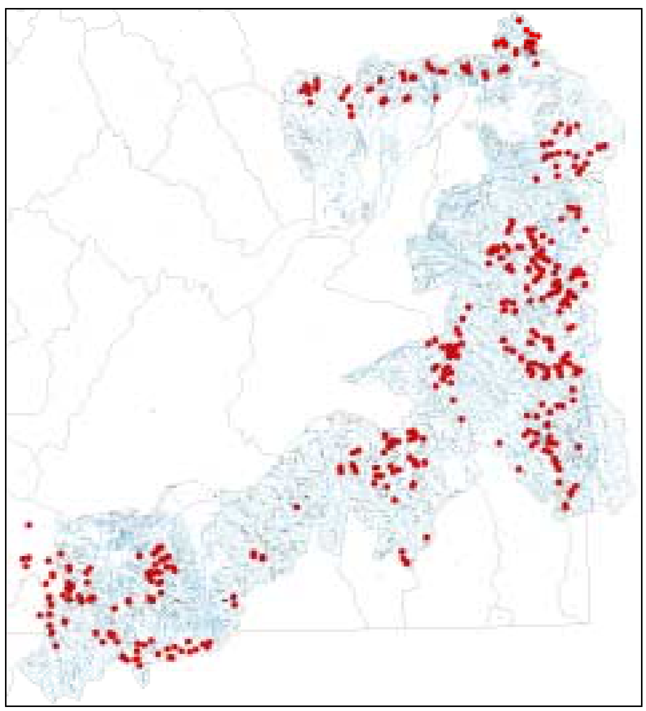
FISHERY RESEARCH

ASSESSMENT OF NATIVE SALMONIDS ABOVE HELLS CANYON DAM, IDAHO

ANNUAL PROGRESS REPORT
July 1, 2002 — June 30, 2003



Prepared by:

Kevin A. Meyer, Senior Fisheries Research Biologist

James A. Lamansky, Jr., Senior Fisheries Technician

IDFG Report Number 03-59
November 2003

Assessment of Native Salmonids Above Hells Canyon Dam, Idaho

Project Progress Report

2002 Annual Report

By

Kevin A. Meyer
James A. Lamansky, Jr.

Idaho Department of Fish and Game
600 South Walnut Street
P.O. Box 25
Boise, ID 83707

To

U.S. Department of Energy
Bonneville Power Administration
Division of Fish and Wildlife
P.O. Box 3621
Portland, OR 97283-3621

Project Number 1998-00200
Contract Number 98-BI-01462

IDFG Report Number 03-59
November 2003

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

PART #I: FACTORS AFFECTING THE DISTRIBUTION AND BIOMASS OF YELLOWSTONE CUTTHROAT TROUT IN THE UPPER SNAKE RIVER SUBBASIN

ABSTRACT

We assessed the relationships between specific stream attributes and Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri* distribution and biomass at 773 stream reaches (averaging 100 m in length) throughout the Upper Snake River Basin in Idaho, in an effort to identify possible limiting factors. Because limiting factors were expected to vary across the range of cutthroat trout distribution in Idaho, separate logistic and multiple regression models were developed for each of the nine major river drainages to relate stream conditions to occurrence and biomass of cutthroat trout. Adequate stream flow to measure fish and habitat existed at 566 sites, and of those, Yellowstone cutthroat trout were present at 322 sites, while rainbow trout *O. mykiss* (or rainbow x cutthroat hybrids) and brook trout *Salvelinus fontinalis* occurred at 108 and 181 sites, respectively. In general, cutthroat trout presence at a specific site within a drainage was associated with a higher percentage of public property, higher elevation, more gravel and less fine substrate, and more upright riparian vegetation. However, there was much variation between drainages in the direction and magnitude of the relationships between stream characteristics and Yellowstone cutthroat trout occurrence and biomass, and in model strength. This was especially true for biomass models, in which we were able to develop models for only five drainages that explained more than 50% of the variation in cutthroat trout biomass. Sample size appeared to affect the strength of the biomass models, with a higher explanation of biomass variation in drainages with lower sample sizes. The occurrence of nonnative salmonids was not strongly related to cutthroat trout occurrence, but their widespread distribution and apparent ability to displace native cutthroat trout suggest they may nevertheless pose the largest threat to long-term cutthroat trout persistence in the Upper Snake River Basin.

Authors:

Kevin A. Meyer
Senior Fisheries Research Biologist

James A. Lamansky, Jr.
Senior Fisheries Technician

INTRODUCTION

Populations of native salmonids have experienced significant reductions in distribution and abundance across much of their historical range in the Interior Columbia River Basin (Rieman et al. 1997; Thurow et al. 1997; Kruse et al. 2000). In June 1998, the U.S. Fish and Wildlife Service listed Columbia River Basin bull trout *Salvelinus confluentus* as a threatened species under the Endangered Species Act (ESA). During the past decade, petitions have also been filed to list redband trout *Oncorhynchus mykiss gairdneri* and Yellowstone cutthroat trout *O. clarki bouvieri* under the ESA, although neither are currently listed. Idaho Department of Fish and Game (IDFG) (2001) has identified all three species as species of special concern category A, which are top priority species. Despite the sensitive status of these salmonids, current knowledge of the population distributions, abundances, and trends is unknown for a large proportion of streams in the Upper Snake River Basin.

Most commonly, declines in distribution and abundance of native salmonids throughout North America, including areas in the Rocky Mountains, have been attributed to nonnative species introductions, habitat degradation, and overharvest (Rieman and McIntyre 1993; Young 1995). In general, populations of native salmonids that persist in western North America tend to be located at high-elevation, steep-gradient reaches that are relatively unproductive (Gresswell 1995; Rieman and McIntyre 1995; Young 1995). While this may hold true in a broad perspective, factors that influence native salmonid persistence within individual drainages may vary. For example, Watson and Hillman (1997) found numerous variables that were related to bull trout occurrence and abundance, including the presence of undercut banks, large substrate, deep pools, and wood and boulder cover, as well as the absence of nonnative trout species. However, the combinations of variables that correlated with bull trout densities varied considerably between basins, and the relationships deteriorated at finer scales of analysis.

Such variation in modeling success highlights the difficulty in developing fish/habitat relationships. Huston (2002) listed three primary obstacles to developing models that accurately conceptualize relations between ecological patterns and the factors that produce them, including: 1) mismatches between spatial and temporal dimensions of ecological measurement and the dimensions at which hypothesized processes operate, 2) misunderstanding of ecological processes, and 3) use of inappropriate statistics to quantify ecological patterns and processes. Most previous fish/habitat models have had low predictability, and those with high predictability have had low transferability to different times or places (Fausch et al. 1988). That models for a particular species would be transferable across the range of the species suggests that limiting factors would be consistent across the range, a tenuous assumption that may rarely be met.

Fish/habitat models that predict standing stock of fish have typically focused on specific small-scale attributes of streams (McFadden and Cooper 1962; Binns 1982; Chisholm and Hubert 1986; Kozel and Hubert 1989). Our goal was not to build models for predictive purposes, but rather to help identify certain physical and biotic stream characteristics that may be limiting Yellowstone cutthroat trout occurrence and biomass in the Upper Snake River Basin. Phase II of this Bonneville Power Administration-funded project is to determine limiting factors for native salmonids in the Upper Snake River Basin. Our goal was to use the results of this study as an initial guide for focusing future studies on limiting factors for Yellowstone cutthroat trout.

OBJECTIVE

1. Assess the relationships between specific stream attributes and Yellowstone cutthroat trout distribution and biomass throughout the Upper Snake River Basin in Idaho to identify potential limiting factors for cutthroat trout.

STUDY AREA

The Snake River passes through southern Idaho from east to west, flowing 1,674 km from the headwaters in Yellowstone National Park to its confluence with the Columbia River at Pasco, Washington. The Upper Snake River Basin is defined herein as the portion of the Snake River drainage near the Idaho-Wyoming border at the upper end of Palisades Reservoir (and including the Salt River drainage within Idaho) downstream to Shoshone Falls near Twin Falls, Idaho (Figure 1). It is composed of nine major river drainages where Yellowstone cutthroat trout distribution and abundance were assessed: Goose Creek, Raft River, Portneuf River, Blackfoot River, Willow Creek, the South Fork of the Snake River, Teton River, the Henrys Fork of the Snake River, and the Sinks drainages. Discharge in most of the 13,650 km of stream in the Upper Snake River Basin is driven by snowmelt and peaks between April and June. However, dams and diversions, primarily for agricultural use and hydroelectric power generation, regulate streamflow in the Snake River and in a number of major tributaries, typically resulting in peak flows occurring later in the summer in these regulated reaches. Elevation within the basin ranges from over 4,000 m at mountain peaks to 760 m at Shoshone Falls. The climate is semiarid with an average precipitation of about 25 cm.

The historical range of Yellowstone cutthroat trout in Idaho included all of the Upper Snake River Basin (excluding the Big and Little lost river drainages), as well as a now extirpated population from Waha Lake (Behnke 1992). Nonnative trout, including rainbow trout *O. mykiss*, brook trout *Salvelinus fontinalis*, and brown trout *Salmo trutta* have been introduced throughout the basin and have widely established self-sustaining populations. Other native fish in the Upper Snake River Basin include mountain whitefish *Prosopium williamsoni*, three species of Cottidae, three species of Catostomidae, and five species of Cyprinidae (Table 1). Bull trout appear to be native to the Little Lost River drainage (B. Gamett, U.S. Forest Service, personal communication). Shoshone Falls, a 65-m natural waterfall near the town of Twin Falls, isolated Yellowstone cutthroat trout and mountain whitefish from downstream intrusion from other native salmonids in the Columbia River Basin.

METHODS

<u>Sampling Design</u>

To select study sites, we first identified potential locations as perennial streams on 1:100,000 land status maps, then randomly selected at least 50% of these streams for sampling. One to nine 100-m sampling sites were distributed randomly from the mouth to the headwaters, with an average of about one study site for every 13 km of stream (range 10 to 16). Sampling in each drainage was distributed randomly across public and private land in order to include land ownership as a factor that may influence native salmonid distribution and biomass. Using this methodology, 28% and 72% of the 773 sites visited for sampling in these drainages occurred on private and public land, respectively. Two hundred seven (27%) sites were dry, had too little water to sample fish or habitat, or had missing data that precluded the site from further analysis. Of the remaining 566 sites, based on 1:100,000 topographic maps, 29% were 1st order stream reaches (see Strahler 1964), 46% were 2nd order reaches, 19% were 3rd order reaches, 5% were 4th order reaches, and 1% were 5th order reaches.

Fishery Sampling

Fish inventories in small streams were performed with backpack electrofishers. Sampling occurred during low to moderate flow conditions (after spring runoff and before the onset of winter) to facilitate effective fish capture and standardization of sampling conditions. To increase the number of sites that could be sampled in a given amount of time, we did not make multi-pass electrofishing depletion estimates at all sites. Instead, using data from the multi-pass depletion sites, we developed a relationship for each drainage between the numbers of trout captured in first passes and maximum-likelihood abundance estimates calculated with the MicroFish software package (Van Deventer and Platts 1989). From this relationship, we then predicted trout abundance at sites where only a single removal pass was made (Lobón-Cerviá et al. 1994; Jones and Stockwell 1995; Kruse et al. 1998). Standardized residuals were investigated to remove outliers from the regression models (Montgomery 1991) before population estimates were made. Block nets installed at the upper and lower end of the sites were used to meet the population estimate modeling assumption that the populations were closed. After a review of the data, we concluded that the variation in emergence time and in catchability precluded inclusion of trout <100 mm in our abundance estimates, but they were used in occurrence analyses. Length was recorded for each salmonid captured, and weight (g) was recorded for approximately 30 trout per site. At sites too large to perform depletions (n = 12), mark-recapture estimates were made using canoe- or boat-mounted electrofishers to capture trout, and the Mark-Recapture for Windows software package was used to estimate abundance (Montana Fish, Wildlife and Parks 1997).

Abundance of Yellowstone cutthroat trout was calculated by multiplying the overall abundance of all trout by the proportion of the catch that cutthroat trout comprised. Abundance was then converted to biomass by calculating the average length of fish caught >100 mm at each site, calculating the average weight of that fish by a standardized length-weight curve developed for Yellowstone cutthroat trout in the Upper Snake River Basin (K. Meyer, unpublished data), multiplying that by abundance, and standardizing to kg/ha.

Habitat Measurements

After completing fish survey, we measured physical stream characteristics for the study site. Site location was determined from a Global Positioning Unit using the 1927 North American Datum of the Universal Transverse Mercator (UTM) grid. Global positioning was used to determine site elevation (using 1:24,000 USGS topographical maps). Gradient was expressed as the percent of drop in water surface elevation per unit of channel length and was calculated as follows: using a 1:24,000 USGS map, stream length (m) was traced between the two contour lines that bounded the study site (using UTM coordinates to determine site location), and gradient was calculated as the elevational increment between the contours (usually 6.1 or 12.2 m) divided by the traced distance. Dominant riparian vegetation was: 1) recorded separately for both banks of the stream as the type of vegetation making up the majority (>50 %) of the stream margin riparian community; 2) coded as 1 for non-vegetated, 2 for grasses or forbs, 3 for shrubs, and 4 for trees (including any woody material, such as willows, dogwoods, or alders), and 3) averaged for each site. Conductivity (µS/cm) was measured with a hand-held conductivity meter.

Starting at the downstream end of the study site and working upstream, habitat units were classified (following Hawkins et al. 1993), and for each habitat unit, we measured the following characteristics:

A.) Average wetted width (m) was determined along three representative transects within each unit as the distance from one stream margin to the other, measured perpendicular to the flow;

B.) Average depth was determined at the same transects by measuring the depth at 1/4, 1/2, and 3/4 distance across the channel and dividing the sum by four (Platts et al. 1983);

C.) Percent substrate composition for each habitat unit was a visual estimate of the percentage of the streambed that was covered by fine sediment (<1 mm), sand (1-5 mm), gravel (5-76 mm), cobble (76-300 mm), boulder (>300 mm), and bedrock, and was broken into and assigned to one of six categories: 0) absent; 1) 1-10%; 2) 11-25%; 3) 26-50%; 4) 51-75%; 5) >75%;

D.) Percent shading was a visual estimate of the amount of the habitat unit that would be shaded in one way or another when the sun was directly overhead, broken into the same six categories as above;

E.) Percent unstable banks was a visual estimate of the percent of stream bank (both sides combined) in the habitat unit that was unstable due to fracture, slumping, sloughing, or erosion, again using the same six categories as above.

A number of other measurements were made, but because they were not used during analysis, they are not listed here (see below). We either measured 10 habitat units or measured habitat to the end of the study site, whichever came first. From the measurements within each habitat unit, averages or totals for the study site were calculated. Raw data for each study site has been published elsewhere (Meyer and Lamansky 2002a, 2002b) or can be found in Appendix A.

Statistical Analyses

We related physical and biotic stream characteristics to Yellowstone cutthroat trout distribution and biomass with regression analyses. We constructed separate models for each drainage to assess whether the relations between stream characteristics and cutthroat trout occurrence and biomass were consistent across drainages. Our goal was not to develop numerous predictive models, but rather to highlight factors that may be limiting distribution or biomass of cutthroat trout within a given drainage. To reduce the number of independent variables being considered for the models, we carefully considered each variable describing stream conditions and chose those that we thought were more accurately measured and were more likely to affect cutthroat trout occurrence and biomass (Table 2). Data were then screened for multicollinearity using correlation analyses and variance inflation factors. Analysis of scatterplots, residual plots, and residual values were used to assess homoscedasticity, nonlinearity, and normality of the data.

We investigated whether stream attributes differed between sites with and without Yellowstone cutthroat trout. We first explored this by calculating mean values and 95% CIs for continuous variables at sites with and without Yellowstone cutthroat trout, then attempted to develop logistic regression models for each drainage. For categorical data such as land ownership (private or public), dummy values were used (e.g., private = 1, public = -1). We first fit models with independent variables without interaction, and after non-significant variables were screened from the model, first order interaction terms were tested for the remaining variables. Logistic regression model strength was evaluated using Akaike's Information Criteria (AIC; Akaike 1973) and coefficients of determination (R^2). We present only the best model for each drainage.

For sites that contained Yellowstone cutthroat trout, we related stream characteristics to biomass of Yellowstone cutthroat trout using simple correlation analysis and by developing multiple regression models. The correlation between an ecological response variable such as biomass and a particular limiting factor can break down as additional factors become more actively limiting, resulting in a wedge-shaped pattern of variation due to the interaction between limiting factors (Terrell et al. 1996; Cade et al. 1999). To assess such interactions in our data, we analyzed scatterplots and tested for heteroscedasticity, and tested for first order interaction between the terms in the models. We also built regression quantile models (Cade et al. 1999) using the Blossom statistical package (Cade and Richards 2001), and tested for heteroscedasticity by looking for differences in slopes between regression quantiles (Terrell et al. 1996; Cade and Richards 2001). Because the regression quantile models were not stronger than linear regression models, and there was no evidence of heteroscedasticity, only linear models are presented. Spatial correlations in the multiple regression models were assessed using Moran's I (Moran 1948), but none were found in the data. The GLM procedure in SAS (1999) was used for building the models so that categorical independent variables could be included in the analyses. Model strength was evaluated using R^2.

RESULTS

Of the 566 sites that contained enough water to assess fish and habitat conditions, 57% were occupied by Yellowstone cutthroat trout. Eighty percent contained some sort of trout species, while 15% of the sites were fishless. Rainbow trout or cutthroat x rainbow trout hybrids occurred in 19% of the study sites, while brook trout occurred in 32% of the sites. More than half (56%) of the sites that contained cutthroat trout also contained nonnative salmonids, and 73% of the fish-bearing sites that were devoid of cutthroat trout were also devoid of nonnative salmonids.

Occurrence of Yellowstone Cutthroat Trout

The direction and magnitude of the relationships between stream characteristics and Yellowstone cutthroat trout occurrence varied greatly (Table 3). In general, cutthroat trout presence within a drainage was more likely on public than private property. The presence of nonnative salmonids was not strongly related to cutthroat trout occurrence except in the Teton River drainage, where cutthroat trout were more likely to occur where nonnative trout also occurred. Bank stability and stream shading also appeared to have little influence on cutthroat trout occurrence. However, fine substrate was consistently lower in sites that contained cutthroat trout.

Logistic regression models were developed separately for six drainages (Table 4). Model strength was highest in the Goose Creek and Portneuf River drainages and lowest in the Teton and Raft river drainages. In general, models indicated that cutthroat trout occurred more often at sites that were publicly owned, in streams that were wider, higher in elevation, contained more gravel and less fine substrate, and more upright riparian vegetation. Conductivity, cobble/boulder substrate, the presence of nonnative salmonids, stream order, and bank stability least often were related to the occurrence of Yellowstone cutthroat trout in the logistic regression models.

Sinks Drainage

Of the 50 sites that were sampled for fish and habitat in the Sinks drainage, 14 were fishless. Yellowstone cutthroat trout were found in 10 of the remaining 36 sites, but occurred without nonnative salmonids in only two locations. For the Sinks drainage, cutthroat trout distribution was too restricted to draw meaningful conclusions about factors related to cutthroat trout occurrence.

Henrys Fork of the Snake River Drainage

For the Henrys Fork drainage, fish and habitat conditions were measured at 69 study sites, but Yellowstone cutthroat trout occurred at only 12 sites, and nonnative salmonids were also present at 8 of those 12 sites. Distribution was too restricted within the drainage to draw meaningful conclusions about factors related to cutthroat trout occurrence.

Teton River Drainage

Yellowstone cutthroat trout were relatively widespread in the Teton River drainage (59% of sites containing perennial streamflow), but nearly all sites that contained cutthroat trout also contained brook trout. In fact, brook trout were more widespread, existing in 75% of sites containing perennial streamflow and all but five sites that contained fish of any species. Cutthroat trout occurrence was associated with lower elevations and a lower percentage of fine substrate, and they were more likely to occur where nonnative salmonids were present. However, none of these relationships were strong (Table 3), and the inclusion of these variables in the logistic regression model relating stream conditions to cutthroat trout distribution explained only 17% of the variation in occurrence (Table 4).

South Fork of the Snake River Drainage

Yellowstone cutthroat trout occurred in 96 of 106 study sites where fish and habitat were measured. Nonnative salmonids were detected in 23 sites, 15 of which contained rainbow trout or hybrids. Distribution was too pervasive within the drainage to draw meaningful conclusions about factors related to cutthroat trout occurrence.

Willow Creek Drainage

Yellowstone cutthroat trout occurred in 20 of 32 study sites where fish and habitat were measured in the Willow Creek drainage, whereas brook trout were found in five sites (three in sympatry with cutthroat trout). Rainbow trout and hybrids were not detected at any study site. Cutthroat trout were more likely to be present in higher order, wider streams with more gravel substrate; public land ownership also increased the likelihood of cutthroat trout presence (Table 3). These variables explained 58% of the variation in cutthroat trout occurrence in the logistic regression model for this drainage (Table 4).

Blackfoot River Drainage

Yellowstone cutthroat trout were found in 39 of 61 study sites where fish and habitat were measured. Nonnative salmonids occurred in 23 sites, including 19 which were in sympatry with cutthroat trout. Above Blackfoot Reservoir, 79% of sites where fish were present contained Yellowstone cutthroat trout, but 55% also contained either rainbow trout or brook trout. In comparison, 59% and 26% of sites below Blackfoot Reservoir contained cutthroat trout and nonnative trout, respectively. Cutthroat trout appeared to be more likely to occur in higher gradient, wider, headwater locations on public land, with higher amounts of gravel, cobble, and boulder substrate and less fine sediment substrate (Table 3). These variables explained 51% of the variation in cutthroat trout occurrence in the logistic regression model developed for this drainage (Table 4).

Portneuf River Drainage

Fish and habitat were measured at 63 study sites in the Portneuf River drainage, 41 of which contained Yellowstone cutthroat trout. Nonnative salmonids occurred at 26 locations, 21 of which were in sympatry with cutthroat trout. Sites with cutthroat trout tended to be wider, lower in elevation, and have more upright vegetation than sites without cutthroat trout (Table 3). Cutthroat trout presence was also associated with public land ownership, a higher percentage of cobble/boulder substrate, and higher stream order. Using these variables in a logistic regression model, 63% of the variation in cutthroat trout occurrence was explained (Table 4).

Raft River Drainage

Yellowstone cutthroat trout were present in 39 of 64 sites measured for fish and habitat in the Raft River drainage. Nonnative salmonids also occurred in 39 sites, and were in sympatry with native cutthroat trout at 22 locations. Elevation, more-upright vegetation, and unstable banks were positively related and stream gradient and fine substrate were negatively related to cutthroat trout occurrence (Table 3), but these variables explained only 35% of the variation in cutthroat trout occurrence in the logistic regression model (Table 4).

Goose Creek Drainage

In the Goose Creek drainage, Yellowstone cutthroat trout occurred in 27 of 57 sites sampled for fish and habitat. In comparison, nonnative salmonids occurred at 24 sites, seven of which also contained cutthroat trout. Cutthroat trout were more often found in wider, higher elevation streams with public land ownership, with more stream shading and more upright vegetation, but with lower gradients and lower levels of gravel substrate (Table 3). The inclusion of these variables in a logistic regression model explained 68% of the variation in cutthroat trout occurrence (Table 4).

Biomass of Yellowstone Cutthroat Trout

There were few consistencies between drainages in the direction and magnitude of correlations between the stream attributes we measured and Yellowstone cutthroat trout biomass (Table 5). For example, stream elevation was positively correlated to biomass in the Henrys Fork of the Snake and Raft river drainages, but negatively correlated to biomass in the Blackfoot River and Sinks drainages. Similarly, stream shading was positively correlated to biomass in the Blackfoot River and Sinks drainages, but negatively correlated to biomass in the Henrys Fork of the Snake and Raft river drainages. In the Portneuf River drainage, biomass was positively correlated with conductivity and fine substrate rating and negatively correlated with cobble/boulder substrate rating. There were few, if any, strong correlations between stream attributes and biomass in the Goose Creek, Willow Creek, South Fork of the Snake River, and Teton River drainages.

Few variables were included in the multiple regression models developed to describe the relationship between stream characteristics and cutthroat trout biomass (Table 6). Of the six stream variables appearing more than once in the individual regression models (stream shading, gradient, unstable banks, width:depth ratio, elevation, and stream width), only elevation was related to biomass in the same direction in each model. Sample size appeared to affect the strength of the multiple regression models, with a higher explanation of biomass variation in drainages with lower sample sizes (Figure 2).

Sinks Drainage

Several stream variables were correlated with cutthroat trout biomass in the Sinks drainage, including positive correlations between biomass and gradient, stream width, width:depth ratio, cobble/boulder substrate, and stream shading, and negative correlations between biomass and elevation, conductivity, and gravel substrate (Table 5). The Sinks drainage multiple regression model was strongest with the inclusion of width:depth ratio and conductivity, explaining 72% of the variation in cutthroat trout biomass (Table 6). However, sample size was low (n = 10).

Henrys Fork Snake River Drainage

Similar to the Sinks drainage, the Henrys Fork of the Snake River drainage had several variables correlated to cutthroat trout biomass, including positive correlations to elevation and fine substrate and negative correlations to more upright riparian vegetation, conductivity, and stream shading (Table 5). The inclusion of elevation and stream shading in a multiple regression model explained 80% of the variation in cutthroat trout biomass (Table 6). Again, however, sample size was low (n = 12).

Teton River Drainage

Few stream variables were correlated with cutthroat trout biomass in the Teton River drainage; only stream gradient (-0.42) had a simple correlation value higher than 0.30 (Table 5). The inclusion of gradient, along with unstable banks (negative correlation), stream order (positive correlation), and stream shading (negative correlation) in a multiple regression model explained 47% of the variation in cutthroat trout biomass (Table 6).

South Fork of the Snake River Drainage

No stream variables were well correlated with Yellowstone cutthroat trout biomass in the South Fork of the Snake River drainage (Table 5). The inclusion of width:depth ratio, stream width, and unstable banks in a multiple regression model explained only 33% of the variation in cutthroat trout biomass (Table 6).

Willow Creek Drainage

Unstable banks were positively correlated to Yellowstone cutthroat trout biomass, but no other stream variable was correlated to biomass (Table 5). No model could be developed to relate stream characteristics to cutthroat trout biomass for the Willow Creek drainage.

Blackfoot River Drainage

Elevation was negatively correlated and stream shading was positively correlated to cutthroat trout biomass in the Blackfoot River drainage (Table 5), but the best regression model included stream shading and gradient and explained 49% of the variation in biomass of cutthroat trout (Table 6).

Portneuf River Drainage

Several stream variables were correlated to cutthroat trout biomass, including a positive relation between biomass and conductivity and fine substrate, and a negative relation to cobble/boulder substrate (Table 5). The best regression model included fine substrate and gradient and explained 57% of the variation in cutthroat trout biomass in this drainage (Table 6).

Raft River Drainage

For the Raft River drainage, stream shading and stream width were negatively related and elevation was positively related to biomass (Table 5); these variables explained 75% of the variation in cutthroat trout biomass (Table 6). Other variables not included in the model results but correlated to cutthroat trout biomass included riparian vegetation and unstable banks.

Goose Creek Drainage

No stream variables were strongly correlated to Yellowstone cutthroat trout biomass. However, the inclusion of land ownership, gravel substrate, and unstable banks did explain 53% of the variation in cutthroat trout biomass in the model developed for this drainage (Table 6).

DISCUSSION

As expected, we found few consistencies between drainages in the relationships between the physical and biotic conditions at a study site and the occurrence or biomass of Yellowstone cutthroat trout at that site. Some independent variables appeared important in some drainages and unimportant in others, while some variables were positively related to occurrence or biomass in some drainages and negatively related in others. Such inconsistencies were not surprising, considering the tremendous complexity in species and the variation in their use of habitat at different life stages (spawning, rearing, adult, etc.) and at multiple spatial scales (watershed level, reach-level, habitat unit-level). The model inconsistencies we found among drainages concurs with many previous studies of species-environment relations for plants and animals in general (Huston 2002) and of fish in particular (Fausch et al. 1988), and probably stems from a number of biotic and abiotic factors.

Biologically, conditions that affect one life history requirement may have little or no affect on another. For example, juvenile overwintering habitat can have important population-level effects on salmonids, despite the fact that it affects only one life stage. In addition, population dynamics such as distribution and abundance can fluctuate greatly between years in response to a number of variables that may be difficult or impossible to monitor with standard habitat measurements, such as predation, recruitment, angling, and parasitic or disease-related outbreaks. Moreover, environmental conditions may have impacts for an indeterminate period of time. For example, drought conditions can impact fish distribution and abundance not only during the drought, but possibly for months or even generations to come as they attempt to recolonize the area and repopulate the available habitat.

In addition to these and many other biotic issues, the process of constructing models alone may cause difficulties. First, a model is a mathematical simplification of a complex biological system, thus it cannot be perfectly predictive. Also, regression models assume that fish populations are limited by the variables included in the model. We chose variables that were easily measurable, and these may not have influenced cutthroat trout distribution and biomass as much as other, more difficult-to-measure variables (e.g., number of diversions upstream of a study site, angling pressure, road density, carrying capacity of the study site, etc.) for which we did not or could not gather information. Both limiting factor and niche theory suggest that fish-habitat relations are unlikely to be linear (e.g., Cade et al. 1999; Dunham et al. 2002). We looked for but found no evidence in our data of nonlinear relationships in our biomass models, but we cannot rule out their existence. Moreover, even when strong relations between fish and their habitat are found, correlation does not necessarily signify causation. Finally, because of the number of models we constructed, and the number of independent variables considered for each model, a number of statistically significant relationships would be expected by chance alone (i.e., a type I error) when using α = 0.05 as we did in our analysis.

Of the models we developed, more variation was explained when sample sizes were smaller, and often the only relatively precise (i.e., high R^2) models that could be constructed were for drainages that had low sample size. This finding is not unique. Fausch et al. (1988) reviewed mathematical models that predict stream fish standing stock from measurable stream attributes, including 98 models that reported sample size. They divided the studies into those with datasets of more than and less than 20 observations. Of the models with more than 20 observations, 46% of them had values of r^2 >0.75. In comparison, of the models with sample size less than 20 observations, 68% of them had values of r^2 >0.75. This trend was even more pronounced in our data, where 1 of 6 habitat/biomass models (17%) with sample sizes greater than 20 explained >75% of the variation in the data, whereas 1 of 2 models (50%) with sample sizes less than 20 explained >75% of the variation in the data. Fausch et al. (1988) concluded that relatively precise models often lack generality.

Despite these difficulties, many conclusions can be drawn from our modeling results, and from simply evaluating the distribution and abundance of Yellowstone cutthroat trout by drainage and assessing current status of cutthroat trout and other nonnative salmonids. Below we summarize model results and current status by river drainage, and make recommendations as to future research or management actions.

Sinks Drainage

It is difficult to draw strong conclusions from our modeling efforts about factors affecting Yellowstone cutthroat trout occurrence and biomass in the Sinks drainage because sample size was low for both models, and because historic distribution of Yellowstone cutthroat trout in the Sinks drainage is not well known (B. Gamett, U.S. Forest Service, personal communication). However, considering that cutthroat trout were found at only 10 study sites, and that nonnative salmonids were present in 8 of those 10 sites, the presence of nonnative salmonids is likely the most serious threat to cutthroat trout persistence at existing locations in the Sinks drainage. Management actions should focus on protecting these existing populations, and a more rigorous study to define the extent of these populations should be undertaken in Rattlesnake, Dry, Indian, Irving, Webber, and Fritz creeks. Ongoing genetic studies may shed light on the degree of genetic bottlenecking occurring in these small populations.

Henrys Fork of the Snake River Drainage

As with the Sinks drainage, we could not draw definitive conclusions about Yellowstone cutthroat trout occurrence and biomass in the Henrys Fork of the Snake River drainage, because sample sizes were too low to construct adequate models. However, as with the Sinks drainage, distribution of cutthroat trout was restricted to a few small streams, some of which were outside the state of Idaho. Only Tygee Creek appeared to contain an allopatric population of Yellowstone cutthroat trout. A more definitive description of the distribution of cutthroat trout in Duck, Howard, Tygee, Twin, Boone, Squirrel, and Conant creeks would help focus what management actions could be implemented for protective and restorative purposes.

Teton River Drainage

Yellowstone cutthroat trout were relatively widespread in the Teton River drainage, but not as widespread as brook trout. In fact, brook trout existed in all but five sites where cutthroat trout occurred. Few variables were strongly related to cutthroat trout distribution. Possibly the most important characteristic dictating occurrence in the Teton River drainage was perennial stream flow. Indeed, 83% of the sites with perennial stream flow contained trout, and of those, 72% contained cutthroat trout. Most streams in this drainage subside underground or are diverted for irrigation when they reach the valley floor, and after an intermittent stretch of stream channel, they emerge again from springs before reaching the mainstem of the Teton River. Considering that cutthroat trout still exist in most perennial stream segments in the Teton River drainage, that brook trout were more widespread than cutthroat trout, and that rainbow trout were relatively absent from Teton River tributaries, brook trout may pose the largest threat to cutthroat trout in this drainage (see Peterson and Fausch 2002). Monitoring efforts should be established in allopatric populations to track population dynamics of both species and monitor any expansions or contractions for either species.

That rainbow trout are well established throughout the mainstem of the Teton River, and currently dominate the composition of salmonids in certain areas (Schrader and Brenden, In press), does indicate that they too pose a threat to cutthroat trout. This is also true in perennial streams that are consistently connected to the Teton River, and in more-intermittently connected streams that nevertheless are known or suspected to provide spawning grounds for migratory fish from the mainstem, such as Canyon Creek.

South Fork of the Snake River Drainage

Considering that Yellowstone cutthroat trout occurred in over 90% of the sites surveyed in the South Fork of the Snake River drainage, distribution does not appear to be limited. However, because of the highly connected nature of this drainage, and the fact that rainbow trout or hybrids were found at 14% of the study sites, there is potential for expansion of hybridization.

Willow Creek Drainage

Within the Willow Creek drainage, brook trout have a narrow distribution and rainbow trout (despite widespread stocking in the past) have not been found to date. Thus, nonnative salmonids do not appear to be a serious risk to Yellowstone cutthroat trout distribution or abundance within this drainage. However, Willow Creek has been listed by the Soil Conservation Service as one of the most serious soil erosion areas in the United States, and nearly every segment of the main stem of Willow Creek and its tributaries are listed on Idaho’s 303(d) list due to high sediment levels within the streams. Indeed, we found more fine sediment per study site within the Willow Creek drainage than in any other drainage (Table 3). Based on our modeling results, it appears that efforts to improve habitat on private property, where gravel substrate is lacking, and in narrow headwater streams, may increase cutthroat trout distribution. Since the collection of our data in 2001, drought conditions have more severely restricted the distribution of cutthroat trout in the Willow Creek drainage, compounding what were already poor habitat conditions. Yellowstone cutthroat trout conservation strategies within this drainage should focus on habitat improvement, water management, and fencing in an effort to reduce fine sediment loads in streams.

Blackfoot River Drainage

Although Yellowstone cutthroat trout distribution within the Blackfoot River drainage was relatively widespread, so too was the presence of nonnative salmonids. This was especially true in the upper Blackfoot River (above Blackfoot Reservoir), where cutthroat trout were 34% more likely to occur at a given study site than at study sites below the reservoir, but nonnative trout were 112% more likely to occur. There were few areas within the drainage where cutthroat trout were isolated from nonnative trout, even in the headwater, higher-quality stream segments on public land where the logistic regression model indicated cutthroat trout were more likely to occur. Yellowstone cutthroat trout conservation strategies within the entire Blackfoot River drainage should focus on controlling nonnative trout expansion.

Portneuf River Drainage

Within the Portneuf River drainage, Yellowstone cutthroat trout were more likely to be found where riparian canopy cover was more upright, where cobble/boulder substrate was more prevalent, and where public land ownership occurred. At these locations, cutthroat trout biomass was higher where conductivity was higher, fine substrate was more prevalent (but still lower than at sites without cutthroat trout), and where cobble/boulder substrate was less prevalent (but still higher than at sites without cutthroat trout). Those streams within the drainage that are isolated from the Portneuf River and its tributaries, but still contain cutthroat trout (e.g., Goodenough, Bell Marsh, Walker, Robbers Roost, and Harkness creeks), do not appear to contain nonnative salmonids, whereas streams more connected to the Portneuf River, such as Rapid, Pebble, and Toponce creeks and their tributaries, tend to contain nonnative salmonids, including rainbow trout. At the present time, isolated streams in the Portneuf River drainage that still contain cutthroat trout should be protected as core conservation populations, and analysis of the genetic risk those populations face (due to their isolation) should be undertaken. For those tributaries containing nonnative salmonids, the extent of hybridization occurring should be more fully assessed.

Raft River Drainage

Yellowstone cutthroat trout occurrence within the Raft River drainage was not strongly related to the variables we measured, thus conclusions regarding factors that affected cutthroat trout distribution were difficult to develop. However, within the stream segments that did contain cutthroat trout, biomass appeared to decrease as elevation decreased and stream shading and width increased. Populations of Yellowstone cutthroat trout in the Raft River drainage were either extremely small and isolated or occurred sympatrically with nonnative salmonids. Cutthroat trout conservation efforts or limiting factor analysis within this drainage should be focused on three areas: 1) assessing population size within individual isolated populations; 2) assessing the rate of loss of genetic diversity; and 3) controlling the expansion of nonnative salmonids. Considering that several isolated cutthroat trout populations exist in drainages that span across Idaho into Utah, cooperative protection and restoration projects should be investigated.

Goose Creek Drainage

Several factors within the Goose Creek drainage appeared to be related to Yellowstone cutthroat trout occurrence, but most notably, they tended to occur at higher elevation sites under public land ownership, with lower gradient and wider channels. Within those locations where cutthroat trout were found, biomass appeared to be higher at sites when gravel substrate levels were lower and bank stability was higher. Cutthroat trout within the drainage were limited to two isolated populations in the Big Cottonwood Creek drainage and in the upper end of Goose Creek. Conservation efforts should focus on protection of these two conservation populations, and on broadening the distribution of cutthroat trout outside these two areas.

CONCLUSION

Yellowstone cutthroat trout were present at over half of the study sites in the Upper Snake River Basin that contained enough water to sample fish and habitat, and over 2/3 of the sites that contained fish. Despite this widespread distribution, many cutthroat trout populations appeared to be at some level of risk. Nonnative salmonids were present in 56% of the study sites containing fish, and 44% of the study sites containing cutthroat trout. Although the occurrence of nonnative salmonids was not strongly related to cutthroat trout occurrence, their widespread distribution and apparent ability to displace native cutthroat trout (Gresswell 1995; Young 1995; Peterson and Fausch 2002) suggest they may nevertheless pose a threat to long-term cutthroat trout persistence for several populations in the Upper Snake River Basin. Management actions developed to restore or protect cutthroat trout populations in the Upper Snake River Basin should be focused primarily on controlling the threat posed by nonnative salmonids.

ACKNOWLEDGMENTS

Numerous individuals were involved in collecting the data used in this report, with Steven Elle, Liz Mamer, and John Cassinelli deserving special recognition. The cooperation of literally hundreds of landowners throughout southeastern Idaho was essential to the completion of this project. Joe Kozfkay, Dan Garren, and Dan Schill reviewed the manuscript and made many helpful suggestions for improvement. The Bonneville Power Administration provided funding.

LITERATURE CITED

Akaike, H. 1973. Information theory and an extension of the maximum likelihood principle. Pages 267-281 *in* B. N. Petran and F. Csaki, editors. International symposium on information theory, 2nd edition. Akadémiai Kiadó, Budapest, Hungary.

Behnke, R. J. 1992. Native trout of western North America. American Fisheries Society, Monograph 6, Bethesda, Maryland.

Binns, N. A. 1982. Habitat quality index procedures manual. Cheyenne, Wyoming: Wyoming Game and Fish Department. 209 pp.

Cade, B. S., and J. D. Richards. 2001. User manual for Blossom statistical software. Midcontinent Ecological Science Center, U.S. Geological Survey. Fort Collins, Colorado.

Cade, B. S., J. W. Terrell, and R. L. Schroeder. 1999. Estimating effect of limiting factors with regression quantiles. Ecology 80:311-323.

Chisholm, I. M., and W. A. Hubert. 1986. Influence of stream gradient on standing stock of brook trout in the Snowy Range, Wyoming. Northwest Science 60:137-139.

Dunham, J. B., B. S. Cade, and J. W. Terrell. 2002. Influences of spatial and temporal variation on fish-habitat relationships defined by regression quantiles. Transactions of the American Fisheries Society 131:86-98.

Fausch, K. D., C. L. Hawkes, and M. G. Parsons. 1988. Models that predict standing crop of stream fish from habitat variables: 1950-1985. General Technical Report PNW-GTR-213. U.S. Forest Service, Pacific Northwest Research Station, Portland, Oregon.

Gresswell, R. E. 1995. Yellowstone cutthroat trout. Pages 36-54 *in* M. K. Young, 1995.

Hawkins, C., and 10 others. 1993. A hierarchical approach to classifying stream habitat features. Fisheries 18(6):3-12.

Huston, M. A. 2002. Introductory essay: critical issues for improving predictions. Pages 7-21 *in* J. M. Scott, P. Heglund, M. Morrison. J. Haufler, M. Raphael, W. Wall, and F. Samson, editors. Predicting species occurrences: issues of accuracy and scale. Island Press, Washington, D.C.

Idaho Department of Fish & Game. 2001. Fisheries management plan 2001-2005. Boise, Idaho.

Jones, M. L., and J. D. Stockwell. 1995. A rapid assessment procedure for the enumeration of salmonine populations in streams. North American Journal of Fisheries Management 15:551-562.

Kozel, S. J., and W. A. Hubert. 1989. Factors influencing the abundance of brook trout *Salvelinus fontinalis* in forested mountain streams. Journal of Freshwater Ecology 5:113-122.

Kruse, C. G., W. A. Hubert, and F. J. Rahel. 2000. Status of Yellowstone cutthroat trout in Wyoming waters. North American Journal of Fisheries Management 20:693-705.

Kruse, C. G., W. A. Hubert, and F. J. Rahel. 1998. Single-pass electrofishing predicts trout abundance in mountain streams with sparse habitat. North American Journal of Fisheries Management 18:940-946.

Lobón-Cerviá, J., C. Utrilla, and E. Queirol. 1994. An evaluation of the 3-removal method with electrofishing techniques to estimate fish numbers in streams of the Brazilian Pampa. Archive for Hydrobiology. 130:371-381.

McFadden, J. T., and E. L. Cooper. 1962. An ecological comparison of six populations of brown trout *Salmo trutta*. Transactions of the American Fisheries Society 91:53-62.

Meyer, K. A, and J. T. Lamansky. 2002a. Assessment of native salmonids above Hell's Canyon Dam, Idaho. Idaho Department of Fish and Game 2000 Annual Report, No. 02-04. Boise, Idaho.

Meyer, K. A, and J. T. Lamansky. 2002b. Assessment of native salmonids above Hell's Canyon Dam, Idaho. Idaho Department of Fish and Game 2001 Annual Report, No. 02-57. Boise, Idaho.

Montana Fish, Wildlife and Parks. 1997. Mark Recapture for Windows, Version 5.0. Bozeman, Montana.

Montgomery, D. C. 1991. Design and analysis of experiments, 3rd edition. Wiley, New York, New York.

Moran, P. 1948. The interpretation of statistical maps. Journal of the Royal Statistical Society B 10:243-251.

Peterson, D. P., and K. D. Fausch. 2002. Demography, dispersal, and effects of nonnative brook trout on native cutthroat trout in Colorado streams. Final Progress Report to Department of Interior. Colorado State University.

Platts, W., W. Megahan, and G. Minshall. 1983. Methods for evaluating stream, riparian, and biotic conditions. U.S. Forest Service, Ogden, Utah. General Technical Report INT-138.

Rieman, B. E., D. C. Lee, and R. F. Thurow. 1997. Distribution, status, and likely future trends of bull trout within the Columbia River and Klamath River basins. North American Journal of Fisheries Management 17:1111-1125.

Rieman, B. E., and J. D. McIntyre. 1995. Occurrence of bull trout in naturally fragmented habitat patches of varied size. Transactions of the American Fisheries Society 124:285-296.

Rieman, B. E., and J. D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. U.S. Forest Service, Ogden, Utah. General Technical Report INT-302.

SAS Institute Inc. 1999. SAS/STAT User's Guide, Version 8. Cary, North Carolina.

Schrader, W. C., and K. R. Brenden. In press. Teton River investigations: Part II, fish population surveys. Idaho Department of Fish and Game, Final Progress Report, September 1997—September 2002.

Strahler, A. N. 1964. Quantitative geomorphology of drainage basins and channel networks. Section 4-2 *in* V. T. Chow, editor. Handbook of Applied Hydrology. McGraw-Hill, New York, New York.

Terrell, J. W., B. S. Cade, J. Carpenter, and J. M. Thompson. 1996. Modeling stream fish habitat limitations from wedge-shaped patterns of variation in standing stock. Transactions of the American Fisheries Society 125:104-117.

Thurow, R. F., D. C. Lee, and B. E. Rieman. 1997. Distribution and status of seven native salmonids in the Interior Columbia River basin and portions of the Klamath River and Great basins. North American Journal of Fisheries Management 17:1094-1110.

Van Deventer, J., and W. Platts. 1989. A computer software system for entering, managing, and analyzing fish capture data from streams. Research Note INT-352. USDA Forest Service, Intermountain Research Station. Ogden, Utah.

Watson, G., and T. W. Hillman. 1997. Factors affecting the distribution and abundance of bull trout: an investigation at hierarchical scales. North American Journal of Fisheries Management 17:237-252.

Young, M. K, tech. ed. 1995. Conservation assessment for inland cutthroat trout. U.S. Forest Service General Technical Report RM-256.

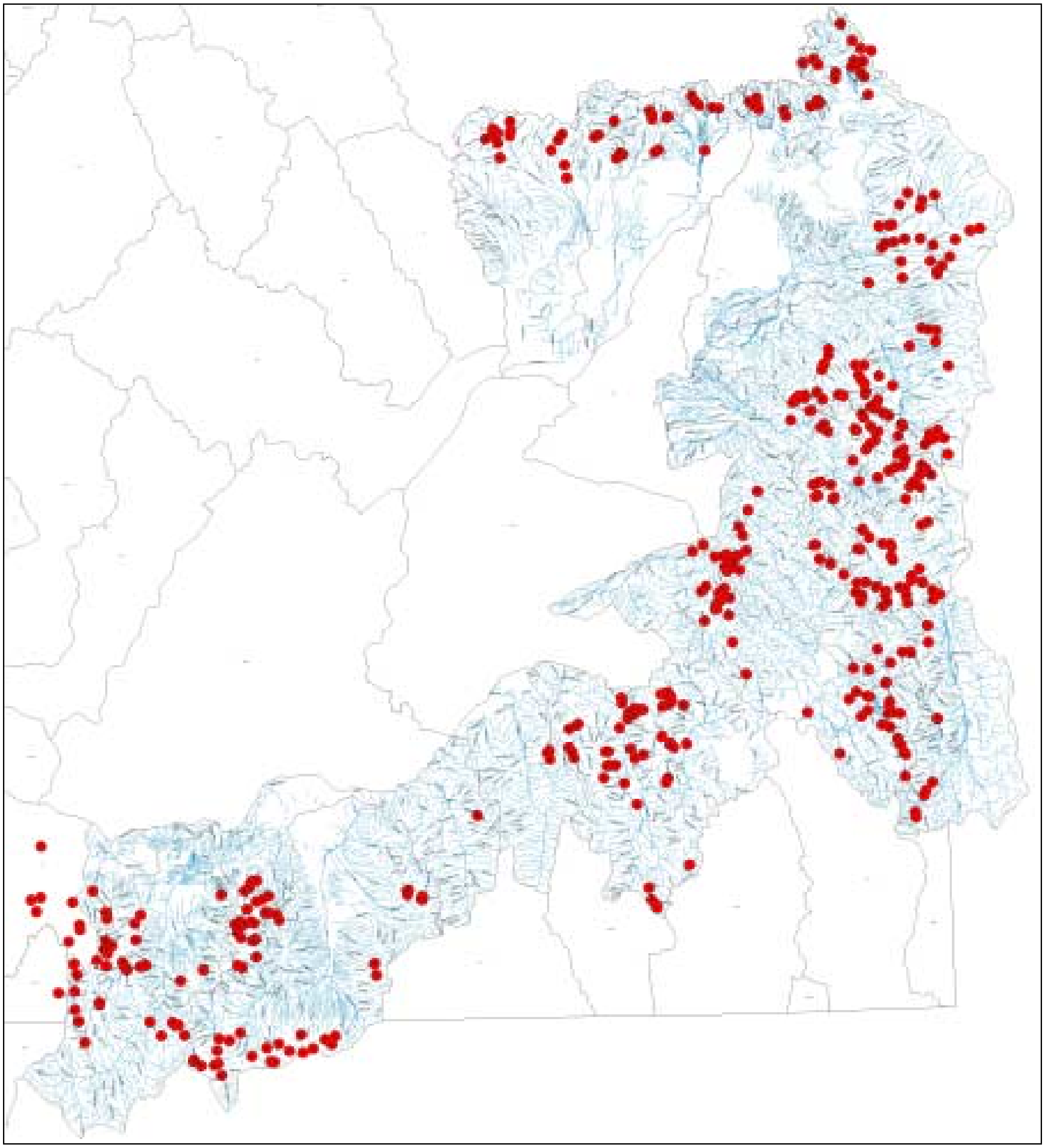


Figure 1. Distribution of study sites used for relating Yellowstone cutthroat trout occurrence and biomass to stream characteristics in the Upper Snake River Basin, Idaho.

Table 1. Native fish species in the Upper Snake River Basin, Idaho.

Common Name	Scientific Name
Yellowstone cutthroat trout	*Oncorhynchus clarki bouvieri*
Mountain whitefish	*Prosopium williamsoni*
Utah chub	*Gila atraria*
Leatherside chub	*Gila copei*
Longnose dace	*Rhinichthys cataractae*
Speckled dace	*Rhinichthys osculus*
Redside shiner	*Richardsonius balteatus*
Utah sucker	*Catostomus ardens*
Bluehead sucker	*Catostomus discobolus*
Mountain sucker	*Catostomus platyrhynchus*
Mottled sculpin	*Cottus bairdi*
Paiute Sculpin	*Cottus beldingi*
Shorthead sculpin	*Cottus confusus*

Table 2. Stream attributes measured at study sites and used (indicated with an X) in Yellowstone cutthroat trout occurrence and biomass analyses in the Upper Snake River Basin, Idaho.

Stream variable	Occurrence	Biomass
Cobble/boulder substrate rating	X	X
Conductivity (µS/cm)		X
Elevation (m)	X	X
Exotic salmonid presence	X	
Fines substrate rating	X	X
Gradient (%)	X	X
Gravel substrate rating	X	X
Land ownership (Private or public)	X	X
Dominant riparian vegetation	X	X
Stream order	X	X
Stream shading rating	X	X
Stream width (m)	X	X
Bank stability rating	X	X
Width:depth ratio rating		X

Table 3. Mean values of stream characteristics in study sites with and without Yellowstone cutthroat trout within several river drainages in the Upper Snake River Basin, Idaho. Bold italics within each river drainage indicate variables that were subsequently included in logistic regression models.

	Teton River (n = 64)		Willow Creek (n = 32)		Blackfoot River (n = 61)		Portneuf River (n = 63)		Raft River (n = 64)		Goose Creek (n = 57)	
Variables	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present
n	26	38	12	20	22	39	22	41	25	39	30	27
Stream order	1.6	1.9	***1.3***	***2.2***	***2.6***	***2.0***	***1.5***	***1.9***	2.0	2.0	1.9	2.3
Dominant riparian vegetation rating	3.2	3.2	2.7	2.7	2.3	2.6	***2.6***	***3.4***	***2.5***	***2.9***	***2.7***	***3.6***
Gradient (%)	3.8	3.0	3.5	2.2	***1.5***	***1.9***	3.1	3.7	***4.0***	***3.9***	***5.3***	***3.1***
Stream width (m)	2.4	3.2	***1.5***	***2.2***	***2.7***	***2.7***	***1.8***	***2.8***	2.1	2.3	***1.9***	***2.7***
Fines substrate rating	***2.1***	***1.9***	3.5	3.4	***3.9***	***2.3***	3.0	1.6	***2.3***	***1.7***	1.8	2.1
Gravel substrate rating	2.8	2.6	***1.5***	***2.1***	***1.5***	***2.7***	2.3	2.6	***2.8***	***3.1***	***3.2***	***3.0***
Coble/Boulder substrate rating	1.3	1.5	0.6	0.6	***0.7***	***0.9***	***0.5***	***1.8***	1.1	1.6	1.3	1.5
Stream shading rating	1.8	1.5	2.0	1.7	1.2	1.4	2.7	2.7	1.9	2.3	***2.0***	***2.6***
Bank stability rating	0.6	0.7	***0.5***	***1.5***	2.2	1.2	1.0	1.1	1.3	1.3	1.3	0.9
% Private property	27	29	***75***	***45***	***36***	***33***	***50***	***32***	24	33	***27***	***4***
% Exotic salmonids present	***58***	***87***	17	15	18	49	23	51	68	56	57	26
Elevation (m)	***6607***	***6432***	6364	6349	6129	6370	***5552***	***5458***	***5860***	***6263***	***5582***	***6277***

Table 4. Summary of variables included in logistic regression models relating stream characteristics to the occurrence of Yellowstone cutthroat trout in the Upper Snake River Basin, Idaho. Up and down arrows indicate direct or indirect relationships between stream attributes and cutthroat trout presence, respectively.

	Teton River	Willow Creek	Blackfoot River	Portneuf River	Raft River	Goose Creek
Variables in model	Exotic salmonids ↑	Land ownership ↑	Stream order ↓	Elevation ↓	Gradient ↓	Elevation ↑
	Elevation ↓	Unstable banks ↑	Land ownership ↑	Land ownership ↑	Fines substrate ↓	Gradient ↓
	Fines substrate ↓	Stream order ↑	Fines substrate ↓	Cobble/boulder substrate ↑	Elevation ↑	Riparian vegetation ↑
		Gravel substrate ↑	Gradient ↑	Stream width ↑	Riparian vegetation ↑	Gravel substrate ↓
		Stream width ↑	Stream width ↑	Stream order ↑	Unstable banks ↑	Stream shading ↑
			Cobble/boulder substrate ↑	Riparian vegetation ↑		Stream width ↑
			Gravel substrate ↑			Land ownership ↑
Model output						
AIC	82.8	26.9	52.5	39.2	69.9	30
n	64	32	61	63	64	56
R^2	0.17	0.58	0.51	0.63	0.35	0.68

Table 5. Mean correlations between stream variables and Yellowstone cutthroat trout biomass within several river drainages in the Upper Snake River Basin, Idaho.

Variables	Sinks Drainages (n = 10)	Henry's Fork Snake River (n = 12)	Teton River (n = 35)	South Fork Snake River (n = 91)	Willow Creek (n = 20)	Blackfoot River (n = 38)	Portneuf River (n = 40)	Raft River (n = 36)	Goose Creek (n = 26)
Stream order	0.31	0.06	0.12	0.22	-0.04	0.12	0.22	-0.28	-0.02
Elevation	-0.62	0.63	-0.12	-0.11	-0.07	-0.46	0.04	0.45	-0.07
Riparian vegetation rating	0.01	-0.32	-0.01	0.01	0.00	0.15	0.18	-0.34	-0.06
Gradient	0.52	-0.07	-0.42	-0.19	0.08	0.03	0.05	-0.16	0.08
Conductivity (µS/cm)	-0.52	-0.34	-0.04	0.12	0.14	0.06	0.45	0.16	-0.16
Stream width (m)	0.47	-0.23	-0.16	0.25	-0.07	-0.06	0.17	-0.38	-0.14
Width:depth ratio	0.76	0.23	-0.08	0.11	0.09	-0.08	0.05	-0.20	0.08
Fines substrate rating	-0.04	0.40	0.28	0.10	0.04	0.08	0.61	0.13	0.01
Gravel substrate rating	-0.40	0.05	-0.04	0.06	0.21	0.05	-0.28	0.00	-0.15
Cobble/Boulder substrate rating	0.35	-0.22	-0.22	0.05	-0.04	0.01	-0.45	-0.22	0.12
Shading rating	0.54	-0.41	-0.12	-0.14	0.04	0.34	0.11	-0.47	0.15
Unstable banks rating	0.25	0.08	-0.19	0.03	0.32	0.00	0.12	0.35	-0.21

Table 6. Summary of influential variables in multiple regression models relating stream characteristics to biomass of Yellowstone cutthroat trout within several river drainages in the Upper Snake River Basin, Idaho. Up and down arrows indicate direct or indirect relationships between stream attributes and cutthroat trout biomass, respectively.

	Sinks drainages	Henry's Fork Snake River	Teton River	South Fork Snake River	Blackfoot River	Portneuf River	Raft River	Goose Creek
Variables	W:D ratio* ↑	Elevation* ↑	Gradient* ↓	W:D ratio* ↓	Stream shading* ↑	Fines substrate* ↑	Stream shading* ↓	Land ownership* ↑
	Conductivity ↓	Stream shading* ↓	Unstable banks* ↓	Stream width* ↑	Gradient ↓	Gradient* ↑	Elevation* ↑	Gravel substrate ↓
			Stream order* ↑	Unstable banks* ↑			Stream width ↓	Unstable banks ↓
			Stream shading ↓					
n	10	12	35	91	38	40	36	26
R^2	0.72	0.80	0.47	0.33	0.49	0.57	0.75	0.53

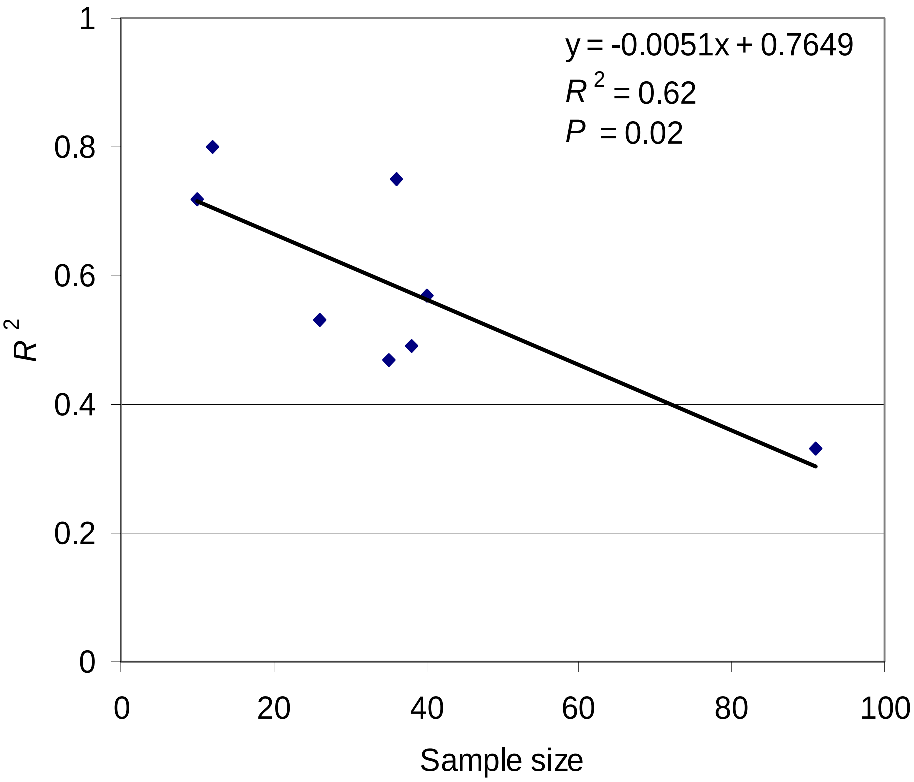


Figure 2. Relationship between the number of study sites within an individual drainage in the Upper Snake River Basin and the strength of the multiple regression model developed for that drainage.

APPENDIX

Appendix A. Compiled data from sites sampled in the Sinks drainage and in the drainages of the Henrys and South forks of the Snake River during 2002 inventorying in the Upper Snake River Basin.

Stream Loc ID Number	Subbasin	Stream name	Region	Sample Date	UTM East	UTM North
876	Beaver Creek (Sinks)	Huntley Canyon	6	7/14/2002	404655	4913079
875	Beaver Creek (Sinks)	Huntley Canyon	6	7/14/2002	404967	4912890
881	Beaver Creek (Sinks)	Huntley Canyon	6	7/15/2002	404232	4913521
816	Beaver Creek (Sinks)	Miners Creek	6	6/27/2002	408185	4923479
817	Beaver Creek (Sinks)	Miners Creek	6	6/27/2002	407208	4923164
818	Beaver Creek (Sinks)	Miners Creek	6	6/27/2002	406426	4922998
841	Beaver Creek (Sinks)	Pleasant Valley Creek	6	7/1/2002	397875	4919204
847	Beaver Creek (Sinks)	Pleasant Valley Creek	6	7/11/2002	396607	4918561
846	Beaver Creek (Sinks)	Pleasant Valley Creek	6	7/11/2002	402787	4923230
874	Beaver Creek (Sinks)	Spring Creek	6	7/14/2002	419060	4914556
873	Beaver Creek (Sinks)	Spring Creek	6	7/14/2002	419647	4915022
848	Camas Creek (Sinks)	Alex Draw	6	7/11/2002	412594	4924086
849	Camas Creek (Sinks)	Alex Draw	6	7/11/2002	414186	4924684
851	Camas Creek (Sinks)	Alex Draw	6	7/12/2002	414192	4923460
857	Camas Creek (Sinks)	Calf Creek	6	7/12/2002	408398	4918709
856	Camas Creek (Sinks)	Calf Creek	6	7/12/2002	408622	4918979
882	Camas Creek (Sinks)	Ching Creek	6	7/15/2002	430088	4914893
858	Camas Creek (Sinks)	Ching Creek	6	7/13/2002	432370	4929655
885	Camas Creek (Sinks)	Ching Creek	6	7/16/2002	432376	4926181
852	Camas Creek (Sinks)	Cottonwood Creek	6	7/12/2002	427466	4928163
866	Camas Creek (Sinks)	Cottonwood Creek	6	7/13/2002	428515	4927072
853	Camas Creek (Sinks)	Cottonwood Creek	6	7/12/2002	426321	4930036
877	Camas Creek (Sinks)	Crooked Creek	6	7/15/2002	424777	4918047
878	Camas Creek (Sinks)	Crooked Creek	6	7/15/2002	424923	4917288
879	Camas Creek (Sinks)	Crooked Creek	6	7/15/2002	425098	4916556
870	Camas Creek (Sinks)	EF Rattlesnake Creek	6	7/14/2002	414280	4911413
869	Camas Creek (Sinks)	EF Rattlesnake Creek	6	7/13/2002	414671	4913333
868	Camas Creek (Sinks)	EF Rattlesnake Creek	6	7/14/2002	415777	4913999
867	Camas Creek (Sinks)	Middle Dry Creek	6	7/13/2002	398806	4915181
865	Camas Creek (Sinks)	Middle Dry Creek	6	7/13/2002	398721	4915098
864	Camas Creek (Sinks)	Middle Dry Creek	6	7/13/2002	398714	4915133
883	Camas Creek (Sinks)	Middle Dry Creek	6	7/15/2002	402961	4911822
886	Camas Creek (Sinks)	Moose Creek	6	7/16/2002	434414	4925897
872	Camas Creek (Sinks)	Rattlesnake Creek	6	7/14/2002	416140	4911217
884	Camas Creek (Sinks)	Spring Creek	6	7/16/2002	429771	4913257
854	Camas Creek (Sinks)	Steel Creek	6	7/12/2002	418614	4923655
855	Camas Creek (Sinks)	Steel Creek	6	7/12/2002	418983	4924000
863	Camas Creek (Sinks)	Threemile Creek	6	7/13/2002	408942	4910983
862	Camas Creek (Sinks)	Threemile Creek	6	7/13/2002	408874	4909792
880	Camas Creek (Sinks)	Threemile Creek	6	7/15/2002	409674	4912310
850	Camas Creek (Sinks)	West Camas Creek	6	7/11/2002	413624	4925937
999	Henrys Fork Snake R.	Beaver Creek	6	9/20/2002	489305	4884179
971	Henrys Fork Snake R.	Blue Creek	6	9/6/2002	460612	4926953
1026	Henrys Fork Snake R.	Bootjack Creek	6	10/4/2002	468862	4937323
1009	Henrys Fork Snake R.	Boundary Creek	6	9/22/2002	495280	4907579
1012	Henrys Fork Snake R.	Calf Creek	6	9/23/2002	509077	4886054
1028	Henrys Fork Snake R.	Canyon Creek	6	10/4/2002	477790	4935302
1001	Henrys Fork Snake R.	Cascade Creek	6	9/20/2002	512119	4886621
1040	Henrys Fork Snake R.	Chick Creek	6	10/6/2002	488565	4919691
1003	Henrys Fork Snake R.	Conant Creek	6	9/21/2002	477703	4871120
1002	Henrys Fork Snake R.	Conant Creek	6	9/21/2002	488122	4872253
1013	Henrys Fork Snake R.	Conant Creek	6	9/23/2002	498633	4873863
1014	Henrys Fork Snake R.	Coyote Creek	6	9/23/2002	498586	4873029
1010	Henrys Fork Snake R.	Dog Creek	6	9/23/2002	497773	4882027
968	Henrys Fork Snake R.	Duck Creek	6	9/6/2002	460382	4938465
978	Henrys Fork Snake R.	Duck Creek	6	9/7/2002	463619	4939960
981	Henrys Fork Snake R.	EF Hotel Creek	6	9/8/2002	464582	4927736
982	Henrys Fork Snake R.	EF Hotel Creek	6	9/8/2002	464379	4927191
970	Henrys Fork Snake R.	EF Hotel Creek	6	9/6/2002	463980	4925924
984	Henrys Fork Snake R.	EF Sheridan Creek	6	9/8/2002	444567	4928754
1029	Henrys Fork Snake R.	Enget Creek	6	10/4/2002	478762	4934163

Appendix A. Continued.

Stream Loc ID Number	Subbasin	Stream name	Region	Sample Date	UTM East	UTM North
1032	Henrys Fork Snake R.	Fish Creek	6	10/5/2002	483506	4888765
1031	Henrys Fork Snake R.	Fish Creek	6	10/5/2002	484522	4888433
1044	Henrys Fork Snake R.	Fish Creek	6	10/7/2002	481586	4888405
1021	Henrys Fork Snake R.	Garner Creek	6	10/3/2002	478304	4937262
1000	Henrys Fork Snake R.	Granite Creek	6	9/20/2002	488503	4872506
1024	Henrys Fork Snake R.	Hope Creek	6	10/4/2002	464906	4938227
979	Henrys Fork Snake R.	Howard Creek	6	9/7/2002	477151	4946057
963	Henrys Fork Snake R.	Howard Creek	6	9/5/2002	446120	4926692
965	Henrys Fork Snake R.	Howard Creek	6	9/5/2002	445910	4927841
964	Henrys Fork Snake R.	Howard Creek	6	9/5/2002	445981	4928656
980	Henrys Fork Snake R.	Howard Creek	6	9/7/2002	475529	4945190
973	Henrys Fork Snake R.	Icehouse Creek	6	9/6/2002	452943	4919618
988	Henrys Fork Snake R.	Icehouse Creek	6	9/9/2002	454020	4924556
974	Henrys Fork Snake R.	Icehouse Creek	6	9/6/2002	454696	4922808
1025	Henrys Fork Snake R.	Ingalls Creek	6	10/4/2002	461772	4937615
1006	Henrys Fork Snake R.	Jackass Creek	6	9/22/2002	500926	4876301
1008	Henrys Fork Snake R.	Jackass Creek	6	9/22/2002	500204	4875606
1022	Henrys Fork Snake R.	Jesse Creek	6	10/3/2002	478608	4938791
989	Henrys Fork Snake R.	Jesse Creek	6	9/9/2002	476648	4938141
972	Henrys Fork Snake R.	Kelly Creek	6	9/6/2002	464173	4942141
992	Henrys Fork Snake R.	Little Robinson Creek	6	9/19/2002	494293	4893490
1004	Henrys Fork Snake R.	Little Robinson Creek	6	9/21/2002	494846	4895898
1027	Henrys Fork Snake R.	NF Duck Creek	6	10/4/2002	460512	4938904
1035	Henrys Fork Snake R.	NF Partridge Creek	6	10/5/2002	486236	4907456
1011	Henrys Fork Snake R.	North Boone Creek	6	9/23/2002	504535	4883505
1037	Henrys Fork Snake R.	Partridge Creek	6	10/5/2002	477273	4902003
1036	Henrys Fork Snake R.	Partridge Creek	6	10/5/2002	479051	4905691
1043	Henrys Fork Snake R.	Porcupine Creek	6	10/7/2002	490580	4881880
1030	Henrys Fork Snake R.	Porcupine Creek	6	10/5/2002	482169	4881718
1033	Henrys Fork Snake R.	Reas Pass Creek	6	10/5/2002	480786	4932396
1039	Henrys Fork Snake R.	Rock Creek	6	10/6/2002	463979	4937692
1038	Henrys Fork Snake R.	Rock Creek	6	10/6/2002	463808	4936964
986	Henrys Fork Snake R.	Rock Creek	6	9/9/2002	461554	4934673
1049	Henrys Fork Snake R.	Sawtell Creek	6	10/8/2002	469999	4933802
1023	Henrys Fork Snake R.	SF Duck Creek	6	10/4/2002	460316	4938394
995	Henrys Fork Snake R.	Shaefer Creek	6	9/20/2002	485957	4883435
966	Henrys Fork Snake R.	Sheridan Creek	6	9/5/2002	443853	4927513
985	Henrys Fork Snake R.	Sheridan Creek	6	9/8/2002	446568	4925066
967	Henrys Fork Snake R.	Sheridan Creek	6	9/5/2002	445148	4926354
1047	Henrys Fork Snake R.	Snow Creek	6	10/7/2003	488101	4894775
1005	Henrys Fork Snake R.	Snow Creek	6	9/21/2002	490610	4898279
1045	Henrys Fork Snake R.	Snow Creek	6	10/7/2002	485624	4888621
1007	Henrys Fork Snake R.	South Boone Creek	6	9/22/2002	502650	4878211
1046	Henrys Fork Snake R.	Spring Creek	6	10/7/2002	483328	4883094
1016	Henrys Fork Snake R.	Squirrel Creek	6	9/24/2002	502840	4877258
1015	Henrys Fork Snake R.	Squirrel Creek	6	9/24/2002	496798	4877067
1017	Henrys Fork Snake R.	Squirrel Creek	6	9/24/2002	487796	4877287
1042	Henrys Fork Snake R.	Targhee Creek	6	10/6/2002	472178	4950440
1034	Henrys Fork Snake R.	Thirsty Creek	6	10/5/2002	479678	4928435
1019	Henrys Fork Snake R.	Twin Creek	6	10/3/2002	478010	4941498
990	Henrys Fork Snake R.	Twin Creek	6	9/10/2002	475089	4937193
991	Henrys Fork Snake R.	Twin Creek	6	9/10/2002	475843	4939006
1020	Henrys Fork Snake R.	Tygee Creek	6	10/3/2002	481201	4941930
1018	Henrys Fork Snake R.	Tygee Creek	6	10/3/2002	478000	4942623
1048	Henrys Fork Snake R.	Unnamed Trib of Bootjack Ck.	6	10/8/2002	470186	4935676
994	Henrys Fork Snake R.	Unnamed Trib to Boundary Ck.	6	9/19/2002	498192	4898177
993	Henrys Fork Snake R.	Unnamed Trib to Boundary Ck.	6	9/19/2002	498767	4897316
1041	Henrys Fork Snake R.	West Targhee Creek	6	10/6/2002	471826	4950535
976	Henrys Fork Snake R.	WF Hotel Creek	6	9/7/2002	461188	4927470
975	Henrys Fork Snake R.	WF Hotel Creek	6	9/7/2002	461582	4925840
977	Henrys Fork Snake R.	WF Hotel Creek	6	9/7/2002	462217	4925448
996	Henrys Fork Snake R.	Winegar Creek	6	9/20/2002	498005	4883911
997	Henrys Fork Snake R.	Wyoming Creek	6	9/20/2002	496271	4888730
998	Henrys Fork Snake R.	Wyoming Creek	6	9/20/2002	493980	4884084
969	Henrys Fork Snake R.	Yale Creek	6	9/6/2002	465013	4926445

Appendix A. Continued.

Stream Loc ID Number	Subbasin	Stream name	Region	Sample Date	UTM East	UTM North
987	Henrys Fork Snake R.	Yale Creek	6	9/9/2002	464141	4931974
983	Henrys Fork Snake R.	Yale Creek	6	9/8/2002	464712	4925948
840	Medicine Lodge Cr. (Sinks)	Cold Creek	6	7/1/2002	367310	4917812
827	Medicine Lodge Cr. (Sinks)	Crooked Creek	6	6/28/2002	362576	4903088
819	Medicine Lodge Cr. (Sinks)	Crooked Creek	6	6/28/2002	358000	4907578
831	Medicine Lodge Cr. (Sinks)	Dead Horse Creek	6	6/29/2002	382598	4914363
837	Medicine Lodge Cr. (Sinks)	Deep Creek	6	6/30/2002	381514	4894686
822	Medicine Lodge Cr. (Sinks)	Divide Creek	6	6/27/2002	358059	4924505
823	Medicine Lodge Cr. (Sinks)	Divide Creek	6	6/27/2002	362953	4924325
829	Medicine Lodge Cr. (Sinks)	Fritz Creek	6	6/29/2002	365443	4919866
828	Medicine Lodge Cr. (Sinks)	Fritz Creek	6	6/28/2002	363582	4919288
820	Medicine Lodge Cr. (Sinks)	Horse Creek	6	6/27/2002	362473	4921824
821	Medicine Lodge Cr. (Sinks)	Horse Creek	6	6/27/2002	360649	4923868
830	Medicine Lodge Cr. (Sinks)	Horse Creek	6	6/29/2002	366394	4921042
860	Medicine Lodge Cr. (Sinks)	Indian Creek	6	7/13/2002	387542	4903339
839	Medicine Lodge Cr. (Sinks)	Indian Creek	6	6/30/2002	387220	4910393
861	Medicine Lodge Cr. (Sinks)	Indian Creek	6	7/13/2002	387718	4906422
842	Medicine Lodge Cr. (Sinks)	Irving Creek	6	7/1/2002	371286	4921247
838	Medicine Lodge Cr. (Sinks)	Irving Creek	6	6/30/2002	371223	4924188
843	Medicine Lodge Cr. (Sinks)	Irving Creek	6	7/1/2002	370967	4919951
832	Medicine Lodge Cr. (Sinks)	Rocky Creek	6	6/29/2002	377715	4911940
824	Medicine Lodge Cr. (Sinks)	Warm Creek	6	6/27/2002	364481	4925283
825	Medicine Lodge Cr. (Sinks)	Warm Creek	6	6/27/2002	365928	4922220
826	Medicine Lodge Cr. (Sinks)	Warm Creek	6	6/28/2002	367242	4920925
836	Medicine Lodge Cr. (Sinks)	Warm Springs Creek	6	6/30/2002	368290	4902279
844	Medicine Lodge Cr. (Sinks)	Webber Creek	6	7/2/2002	365395	4913357
845	Medicine Lodge Cr. (Sinks)	Webber Creek	6	7/2/2002	367777	4913321
835	Medicine Lodge Cr. (Sinks)	WF Indian Creek	6	6/30/2002	383308	4915029
834	Medicine Lodge Cr. (Sinks)	WF Indian Creek	6	6/29/2002	386802	4919892
833	Medicine Lodge Cr. (Sinks)	WF Indian Creek	6	6/29/2002	385572	4918105
898	South Fork Snake R.	Banks Creek	6	7/27/2002	474645	4773186
785	South Fork Snake R.	Barnes Creek	5	10/22/1999	472335	4775758
784	South Fork Snake R.	Barnes Creek	5	10/22/1999	472268	4776309
790	South Fork Snake R.	Bear (Canyon) Creek	5	10/24/1999	484010	4758430
932	South Fork Snake R.	Bear Creek	6	8/13/2002	479088	4791637
931	South Fork Snake R.	Bear Creek	6	8/12/2002	471537	4790281
930	South Fork Snake R.	Bear Creek	6	8/12/2002	472339	4790044
21	South Fork Snake R.	Bear Creek	6	9/25/2000	481528	4791386
138	South Fork Snake R.	Big Elk Creek	6	9/11/2000	493081	4797837
137	South Fork Snake R.	Big Elk Creek	6	9/11/2000	491079	4796975
904	South Fork Snake R.	Bilk Creek	6	7/29/2002	476072	4770960
897	South Fork Snake R.	Bilk Creek	6	7/27/2002	478445	4772484
888	South Fork Snake R.	Bitters Creek	6	7/25/2002	490812	4779621
887	South Fork Snake R.	Bitters Creek	6	7/25/2002	490837	4779326
532	South Fork Snake R.	Black Canyon	6	9/9/2001	462786	4825964
534	South Fork Snake R.	Black Canyon	6	9/9/2001	463820	4826290
505	South Fork Snake R.	Blacktail Canyon	6	8/26/2001	460135	4804478
506	South Fork Snake R.	Blacktail Canyon	6	8/26/2001	459932	4805152
909	South Fork Snake R.	Burn Creek Tributary	6	7/30/2002	494711	4774557
11	South Fork Snake R.	Burns Canyon	6	11/6/2000	462800	4828594
1	South Fork Snake R.	Burns Canyon	6	11/6/2000	461714	4827654
908	South Fork Snake R.	Burns Creek	6	7/30/2002	495975	4775588
946	South Fork Snake R.	Burns Creek	6	8/25/2002	493881	4774054
928	South Fork Snake R.	Camp Creek	6	8/12/2002	475883	4794662
929	South Fork Snake R.	Camp Creek	6	8/12/2002	475196	4793715
367	South Fork Snake R.	Canyon Creek	6	4/5/2000	464200	4846616
949	South Fork Snake R.	Chicken Spring Canyon	6	8/25/2002		
894	South Fork Snake R.	City Creek	6	7/26/2002	471722	4774453
895	South Fork Snake R.	City Creek	6	7/26/2002	471900	4774061
900	South Fork Snake R.	Clear Creek	6	7/27/2002	474568	4779670
962	South Fork Snake R.	Clear Creek	6	8/27/2002	485518	4708037
903	South Fork Snake R.	Clear Creek	6	7/29/2002	473594	4780130
783	South Fork Snake R.	Clear Creek	5	10/22/1999	476730	4778700
779	South Fork Snake R.	Comb Creek	5	10/21/1999	485800	4775500
939	South Fork Snake R.	Corral Canyon	6	8/23/2002	493249	4813256

Appendix A. Continued.

Stream Loc ID Number	Subbasin	Stream name	Region	Sample Date	UTM East	UTM North
933	South Fork Snake R.	Corral Canyon	6	8/22/2002	494576	4812076
911	South Fork Snake R.	Corral Creek	6	8/8/2002	479043	4825701
122	South Fork Snake R.	Crow Creek	5	10/17/2000	489676	4715833
795	South Fork Snake R.	Crow Creek	5	10/25/1999	486157	4709556
943	South Fork Snake R.	Deadman Canyon	6	8/23/2002	490976	4812049
796	South Fork Snake R.	Deer Creek	5	10/25/1999	488970	4714550
953	South Fork Snake R.	Dry Canyon	6	8/25/2002	491715	4807934
530	South Fork Snake R.	Dry Canyon	6	9/8/2001	467201	4820517
529	South Fork Snake R.	Dry Canyon	6	9/8/2001	467947	4820837
528	South Fork Snake R.	Dry Canyon	6	9/8/2001	469052	4821819
955	South Fork Snake R.	Dry Canyon	6	8/25/2002	491188	4808419
942	South Fork Snake R.	EF Palisades Creek	6	8/23/2002	492426	4813218
941	South Fork Snake R.	EF Palisades Creek	6	8/23/2002	493138	4813805
940	South Fork Snake R.	EF Palisades Creek	6	8/23/2002	493109	4813574
893	South Fork Snake R.	Elk Creek	6	7/26/2002	481606	4787693
892	South Fork Snake R.	Elk Creek	6	7/26/2002	482023	4786691
6	South Fork Snake R.	Elk Creek	6	9/26/2000	481860	4790587
914	South Fork Snake R.	Elk Flat Fork	6	8/8/2002	474823	4830285
915	South Fork Snake R.	Elk Flat Fork	6	8/8/2002	474282	4831419
368	South Fork Snake R.	Fall Creek	6	4/5/2000	466382	4808106
536	South Fork Snake R.	Fall Creek	6	9/10/2001	465083	4790939
509	South Fork Snake R.	Fall Creek	6	8/27/2001	460191	4799966
510	South Fork Snake R.	Fall Creek	6	8/28/2001	465055	4806261
15	South Fork Snake R.	Fall Creek	6	10/16/2000	464734	4805717
901	South Fork Snake R.	Fish Creek	6	7/28/2002	486110	4773306
780	South Fork Snake R.	Fish Creek	5	10/21/1999	485578	4777936
781	South Fork Snake R.	Fish Creek	5	10/23/1999	485809	4775782
925	South Fork Snake R.	Garden Creek	6	8/11/2002	460983	4811082
916	South Fork Snake R.	Garden Creek	6	8/9/2002	458907	4810272
926	South Fork Snake R.	Garden Creek	6	8/11/2002	460088	4810816
503	South Fork Snake R.	Gibson Creek	6	8/26/2001	457989	4802405
504	South Fork Snake R.	Gibson Creek	6	8/26/2001	458242	4801789
502	South Fork Snake R.	Gibson Creek	6	8/26/2001	457677	4803302
508	South Fork Snake R.	Haskin Creek	6	8/27/2001	458850	4798004
507	South Fork Snake R.	Horse Creek	6	8/27/2001	464326	4805009
538	South Fork Snake R.	Horse Creek	6	9/11/2001	466871	4803334
786	South Fork Snake R.	Horse Creek	5	10/23/1999	493760	4737860
947	South Fork Snake R.	Indian Creek	6	8/25/2002	495053	4789367
498	South Fork Snake R.	Indian Creek	6	8/28/2001	474016	4805731
948	South Fork Snake R.	Indian Creek	6	8/25/2002	492842	4788726
539	South Fork Snake R.	Indian Creek	6	9/11/2001	467374	4803104
20	South Fork Snake R.	Iowa Creek	6	10/18/2000	479814	4777204
906	South Fork Snake R.	Iowa Creek	6	7/29/2002	479818	4773734
907	South Fork Snake R.	Iowa Creek	6	7/29/2002	479465	4775912
787	South Fork Snake R.	Jackknife Creek	5	10/23/1999	491880	4766150
789	South Fork Snake R.	Jensen Creek	5	10/23/1999	487571	4780459
788	South Fork Snake R.	Jensen Creek	5	10/23/1999	487569	4780325
937	South Fork Snake R.	Little Dry Canyon	6	8/23/2002		
960	South Fork Snake R.	Little Elk Creek	6	8/27/2002	489332	4799013
919	South Fork Snake R.	Long Gulch	6	8/9/2002	474393	4801174
936	South Fork Snake R.	Lost Spring Canyon	6	8/23/2002	491080	4912023
126	South Fork Snake R.	McCoy Creek	6	9/12/2000	487648	4780309
127	South Fork Snake R.	McCoy Creek	6	9/8/2000	483801	4778223
782	South Fork Snake R.	McCoy Creek	5	10/22/1999	476710	4778500
934	South Fork Snake R.	NF Palisades Creek	6	8/22/2002	491727	4814772
944	South Fork Snake R.	NF Palisades Creek	6	8/23/2002	491771	4813384
935	South Fork Snake R.	NF Palisades Creek	6	8/22/2002	491828	4815125
9	South Fork Snake R.	NF Pine Creek	6	9/22/2000	477985	4823003
910	South Fork Snake R.	NF Pine Creek	6	8/8/2002	476804	4827464
17	South Fork Snake R.	NF Pine Creek	6	9/23/2000	478282	4825570
531	South Fork Snake R.	NF Rainey Creek	6	9/7/2001	484776	4818762
537	South Fork Snake R.	NF Rainey Creek	6	9/7/2001	486520	4819987
5	South Fork Snake R.	Palisades Creek	6	9/22/2000	486690	4804929
956	South Fork Snake R.	Palisades Creek	6	8/26/2002	488002	4808660
957	South Fork Snake R.	Palisades Creek	6	8/26/2002	488697	4809246

Appendix A. Continued.

Stream Loc ID Number	Subbasin	Stream name	Region	Sample Date	UTM East	UTM North
945	South Fork Snake R.	Palisades Creek	6	8/24/2002	489390	4810295
499	South Fork Snake R.	Papoose Creek	6	8/25/2001	471441	4808430
10	South Fork Snake R.	Pine Creek	6	9/23/2000	475166	4820313
16	South Fork Snake R.	Pine Creek	6	9/23/2000	471138	4817174
18	South Fork Snake R.	Pine Creek	6	9/23/2000	475181	4820321
7	South Fork Snake R.	Pine Creek	6	9/23/2000	476295	4822036
905	South Fork Snake R.	Pole Creek	6	7/29/2002	473493	4780044
899	South Fork Snake R.	Pole Creek	6	7/27/2002	471065	4780015
913	South Fork Snake R.	Pritchard Creek	6	8/8/2002	459393	4806618
917	South Fork Snake R.	Pritchard Creek	6	8/9/2002	464127	4810132
912	South Fork Snake R.	Pritchard Creek	6	8/8/2002	460160	4807014
12	South Fork Snake R.	Rainey Creek	6	11/7/2000	472632	4810846
14	South Fork Snake R.	Rainey Creek	6	11/7/2000	478513	4811828
13	South Fork Snake R.	Rainey Creek	6	11/7/2000	481836	4813772
918	South Fork Snake R.	Russell Creek	6	8/9/2002	480828	4797996
794	South Fork Snake R.	Sage Creek	5	10/25/1999	491700	4718400
922	South Fork Snake R.	SF Rainey Creek	6	8/10/2002	486137	4815280
921	South Fork Snake R.	SF Rainey Creek	6	8/10/2002	487079	4816992
927	South Fork Snake R.	SF Rainey Creek	6	8/11/2002	484013	4814839
961	South Fork Snake R.	SF Tincup Creek	6	8/27/2002	486541	4757999
526	South Fork Snake R.	Sheep Creek	6	9/6/2001	485425	4800898
525	South Fork Snake R.	Sheep Creek	6	9/6/2001	486099	4801583
527	South Fork Snake R.	Sheep Creek	6	9/6/2001	483725	4800375
19	South Fork Snake R.	Spring Creek	6	10/18/2000	470533	4777089
511	South Fork Snake R.	Squaw Creek	6	8/28/2001	472742	4806756
540	South Fork Snake R.	Squaw Creek	6	9/11/2001	471306	4805153
123	South Fork Snake R.	Stump Creek	5	10/17/2000	493859	4737673
920	South Fork Snake R.	Table Rock Canyon	6	8/9/2002	452793	4830256
792	South Fork Snake R.	Tincup Creek	5	10/24/1999	486398	4758462
793	South Fork Snake R.	Tincup Creek	5	10/24/1999	476510	4759600
891	South Fork Snake R.	Trout Creek	6	7/25/2002	494260	4778209
889	South Fork Snake R.	Trout Creek	6	7/25/2002	493736	4776961
896	South Fork Snake R.	Unknown Trib of McCoy Ck	6	7/27/2002	487330	4782313
890	South Fork Snake R.	Unknown Trib of McCoy Ck	6	7/25/2002	487540	4781565
958	South Fork Snake R.	Unnamed Trib to NF Bear Ck	6	8/26/2002	473355	4796320
959	South Fork Snake R.	Unnamed Trib to NF Bear Ck	6	8/26/2002	473129	4796047
535	South Fork Snake R.	Unnamed Trib EF Fall Creek	6	9/10/2001	463190	4796880
533	South Fork Snake R.	Unnamed Trib EF Fall Creek	6	9/10/2001	464801	4796180
950	South Fork Snake R.	Upper Palisades Lake Outlet	6	8/25/2002	489137	4809677
952	South Fork Snake R.	Vacation Canyon	6	8/25/2002	491419	4808248
954	South Fork Snake R.	Waterfall Canyon	6	8/25/2002	491139	4808364
951	South Fork Snake R.	Waterfall Canyon	6	8/25/2002	491395	4806933
366	South Fork Snake R.	West Pine Creek	6	4/5/2000	476137	4822445
8	South Fork Snake R.	West Pine Creek	6	9/22/2000	476209	4822223
924	South Fork Snake R.	West Pine Creek	6	8/10/2002	472089	4826916
923	South Fork Snake R.	West Pine Creek	6	8/10/2002	472505	4826403
797	South Fork Snake R.	White Dugway Creek	5	10/25/1999	486192	4709482
902	South Fork Snake R.	Williams Creek	6	7/28/2002	490003	4783628

Appendix A. Continued.

Stream Loc ID Number	GPS zone	Stream order 1:24,000	Stream order 1:100,000	Elevation (ft)	Land ownership	Dominant riparian vegetation rating (left bank)	Dominant riparian vegetation rating (right bank)	Gradient (%)	Streamflow condition
876	12	2	2	5980	Private	4	4	4.15	Low
875	12	2	2	5940	Private	4	4	2.77	Low
881	12	2	1	6050	Public	4	2	3.37	Low
816	12	3	2	6420	Public	4	4	1.7	Moderate
817	12	3	2	6340	Public	4	4	1.7	Moderate
818	12	3	2	6300	Public	4	4	1.2	Moderate
841	12	3	2	6900	Public	2	2	2.2	Low
847	12	2	1	7090	Public	4	4	2.94	Moderate
846	12	3	2	6360	both	2	2	1.65	Low
874	12			6680	Public				Dry
873	12			6715	Public				Dry
848	12	1	1	6960	Private	2	2		Puddled
849	12	2	2	6850	Public	2	2	1.54	Moderate
851	12	1	1	6930	Public	4	4	3.4	Low
857	12	1	1	6440	Public				Puddled
856	12	1	1	6440	Public				Puddled
882	12	3	2	6295	Private	2	4	0.19	Low
858	12	2	2	7440	Public	4	4	6.6	Moderate
885	12	2	2	6730	Public	4	4	2.47	Moderate
852	12	3	2	6860	Public	4	4	1.5	Moderate
866	12	3	3	6750	Public	4	4	1.61	Moderate
853	12	3	2	7120	Public	4	4	3.36	Moderate
877	12	1	1	6400	Private	2	2	0.55	Low
878	12	2	1	6380	Private	4	4	0.34	Low
879	12	2	2	6380	Private				Dry
870	12	2	2	6045	Private				Dry
869	12	2	2	6140	Private	2	2	1.41	Low
868	12	2	2	6320	Public	4	4	2.2	Low
867	12	1	1	7350	Public	3	3	17.5	Low
865	12	1	1	7380	Public	3	3	17.5	Low
864	12	1	1	7400	Public				Dry
883	12	2	2	6140	Public	2	2	5.46	Low
886	12	2	2	6740	Public	2	2	2.9	Low
872	12			6070					Dry
884	12	4	3	6320	Private	4	4	0.1	Low
854	12	2	1	6720	Public	4	4	1.9	Moderate
855	12	2	2	6640	Public	4	4	2.04	Low
863	12	2	3	5890	Private	2	2	0.79	Low
862	12	2	3	5850	Private	4	4	0.93	Low
880	12	2	1	5980		2	2	1.7	Low
850	12	2	2	6840	Public	4	4	0.9	Moderate
999	12	2	2	5940	Public	4	4	3.7	Low
971	12	2	2	7020	Public				Dry
1026	12	2	2	6760	Public	2	2	4.4	Moderate
1009	12	3	3	7630	Public	2	2	0.42	Puddled
1012	12	1	1	7160	Public	4	4	1.7	Low
1028	12	2	1	6500	Public	4	4	3.3	Moderate
1001	12	2	2	7140	Public	4	4	2.1	Low
1040	12	0	0	7550	Public				Dry
1003	12	3	3	5500	Private	4	4	0.6	Low
1002	12	3	3	5810	Public	4	4	4.24	Moderate
1013	12	2		6160	Public	4	4	1.5	Moderate
1014	12	2	2	6320	Public	4	4	1.44	Low
1010	12	1	1	6155	Public	4	4	0.7	Moderate
968	12	0	0	6805	Public				Dry
978	12	2	2	6590	Public	4	4	0.85	Moderate
981	12	2	2	7100	Public	4	4	6.15	Moderate
982	12	2	2	6900	Public	4	4	6.4	Moderate
970	12	2	2	6880	Public	4	4	4.58	High
984	12	0	0	7200	Public				Dry
1029	12	1	1	6490	Public	4	4	3.3	Moderate
1032	12	1	1	5790	Public	4	4	1.1	Moderate
1031	12	1	1	5880	Public	4	4	1.6	Moderate

Appendix A. Continued.

Stream Loc ID Number	GPS zone	Stream order 1:24,000	Stream order 1:100,000	Elevation (ft)	Land ownership	Dominant riparian vegetation rating (left bank)	Dominant riparian vegetation rating (right bank)	Gradient (%)	Streamflow condition
1044	12	1	1	5760	Public	2	2	0.77	Moderate
1021	12	1	1	6820	Public	4	4	10.2	Low
1000	12	0	0	5720	Public				Dry
1024	12	1	1	6720	Public	4	4	6.8	Moderate
979	12	1	1	6960	Public	4	4	6.7	Low
963	12	1	1	6640	Public	4	4	1.16	Moderate
965	12	1	1	6800	Public	4	4	3.11	Moderate
964	12	1	1	6960	Public	4	4	2.6	Low
980	12	1	1	6910	Public	4	4	2.5	Moderate
973	12	2	2	6345	Public	2	2	0.24	Moderate
988	12	2	2	6590	Public	4	4	0.39	Moderate
974	12	2	2	6540	Public	2	2	1.3	Moderate
1025	12	0	0	6820	Public				Dry
1006	12	1		6470	Public	2	2	0.46	Moderate
1008	12	1	1	6440	Public	4	4	1.2	Moderate
1022	12	1	1	7020	Public	4	4	5.9	Moderate
989	12	1	2	6645	Public	4	4	4.7	Moderate
972	12	0	0	6580	Public				Dry
992	12	3	3	6370	Public	2	4	0.9	Moderate
1004	12	2	2	6530	Public	4	4	1.18	Moderate
1027	12	2	2	6770	Public	3	3	1.8	Moderate
1035	12			7263	Public				Dry
1011	12	3		6540	Public	3	3	0.95	Low
1037	12			6055	Public				Dry
1036	12			6200	Public				Dry
1043	12			6080	Public				Dry
1030	12	2	2	5580	Public	4	4	1.35	Moderate
1033	12			6580	Public				Dry
1039	12	3	2	6960	Public	4	4	3.8	Moderate
1038	12	3	2	7140	Public	4	4	6.1	Moderate
986	12	1	1	8750	Public				Puddled
1049	12	1	1	6600	Public	2	2	6.4	Moderate
1023	12	0	0	6800	Public				Dry
995	12	2	2	5717	Public	4	4	1.37	Low
966	12	3	3	6800	Public	4	4	2.75	Moderate
985	12	3	3	6540	Public	4	4	1.5	Moderate
967	12	3	3	6680	Public	4	4	1.6	Moderate
1047	12	1	3	6700	Public	2	4	0.66	Moderate
1005	12	3	2	6795	Public	2	2	0.14	Moderate
1045	12	1	3	5910	Public	4	4	2.4	Moderate
1007	12	3		6560	Public	4	4	1.66	Moderate
1046	12	1	1	5580	Public	2	2	1.23	Low
1016	12	1	1	6640	Public	4	4	7.9	Moderate
1015	12	2		6232	Public	2	4	1.3	Low
1017	12	2		5930	Public	4	4	0.68	Moderate
1042	12	2	2	7380	Public	1	1	7	Moderate
1034	12	3	4	6430	Public	4	4	0.6	Moderate
1019	12	1	1	7400	Public				Low
990	12	1	2	6470	Public	2	4	1.2	Moderate
991	12	1	2	6660	Public	4	4	4.6	Moderate
1020	12	1	2	7670	Public	4	4	0.7	Low
1018	12	2	2	7285	Public	4	4	4	Moderate
1048	12	1	1	6600	Public	4	4	4.9	Moderate
994	12	2	2	6520	Public	2	2	2.15	Moderate
993	12		2	6405	Public	2	2	0.28	Moderate
1041	12	1	1	7480	Public	4	4	12.1	Moderate
976	12	2	1	7100	Public	4	4	11.3	High
975	12	2	1	6720	Public	4	4	4.3	Low
977	12	2	2	6600	Public	4	4	3.8	Moderate
996	12	1	1	6220	Public	4	4	0.58	Low
997	12	1	1	6440	Public	2	2	0.82	Low
998	12	2	2	6320	Public	4	4	0.25	Low
969	12	2	2	6840	Public	4	4	5.47	Moderate

Appendix A. Continued.

Stream Loc ID Number	GPS zone	Stream order 1:24,000	Stream order 1:100,000	Elevation (ft)	Land ownership	Dominant riparian vegetation rating (left bank)	Dominant riparian vegetation rating (right bank)	Gradient (%)	Streamflow condition
987	12	2	1	8440	Public	1	1	12.2	Moderate
983	12	2	2	6700	Public	4	4	3.97	Moderate
840	12	3	2	6660	Private	2	2	1.3	Low
827	12	2	2	6530	Public	2	2	2.6	Moderate
819	12	2	2	7200	Public	2	2	3.7	Moderate
831	12	2	1	6640	Public				Dry
837	12			5220	Public				Dry
822	12	2	2	7350	Public				Puddled
823	12	2	2	7040	Public				Dry
829	12	3	2	6760	Private	2	2	1.2	Moderate
828	12	3	2	6870	Public	2	2	2.3	Moderate
820	12	3	2	7020	Public				Puddled
821	12	2	1	7190	Public				Puddled
830	12	3	2	6600	Public	3	3	1.7	Moderate
860	12	4	3	5570	Private				Dry
839	12	3	3	6030	Public	4	4	2.2	Moderate
861	12	4	3	5770	Private	2	2	1.6	Low
842	12	3	3	6710	Public	2	2	1.9	Moderate
838	12	3	1	7120	Public	4	4	3.5	Moderate
843	12	3	3	6620	Private	2	2	1.8	Moderate
832	12	2	1	6880	Public				Dry
824	12	3	2	7270	Public				Puddled
825	12	3	3	6660	Private	2	2	1.1	Moderate
826	12	4	3	6560	Private	2	2	1.1	Moderate
836	12			6500	Public				Puddled
844	12	3	2	6880	Public	4	4	2.4	Moderate
845	12	3	2	6600	Public	4	4	2.5	Moderate
835	12	3	2	6600	Public	4	2	2.2	Low
834	12	2	1	7200	Public	2	4	2.5	Low
833	12	3	2	6960	Public	2	4	2.1	Low
898	12	1	1	7560	Public	4	4	9.55	Moderate
785	12	1	1	6600	Public	4	4	4.9	Low
784	12	3	2	6560	Public	4	4	4.9	Low
790	12	2	1	6200	Public	2	2	5.1	Low
932	12	2	2	5760	Public	4	4	1.17	Moderate
931	12	2	2	6380	Public	4	1	1.72	Low
930	12	2	2	6100	Public	1	2	1.8	Moderate
21	12	4	4	5675	Public	4	4	0.67	Low
138	12	4	3	5840	Public	4	4	1.68	Low
137	12	4	3	5680	Public	4	4	5.6	Low
904	12	1	1	8324	Public	2	2	14.34	Moderate
897	12	1	1	6819	Public	4	4	7.96	Moderate
888	12	2	2	6079	Public	2	2	6.9	Moderate
887	12	2	2	6176	Public	4	4	8.55	Moderate
532	12	2	2	5175	Public				Dry
534	12	2	2	5390	Public	2	2	5.5	Low
505	12	1	1	6300	Public				Puddled
506	12	1	1	6720	Public				Dry
909	12	0	0	5998	Public				Dry
11	12	3	3	5240	Public	4	4	2.03	Low
1	12	3	3	5150	Private	4	4	2.33	Moderate
908	12	2	2	5778	Public	2	2	3.2	Low
946	12	1	1	6218	Public	4	4	2.8	Low
928	12	1	2	6600	Public	4	4	11.17	Moderate
929	12	2	2	6160	Public	4	2	10.42	Moderate
367	12	3	2	5800	Private				Moderate
949	12	1	1	6120	Private				Braided
894	12	1	2	6874	Public	4	4	4.96	Moderate
895	12	1	2	6942	Public	2	2	4.64	Moderate
900	12	3	3	6348	Public	2	2	1.2	Moderate
962	12	0	0	7000	Public				Dry
903	12	3	3	6375	Public	4	4	2.03	Moderate
783	12	3	3	6220	Public	2	2	0.9	Moderate

Appendix A. Continued.

Stream Loc ID Number	GPS zone	Stream order 1:24,000	Stream order 1:100,000	Elevation (ft)	Land ownership	Dominant riparian vegetation rating (left bank)	Dominant riparian vegetation rating (right bank)	Gradient (%)	Streamflow condition
779	12	2	1	6160	Public	2	2	6.7	Moderate
939	12	3	2	6730	Private	4	4	3.98	Low
933	12	3	2	6980	Public	3	3	4.66	Low
911	12	1	1	6310	Public	4	4	4.68	Moderate
122	12	3	3	6510	Public	2	2	0.41	Low
795	12	3	2	6720	Public	3	3	1.2	Moderate
943	12	1	1	6540	Public	4	4	11.17	Low
796	12	1	1	6600	Public	2	2	1.3	Low
953	12	2	2	6805	Public	4	4	13.58	Low
530	12	1	2	5400	Public				Dry
529	12	1	2	5525	Public				Dry
528	12	1	2	5600	Public				Dry
955	12	3	2	6640	Public	3	3	7	Moderate
942	12	3	2	6620	Public	4	4	2.4	Low
941	12	2	2	6840	Public	4	4	6.2	Moderate
940	12	2	2	6600	Public	4	4	3.8	Low
893	12	3	1	6040	Public	2	3	4.2	Moderate
892	12	3	1	6349	Public	4	4	5.38	Moderate
6	12	4	3	5760	Public	4	4	2.84	Low
914	12	3	2	7010	Public	4	4	4.9	Moderate
915	12	3	2	7020	Public	4	4	6.9	Moderate
368	12	4	4	5400	Public				Moderate
536	12	1	2	6818	Public				Puddled
509	12	3	4	5800	Public				Dry
510	12	3	4	5440	Public	4	4	0.7	Low
15	12	4	4	5460	Public	4	4	0.8	Low
901	12	2	1	6532	Public	4	4	5.42	Low
780	12	3	3	5880	Public	2	2	3.8	Moderate
781	12	3	3	6160	Public	4	4	2.6	Low
925	12	2	2	5800	Public	4	4	3.4	Moderate
916	12	2	2	6340	Public	3	3	6.5	Moderate
926	12	2	2	6060	Public	4	4	5.57	Moderate
503	12	2	2	6000	Public				Puddled
504	12	2	2	6100	Public				Puddled
502	12	2	2	6220	Public				Puddled
508	12	1	1	6150	Public				Dry
507	12	0	2	5600	Public				Dry
538	12	1	2	6450	Public				Dry
786	12	1	1	6200	Public	2	2	2.3	Low
947	12	3	3	5865	Public	4	4	2.4	Moderate
498	12	3	2	5560	Public				Puddled
948	12			5660	Public				Dry
539	12	2	2	6250	Public				Dry
20	12	3	3	6160	Public	4	2	2.3	Low
906	12	3	3	6403	Public	2	2	3.65	Moderate
907	12	4	3	6228	Public	4	4	1.98	Moderate
787	12	4	4	5860	Public	2	2	0.6	Low
789	12	3	2	5760	Public	4	4	2.3	Low
788	12	3	2	5760	Public	2	2	2.3	Low
937	12	1		6400	Public				Dry
960	12	0	0	6160	Public				Dry
919	12			6780	Public				Dry
936	12	1	1	6480	Public				Dry
126	12	4	4	5120	Public	4	4	0.74	Low
127	12	4	4	5900	Public	4	4	1.06	Low
782	12	2	1	6240	Public	2	2	1	Moderate
934	12	2	2	6880	Public	4	4	3.2	Low
944	12	2	2	6630	Public	4	4	3.24	Low
935	12	2	2	7020	Public	4	4	7.83	Low
9	12	4	3	5940	Public	4	4	1.35	Low
910	12	4	3	6370	Public	4	4	2.2	Moderate
17	12	4	3	6280	Public	4	4	1.52	Low
531	12	2	2	6550	Public	4	4	2	Low

Appendix A. Continued.

Stream Loc ID Number	GPS zone	Stream order 1:24,000	Stream order 1:100,000	Elevation (ft)	Land ownership	Dominant riparian vegetation rating (left bank)	Dominant riparian vegetation rating (right bank)	Gradient (%)	Streamflow condition
537	12	2	2	6850	Public	4	4	2	Low
5	12	4	3	5960	Public			1.7	Moderate
956	12	3	3	6140	Public	2	2	0.49	Low
957	12	3	3	6190	Public	2	2	1.72	Moderate
945	12	3	2	6260	Public	4	4	2.7	Moderate
499	12	0	1	5360	Public				Dry
10	12	4	3	5800	Private	4	4	0.68	Low
16	12	4	3	5600	Private	4	4	1.56	Low
18	12	4	3	5800	Private	4	4	0.68	Low
7	12	4	3	5900	Public	4	4	0.88	Low
905	12	2	2	6423	Public	3	3	1.31	Low
899	12	1	1	6553	Public	4	4	2.54	Moderate
913	12	2	2	6200	Public	2	2	6	Low
917	12	2	3	5500	Public	4	4	3	Moderate
912	12	2	3	6070	Public	2	2	4.74	Low
12	12	3	3	5270	Private	2	2	0.47	Low
14	12	3	3	5500	Public	4	4	1.52	Moderate
13	12	3	3	5700	Public	4	4	1.74	Low
918	12	0	0	5860	Public				Dry
794	12	3	2	6430	Private	2	2	0.5	Moderate
922	12	2	2	6500	Public	4	4	3.94	Moderate
921	12	2	2	6800	Public	2	4	2.75	Low
927	12	2	2	6020	Public	4	4	6.47	Moderate
961	12	3	2	6120	Public	4	4	5	Low
526	12	2	2	6016	Public				Dry
525	12	2	2	6400	Public				Dry
527	12	1	2	5645	Private	2	2	8	Low
19	12	2	1	6700	Public	2	4	2.02	Low
511	12	0	1	5450	Public				Dry
540	12	2	2	5950	Public				Dry
123	12	3	3	6190	Public	4	4	0.31	Low
920	12	2	2	5560	Public	4	4	8.65	Low
792	12	3	2	5780	Public	2	2	1.1	Low
793	12	3	2	6570	Public	2	2	1.9	Low
891	12	3	2	5728	Public	4	2	3.8	Moderate
889	12	3	2	5980	Public	4	4	5.3	Moderate
896	12	2	1	6406	Public	3	3	16.44	Low
890	12	2	2	6033	Public	4	4	10.19	Low
958	12	1	1	6600	Public	2	2	11.4	Low
959	12	1	2	6460	Public	4	4	6.9	Low
535	12	2	2	6250	Public				Dry
533	12	2	2	6750	Public				Dry
950	12	1	1	6360	Public	3	3	6.84	Moderate
952	12	2	2	6736	Public				Dry
954	12	3	3	6650	Public	4	4	8.2	Low
951	12			7610	Public				Dry
366	12	3	2	5960	Public			1.2	Moderate
8	12	3	2	5880	Public	4	4	1.49	Low
924	12	2	2	6720	Public	2	4	2.12	Moderate
923	12	2	2	6700	Public	4	3	2	Moderate
797	12	3	2	6760	Public	2	2	1.3	Moderate
902	12	2	2	5923	Public	4	4	6.88	Moderate

Appendix A. Continued.

Stream Loc ID Number	Conductivity (μS/cm)	Reach Length (m)	Width (m)	Depth (m)	Percent fines rating	Percent gravel rating	Percent cobble rating	Percent boulder rating	Stream shading rating	Unstable banks rating
876	264	100	1.49	0.06	2.11	3.54	0.65	0.00	1.39	0.30
875	270	90	1.04	0.04	1.92	4.00	1.00	0.79	3.74	1.70
881	275	92	1.50	0.06	0.58	2.47	2.96	0.51	3.23	0.00
816	598	95.5	1.46	0.07	2.09	2.11	2.14	0.75	1.14	1.66
817	598	95.2	1.57	0.14	3.92	1.48	0.97	1.04	1.60	1.49
818	560	91.8	1.95	0.30	3.76	1.04	0.62	1.02	1.48	0.68
841	264	95	1.97	0.11	1.72	3.49	1.58	0.00	1.53	1.18
847	223	100	1.58	0.08	1.01	3.22	2.52	0.00	2.46	1.51
846	357	75	2.48	0.09	1.28	3.58	1.07	0.35	1.00	0.07
874										
873										
848										
849	215	84	1.64	0.10	1.70	2.74	1.73	0.00	0.72	0.72
851	179	95	1.29	0.07	2.10	2.03	0.97	0.00	0.53	0.13
857										
856										
882	105	110	3.12	0.20	4.04	1.96	0.00	0.00	1.00	0.52
858	55	110	3.18	0.13	0.00	2.55	2.93	1.25	1.11	0.00
885		91	2.82	0.20	0.88	2.11	2.79	2.32	1.37	0.00
852	210	95.6	3.53	0.10	1.00	2.06	3.72	0.78	2.34	0.13
866	247	98	3.31	0.13	1.28	2.22	2.61	0.99	2.02	1.71
853	281	85	2.99	0.09	1.16	1.59	3.44	0.64	1.95	0.00
877	50	100	0.99	0.14	3.00	3.00	0.00	0.00	1.00	0.00
878	51	88	1.81	0.14	5.00	0.00	0.00	0.00	3.55	3.00
879										
870										
869	32	103	1.94	0.06	2.02	2.82	1.04	0.00	1.50	1.05
868	35	90.4	2.95	0.09	1.08	2.13	3.66	0.66	2.80	3.10
867	82	56.6	1.35	0.12	1.00	2.96	1.96	0.85	1.86	0.00
865	74	42.6	1.02	0.11	0.29	2.48	2.25	1.89	0.24	0.00
864										
883	188	102	2.03	0.09	1.08	2.47	1.91	0.91	1.83	0.10
886	140	103	1.55	0.04	1.12	2.79	1.91	0.16	1.57	0.06
872										
884	96	80	2.69	0.16	5.00	0.00	0.00	0.00	1.05	0.00
854	68	36.4	1.45	0.15	1.00	3.78	0.00	0.00	1.10	0.85
855	67	29	1.71	0.09	3.48	3.07	0.15	0.00	1.28	1.09
863	127	106	1.95	0.08	2.33	2.23	0.86	0.63	0.00	2.66
862	117	100	1.52	0.06	1.00	4.00	1.00	1.00	0.00	0.00
880	180	95.2	1.82	0.09	1.24	3.20	0.69	0.00	0.50	0.14
850	96	95	2.57	0.14	1.03	3.18	1.75	0.00	0.70	0.94
999		82.3	2.18	0.08	1.60	2.71	2.93	0.42	2.50	0.00
971										
1026	68	98	0.91	0.04	2.00	4.00	1.00	1.00	2.00	1.00
1009	7	100	3.24	0.28	3.00	3.00	1.00	0.00	1.00	0.00
1012	73	110	1.98	0.10	0.45	3.72	2.39	0.86	2.75	0.00
1028	64	100	2.40	0.09	1.41	2.44	2.88	1.40	1.79	0.00
1001	21	99	6.84	0.14	0.86	2.37	3.14	1.95	0.91	0.00
1040										
1003		91.5	4.89	0.08	2.31	1.94	2.94	1.81	1.00	0.00
1002	99	110	5.47	0.22	1.76	2.09	2.87	0.52	1.33	0.00
1013	98	99	6.21	0.13	1.00	2.00	4.00	2.00	1.00	0.00
1014	82	98	2.58	0.08	2.24	2.53	2.64	0.20	1.68	0.00
1010		80.2	2.80	0.13	2.47	1.77	1.23	0.73	1.17	0.00
968										
978	220	99.2	2.82	0.15	1.25	2.91	0.81	0.00	2.23	0.11
981	50	99	2.69	0.12	1.37	2.59	2.90	2.23	1.36	0.00
982	52	93.5	2.55	0.12	1.09	1.95	2.86	2.86	1.98	0.00
970	52	107	2.74	0.13	1.01	1.99	2.99	2.38	1.02	0.00
984										
1029	72	93.3	0.98	0.09	0.90	3.54	1.16	1.01	1.63	0.00
1032	58	100	1.08	0.12	2.89	2.82	0.13	0.00	1.22	0.00
1031	54	93.6	1.29	0.09	2.70	2.30	0.00	0.00	2.55	0.00
1044	63	89	2.06	0.13	3.54	2.00	0.00	0.46	1.46	0.00
1021	78	86.1	1.17	0.04	1.68	2.76	2.30	0.54	2.10	0.00

Appendix A. Continued.

Stream Loc ID Number	Conductivity (µS/cm)	Reach Length (m)	Width (m)	Depth (m)	Percent fines rating	Percent gravel rating	Percent cobble rating	Percent boulder rating	Stream shading rating	Unstable banks rating
1000										
1024	67	87	1.31	0.05	1.44	3.21	1.45	1.00	2.16	0.00
979	28	81	0.80	0.01	2.00	3.00	1.00	1.00	3.00	0.00
963	413	93.2	2.25	0.14	3.05	2.18	1.52	0.00	1.28	0.80
965	412	87	2.05	0.08	1.66	3.88	1.06	0.00	2.14	0.24
964	332	86.2	1.52	0.05	1.24	3.56	2.06	0.00	1.53	0.80
980	286	77.5	1.29	0.06	2.00	3.00	1.00	0.00	4.00	0.00
973	215	56	6.66	0.28	4.00	1.00	0.00	0.00	0.00	0.00
988	206	91.3	3.84	0.21	1.77	2.32	0.88	1.21	0.88	0.00
974	216	98.4	3.99	0.14	2.00	4.00	2.00	1.00	0.00	0.00
1025										
1006	47	68	1.68	0.21	4.71	0.29	0.00	0.00	1.29	0.29
1008	77	100	2.02	0.14	1.57	3.39	1.67	0.68	1.12	0.00
1022	71	85.8	1.99	0.10	0.92	1.70	2.52	2.11	1.82	0.00
989	205	81.5	3.07	0.12	1.22	3.00	2.88	1.66	3.45	0.00
972										
992	58	107	2.87	0.12	1.45	1.89	3.95	1.16	0.84	0.00
1004	38	100	2.02	0.16	1.91	4.54	0.00	0.00	0.87	0.00
1027	97	96	1.39	0.06	2.00	4.00	1.00	0.00	1.00	2.00
1035										
1011	37	92	4.37	0.15	0.88	3.37	2.32	0.56	1.82	0.00
1037										
1036										
1043										
1030	220	92.7	3.36	0.10	1.72	1.43	2.98	2.19	1.45	0.00
1033										
1039	127	97	3.27	0.10	1.00	2.00	3.00	3.00	3.00	0.00
1038	125	93.3	3.17	0.09	1.00	2.00	3.35	2.60	1.97	0.00
986										
1049	85	100	1.97	0.07	1.00	2.00	3.00	3.00	1.00	1.00
1023										
995	145	40	2.02	0.15	4.00	1.00	0.00	0.00	2.00	0.00
966	420	91.5	2.69	0.10	0.34	1.85	3.24	2.88	1.00	0.00
985	355	100	4.39	0.12	1.38	2.03	3.80	2.00	1.90	0.00
967	394	92.3	4.66	0.10	1.53	2.23	2.72	1.86	0.77	0.56
1047	30	95	1.76	0.18	1.03	3.99	0.45	0.00	2.05	0.00
1005	34	97	2.54	0.23	1.56	3.74	0.39	0.00	1.30	0.00
1045	37	100	3.16	0.12	1.00	2.00	4.00	1.00	2.00	0.00
1007	125	85	5.83	0.18	1.46	2.07	3.85	1.85	1.33	0.00
1046	175	100	1.29	0.10	1.77	3.46	0.46	0.00	1.13	0.00
1016	41	87.8	2.78	0.06	1.15	2.16	3.01	0.60	1.41	0.00
1015	165	102	4.59	0.09	1.15	2.72	3.93	1.13	0.57	1.86
1017		85	3.79	0.23	3.00	1.00	3.00	1.20	1.98	0.00
1042	136	55.3	4.42	0.19	0.00	1.34	1.66	3.41	0.78	0.00
1034		104	2.09	0.11	1.60	3.43	0.00	0.00	1.21	0.00
1019										
990	259	105	1.87	0.16	1.00	3.00	3.00	1.00	2.00	0.00
991	263	98.4	3.29	0.14	0.01	3.93	1.07	1.07	1.01	0.00
1020	51	87.2	1.86	0.08	2.46	3.05	0.67	0.18	1.00	0.00
1018	86	91.8	2.29	0.11	1.00	2.03	3.97	1.96	2.00	0.00
1048	58	100	1.61	0.07	1.58	3.82	0.92	1.29	1.49	0.26
994	592	86.5	3.35	0.16	0.00	3.00	4.00	0.00	1.00	0.00
993	91	105	11.60	0.19	1.00	5.00	1.00	0.00	1.00	0.00
1041	100	73.3	3.13	0.10	0.00	1.56	2.51	3.14	0.54	0.00
976	55	91.8	2.39	0.09	1.42	1.91	2.37	2.09	1.25	0.40
975	63	91	1.46	0.09	1.26	2.39	1.87	1.49	1.29	0.00
977	62	95.4	2.52	0.12	1.40	2.12	2.94	1.92	2.08	0.15
996	75	60	3.72	0.22	2.25	1.38	2.43	1.00	1.00	0.00
997		90.2	1.84	0.08	1.00	1.22	4.00	0.10	0.90	0.00
998		97	5.58	0.24	4.00	1.00	2.00	0.00	1.00	0.00
969	48	85.2	3.34	0.14	2.00	2.00	3.00	2.00	1.00	1.00
987	45	34	1.40	0.06	1.97	0.92	1.11	1.83	0.84	0.00
983	51	103	3.38	0.14	1.17	1.94	3.14	2.36	1.22	0.00
840	332	98.4	1.43	0.11	1.41	3.23	1.77	0.60	1.07	0.26
827	197	100	1.28	0.22	1.00	3.00	2.00	0.00	1.00	0.00

Appendix A. Continued.

Stream Loc ID Number	Conductivity (µS/cm)	Reach Length (m)	Width (m)	Depth (m)	Percent fines rating	Percent gravel rating	Percent cobble rating	Percent boulder rating	Stream shading rating	Unstable banks rating
819	192	100	1.72	0.09	0.98	4.00	0.98	0.00	1.56	0.00
831										
837										
822										
823										
829	479	99	1.22	0.08	1.42	4.82	0.13	0.11	1.00	0.00
828	455	100	1.34	0.05	1.00	4.02	1.99	0.60	1.05	0.39
820										
821										
830	378	100	1.90	0.11	1.82	2.48	2.12	0.85	1.72	0.69
860										
839	234	90	4.29	0.12	1.00	2.37	3.92	0.00	0.44	0.79
861	210	92	2.64	0.14	1.12	3.00	2.88	0.95	2.03	0.00
842	276	100	3.22	0.12	1.00	4.00	2.00	0.00	1.00	1.00
838	335	88	1.93	0.09	3.16	2.44	0.63	0.50	2.21	0.08
843	247	95	2.71	0.12	1.00	3.00	3.00	0.00	2.00	1.00
832										
824										
825	535	95	3.11	0.13	2.17	2.84	1.50	0.19	1.02	0.21
826	680	95	2.41	0.16	1.09	3.03	0.96	0.00	1.00	1.84
836										
844	280	88.5	2.63	0.13	1.05	3.13	2.52	0.56	1.98	1.91
845	231	100	2.94	0.12	1.38	2.20	2.93	0.00	0.80	1.40
835	301	90	2.07	0.15	2.19	2.31	1.54	0.23	0.71	2.03
834	267	100	1.45	0.07	1.00	3.00	3.00	0.00	1.00	0.00
833	265	100	2.35	0.10	2.11	2.89	1.36	0.33	1.60	0.33
898	113	91	1.65	0.08	0.00	3.16	2.80	1.32	2.14	0.00
785	181	77.74	3.17	0.08	1.45	3.00	2.78	2.19	1.45	1.00
784	245	101.3	2.71	0.10	1.71	3.97	3.00	1.97	3.11	1.00
790	412	52.4	1.78	0.09	2.95	1.77	3.53	1.00	1.54	1.70
932	381	115	8.36	0.23	1.00	2.00	3.00	3.00	1.00	0.00
931	482	49.2	4.37	0.11	2.19	2.14	3.76	1.44	0.05	1.83
930	462	88.2	4.64	0.16	1.49	1.99	2.36	1.20	0.52	1.76
21	456	145.7	8.27	0.19	1.80	2.83	3.34	1.74	0.36	0.13
138	335	150	7.73	0.37	1.45	2.34	3.01	2.81	1.26	0.00
137	324	100	6.90	0.29	1.00	2.25	3.00	2.42	1.00	0.75
904	73	89	1.64	0.08	0.00	2.96	3.88	1.95	0.88	0.00
897	153	92	2.13	0.07	0.13	1.86	3.97	1.84	1.84	0.00
888	272	100	1.45	0.09	1.03	2.60	2.56	0.96	1.61	0.89
887	264	96.5	1.93	0.09	1.10	0.51	3.57	1.98	2.12	0.00
532										
534	467	100	1.83	0.08	1.10	3.44	3.29	0.77	2.98	0.00
505										
506										
909										
11		86	5.35	0.20	0.88	2.88	4.00	1.46	1.27	0.85
1	263	84	5.91	0.19	1.62	2.95	3.43	1.58	1.82	0.00
908	70	100	1.68	0.08	1.68	1.46	2.51	0.00	1.49	1.46
946	300	87	1.40	0.05	3.00	3.02	0.98	0.00	1.96	0.00
928	163	101	1.44	0.06	0.10	2.60	2.76	2.17	1.98	0.00
929	200	79.4	1.17	0.12	0.60	2.20	2.66	1.23	2.88	0.00
367										
949										
894	290	93.2	1.45	0.05	1.12	1.99	3.65	1.10	1.85	0.03
895	292	91	1.46	0.06	2.68	2.20	1.69	0.88	1.44	0.38
900	252	103	3.30	0.11	2.25	2.14	3.14	1.93	0.30	0.26
962										
903	261	97.4	2.30	0.12	1.49	0.83	2.61	1.58	1.29	0.76
783	334	122	3.17	0.14	2.97	1.80	2.64	1.95	1.24	2.54
779	350	92	1.79	0.05	1.00	2.36	2.84	2.33	2.46	1.00
939	391	98	2.71	0.10	0.02	2.20	3.00	2.00	1.02	0.60
933	401	92	2.55	0.09	0.28	2.75	3.88	1.70	1.06	0.13
911	282	92	1.35	0.11	2.09	3.61	1.55	0.44	1.48	0.00
122	502	332	5.34	0.24	3.09	3.17	1.99	0.11	0.34	2.28
795	400	111	4.24	0.31	4.32	1.66	1.34	1.00	1.07	1.07

Appendix A. Continued.

Stream Loc ID Number	Conductivity (µS/cm)	Reach Length (m)	Width (m)	Depth (m)	Percent fines rating	Percent gravel rating	Percent cobble rating	Percent boulder rating	Stream shading rating	Unstable banks rating
943		37.5	1.46	0.07	1.00	2.31	2.80	2.83	1.91	0.00
796	389									
953	150	39.1	2.29	0.08	1.00	1.95	2.95	3.49	1.00	0.00
530										
529										
528										
955	216	102	3.01	0.14	0.41	3.38	2.70	1.57	1.68	0.00
942	413	84.1	4.05	0.15	0.76	2.69	3.19	1.89	1.34	0.00
941	427	102	2.62	0.13	0.08	1.30	2.55	2.61	1.51	0.00
940	416	110	2.95	0.11	1.24	2.07	3.33	2.43	1.61	0.00
893	345	100	2.52	0.08	1.04	2.04	3.66	0.96	0.70	2.48
892	340	100	2.73	0.08	1.00	2.03	3.91	1.91	1.03	0.27
6	488	146	3.62	0.13	1.94	2.33	3.26	0.83	0.64	0.77
914		94.2	2.67	0.07	1.00	2.96	3.00	2.00	2.84	0.05
915		97.3	2.62	0.07	1.03	1.99	2.97	1.04	1.96	0.00
368										
536										
509										
510	534	120	4.54	0.25	4.18	1.37	1.26	0.84	1.34	2.18
15	652	129	5.99	0.28	3.57	1.85	1.62	0.45	1.51	1.34
901	503	80	1.94	0.09	1.52	2.19	1.85	0.00	1.79	1.28
780	400	100	3.74	0.13	2.28	2.52	3.06	1.00	1.00	1.66
781	315	92	3.23	0.12	3.07	2.71	3.32	2.26	1.43	1.00
925	388	84.6	1.25	0.07	2.05	2.24	1.04	0.33	2.61	0.22
916	393	55	1.14	0.06	1.23	2.94	1.53	0.66	2.56	0.05
926	426	100	1.57	0.05	2.19	2.27	1.84	0.78	2.64	0.00
503										
504										
502										
508										
507										
538										
786	433		2.23	0.15	2.92	3.26	1.06	1.00	1.67	1.78
947	400	91	3.32	0.11	1.00	2.00	4.00	1.00	1.00	1.00
498										
948										
539										
20	266	99	3.55	0.09	2.37	3.00	3.02	0.37	0.62	1.37
906	228	85	2.98	0.10	1.07	3.66	1.97	0.70	0.74	0.45
907	260	100	3.65	0.15	1.18	2.75	2.76	1.82	0.88	0.06
787	397		5.72	0.31	4.17	1.49	2.12	1.00	1.11	2.64
789	330	99	3.63	0.08	2.10	2.79	3.82	1.62	1.06	1.28
788	385	43.6	3.58	0.12	3.26	2.33	3.70	1.00	1.00	1.00
937										
960										
919										
936										
126	343	375	9.29	0.19	1.43	1.17	3.83	1.24	0.71	0.99
127	299	388	8.73	0.18	1.78	1.58	3.46	1.66	0.19	1.41
782	316		3.27	0.21	3.17	1.15	2.76	1.48	1.17	1.59
934	287	100	2.96	0.10	1.09	2.30	3.11	0.59	1.53	0.00
944		99	3.35	0.08	1.03	2.54	3.23	1.48	2.03	0.00
935	274	88.8	2.82	0.11	1.00	2.66	2.95	2.96	2.28	0.09
9	241	72	5.39	0.15	1.19	2.49	3.00	2.20	0.40	1.28
910	220	98	6.66	0.10	1.00	2.74	3.00	2.88	1.81	0.00
17	296	80	7.89	0.12	1.44	1.50	3.01	2.44	0.00	0.00
531	262	106	2.01	0.09	2.43	2.57	2.51	0.30	2.45	0.89
537	253	96.5	2.06	0.09	1.52	3.39	2.05	0.48	2.81	1.68
5	263	50								
956	260	172.3	10.98	0.30	1.20	3.58	1.52	0.00	0.56	0.00
957	276	130	9.71	0.31	0.49	2.04	3.96	2.45	0.49	0.00
945	392	131.1	9.03	0.18	1.51	2.97	3.75	2.23	1.00	0.00
499										
10	353	90	10.62	0.12	1.43	3.03	3.54	1.57	1.00	0.00
16	355	66	11.04	0.11	2.44	2.12	3.22	1.83	0.00	0.00

Appendix A. Continued.

Stream Loc ID Number	Conductivity (μS/cm)	Reach Length (m)	Width (m)	Depth (m)	Percent fines rating	Percent gravel rating	Percent cobble rating	Percent boulder rating	Stream shading rating	Unstable banks rating
18	353	77	5.09	0.21	1.48	2.20	3.34	1.34	0.88	0.33
7	376	80	4.90	0.16	0.85	3.07	3.29	1.63	1.05	0.61
905	307	85.5	1.63	0.20	3.81	1.62	1.16	0.92	1.23	1.77
899	357	43.5	2.30	0.36	5.00	0.00	0.00	0.00	1.00	0.00
913	346	82	1.14	0.05	3.29	3.33	0.05	0.02	1.58	0.74
917	425	85	1.59	0.05	1.54	2.91	2.34	0.87	2.95	0.00
912	345	100	1.20	0.07	2.66	2.18	0.71	0.00	1.94	0.00
12	374	178	7.77	0.22	3.64	2.14	1.43	0.53	0.61	0.00
14	270	160	5.66	0.15	1.00	4.00	2.87	0.76	1.89	0.76
13	281	124.3	6.12	0.14	0.31	2.62	3.85	0.83	1.16	0.62
918										
794	399	187	5.69	0.25	2.13	4.05	1.00	1.00	1.00	2.92
922	320	97.1	2.66	0.10	1.00	2.58	2.35	1.42	2.52	0.56
921	258	100	1.82	0.06	1.72	2.69	3.15	1.86	1.58	2.36
927	313	100	2.93	0.11	0.97	3.00	3.00	3.00	2.00	0.00
961	300	93.7	1.60	0.10	1.55	2.61	2.20	2.14	1.70	0.00
526										
525										
527	356	100	0.45	0.03	5.00	1.00	0.00	0.00	1.00	1.00
19	415	121.4	2.39	0.37	3.95	1.38	1.67	0.89	2.40	0.50
511										
540										
123	835	477	6.95	0.23	3.19	3.40	0.58	0.00	0.81	4.08
920	177	86.2	1.59	0.05	1.47	2.72	1.70	1.26	2.13	1.00
792	358	117	5.81	0.25	2.87	2.73	2.82	1.00	1.00	2.64
793	312	100	5.07	0.11	2.46	1.05	3.33	2.21	1.00	3.25
891	335	100	2.58	0.10	1.36	2.97	3.59	0.67	0.66	0.06
889		100	2.11	0.12	1.00	2.09	3.91	1.00	1.69	0.32
896	221	90	0.97	0.07	1.04	1.98	2.96	2.84	1.96	0.00
890	253	90	1.42	0.04	1.00	2.00	4.00	1.00	3.00	0.00
958	200	86	1.08	0.06	1.00	2.04	2.96	1.90	2.75	0.00
959	300	100	1.99	0.07	2.39	1.52	2.94	2.00	2.03	0.00
535										
533										
950	181	64	4.37	0.23	0.00	0.00	2.00	4.00	1.00	0.00
952										
954	200	55	6.20	0.12	1.00	1.00	4.00	3.00	1.00	3.00
951										
366										
8	332	114.6	3.19	0.13	1.09	2.82	3.51	1.01	3.22	0.00
924	254	97.5	2.01	0.07	0.03	2.21	3.82	1.97	1.06	0.00
923	320	91	2.51	0.09	0.03	2.97	4.00	1.97	1.00	0.00
797	790	84	1.79	0.13	4.69	2.18	1.09	1.29	1.32	3.64
902	290	59.2	1.60	0.09	0.58	2.77	2.58	0.99	4.25	0.51

Appendix A. Continued.

Stream Loc ID Number	Total trout (>100 mm) abundance	Lower 95% CL (>100 mm)	Upper 95% CL (>100 mm)	Total trout (<100 mm) abundance	Lower 95% CL (<100 mm)	Upper 95% CL (<100 mm)	Trout (>100 mm) density (fish/m²)	Trout (<100 mm) density (fish/m²)
876	15	15	15.6	30	30	32.2	0.10	0.20
875	10	10	10.8	5			0.11	0.05
881	14	14	14.6	21	21	23.1	0.10	0.15
816	0			0			0.00	0.00
817	0			0			0.00	0.00
818	0			0			0.00	0.00
841	53	46	59	71	63	78	0.28	0.38
847	39	39	41.2				0.25	
846	20	20	20.5	16	16	18.3	0.11	0.09
874								
873								
848								
849	21	17	28	16	13	22	0.15	0.12
851	17	17	18.2	15	15	17	0.14	0.12
857								
856								
882	0			0			0.00	0.00
858	0			0			0.00	0.00
885	34	33	37.5	12	12	13.5	0.13	0.05
852	74	74	75.6				0.22	
866	54	54	55.5	24	24	24.4	0.17	0.07
853	20	20	20.5				0.08	
877	0			0			0.00	0.00
878	0			0			0.00	0.00
879								
870								
869	8	6	14	0			0.04	0.00
868	98	95	103.5	41	27	77.9	0.37	0.15
867	0			0			0.00	0.00
865	0			0			0.00	0.00
864								
883	48	44	56.2	22	22	22.5	0.23	0.11
886	34	30	43.8	21	21	22	0.21	0.13
872								
884	20	19	24.5	5	5	6.5	0.09	0.02
854	11	11	12.6				0.21	
855	6	6	8.7				0.12	
863	0			0			0.00	0.00
862	0			0			0.00	0.00
880	0			0			0.00	0.00
850	23	18	29	14	12	21	0.09	0.06
999	30	30	32.2	12	12	12.7	0.17	0.07
971								
1026	0			0			0.00	0.00
1009	0			0			0.00	0.00
1012	10	10	11.7	26	25	30.3	0.05	0.12
1028								
1001	57	55	61.2	2	2	9.1	0.08	0.00
1040								
1003	1	1	10	0			0.00	0.00
1002	27	27	29.3	24	23	27.9	0.04	0.04
1013	20	17	29.3	8	8	9.2	0.03	0.01
1014	34	34	35.6	53	45	67.9	0.13	0.21
1010	57	49	66	0			0.25	0.00
968								
978	19	19	21.3	0			0.07	0.00
981	0			0			0.00	0.00
982	1	1	10	0			0.00	0.00
970	27	26	31.2	1			0.09	0.00
984								
1029	10	8	18	33	22	48	0.11	0.36
1032	0			3	2	19	0.00	0.03
1031	6	5	15	58	39	74	0.05	0.48
1044	6	5	15	6	4	22	0.03	0.03

Appendix A. Continued.

Stream Loc ID Number	Total trout (>100 mm) abundance	Lower 95% CL (>100 mm)	Upper 95% CL (>100 mm)	Total trout (<100 mm) abundance	Lower 95% CL (<100 mm)	Upper 95% CL (<100 mm)	Trout (>100 mm) density (fish/m²)	Trout (<100 mm) density (fish/m²)
1021	0			0			0.00	0.00
1000								
1024	1	1	10	0			0.01	0.00
979	0			0			0.00	0.00
963	12	12	12.7	32	32	33.6	0.06	0.15
965	12	10	21	7	5	23	0.07	0.04
964	5	5	8.3	4			0.04	0.03
980	4	3	12	3	2	19	0.04	0.03
973	0			0			0.00	0.00
988	16	16	17.2				0.05	
974	4	3	12	0			0.01	0.00
1025								
1006	0			0			0.00	0.00
1008	13	13	14.4	4	4	5.9	0.06	0.02
1022	10			2			0.06	0.01
989	20	20	22.2	25	24	28.9	0.08	0.10
972								
992	65	64	68.5				0.21	
1004	34	28	43	54	36	69	0.17	0.27
1027	10	10	10.8	1			0.07	0.01
1035								
1011	33	33	35	121	98	148.4	0.08	0.30
1037								
1036								
1043								
1030	28	28	29.8	16	16	16.6	0.09	0.05
1033								
1039	0			0			0.00	0.00
1038	0			0			0.00	0.00
986								
1049	19	18	23.7	2			0.10	0.01
1023								
995	5			10			0.06	0.12
966	69	67	73.8				0.28	
985	29	29	29.4				0.07	
967	93	88	100.8				0.22	
1047								
1005	61	61	63				0.25	
1045	24	24	25.4	25	22	34	0.08	0.08
1007	30	30	32.2	44	34	65.4	0.06	0.09
1046	1	1	10	1	1	17	0.01	0.01
1016	0			0			0.00	0.00
1015	27	22	35	73	57	89	0.06	0.16
1017	6	5	15	1	1	17	0.02	0.00
1042								
1034	25	25	26.9	115	109	123.4	0.12	0.53
1019								
990	17	17	17.5				0.09	
991								
1020	22	22	22.5	10	10	10.8	0.14	0.06
1018	14	14	15.3	1			0.07	0.00
1048	21	21	21.5	39	39	41.2	0.13	0.24
994								
993								
1041	0			0			0.00	0.00
976	0			0			0.00	0.00
975	0			0			0.00	0.00
977	28	26	33.6	35	33	40	0.12	0.15
996	0			0			0.00	0.00
997	0			0			0.00	0.00
998	4	3	12	0			0.01	0.00
969								
987	0			0			0.00	0.00
983	36	36	37.5	28	19	56.7	0.10	0.08

Appendix A. Continued.

Stream Loc ID Number	Total trout (>100 mm) abundance	Lower 95% CL (>100 mm)	Upper 95% CL (>100 mm)	Total trout (<100 mm) abundance	Lower 95% CL (<100 mm)	Upper 95% CL (<100 mm)	Trout (>100 mm) density (fish/m²)	Trout (<100 mm) density (fish/m²)
840	21	17	28	0			0.15	0.00
827	0			0			0.00	0.00
819	0			0			0.00	0.00
831								
837								
822	0			0				
823								
829	8			0			0.07	0.00
828	2			0			0.01	0.00
820	0			0				
821	0			0				
830	20	20	22.2	0			0.11	0.00
860								
839	32	31	35.7	1			0.08	0.00
861	9	9	9.9	0			0.04	0.00
842	24	24	25.4	26	24	32.7	0.07	0.08
838	3	2	10	0			0.02	0.00
843	13	13	15.2	1			0.05	0.00
832								
824								
825	107	106	110	0			0.36	0.00
826	34	34	35.6	31	30	34.8	0.15	0.14
836								
844	0			0			0.00	0.00
845	5	4	12	0			0.02	0.00
835	23	18	29	2	2	9	0.12	0.01
834	14	14	15.3	35	27	54.8	0.10	0.24
833	21	21	22	18	18	19.1	0.09	0.08
898	0			0			0.00	0.00
785	8			85	17	697	0.03	0.34
784	33	28	44	37	36	41	0.12	0.13
790	18	18	19	84	83	87	0.19	0.90
932	31	31	31.8				0.03	
931	7	5	25				0.03	
930	15	11	33	1	1	8	0.04	0.00
21	174	170	179	148	142	155	0.14	0.12
138	89	84	97				0.08	
137	32	31	36	2			0.05	0.00
904	0			0			0.00	0.00
897	3	2	21	1	1	8	0.02	0.01
888	1	1	20	0			0.01	0.00
887	1	1	20	0			0.01	0.00
532								
534	23	23	23.6	26	25	29.7	0.13	0.14
505								
506								
909								
11	32	32	33	48	33	82	0.07	0.10
1	41	35	54	210	138	289	0.08	0.42
908	4	3	22	0			0.02	0.00
946	1	1	20	0			0.01	0.00
928	0			0			0.00	0.00
929	5	5	6.5	10	10	11.7	0.05	0.11
367								
949	0			0				
894								
895	1	1	20	1	1	8	0.01	0.01
900	0			0			0.00	0.00
962								
903	6			8	8	10	0.03	0.04
783	38	37	42	8	5	34	0.10	0.02
779	6	6	7	25	24	29	0.04	0.15
939	20	20	21.6	5	5	6.5	0.08	0.02
933	21	21	22.5	8	8	8.9	0.09	0.03

Appendix A. Continued.

Stream Loc ID Number	Total trout (>100 mm) abundance	Lower 95% CL (>100 mm)	Upper 95% CL (>100 mm)	Total trout (<100 mm) abundance	Lower 95% CL (<100 mm)	Upper 95% CL (<100 mm)	Trout (>100 mm) density (fish/m²)	Trout (<100 mm) density (fish/m²)
911	6	6	7.2				0.05	
122								
795	140	140	142	118	108	130	0.30	0.25
943	5	4	24	12	10	19	0.09	0.22
796	133	133	134	293	283	303		
953	0			0			0.00	0.00
530								
529								
528								
955	2			0			0.01	0.00
942	44	44	45.3				0.13	
941	21	21	21.5	17	10	53.4	0.08	0.06
940	25	25	26.4				0.08	
893	5			17	17	17.5	0.02	0.07
892	4	4	5.9	22	22	23.5	0.01	0.08
6	54	53	57	270	197	343	0.10	0.51
914	8	6	26	1	1	8	0.03	0.00
915	17	13	35	1	1	8	0.07	0.00
368								
536								
509								
510	25	25	27	13	12	18.3	0.05	0.02
15	81	70	97	82	91	189	0.10	0.11
901	8	8	8.9	0			0.05	0.00
780	154	148	161	20	20	21	0.41	0.05
781	86	82	92	109	93	127	0.29	0.37
925	8	7	15.4	4			0.08	0.04
916	4			5			0.06	0.08
926	9	7	28	0			0.06	0.00
503								
504								
502								
508								
507								
538								
786	62	62	64	74	73	78		
947	0			0			0.00	0.00
498								
948								
539								
20	32	32	34	60	60	62	0.09	0.17
906	21			8	7	15.4	0.08	0.03
907	13	13	15.2	5			0.04	0.01
787	19	19	21	1				
789								
788	0			26	25	30	0.00	0.17
937								
960								
919								
936								
126								
127	455.9	306.9	604.9				0.13	
782	82	79	88	43	40	50		
934	61	61	62.4	80	79	83.1	0.21	0.27
944	50	50	50.3	31	30	35.3	0.15	0.09
935	7			0			0.03	0.00
9	13	13	14	129	116	14	0.03	0.33
910	12	9	30				0.02	
17	8	8	10	136	92	190	0.01	0.22
531	43	43	44.4	2	2	2	0.20	0.01
537	28	28	28.8	142	141	145.2	0.14	0.72
5								
956	213	203	222.6	67	32	166.4	0.11	0.04
957	94	93	97.3				0.07	

Appendix A. Continued.

Stream Loc ID Number	Total trout (>100 mm) abundance	Lower 95% CL (>100 mm)	Upper 95% CL (>100 mm)	Total trout (<100 mm) abundance	Lower 95% CL (<100 mm)	Upper 95% CL (<100 mm)	Trout (>100 mm) density (fish/m^2)	Trout (<100 mm) density (fish/m^2)
945	149	147	153.1				0.13	
499								
10	22	22	24	206	195	217	0.02	0.22
16	51	49	56	54	45	69	0.07	0.07
18	274	86	789	109	101	120	0.70	
7	72	72	73	177	172	184	0.18	0.45
905	4	3	22	1	1	8	0.03	0.01
899								
913	15	11	33	4	3	10	0.16	0.04
917	3	2	21	0			0.02	0.00
912	7	7	9.3				0.06	
12	90	90	91	1			0.07	0.00
14	63	55	77	33	32	37	0.07	0.04
13	5	5	8	29	28	33	0.01	0.04
918								
794	163	161	167	42	22	112	0.15	0.04
922	25	25	26.9	12	12	13.5	0.10	0.05
921	9	7	28				0.05	
927	29	29	31.2	17	17	19.5	0.10	0.06
961	16	16	16.6	0			0.11	0.00
526								
525								
527								
19								
511								
540								
123								
920	4	3	22	0			0.03	0.00
792	74	72	79	33	32	37	0.11	0.05
793	21	21	23	8	8	9	0.04	0.02
891	0			0			0.00	0.00
889	3	2	21	0			0.01	0.00
896	0			0			0.00	0.00
890	1	1	20	0			0.01	0.00
958	4	3	22	0			0.04	0.00
959	18			1			0.09	0.01
535								
533								
950								
952								
954	0			0			0.00	0.00
951								
366								
8								
924	13	13	13.6	30	30	32.2	0.07	0.15
923	11	8	29	17	14	23	0.05	0.07
797	5			3	3	6	0.03	0.02
902	2			8	8	10	0.02	0.08

Appendix A. Continued.

Stream Loc ID Number	Yellowstone cutthroat trout (>100 mm) captured	Yellowstone cutthroat trout (<100 mm) captured	Rainbow trout (>100 mm) captured	Rainbow trout (<100 mm) captured	RBTxYCT (>100 mm) captured	RBTxYCT (<100 mm) captured	Brook trout (>100 mm) captured	Brook trout (<100 mm) captured
876							15	30
875							10	5
881							14	18
816								
817								
818								
841							42	59
847							39	46
846							20	16
874								
873								
848								
849							17	13
851							17	15
857								
856								
882								
858								
885							33	12
852							74	35
866							54	24
853							20	69
877								
878								
879								
870								
869							4	
868	27	10					68	17
867								
865								
864								
883	44	22						
886	2						28	21
872								
884							18	5
854							11	32
855							6	31
863								
862								
880								
850							17	12
999							30	12
971								
1026								
1009								
1012	10	25						
1028			1				55	42
1001			55	2				
1040								
1003			1					
1002			19	2			8	21
1013	1						16	8
1014	1						33	45
1010							47	116
968								
978	13						6	
981								
982							1	
970							26	1
984								
1029							8	22
1032								2
1031							5	39

Appendix A. Continued.

Stream Loc ID Number	Yellowstone cutthroat trout (>100 mm) captured	Yellowstone cutthroat trout (<100 mm) captured	Rainbow trout (>100 mm) captured	Rainbow trout (<100 mm) captured	RBTxYCT (>100 mm) captured	RBTxYCT (<100 mm) captured	Brook trout (>100 mm) captured	Brook trout (<100 mm) captured
1044							5	4
1021								
1000								
1024							1	
979								
963							12	32
965							10	5
964							5	4
980	1	2					2	
973								
988							16	26
974							3	
1025								
1006								
1008	13	4						
1022							10	2
989							20	24
972								
992							64	73
1004							28	36
1027							10	1
1035								
1011	1	1					32	97
1037								
1036								
1043								
1030							28	16
1033								
1039								
1038								
986								
1049							18	2
1023								
995							5	10
966			6				61	5
985			16				13	16
967			9	2			79	18
1047								
1005							61	114
1045			2				21	22
1007	7						23	34
1046							1	1
1016								
1015	10	27			1		11	22
1017					1	1	4	
1042							33	
1034							25	109
1019								
990	3				2		12	60
991			1				15	23
1020	22	10						
1018	14	1						
1048							21	39
994								
993			32	42				
1041								
976								
975								
977			2		1		23	33
996								
997								
998			3					
969								

Appendix A. Continued.

Stream Loc ID Number	Yellowstone cutthroat trout (>100 mm) captured	Yellowstone cutthroat trout (<100 mm) captured	Rainbow trout (>100 mm) captured	Rainbow trout (<100 mm) captured	RBTxYCT (>100 mm) captured	RBTxYCT (<100 mm) captured	Brook trout (>100 mm) captured	Brook trout (<100 mm) captured
987								
983							36	19
840			6				11	
827								
819								
831								
837								
822								
823								
829	1		2		5			
828	2							
820								
821								
830			18				2	
860								
839			30	1	1			
861			9					
842			6	2	5		13	22
838	1						1	
843			5		5		3	1
832								
824								
825			102		4			
826			34	30				
836								
844								
845	1		2				1	
835	7		4	1	7	1		
834	3				11	27		
833	19	18			2			
898								
785	8	17						
784	28	20						
790	18	61						
932	31							
931	5	4						
930	11	1						
21	169	142			1			
138	84	7						
137	31	2						
904								
897	2	1						
888	1							
887	1							
532								
534	23	25						
505								
506								
909								
11	27	18			2			
1	24	37	2	2	2	2		
908	3							
946	1							
928								
929	5	10						
367								
949								
894		3						
895	1	1						
900								
962								
903	6	8						
783	37	5						

Appendix A. Continued.

Stream Loc ID Number	Yellowstone cutthroat trout (>100 mm) captured	Yellowstone cutthroat trout (<100 mm) captured	Rainbow trout (>100 mm) captured	Rainbow trout (<100 mm) captured	RBTxYCT (>100 mm) captured	RBTxYCT (<100 mm) captured	Brook trout (>100 mm) captured	Brook trout (<100 mm) captured
779	6	24						
939	20	5						
933	21	8						
911	6	8						
122								
795	57	27						
943	4	10						
796	124	25						
953								
530								
529								
528								
955	2							
942	44	16						
941	21	10						
940	25	45						
893	5	17						
892	4	22						
6	53	189						
914	6	1						
915	13	1						
368								
536								
509								
510	25	12						
15	70	41						
901	8							
780	148	20						
781	25	16						
925	7	4						
916	4	5						
926	7	21						
503								
504								
502								
508								
507								
538								
786	58	22						
947								
498								
948								
539								
20	32	60						
906	21	7						
907	13	5						
787	15	1						
789								
788		25						
937								
960								
919								
936								
126								
127	233	44						
782	79	40						
934	61	79						
944	50	30						
935	7							
9	13	116						
910	9	6						
17	7	92	1					
531	43	2						

Appendix A. Continued.

Stream Loc ID Number	Yellowstone cutthroat trout (>100 mm) captured	Yellowstone cutthroat trout (<100 mm) captured	Rainbow trout (>100 mm) captured	Rainbow trout (<100 mm) captured	RBTxYCT (>100 mm) captured	RBTxYCT (<100 mm) captured	Brook trout (>100 mm) captured	Brook trout (<100 mm) captured
537	28	75						
5								
956	203	32						
957	93	16						
945	146	20			1			
499								
10	22	195						
16	45	45	1		3			
18	83	101	3					
7	66	47	1		5			
905	3	1						
899	2							
913	5	1			6	2		
917	1				1			
912					7	7		
12	69	1	1		2			
14	52	32						
13	5	28						
918								
794	58	12						
922	25	12						
921	7	10						
927	26	17			3			
961	14				2			
526								
525								
527								
19	1	1						
511								
540								
123								
920	3							
792	64	5						
793	21	8						
891								
889	1							
896								
890	1							
958	3							
959	18	1						
535								
533								
950								
952								
954								
951								
366								
8								
924	13	30						
923	7	14			1			
797	5	3						
902	2	8						

Appendix A. Continued.

Stream Loc ID Number	Brown trout (>100 mm) captured	Brown trout (<100 mm) captured	Mottled sculpin captured	Longnose dace captured	Bluehead sucker captured	Mountain sucker captured
876						
875						
881						
816						
817						
818						
841						
847						
846			4			
874						
873						
848						
849						
851						
857						
856						
882						
858						
885						
852						
866						
853						
877						
878						
879						
870						
869						
868						
867						
865						
864						
883						
886						
872						
884	1					
854						
855						
863						
862						
880						
850	1					
999						
971						
1026						
1009						
1012						
1028						
1001						
1040						
1003				13		
1002				11		
1013						
1014						
1010						
968						
978			30			
981						
982						
970						
984						
1029						
1032					2	
1031						
1044						
1021						

Appendix A. Continued.

Stream Loc ID Number	Brown trout (>100 mm) captured	Brown trout (<100 mm) captured	Mottled sculpin captured	Longnose dace captured	Bluehead sucker captured	Mountain sucker captured
1000						
1024						
979						
963						
965						
964						
980						
973			32			
988			30			
974			26			
1025						
1006						
1008						
1022						
989						
972						
992			30			
1004			14			
1027						
1035						
1011			26			
1037						
1036						
1043						
1030			30			
1033						
1039						
1038						
986						
1049						
1023						
995					7	
966			16			
985			30			
967			30			
1047						
1005						
1045	1					
1007			30			
1046						
1016						
1015			23	20	8	
1017			21	7		
1042						
1034						
1019						
990			12			
991						
1020						
1018						
1048						
994						
993			29			
1041						
976						
975						
977						
996						
997						
998						
969						
987						
983						
840						
827						

Appendix A. Continued.

Stream Loc ID Number	Brown trout (>100 mm) captured	Brown trout (<100 mm) captured	Mottled sculpin captured	Longnose dace captured	Bluehead sucker captured	Mountain sucker captured
819						
831						
837						
822						
823						
829			5			
828						
820						
821						
830			30			
860						
839			62			
861			30			
842			62			
838						
843			34			
832						
824						
825			31			
826			31			
836						
844						
845						
835			27			
834						
833			30			
898						
785			2			
784			9			
790						
932			30			
931			30			
930			29			
21			24			
138						
137			17			
904						
897						
888						
887						
532						
534						
505						
506						
909						
11	3	15	22			
1	7	14	11			
908			30			
946						
928						
929						
367						
949						
894						
895			9			
900			23	17		4
962						
903			20	30	5	
783			20	13		
779						
939						
933						
911						
122						
795	5	7				

Appendix A. Continued.

Stream Loc ID Number	Brown trout (>100 mm) captured	Brown trout (<100 mm) captured	Mottled sculpin captured	Longnose dace captured	Bluehead sucker captured	Mountain sucker captured
943						
796	9	3				
953						
530						
529						
528						
955						
942						
941						
940						
893			3			
892						
6			37			
914						
915						
368						
536						
509						
510			27			1
15			26			5
901						
780			22			
781			13			
925						
916						
926						
503						
504						
502						
508						
507						
538						
786	4	15	21			
947						
498						
948						
539						
20			23	6		
906			4			
907			13			3
787	4		20	1	1	
789						
788						
937						
960						
919						
936						
126						
127						
782				2		
934						
944						
935						
9			30			
910						
17			34			
531			1			
537						
5						
956						
957						
945						
499						
10						
16			28		12	

Appendix A. Continued.

Stream Loc ID Number	Brown trout (>100 mm) captured	Brown trout (<100 mm) captured	Mottled sculpin captured	Longnose dace captured	Bluehead sucker captured	Mountain sucker captured
18					5	
7			2			
905						
899			1			2
913						
917						
912						
12	18		2			
14	3		19			
13			18			
918						
794	118	6				
922						
921						
927						
961						
526						
525						
527						
19						
511						
540						
123						
920						
792			20			
793			22	24	10	
891						
889	1					
896						
890						
958						
959						
535						
533						
950						
952						
954						
951						
366						
8						
924						
923						
797			20			
902						

Appendix A. Continued.

Stream Loc ID Number	Piute sculpin captured	Redside shiner captured	Speckled dace captured	Unknown Sucker sp. Captured	Utah sucker captured	No fish captured
876						
875						
881						
816						1
817						1
818						1
841						
847						
846						
874						1
873						1
848						1
849						
851						
857						1
856						1
882		36	23		10	
858						1
885						
852						
866						
853						
877						1
878						1
879						1
870						1
869						
868						
867						1
865						1
864						1
883						
886						
872						1
884						
854						
855						
863						1
862						1
880						1
850						
999	9					
971						1
1026						1
1009						1
1012						
1028						
1001		12	15			
1040						1
1003	11		20			
1002	14		4			
1013	23					
1014	19					
1010		7	11			
968						1
978						
981						1
982						
970						
984						1
1029						
1032						
1031						
1044						
1021						1

Appendix A. Continued.

Stream Loc ID Number	Piute sculpin captured	Redside shiner captured	Speckled dace captured	Unknown Sucker sp. Captured	Utah sucker captured	No fish captured
1000						1
1024						
979						1
963						
965						
964						
980						
973		3				
988						
974						
1025						1
1006						1
1008						
1022						
989						
972						1
992						
1004						
1027						
1035						1
1011						
1037						1
1036						1
1043						1
1030			18			
1033						1
1039						1
1038						1
986						1
1049						
1023						1
995		30	30			
966						
985		1				
967						
1047						
1005						
1045	8					
1007						
1046			30			
1016						1
1015			1			
1017		30	29			
1042						
1034						
1019						1
990						
991						
1020						
1018						
1048						
994						1
993						
1041						1
976						1
975						1
977						
996		30	26			
997						1
998	7					
969						
987						1
983						
840						
827						1

Appendix A. Continued.

Stream Loc ID Number	Piute sculpin captured	Redside shiner captured	Speckled dace captured	Unknown Sucker sp. Captured	Utah sucker captured	No fish captured
819						1
831						1
837						1
822						1
823						1
829						
828						
820						1
821						1
830						
860						1
839						
861						
842						
838						
843						
832						1
824						1
825						
826						
836						1
844						1
845						
835						
834						
833						
898						1
785						
784						
790						
932						
931						
930						
21		22	27			
138						
137			3			
904						1
897						
888						
887						
532						1
534						
505						1
506						1
909						1
11						
1						
908						
946						
928						1
929						
367						
949						1
894						
895						
900		4				
962						1
903						
783				1		
779						
939						
933						
911						
122						
795						

Appendix A. Continued.

Stream Loc ID Number	Piute sculpin captured	Redside shiner captured	Speckled dace captured	Unknown Sucker sp. Captured	Utah sucker captured	No fish captured
943						
796						
953						1
530						1
529						1
528						1
955						
942	2					
941						
940	1					
893						
892						
6						
914	3					
915						
368						
536						1
509						1
510			25			
15			14			
901						
780						
781						
925						
916						
926						
503						1
504						1
502						1
508						1
507						1
538						1
786						
947						1
498						1
948						1
539						1
20			16			
906						
907			1			
787		21	3			
789						
788						
937						1
960						1
919						1
936						1
126						
127						
782		1	3			
934						
944						
935						
9						
910	2					
17						
531						
537						
5						
956	2					
957						
945						
499						
10						
16			20			

Appendix A. Continued.

Stream Loc ID Number	Piute sculpin captured	Redside shiner captured	Speckled dace captured	Unknown Sucker sp. Captured	Utah sucker captured	No fish captured
18			16			
7						
905		16				
899						
913						
917						
912						
12						
14						
13						
918						1
794						
922						
921						
927	10					
961	25				3	
526						1
525						1
527						1
19						
511						1
540						1
123						
920						
792						
793			15			
891						1
889						
896						1
890						
958						
959						
535						1
533						1
950	5					
952						1
954						1
951						1
366						
8						
924						
923						
797			8			
902						

Prepared by:	**Approved by:**
	IDAHO DEPARTMENT OF FISH AND GAME
Kevin A. Meyer Senior Fisheries Research Biologist	Virgil K. Moore, Chief Bureau of Fisheries
James A. Lamansky, Jr. Senior Fisheries Technician	Dan Schill Fishery Research Manager