTEGRATOR	31	15	6	5	5	7
WILLOW	106-11-I-I1-02	INTEGRATOR	31	11	7	8	5	3
WOOD	106-12-I-I1-02	INTEGRATOR	43	16	8	10	7	5

Table B-4. (Continued)

Integrator and Additional Reaches

Stream	Reach	Community tolerance quotient	RIVPAC Observed/ Expected(0.5)
CABIN	121-06-I-I2-01	64	0.90
CLEAR	127-01-I-I1-02	61	1.05
FAWN	128-08-I-I2-01	55	0.93
SHEEP	121-04-I-I2-01	51	1.27
TRAPPER	119-05-IS-I1-02	60	1.05
TRAPPER	119-05-IS-I2-00	54	1.17
TRAPPER	119-05-IS-I2-01	58	0.99
ANDERSON	126-07-I-I2-01	66	0.79
NO NAME	128-14-I-I1-01	81	0.50
PINE	128-02-I-I1-01	58	
RAMMAGE	129-05-E-I2-00	77	0.79
SECOND FORK SQUAW	128-13-I-I2-01	64	0.70
THIRD FORK SQUAW	129-05-I-I1-02	64	
TRIPOD	128-04-A-I1-01	75	0.64
TRIPOD	128-04-E-I2-01	69	0.69
WOODY	128-13-A-I2-00	-34	
WOODY	128-13-E-I2-00	75	0.62
BLACK WARRIOR	107-11-I-I1-00	55	0.92
ELK	125-01-I-I2-00	60	0.80
GRIMES	125-16-IS-I3-00	58	0.97
GRIMES	125-16-IS-I4-01	61	1.14
BEARSKIN	117-12-IS-I1-01	73	0.40
BEARSKIN	117-12-IS-I1-02	58	0.46
DEADWOOD	126-03-I-I3-01	68	0.66
DEER	126-02-I-I3-01	61	0.90
PORTER	117-08-I-I1-00	56	0.98
TRAIL	126-10-I-I2-01	59	1.02
WHITEHAWK	126-16-I-I1-00	55	0.97
WHITEHAWK	126-16-I-I1-01	62	1.08
LITTLE RATTLESNAKE	106-10-I-I1-02	72	0.44
WILLOW	106-11-I-I1-02	75	0.47
WOOD	106-12-I-I1-02	74	0.51

Table B-5. Idaho DEQ Temperature Standards

Daily Average Temperature and Daily Maximum Temperature Ratings

Idaho

Stream	Reach	Year	DAT>19	DAT impairment	DMT>22	DMT impairment
CABIN	121-06-I-I2-01	2001	0	UNIMPAIRED	0	UNIMPAIRED
CLEAR	127-01-I-I1-02	2002	0	UNIMPAIRED	0	UNIMPAIRED
FAWN	128-08-I-I2-01	2001	0	UNIMPAIRED	0	UNIMPAIRED
SHEEP	121-04-I-I2-01	2001	0	UNIMPAIRED	0	UNIMPAIRED
TRAPPER	119-05-IS-I1-02	2002	0	UNIMPAIRED	0	UNIMPAIRED
TRAPPER	119-05-IS-I1-03	2003	0	UNIMPAIRED	0	UNIMPAIRED
TRAPPER	119-05-IS-I2-00	2000	0	UNIMPAIRED	0	UNIMPAIRED
ANDERSON	126-07-I-I2-01	2001	0	UNIMPAIRED	2	IMPAIRED
NO NAME	128-14-I-I1-01	2001	0	UNIMPAIRED	0	UNIMPAIRED
PINE	128-02-I-I1-01	2001	1	IMPAIRED	4	IMPAIRED
SECOND FORK SQUAW	128-13-I-I2-01	2001	0	UNIMPAIRED	0	UNIMPAIRED
THIRD FORK SQUAW	129-05-I-I1-02	2002	3	IMPAIRED	20	IMPAIRED
W.F. SIXMILE	127-19-I-I1-00	2000	0	UNIMPAIRED	0	UNIMPAIRED
BLACK WARRIOR	107-11-I-I1-00	2000	3	IMPAIRED	4	IMPAIRED
ELK	125-01-I-I2-00	2000	3	IMPAIRED	7	IMPAIRED
GRIMES	125-16-IS-I3-03	2003	0	UNIMPAIRED	0	UNIMPAIRED
GRIMES	125-16-IS-I4-01	2001	0	UNIMPAIRED	0	UNIMPAIRED
YUBA	105-15-I-I2-03	2003	0	UNIMPAIRED	0	UNIMPAIRED
BEARSKIN	117-12-IS-I1-00	2000	0	UNIMPAIRED	0	UNIMPAIRED
BEARSKIN	117-12-IS-I1-01	2001	0	UNIMPAIRED	0	UNIMPAIRED
BEARSKIN	117-12-IS-I1-02	2002	0	UNIMPAIRED	0	UNIMPAIRED
BEARSKIN	117-12-IS-I3-03	2003	0	UNIMPAIRED	0	UNIMPAIRED
CANYON	116-13-I-I2-03	2003	0	UNIMPAIRED	0	UNIMPAIRED
DEER	126-02-I-I3-01	2001	0	UNIMPAIRED	0	UNIMPAIRED
EIGHTMILE	116-07-I-I4-03	2003	0	UNIMPAIRED	0	UNIMPAIRED
PORTER	117-08-I-I1-00	2000	0	UNIMPAIRED	0	UNIMPAIRED
TENMILE	116-05-I-I3-03	2003	0	UNIMPAIRED	0	UNIMPAIRED
TRAIL	126-10-I-I2-01	2001	0	UNIMPAIRED	0	UNIMPAIRED
BEAR	105-06-I-I4-03	2003	0	UNIMPAIRED	0	UNIMPAIRED
LINCOLN	105-07-I-I4-03	2003	0	UNIMPAIRED	0	UNIMPAIRED
LITTLE RATTLESNAKE	106-10-I-I1-02	2002	11	IMPAIRED	46	IMPAIRED

Table B-5. (Continued.)

Daily Average Temperature and Daily Maximum Temperature Ratings
Idaho

Stream	Reach	Year	DAT>19	DAT impairment	DMT>22	
N.F. GROUSE	105-02-I-I4-03	2003	0	UNIMPAIRED	0	UNIMPAIRED
TRINITY	105-12-I-I4-03	2003	0	UNIMPAIRED	0	UNIMPAIRED
WILLOW	106-11-I-I1-02	2002	0	UNIMPAIRED	0	UNIMPAIRED
WOOD	106-12-I-I1-02	2002	0	UNIMPAIRED	42	IMPAIRED

Table B-6. Comparison between PACFISH / INFISH Riparian Management Objectives and all integrator reaches sampled 2000 - 2003 on the Boise National Forest. Symbols: +: met RMO, -: did not meet RMO, w: wooded reach, m: meadow reach.

Integrator Reaches											
				Pools per mile		Wetted width:depth ratio RMO<10		% lower bank angle RMO>75		% bank stability RMO>80	
Stream	RchID	Yr	RMO PPM	PoolPerMile	PPM>RMO	AvgWetRat	AWR<10	PctUnCut	PUC>75	PctStaBk	PSB>80
CABIN	121-06-I-I2-01	2001	56	75	+	35.8	-	W		W	
CLEAR	127-01-I-I1-02	2002	56	88	+	33.8	-	W		W	
FAWN	128-08-I-I2-01	2001	56	62	+	91.4	-	W		W	
SHEEP	121-04-I-I2-01	2001	56	199	+	115.5	-	W		W	
TRAPPER	119-05-IS-I1-02	2002	47	56	+	96.4	-	W		W	
TRAPPER	119-05-IS-I1-03	2003	47	75	+	86.2	-	W		W	
TRAPPER	119-05-IS-I2-00	2000	47	67	+	74.7	-	W		W	
TRAPPER	119-05-IS-I2-01	2001	47	150	+	117.6	-	W		W	
ANDERSON	126-07-I-I2-01	2001	47	57	+	189.9	-	W		W	
NO NAME	128-14-I-I1-01	2001	96	260	+	17.5	-	82	+	100	+
PINE	128-02-I-I1-01	2001	96	151	+	68.6	-	W		W	
SECOND FORK SQUAW	128-13-I-I2-01	2001	47	116	+	120.9	-	W		W	
THIRD FORK SQUAW	129-05-I-I1-02	2002	47	39	-	52.1	-	28	-	97	+
W.F. SIXMILE	127-19-I-I1-00	2000	56	145	+	40	-	W		W	
BLACK WARRIOR	107-11-I-I1-00	2000	56	39	-	62.2	-	12	-	100	+
ELK	125-01-I-I2-00	2000	56	143	+	37.5	-	24	-	100	+
GRIMES	125-16-IS-I3-00	2000	96	92	-	21.4	-	46	-	95	+
GRIMES	125-16-IS-I3-03	2003	56	75	+	40.5	-	46	-	88	+
GRIMES	125-16-IS-I4-01	2001	56	89	+	38.8	-	53	-	66	-
YUBA	105-15-I-I2-03	2003	47	31	-	81	-	W		W	
BEARSKIN	117-12-IS-I1-00	2000	56	82	+	41.5	-	46	-	93	+
BEARSKIN	117-12-IS-I1-01	2001	56	77	+	73.5	-	28	-	100	+
BEARSKIN	117-12-IS-I1-02	2002	56	87	+	74.4	-	38	-	91	+
BEARSKIN	117-12-IS-I3-03	2003	56	95	+	46.4	-	33	-	93	+
CANYON	116-13-I-I2-03	2003	26	32	+	51.4	-	W		W	
DEADWOOD	126-03-I-I3-01	2001	26	30	+	100.3	-	W		W	
DEER	126-02-I-I3-01	2001	47	58	+	118.5	-	W		W	
EIGHTMILE	116-07-I-I4-03	2003	26	22	-	61.6	-	W		W	
PORTER	117-08-I-I1-00	2000	56	75	+	30.1	-	49	-	88	+
TENMILE	116-05-I-I3-03	2003	47	38	-	36.1	-	W		W	

TRAIL	126-10-I-I2-01	2001	56	106	+	45	-	W	W

Table B-6. (Continued.)

Integrator Reaches											
				Pools per mile		Wetted width:depth ratio RMO<10		% lower bank angle RMO>75		% bank stability RMO>80	
Stream	RchID	Yr	RMO PPM	PoolPerMile	PPM>RMO	AvgWetRat	AWR<10	PctUnCut	PUC>75	PctStaBk	PSB>80
WHITEHAWK	126-16-I-I1-00	2000	56	75	+	59.2	-	30	-	90	+
WHITEHAWK	126-16-I-I1-01	2001	96	69	-	57.5	-	29	-	96	+
BEAR	105-06-I-I4-03	2003	56	65	+	19.8	-	7	-	100	+
LINCOLN	105-07-I-I4-03	2003	96	134	+	42.4	-	31	-	90	+
LITTLE RATTLESNAKE	106-10-I-I1-02	2002	96	108	+	41.7	-	0	-	80	-
N.F. GROUSE	105-02-I-I4-03	2003	96	171	+	22.3	-	W		W	
TRINITY	105-12-I-I4-03	2003	26	32	+	62.1	-	W		W	
WILLOW	106-11-I-I1-02	2002	56	87	+	77	-	W		W	
WOOD	106-12-I-I1-02	2002	96	129	+	198	-	12	-	84	+

Table B-6. (Continued)

Integrator Reaches						
		Large woody debris RMO>20		7-day average moving maximum temperature		
Stream	RchID	WoodPerMile (>11m_by_ >.28m)	WPM>20	#days exceeding 7D-AMT>15.5	#days exceeding 7D-AMT>17.8	#days reported
CABIN	121-06-I-I2-01	0	-	0	0	43
CLEAR	127-01-I-I1-02	20	-	0	0	43
FAWN	128-08-I-I2-01	21	+	22	0	43
SHEEP	121-04-I-I2-01	75	+	0	0	43
TRAPPER	119-05-IS-I1-02	185	+	0	0	43
TRAPPER	119-05-IS-I1-03	150	+	0	0	43
TRAPPER	119-05-IS-I2-00	29	+	0	0	43
TRAPPER	119-05-IS-I2-01	113	+			
ANDERSON	126-07-I-I2-01	0	-	42	21	43
NO NAME	128-14-I-I1-01	M		19	2	43
PINE	128-02-I-I1-01	0	-	43	22	43
SECOND FORK SQUAW	128-13-I-I2-01	27	+	43	27	43
THIRD FORK SQUAW	129-05-I-I1-02	M		42	42	42
W.F. SIXMILE	127-19-I-I1-00	13	-	13	0	43
BLACK WARRIOR	107-11-I-I1-00	M		43	25	43
ELK	125-01-I-I2-00	M		43	43	43
GRIMES	125-16-IS-I3-00	M				
GRIMES	125-16-IS-I3-03	M		30	0	43
GRIMES	125-16-IS-I4-01	M		31	0	43
YUBA	105-15-I-I2-03	38	+	1	0	32
BEARSKIN	117-12-IS-I1-00	M		0	0	43
BEARSKIN	117-12-IS-I1-01	M		0	0	43
BEARSKIN	117-12-IS-I1-02	M		0	0	43
BEARSKIN	117-12-IS-I3-03	M		0	0	43
CANYON	116-13-I-I2-03	0	-	0	0	43
DEADWOOD	126-03-I-I3-01	10	-			
DEER	126-02-I-I3-01	19	-	14	0	43
EIGHTMILE	116-07-I-I4-03	0	-	29	0	43
PORTER	117-08-I-I1-00	M		0	0	43
TENMILE	116-05-I-I3-03	19	-	17	0	43
TRAIL	126-10-I-I2-01	26	+	30	0	43

Table B-6. (Continued.)

Integrator Reaches						
		Large woody debris RMO>20		7-day average moving maximum temperature		
Stream	RchID	WoodPerMile (>11m_by_ >.28m)	WPM>20	#days exceeding 7D-AMT>15.5	#days exceeding 7D-AMT>17.8	
WHITEHAWK	126-16-I-I1-00	M				
WHITEHAWK	126-16-I-I1-01	M				
BEAR	105-06-I-I4-03	M		29	0	43
LINCOLN	105-07-I-I4-03	M		0	0	43
LITTLE RATTLESNAKE	106-10-I-I1-02	M		43	43	43
N.F. GROUSE	105-02-I-I4-03	0	-	0	0	43
TRINITY	105-12-I-I4-03	0	-	42	30	43
WILLOW	106-11-I-I1-02	37	+	0	0	43
WOOD	106-12-I-I1-02	M		43	43	43

Table B-7. Reach summary and vegetation characteristics for grazing DMA reaches 2000 - 2003 on the Boise National Forest. Whenever a DMA site is located at an integrator reach, we have presented the summary data in both tables.

Grazing DMA Reaches

District	Stream	Reach	ICBEMP HUC code	Year	Livestock	Elevation	Gradient	Sinuosity
CASCADE	FAWN	128-08-K-I1-01	170501230302	2001	CATTLE	5636	0.05	1.0
CASCADE	SILVER	129-09-K-I1-02	170501230501	2002	CATTLE	4894	4.33	1.3
EMMETT	PINE	128-02-K-I2-01	170501221201	2001	CATTLE	4317	3.13	1.0
EMMETT	RAMMAGE	129-05-K-I1-02	170501221004	2002	CATTLE	5350	1.24	1.6
LOWMAN	DEADWOOD	126-03-K-I3-01	170501200403	2001	CATTLE	5583	0.18	1.6
LOWMAN	DEER	126-02-K-I2-01	170501200404	2001	CATTLE	6597	0.78	1.3
MOUNTAIN HOME	WILLOW	106-11-K-I1-02	170501131801	2002	CATTLE	3550	0.85	1.1
MOUNTAIN HOME	WOOD	106-12-K-I1-02	170501131802	2002	CATTLE	3400	1.82	1.4

Table B-8. Channel characteristics and condition information for grazing DMA reaches on the Boise National Forest 2000 - 2003.

Grazing DMA Reaches							
		Bank characteristics					
Stream	Reach	Average bankfull width (m)	% stable bank method1	% stable bank method2	Average bank angle	% undercut banks	Average undercut depth (cm)
FAWN	128-08-K-I1-01						
SILVER	129-09-K-I1-02	2.36	64	57	94	40	0.06
PINE	128-02-K-I2-01						
RAMMAGE	129-05-K-I1-02	1.14	95	95	116	12	0.017
DEADWOOD	126-03-K-I3-01						
DEER	126-02-K-I2-01						
WILLOW	106-11-K-I1-02	5.32	69	26	123	18	0.03
WOOD	106-12-K-I1-02	1.85	70	40	130	17	0.014

Table B-9a. Region 4 riparian vegetation summaries for grazing DMA reaches 2000 - 2003. Greenline and cross-section ratings were based on community type cover through 2002, and on species data in 2003.

Grazing DMA Reaches								
Stream	Reach	Greenline wetland rating	Greenline stability rating	Greenline successional rating (% late seral)	Cross-section wetland rating	Effective ground cover (%)	Unidentifiable species (greenline %cover)	Unidentifiable species (cross-sections %cover)
FAWN	128-08-K-I1-01	79	7.6	72	74	96		
SILVER	129-09-K-I1-02	70	6.7	70	68	92		
PINE	128-02-K-I2-01	62	6.0	81	61	71		
RAMMAGE	129-05-K-I1-02	89	8.1	81	91	100		
DEADWOOD	126-03-K-I3-01	75	6.7	55	71	91		
DEER	126-02-K-I2-01	92	9.7	99	83	100		
WILLOW	106-11-K-I1-02	86	6.3	22	73	87		
WOOD	106-12-K-I1-02	68	6.9	56	75	86		

APPENDIX C

Reach Description Pages