IDAHO POWER
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Responses to FERC Additional Information Request AR-2

Listed Mollusks

Final Report

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Hells Canyon Project
FERC No. P-1971-079

February 2005

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

SCHEDULE A: ADDITIONAL INFORMATION REQUEST AR-2—LISTED MOLLUSKS

Time Required: 9 months

FWS has indicated that it believes that your invertebrate surveys were not adequately designed to detect rare species, and we concur with their assessment. FWS notes that certain rare, listed, and sensitive species are frequently restricted to specialized microhabitats and that such habitats should be more thoroughly surveyed to determine presence or absence. FWS has also recommended that additional surveys be conducted to verify the taxonomic identity of snails collected near the Pine Bar site in the Hells Canyon reach that were initially identified as Bliss Rapids, but whose taxonomic identity could not be verified. We recognize that seasonal flow conditions could affect sampling efficiency, and that sampling could be conducted most efficiently during the fall when river flows are low.

Accordingly, after consultation with FWS, develop a plan to conduct targeted surveys to provide additional information on the presence or absence of listed, rare, or sensitive molluscs in project-affected areas. If any Bliss Rapids snails are identified during these surveys, you should submit these specimens to a qualified molluscan taxonomist for identification. Within 2 months of the date of this AIR, please provide a draft of the plan to the FWS, with a request for its comments. Your draft study plan should include a description of your proposed study methods, a schedule for conducting the surveys, a description of how the results will be reported, and a schedule for consulting with FWS. Within 4 months of the date of this AIR, please file the plan with the Commission, including any comments that you received from FWS on the draft plan and indicating how those comments were addressed in the final plan.

You should provide a draft report of your findings to the FWS within 7 months of the date of this AIR. The draft report should include a description of your study methods, results, assessment of the results, and any recommendations stemming from the study results. Within 9 months of the date of this AIR, you should file the final report of your findings with the Commission, including any comments that you received from FWS on the draft report and a discussion of how those comments were addressed in the final report.

1. INTRODUCTION

On May 4, 2004, the Federal Energy Regulatory Commission (FERC) issued a request for additional information to Idaho Power Company (IPC) in response to its final license application for the Hells Canyon Hydroelectric Project (FERC Project No. 1971). Request AR-2 specified that IPC consult with the U.S. Fish and Wildlife Service (USFWS) to develop a plan to conduct targeted surveys that would provide additional information on the presence or absence of listed, rare, or sensitive mollusk species in the project-affected area. AR-2 was based on the contention of FERC and the USFWS that the macroinvertebrate surveys conducted by IPC during preparation of the license application (Myers and Foster 2003) were inadequate for detecting listed, rare, or sensitive mollusk species. The main concern identified by the two agencies was that unique habitats in the project area may not have been sampled because of the systematic location of a relatively small total area of sampling throughout the entire study area. AR-2 suggested that sampling focused on unique habitats would result in a more definitive search for listed, rare, or sensitive species. The study reported in this response to AR-2, was conducted to address agency concerns and to provide the additional information requested by FERC in AR-2.

Listed mollusk species that could be encountered within the study area include: *Pyrgulopsis idahoensis* (Idaho springsnail) and *Taylorconcha serpenticola* (Bliss Rapids snail). The downstream historic range of these species was thought to be near Homedale, Idaho (USFWS 1992), approximately 75 miles upstream of Brownlee Reservoir. However, macroinvertebrate collections conducted by IPC in 1998 and 2002, as part of studies related to preparation of the license application, revealed specimens of Idaho springsnail occurring downstream to the upper limits of Brownlee Reservoir and specimens of a taxon identified as *Taylorconcha* sp. that may be Bliss Rapids snails at one location downstream of Hells Canyon Dam (HCD) (Myers and Foster 2003). No proposed or candidate mollusk species are believed to occur in the study area (Species List #1-4-03-SP-70) (Ruesink 2002). Myers and Foster (2003) reported several taxa of bivalves and gastropods throughout the study area. Specifically, *Ferrissia* sp., *Corbicula* sp., *Gyraulus* sp., *Physa* sp., *Pisidium* sp., *Vorticifex effusa*, *Fluminicola* sp., and *Potamopyrgus antipodarum* (New Zealand mudsnail) were all sampled during the 1998 IPC survey in the Snake River in the project area (Myers and Foster 2003).

The study area was defined in AR-2 as “project-affected areas.” For purposes of this survey, we have used the longitudinal geographic scope of this survey to include the Snake River from Cobb Rapids (river mile [RM] 340) to below the confluence with the Salmon River at RM 188 and downstream to the confluence with the Grand Ronde River (RM 168.5). Within that approximately 172-mile reach of the Snake River, study areas included all aquatic habitats occurring below the high-water line of Brownlee, Oxbow, and Hells Canyon reservoirs, as well as unimpounded sections of the Snake River below the high-water line. Tributary habitats that lie below the high-water line of the Snake River within the study area were also sampled.

Previous experience by the investigators indicated five types of benthic habitat in reservoirs associated with this target reach and nine generic types of riverine benthic habitat in the target reach:

The following types of benthic habitat are found in the reservoirs associated with the study area:

1. Open reservoir shoreline subject to drawdown

2. Deep sediments below drawdown levels—always permanently wetted

3. Heads of embayments—shoreline subject to drawdown

4. Tributary stream mouths—substrate subject to drawdown but still stream wetted

5. Tailrace waters below dams

The following generic types of riverine benthic habitat are found in the free-flowing sections of the study area:

1. Rock points at heads of rapids
    - a. Above or at points, with larger substrate and high velocity (Figure 24);
    - b. Below the points in eddies, with smaller substrate and low velocity (Figure 25);
2. Tributary washout deltas—large substrate with little fines above the tributary (“perched rocks”) and more fines below the tributary (Figure 26);
3. Back eddies on the side of rapids (Class II and III rapids are considered the most diverse benthic habitat; Class IV rapids have very large substrate at their margins with little fines) and rapidly dropping velocity with wave action from rapids washing the shore (Figure 27);
4. Banks of chutes along runs below rapids—large cobble to boulders and steep bank slopes (Figure 28);
5. Long stretches of flat water
    - a. Sheer bedrock walls along deep pools (Figure 29);
    - b. Low-gradient cobble banks-organic detrital deposition areas (Figure 30);
6. Back eddies and bays—substrate of variable size, higher temperatures, periphyton, and accumulated detritus (Figure 31);
7. Sandbars-generally steep underwater slopes to deep pools (Figure 32).

In this study, we sampled all the above habitat types but emphasized those habitats that we believed *a priori* would offer ideal habitat for listed and sensitive mollusks (Frest and Johannes 1992, 1995, Lysne 2003, Neitzel and Frest 1990, Richards 2004, Strayer and Smith 2003).

2. STUDY METHODS

2.1. Hells Canyon Reservoirs

We sampled the benthic invertebrate community in reservoir, reservoir tributary mouths, and free flowing reaches of the Snake River from RM 297.4 to RM 247.5 (the tailrace below HC Dam). From September 24 to October 3, 2004, over 150 sites were sampled in Brownlee Reservoir, Oxbow Reservoir, Hells Canyon Reservoir, sections of the Snake River between reservoirs, and tributaries to these three reservoirs. Three Ponar grabs were made at each site in the reservoirs, 20-cobble counts were handpicked in the tributaries and river, and SCUBA diving cobble counts and visual diver inspections were made at several locations within the reservoir study area. We collected samples from a variety of conditions focusing on known and perceived habitats for threatened and endangered mollusks. In addition, we recorded water temperature, pH, dissolved oxygen, conductivity using a Hydrolab, UTM coordinates using GPS, and river mile locations using aerial photos at each site. Descriptions of each site were also written, and digital photographs taken. All mollusks were counted and identified to lowest practical taxon. Also, non-mollusk invertebrate taxa were collected from each site and identified to lowest practical taxon to determine invertebrate taxa assemblages.

2.2. Snake River in Hells Canyon Downstream of Hells Canyon Dam

2.2.1. Description and Comparison of Mollusk Community

Between September 20 and October 21, 2004, we collected mollusk taxa samples from more than 134 sites; most were from the Snake River, but some were from sampling of tributary mouths and the lower Salmon River. To cover the maximal amount of river habitat and provide replicated samples for comparisons of mollusk taxa distribution, we used four sampling approaches:

1. Qualitative search for mollusks over approximately 100 m of shoreline in 0- to 1-m depth at each site. Relative abundance was noted for each mollusk species. This technique was used over the entire river reach studied. For more detail, see information later in this section.

2. Quantitative 40-cobble counts along a 40-m littoral shoreline reach. Five replicates at seven sites with direct counts of all mollusks present on each cobble. For more detail, see section 2.2.3.

3. Quantitative 40-rock counts along a 40-m littoral shoreline reach near RM 225.2, repeated at 1.8, 2.8, 3.7, 5.5, and 6.5 m depth contours; three replicates at each depth with direct counts of all mollusks present on each cobble. For more detail, see section 2.2.6.

4. Two sets of suction-dredging followed by hand-picking and hand-picking followed by suction-dredging within 0.25-m^2 quadrats at RM 215.4, repeated for five replicates. For more detail, see section 2.2.7.

For the relative abundance scale in the first method above we used a value of "0" for 0 individuals/m^2, "1" for 1 to 10 estimated individuals/m^2, "2" for 10 to 100 estimated individuals/m^2, "3" for 100 to 1,000 estimated individuals/m^2, and "4" for more than 1,000 estimated individuals/m^2. We primarily sampled mollusks using a 40- to 120-cobble count method by wading during periods of low flows (< 9,000 cubic feet per second [cfs]). For most samples, we estimated mollusk taxa abundance using the categorical variables from 0 to 4. In addition to taking digital photographs, we assessed water temperature, dissolved oxygen, pH, conductivity using a Hydrolab, latitude and longitude or UTM coordinates using a Garmin brand GPS unit, and river mile location from aerial photos at most sites. We also visually estimated velocity at the substrate surface or tops of the cobbles, substrate type at the site, and subjective categorical estimates of periphyton and detritus on the cobbles. Samples were collected from a variety of conditions and locations, although we focused on likely habitats for threatened and endangered mollusks and other mollusk taxa of concern including pools, riffles, eddies, and all tributaries within the fluctuation zone.

In section 3, we discuss our findings and graphically compare mollusk taxa abundance at sites from HCD to 80 miles downstream. Because we primarily used categorical variables to estimate taxa abundance for this portion of the study, we explored taxa relationships using non-metric multidimensional scaling (NMDS) on 10 taxa from 114 samples (excluding Salmon River samples and samples with no taxa). For NMDS, we used the Sorenson distance measures and 400 iterations. We conducted 40 runs using real data and 50 runs of Monte Carlo simulations. We also used a scree plot to help us determine the best NMDS dimensional model.

2.2.2. Probability of Occurrence of 10 Mollusk Taxa in Relation to Distance Downstream of HC Dam.

We developed fitted response curves for 10 mollusk taxa in relation to distance (miles) downstream of HC dam using the computer program Hyperniche (McCune and Mefford 2004).

2.2.3. Comparison of the Mollusk Community at Seven Sites

Most of the sites were chosen and sampled to cover as many locations and likely habitats for target organisms as possible and to qualitatively describe the abundance and distribution of mollusk taxa in the river. To further quantify variability in densities of mollusks and compare sites in the river, we conducted more intensive replicated sampling at the following seven sites (N = five 40-cobble replicates/site) in the river:

Site 1 approximately 2 miles downstream of the confluence of the Salmon and Snake rivers and mixing zone (samples 65-69; Map 10, Appendix E)

Site 2 between RM 225.86 and 224.70 (samples 71-75; Map 4, Appendix E)

Site 3 between RM 227.0 and 226.40 (samples 76-79; Map 4, Appendix E)

Site 4 between RM 227.72 and 227. 64 (samples 81-85; Map 4, Appendix E)

Site 5 between RM 212.46 and 212.38 (samples 86-90; Map 6, Appendix E)

Site 6 between RM 203.60 and 203.35 (samples 91-95; Map 7, Appendix E)

Site 7 between RM 213.35 and 215.02 (samples 97-101; Map 6, Appendix E)

All mollusks were counted on each cobble and depth and width of each cobble (cm) were recorded. Eight mollusk taxa were found at these seven sites: *Ferrissia rivularis*, *Potamopyrgus antipodarum*, *Taylorconcha* sp., *Fluminicola* sp., *Vorticifex effusa*, *Pisidium* sp., *Physa* sp., and *Fisherola nuttalli* (great Columbia River limpet or shortface lanx). We conducted a two-way, fixed-effects, analysis of variance (ANOVA) between eight molluskan taxa abundances (square root transformed) and seven sites and their interaction term. We then conducted a Bonferroni multiple comparison test (MCT) for each taxa at each site to determine which sites were significantly different in individual taxa abundance. For all analysis in this project, statistical significance is reported at alpha = 0.05 or when 95% confidence intervals (CIs) do not overlap.

We calculated four diversity indices for the eight mollusk taxa at the seven sites: 1) taxa richness (number of taxa), S; 2) Simpson's diversity index, D; 3) evenness E; and 4) Shannon diversity index, H.

$$\text{Shannon diversity index, } H = 1 - \sum_{i}^{s} p_i^{\,2} - \sum_{i}^{s} p_i \ \ln(p_i),$$

and

$$\text{Simpson's diversity index, } D = 1 - \sum_{i}^{s} p_i^{\,2},$$

where *p* is the percentage of individuals of each taxa. All indices were calculated using PC-ORD for Windows (McCune and Mefford 1999). We also conducted a one-way ANOVA and Bonferroni MCTs among each of the four diversity index values and the seven sites.

To further explore mollusk taxa relations, we conducted principal components analysis (PCA) on the correlation matrix using all seven sites and eight mollusk taxa abundances combined (N = 1,400 cobbles). We determined eigenvalues and eigenvectors for five principal components and the proportion of variability explained for each component. To enable us to view taxa relationships, we then created a 3-axis graph of the first three principal components. We also conducted regression analysis for each taxon to explore the relationship between mollusk taxa abundance and depth and width of cobbles. All data analysis was conducted using MINITAB (Minitab Inc. 2000) or S-Plus (Insightful Corp. 2002).

2.2.4. Taylorconcha sp. and Fisherola nuttalli occurrence in relation to other mollusk taxa and environmental variables

We used non-parametric multiplicative regression (NPMR) to separately model *Taylorconcha* sp. and *Fisherola nuttalli* presence/absence (binary response) in relation to the relative abundances of eight mollusks: *F. rivularis*, *P. antipodarum*, *Fluminicola* sp., *V. effusa*, *Pisidium* sp., *Physa* sp., and *C. fluminea* (shell counts) and either *Taylorconcha* sp. or *F. nuttalli*, and seven environmental variables: velocity, temperature, conductivity, pH, periphyton, detritus, and river mile downstream of Hells Canyon Dam (N = 124 samples). NPMR is the most appropriate regression method available when species responses are nonlinear or unknown and response curves interact multiplicatively (McCune and Mefford 2004). Ecological factors invariably interact multiplicatively, rather than additively (McCune and Mefford 2004). We used a Gaussian local mean model selection and a minimum average neighborhood size of 6.2 (5% of number of samples) to generate predictor variable models in the NPMR computer program Hyperniche (McCune and Mefford 2004). We then selected a best model based on parsimony, pseudo R^2 and logB (Bayes factor), the likelihood ratio test statistic G (Sokal and Rohlf 1995, pg 691), and then cross-validated the model using Monte Carlo simulation (N = 50 simulations).

2.2.5. Probability of Detecting Taylorconcha sp. in the Section below HC Dam

Our preliminary survey of mollusks using the cobble-count methodology failed to detect any *Taylorconcha* sp. in the 12-mile section of the Snake River directly below HC Dam (RM 247.5–235.5) (N = four 40-cobble samples). The absence of *Taylorconcha* sp. in this section could have been the result of environmental or ecological factors or our sampling methodology. Because we were able to locate *Taylorconcha* sp. quite easily downstream of this section of the river, we wanted to determine how effective our cobble-count method was at detecting *Taylorconcha* sp. Consequently, we returned to the 12-mile section below the dam and sampled 10 sites that we considered to be good *Taylorconcha* habitat. Of the total 123 samples we collected in the entire river, including those in the 12-mile section below HCD, 109 samples were amenable to developing detection probabilities of *Taylorconcha* sp. These 109 samples were collected from 13 to about 65 river miles downstream of HCD and did not include samples from the 12-mile section directly below HCD that we wanted to evaluate. The 109 samples were evaluated for presence/absence of *Taylorconcha* sp. Samples that had *Taylorconcha* sp. present were given a value of 1, and those with *Taylorconcha* sp. absent were given a value of 0. Mean and 95% CIs of the number of samples with *Taylorconcha* sp. present were computed by bootstrapping the samples ($N = 109$) 10,000 times. We then computed the binomial distribution probability of obtaining no *Taylorconcha* sp. in 10 samples (sites) in the section of river 12 miles downstream of HCD for the bootstrapped mean and 95% CIs.

2.2.6. Depth Distribution of Taylorconcha sp. Abundance

We speculated that *Taylorconcha* sp. abundance would decrease with increasing depth, possibly due to food resource limitation. This relationship between *Taylorconcha* sp. and depth was also reported by IPC in the mid-Snake River (Clark et al. 2004). For this study, most of our *Taylorconcha* sp. samples were handpicked cobbles at wadeable depths (0–1 m), a result that did not allow us to estimate abundance of *Taylorconcha* sp. in relation to depth. Therefore, we conducted an experiment where we handpicked cobbles using SCUBA for depths greater than 1 m and handpicked cobbles by wading at depths less than 1 m. Forty cobbles were handpicked at each of six depths—0 to 1 m, 1.8 m, 2.8 m, 3.7 m, 5.5, and ≤ 6.5 m—at three locations ($N = 3$ replicates) along a straight, deep-pool reach around RM 225.2. Cobbles that were handpicked using SCUBA were placed in 0.5-mm mesh nylon dive bags and brought to the shore so that all mollusks from the individual cobbles could be counted. Divers also examined large cobbles that were too large for collection and described substrate conditions and mollusk abundance. Mollusk counts were made on all cobbles, and contents of dive bags were examined for mollusks that had fallen off during retrieval. We then conducted a one-way ANOVA on *Taylorconcha* sp. abundance versus depth and a best-fit regression of *Taylorconcha* sp. abundance versus depth.

2.2.7. Comparison of Two Methods for Describing the Mollusk Community

Suction dredge sampling is often used to quantify abundance of invertebrates in river ecosystems and has been used in the mid-Snake River and Hells Canyon during previous IPC studies (Strayer and Smith

2003, Clark et al. 2004). For this study, we primarily used a simple 40-cobble count sampling methodology to quantify abundance of mollusks in the Snake River in Hells Canyon. We implemented this approach by gently lifting cobbles out of the water and counting mollusks on all surfaces. Because there was concern that suction dredge and cobble count sampling could give different estimates of abundance or densities of mollusk taxa, we conducted an experiment to compare effectiveness between the two methods. We chose a section of the river on the Oregon side opposite Pittsburg Landing (RM 215.4) with loose cobble substrate that was known to contain mollusks, including *Taylorconcha* sp., from one of our previous surveys. To compare methods, we suction dredged five 0.25-m^2 quadrats and handpicked cobbles in five 0.25-m^2 quadrats. We first handpicked a quadrat that was suction dredged, and then suction dredged a handpicked quadrat to determine the efficiency of each method of mollusk collection. This paired sampling was replicated 5 times. Quadrats were located about 10 m apart, and their order was randomly chosen. We calculated mean and 95% CIs for mollusk abundances using both methods and then compared methods. Methods were considered significantly different if their 95% CIs did not overlap.

River water levels rose rapidly over the course of the experiment and likely effected estimates of relative mollusk abundance during the last replicate. But they probably did not affect our conclusion from this experiment. Since this comparative work was done on the last day of our 20-day sampling run and water levels were entering a regime of higher sustained flows to last through autumn, the experiment could not be repeated in autumn 2004.

2.2.8. Invertebrate Assemblages

We collected entire invertebrate assemblages including mollusks by scrubbing 10 cobbles from several locations in the river. Scrubbed contents from cobbles were processed in the field and brought to EcoAnalysts, Inc. Moscow, Idaho for identification to lowest practical taxon. In the future, this data can be used to provide us understanding of the non-mollusk invertebrate assemblages in relation to mollusk taxa.

2.2.9. SCUBA Survey of Bivalves in Hells Canyon

Because shoreline sampling and cobble counts (N = 134 sites) yielded no live, native Unionids, IPC SCUBA divers sampled 26 sites based on our best available knowledge of native bivalve habitats. Native bivalves typically prefer deeper water than could be sampled by wading. At these 26 sites, two divers spent approximately one hour per site (30-minute dive time/diver) visually searching for bivalves. They also recorded UTM coordinates, water temperature, dissolved oxygen, conductivity, pH, turbidity, substrate type, habitat type, and bivalve occurrence.

2.2.10. Voucher Specimens

Representative voucher specimens of each mollusk taxon collected in this study were preserved using standard procedures and then stored either at EcoAnalysts in Moscow, Idaho and at the Orma J. Smith Museum of Natural History, Albertson College of Idaho in Caldwell, Idaho.

3. RESULTS

3.1. Reservoirs

Intensive sampling revealed no threatened or endangered mollusks in any of the reservoir or reservoir tributary samples. Several fresh *Anodonta californiensis* (California floater) shells, one of which still had a dead mussel inside, were found in the section of the Burnt River that is often inundated by the reservoir. Their occurrence indicates that a colony probably exists in the area, but it wasn't found during SCUBA diving. Mollusk taxa collected included the invasive snail *Potamopyrgus antipodarum*, the invasive Asiatic clam *Corbicula fluminea*, *Physa* (*Physella*) sp., *Gyraulus* sp., *Ferrissia* sp., *Stagnicola* sp., and *Gonidea angulata* (western ridge mussel) shells. No *Pyrgulopsis idahoensis*, *Taylorconcha* sp., *Physa natricina* (Snake River physa), *Valvata utahensis* (Utah valvata), *Fluminicola columbiana* (= *fuscus*) (Columbia pebblesnail or great Columbia River spire snail), *Fisherola nuttalli*, or *Margaritifera* species were found in the reservoir study area.

3.2. Snake River in Hells Canyon Downstream of HCD

3.2.1. Description and Comparison of the Mollusk Community

We found a total of 15 mollusk taxa in our study. These included *Ferrissia rivularis* (a common limpet), *Fisherola nuttalli* (great Columbia River limpet or shortface lanx), *Fluminicola* sp. (pebblesnails), *Vorticifex effusa* (ramshorn snail), *Corbicula fluminea* (formerly *manilensis*, the invasive Asiatic clam), *Potamopyrgus antipodarum* (the invasive New Zealand mudsnail), *Fossaria* sp., *Gyraulus* sp., *Pisidium* sp. (fingernail clam), two taxa of *Physa* (*Physella*) sp., *Stagnicola* sp., empty shells of the mussel species *Gonidia angulata* (western ridge mussel) and *Anodonta californiensis* (California floater), and a *Taylorconcha* sp. Dr. Robert Hershler is assessing the *Taylorconcha* sp. taxonomic status. At this time genetic analysis suggests it may be a new species of *Taylorconcha* (Appendix B). No *P. idahoensis* (Idaho springsnail), *Physa natricina* (Snake River physa), *Valvata utahensis* (Utah valvata), *Fluminicola columbiana* (Columbia pebblesnail or great Columbia River spire snail), or *Margaritifera* species were found in the riverine reaches surveyed in this study.

Of these taxa, *F. rivularis* and the two invasive species, *C. fluminea* and *P. antipodarum,* were by far the most abundant and widespread (Figure 1). *Taylorconcha* sp. was not found until approximately 13 miles downstream of HCD and then became more abundant downstream (Figure 1), peaking in the RM 230 to RM 200 reach. *Fluminicola* sp. was found only in the Salmon River and downstream of the mixing zone of the Salmon and Snake rivers (Figure 1). *Vorticifex effusa*, *Pisidium* sp., and *Physa* sp. were less abundant than the above species and more sporadically distributed (Figure 1). Only empty shells of *G. angulata* and *A. californiensis* were found in shoreline and wading samples, but several live individuals were found while diving at RM 185.5 (see section 3.2.9). *Fisherola nuttalli,* a species of concern, was found throughout the Snake River and was often abundant on cobbles in the faster sections (Figure 1). The remaining three mollusk taxa, *Fossaria* sp., *Gyraulus* sp., and *Stagnicola* sp., were rare and found in very few sites.

Of the 10 taxa assessed using NMDS, results clearly showed that *Fluminicola* sp. was isolated from the rest of the mollusk taxa (Figure 2). We only found it in the lower Salmon River and downstream of the mixing zone of the Salmon and Snake rivers (< RM 188). *Gonidia angulata* was also separated from the rest of the mollusk taxa due to its sporadic occurrence (Figure 2). This result was based only on empty shells found on the shoreline of sample sites. The remaining eight mollusk taxa were more clumped together although *C. fluminea* was distinctly separated due to its occurrence and high abundance in every sample (Figure 2). There was a close association between *Taylorconcha* sp. and *P. antipodarum* (Figures 2, 8, and 13) and a small grouping of *F. nuttalli* with *Physa* sp. and *V. effusa* (Figure 2). *Ferrissia rivularis* was abundant throughout the river. The first NMDS axis separated *Fluminicola* sp. and *G. angulata* from the rest of the taxa, the second axis related all the taxa except *Taylorconcha* sp. and *P. antipodarum*, and the third axis was mostly a descriptor of *G. angulata*, *Taylorconcha* sp. and *Fluminicola* sp. (Table 1).

Because the final NMDS stress value of 17.79 was somewhat on the high end, it gave us only a fair interpretation of the data. Lower stress values give better representation of the data (McCune and Mefford 1999). Stress tends to increase with increased sample sizes, in this case 114 samples, which implies that the stress value was slightly inflated and the representation of the data was satisfactory. However, we suggest that details of the plot in Figure 2 should be interpreted with caution (McCune and Mefford 1999).

3.2.2. Probability of occurrence of 10 mollusk taxa in relation to distance downstream of HC Dam

Potamopyrgus antipodarum, *F. rivularis*, and *C. fluminea* had the highest probability of occurrences (approx. 80%) in the Snake River from HC dam to 80 miles downstream: *F. rivularis* and *C. fluminea* probability of occurrence was constant (Figure 3). *Physella* sp. probability of occurrence was also constant but at a much lower probability (approx. 28%). *Taylorconcha* sp. and *Fisherola nuttalli* probability of occurrence was unimodal with higher probability of occurrence in the middle sections of the river. *Taylorconcha* sp. probability decreased after about 55 miles downstream of HC dam, *F. nuttalli* probability increased after about 60 miles downstream. Probabilities of occurrence of the other four taxa are in Figure 3

3.2.3. Comparison of the Mollusk Community at Seven Sites

There were significant differences in mollusk taxa densities within and between the seven replicated sites (ANOVA $p \leq 0.05$) (Table 2 and Figure 4). At all seven sites, *F. rivularis* and *P. antipodarum* were significantly the most abundant mollusk taxa (using Bonferroni MCT $p \leq 0.05$) (Figure 4) and both species had significantly different densities between sites. For example, *P. antipodarum* densities were highest at site 5 and significantly greater than the lowest *P. antipodarum* density at site 4 (Figure 4). In this comparative study, *Fluminicola* sp. was only found at site 1, below the mixing zone of the Salmon and Snake rivers, but because several of the replicates at site 1 had zero *Fluminicola* sp., site 1 densities were not significantly different from those at the other six sites with no *Fluminicola* sp. in any of the replicates (Figure 4). As were *P. antipodarum* densities, *Taylorconcha* sp. densities were highest at site 5 but there was no significant difference in *Taylorconcha* sp. densities between any of the sites (Figure 4). *Taylorconcha* sp. densities were less than *P. antipodarum* densities at all sites (Figure 4). *Fisherola nuttalli* densities were highest at site 3 and lowest at site 1 but there were no significant differences in their densities among any of the seven sites (Figure 4). Because of the large amount of variability in densities of each taxon within each site, this analysis had low power (1-β). To increase the power of this analysis to 1- β of 0.85, many more samples would have been required, up to twenty-five to thirty, 40-cobble count samples/site.

Taxa richness, *S*, was highest at site 4 ($\bar{x}$ = 5.8 mollusk taxa) and significantly higher than at site 7, which had the lowest taxa richness ($\bar{x}$ = 3.0 mollusk taxa) (Figure 5). There were no significant differences in taxa richness for the other five sites (Figure 5). Mollusk taxa abundances were most evenly distributed, *E*, at site 5 ($\bar{x}$ = 0.61) and least evenly distributed at site 7 ($\bar{x}$ = 0.25) (Figure 6). There were no significant differences among the seven sites for Simpson's diversity index, *D*, and Shannon diversity index, *H* (Figures 7 and 8).

The first three components of PCA of mollusk taxa relationships clearly show associations between *P. antipodarum* and *Taylorconcha* sp. and between *F. rivularis* and *F. nuttalli* (Table 3 and Figure 9). As did NMDS, based on our categorical data (Figure 2), PCA showed *Fluminicola* sp. somewhat isolated from the other taxa (Figure 9). The first PCA component separated *V. effusa* and *Physa* sp. from the other six taxa (Table 3). The second PCA component separated the two limpets, *F. rivularis* and *F. nuttalli*, from the two hydrobiids, *Taylorconcha* sp. and *P. antipodarum* (Table 3). The third PCA component separated the taxa into two groups. The first grouping was *F. rivularis*, *F. nuttalli*, *P. antipodarum*, and *Taylorconcha* sp., and the second grouping was *V. effusa*, *Fluminicola* sp, *Physa* sp, and *Pisidium* sp. (Table 3). The proportion of variability in mollusk taxa abundances explained by these first three components was 0.41. Therefore, there was still a large portion of taxa abundance and their relationships unexplained by PCA. Water column temperature, pH, dissolved oxygen, and conductivity were fairly uniform between sites and did not differ greatly among the seven sites, although these metrics undoubtedly changed rapidly at the aerobic/anaerobic interface in the sediments; which was often close to *Taylorconcha* sp. and *P. antipodarum* occurrences. Therefore, these environmental variables probably did not contribute to the associations among taxa observed at these sites, except possibly for *Fluminicola* sp., which could have been separated more from the other taxa if environmental variables were included.

3.2.4. *Taylorconcha sp. and Fisherola nuttalli occurrence in relation to other mollusk taxa and environmental variables*

3.2.4.1. *Taylorconcha* sp. occurrence

A 3-predictor model best explained *Taylorconcha* sp. presence/absence in our study area: *P. antipodarum*, *V. effusa*, and detritus. This model had a decisive logB = 10.13 (Kass and Raftery 1995) and G = 51.81 ($p = 0.00$). Verification of the model using Monte Carlo simulation ($p = 0.02$) showed that it was unlikely to randomly generate another 3-predictor model from the data that performed better (logB $\geq$ 10.13) than this model. The probability of *Taylorconcha* sp. presence was greatest with high abundance of *P. antipodarum* (Figure 10), moderate abundance of detritus (Figure 11) and low abundance of *V. effusa* (Figure 12). The best single predictor model of *Taylorconcha* sp. presence/absence was the categorical variable *P. antipodarum*: with greater probability of *Taylorconcha* sp. occurring with greater abundance of *P. antipodarum* (Figure 10). This single predictor model had a 'decisive' logB of 6.44 and G = 29.66 ($p = 0.00$) and a pseudo R^2 of 0.16. Verification of the model using Monte Carlo simulation ($p = 0.05$) showed that it was unlikely to randomly generate another single predictor model from the data that performed better (logB $\geq$ 6.44) than *P. antipodarum*.

3.2.4.2. *Fisherola nuttalli* occurrence

A 4-predictor model marginally explained *Fisherola nuttalli* presence/absence. This best model for *Fisherola nuttalli* presence/absence included the quantitative variables: velocity, temperature, conductivity and river mile. Although this model had a decisive logB of 6.68, G= 30.75 ($p = 0.00$) and pseudo R^2 of 0.22; its Monte Carlo simulation p-value of 0.16 suggested that it was not significantly better than other 4-predictor models that could have been randomly generated from the data. *Fisherola nuttalli* probability of occurrence was greater at higher temperatures (Figure 13) and conductivity (Figure 14). Low temperature and low conductivity were only encountered at the mouths of tributaries and therefore, reflect the absence of *F. nuttalli* from tributary mouths. *Fisherola nuttalli* probability of occurrence increased with increased velocities (Figure 15) and increased unimodally downstream of HC Dam (Figure 16).

3.2.5. Probability of Detecting Taylorconcha sp. in the Section below HC Dam

Of the 109 samples used in this analysis, all of which were collected between 13 and 65 river miles downstream of HC Dam, 56 had *Taylorconcha* sp. present. The bootstrapped mean (95% CIs) for percentage of *Taylorconcha* sp. in these samples was 0.51 (0.40, 0.59). Thus, the binomial probability of not finding any *Taylorconcha* in 10 samples in the 12-mile section of the river below HC Dam using our sampling methodology of 40-cobble counts was between 0.0001 and 0.006. In addition, the 109 samples used for this analysis were collected from many different habitats, including those that we considered poor *Taylorconcha* sp. habitat. This analysis, therefore, further underestimated the probability of detection in the 12-mile section below HC Dam, and these values would have been even lower than reported above. A 40-cobble count covers a substrate surface area of roughly 1 m^2 and would translate to a detection rate of about one *Taylorconcha* individual/m^2. Therefore, *Taylorconcha* sp. densities in the 12-mile section below HC Dam were likely to have been less than 1 individual/m^2, and the species is probably either extremely rare or absent in this reach.

3.2.6. Depth Distribution of Taylorconcha sp. Abundance

Taylorconcha sp. abundance decreased with increasing depth (Figure 17). The best-fit regression model was a quadratic curve fit: *Taylorconcha* sp. abundance = 27.47 – 3.12 × depth + 0.09 × depth^2 ($R^2 = 0.52$, $p = 0.01$). This regression model did not include a large cobble that was found at 18 ft at one of the replication sites. This cobble had 27 *Taylorconcha* sp. on it, a result that was significantly greater than any other cobble abundance value in the study. Also, only three replications were conducted per depth contour. Because there was a large amount of variability in *Taylorconcha* sp. abundance on cobbles and cobbles collected using SCUBA were significantly smaller in size than those collected while wading: this depth evaluation should be considered a preliminary analysis only.

3.2.7. Comparison of Two Methods for Describing the Mollusk Community

Only three mollusk taxa were collected using both suction dredging and handpicking in this experiment: *P. antipodarum*, *F. rivularis*, and *C. fluminea*. No *Taylorconcha* sp. were found, even though this experiment was done on a reach where the team found *Taylorconcha* sp. a week prior. We believe that rising water levels over the morning of the experiment severely reduced success in finding *Taylorconcha* sp. However, the three observed taxa, *P. antipodarum*, *F. rivularis*, and *C. fluminea* can be easily used as surrogates for evaluating these sampling techniques on *Taylorconcha* sp., *F. nuttalli*, and the mussel species *G. angulata* and *A. californiensis*. *Taylorconcha* sp. and *P. antipodarum* are both hydrobiid snails, behave similarly, and are distributed on cobbles similarly (on the undersides). *Ferrissia rivularis* and *F. nuttalli* are both limpets and firmly attach themselves to the tops and sides of cobbles. *Corbicula fluminea*, *G. angulata*, and *A. californiensis* also behave more similarly with each other than with hydrobiids or limpets. Therefore, the following results can be used to evaluate the sampling methods for all these species.

Significantly more *P. antipodarum* and *F. rivularis* were collected using handpicking than using suction dredging (Figure 18). *Potamopyrgus antipodarum* occurred primarily on the undersides of cobbles, and *F. rivularis* were firmly attached to cobbles and easily missed by suctioning alone. Alternatively, more *C. fluminea* were collected using suction dredging than handpicking, although not significantly more (Figure 18). These clams are loosely arrayed in the soft sediments for significant depth below the sediment surface, rendering them susceptible to suctioning deeper than could be collected through handpicking. Significantly more *P. antipodarum* were collected by handpicking the same transect after suction dredging, than by suction dredging the same transect after handpicking. The pattern was the same for *F. rivularis* and *C. fluminea* collected either handpicking after dredging or dredging after handpicking, but these differences were not significant (Figure 19). Therefore, handpicking was significantly more efficient than suction dredging for hydrobiid snails and attached limpets, but suction dredging was slightly more efficient than handpicking for bivalve taxa.

3.2.8. Invertebrate Assemblages

Appendix A includes a list of non-mollusk taxa from scrubbed cobbles. We are currently analyzing abundances and diversity of the mollusk component of the invertebrate community.

3.2.9. SCUBA Survey of Bivalves in Hells Canyon

Most SCUBA sites contained live and dead invasive Asiatic clams, *C. fluminea* and some empty shells of *Gonidea angulata* but no live *G. angulata* or *A. californiensis*. Only one site, at RM 185.5 upstream of

Cherry Creek on the Idaho side, had live *G. angulata* (collected October 15, 2004)(Appendix F). A large *G. angulata* was found at a depth of 4 m, one individual at 7 m, and one individual at 8.5 m. Several individuals were also found between 3.5- and 5-m depths. Six specimens were collected and preserved for reference. All live *G. angulata* collected were embedded in sand abutting large boulders or bedrock. They were actively filtering with their attachment (byssal) threads exposed and difficult to remove. No live *A. californiensis* were found at any sites.

4. ASSESSMENT OF RESULTS

We did not anticipate collecting *Taylorconcha* sp. in such abundance in this study area of the Snake River downstream of HCD. It had only previously been reported at one location in this section of the river (Myers and Foster 2003). The next nearest known populations of *Taylorconcha* sp. were the recent finding in the Owhyee River, OR by Dr. Terrence Frest and the well-documented populations of *Taylorconcha serpenticola* in the mid-Snake River, near Hagerman, ID (Richards 2004). At the time of this survey the status of *Taylorconcha* sp. in the Snake River downstream of HC Dam was unknown and it was thought to be either *T. serpenticola* or possibly a new species of *Taylorconcha*. Because *T. serpenticola* was the only federally listed mollusk reasonably expected to be encountered in our study area, a major objective of this survey was to document its abundance and distribution.

The relationship between *P. antipodarum* and *Taylorconcha* sp. abundance and distribution shown by NMDS, PCA, and NPMR was often observed during this study. This relationship was one of the more obvious trends in our observations of mollusk ecology in the Snake River, Hells Canyon. Both species apparently are photophobic, with *Taylorconcha* sp. being slightly more so (Frest and Johannes 1992, Richards 2004). We never found *Taylorconcha* sp. on the tops of cobbles and rarely found *P. antipodarum* there. *Potamopyrgus antipodarum* is much more mobile than *Taylorconcha* sp. and can exploit surfaces of cobbles better, particularly during fluctuating water levels (personal observations, Richards 2004). The closest relative of *Taylorconcha,* systematically, in our study area was *P. antipodarum*. There is strong evidence that both *Taylorconcha* species and *P. antipodarum* can compete for limited resources and habitat and are often spatially disassociated (Richards 2004). Both taxa seem to aggregate in cracks and fissures of cobbles (Figure 20) and appear to be spatially disassociated with one another on the cobbles (Figure 21), although clusters of the two species were often found on the same cobble. Although we cannot support this statistically at this time, both species were almost always found on the bottom of cobbles at the sand/gravel interface scant centimeters above an anoxic layer. The anoxic layer was commonly found below fine surficial sediments of the Snake River littoral. Anoxic sediments were confirmed by black color (metal sulfides precipitating from hydrogen sulfide reaction with metals in the sediments) and either sulfidic and/or putrid odor.

We never observed *Taylorconcha* sp. in anoxic sediments, but individuals were often very close to them (within approximately 2 cm). *Potamopyrgus antipodarum* was sometimes found at the oxic/anoxic interface in surficial sediments several centimeters below the sediment/water interface. These anoxic sediments were rare in the first 10 miles downstream of HC Dam (high scouring of fines with resulting large, well-flushed interstics), but their occurrence increased with progression downstream. Below the confluence with the Salmon River, anoxic sediments in the littoral were especially abundant with the increasing periphyton production and detrital load. These organic-rich conditions were most evident at RM 168.6, just above the confluence with the Grand Ronde River.

4.1. Habitats Associated with *Taylorconcha* sp. Occurrence

Taylorconcha sp. was not found above HC Dam in habitats associated with reservoirs. However, the mollusk sampling effort in autumn 2004 permitted us to subjectively generalize on habitat in the Snake River below HC Dam likely to contain *Taylorconcha* sp. and community characteristics. Listed below are our generalizations regarding habitat and community characteristics below HC Dam.

- *Taylorconcha* sp. were found in back eddies downstream of the head of rapids where upstream, reverse currents were common and off-substrate velocity was between 0 and 0.5 feet per second. *Taylorconcha* sp. were rarely found in high-velocity rapids or riffles but may exist deeper in the sediments below the sheer zone of those areas, under certain conditions. Sampling in high-velocity, large substrate rapids was not feasible during this study.

- *Taylorconcha* sp. were found on substrate cobbles and small boulders in contact with sand sediments. Rocks perched off the substrate with free water beneath were poor *Taylorconcha* sp. habitat.

- *Taylorconcha* sp. were not found on sharp, clean substrate (ie. recent entry into the river).

- Abundant *Taylorconcha* sp. were found in rock areas where periphyton densities were moderate with moderate detrital deposition.

- Dark, under-boulder habitats were often selected. *Taylorconcha* sp. were never found on top surfaces of rocks but always on the bottom, usually in contact with or in finer basement substrate as long as the immediate finer sediments were oxic.

- *Taylorconcha* sp. were never found in black, reducing sediments.

- *Taylorconcha* sp. were never found in sandbar sediments.

With only a few exceptions, the above comments hold for *Taylorconcha* sp. communities observed in the Snake River below HC Dam in autumn 2004. Of the seven general benthic habitats in the free-flowing Snake River (see Section 1), *Taylorconcha* sp. was most commonly found in the following:

- Tributary deltas—in the alluvial fan downstream of a tributary mouth where rocks rested on fines
- Back eddies below and to the side of rapids (Class II and III rapids were most selected by *Taylorconcha* sp.) with rapidly dropping velocity but wave action from the rapids washing the shore, consisting of cobble to small boulders
- Banks of chutes on runs below rapids—large cobble to boulders and steep bank slopes

We very rarely found *Taylorconcha* sp. in stagnant pools or in high-velocity cobble/gravel shallows at the heads of rapids ("redd"-like habitats). We did not find *Taylorconcha* sp. on sheer rock faces over runs or pools, although we only sampled 4 of these sites. Several reasons why *Taylorconcha* sp. was absent from HC Dam to about 13 miles downstream could include physical, chemical, or biological conditions. For example, the armor layer of large cobbles-small boulders with large interstices that exists in the Snake River below HC Dam may inhibit *Taylorconcha* sp. Chemical conditions such as dissolved oxygen levels can vary spatially throughout the reach and can potentially affect *Taylorconcha* sp. distribution patterns. Because *Taylorconcha* species (e.g. *T. serpenticola*) are relatively slow dispersers, colonization or recolonization of habitats may be limited (Richards 2004).

Our assessment of *Taylorconcha* sp. habitat would be that the species prefers stable substrates under a wide range of conditions. It did not appear to occur in the faster waters that *F. nuttalli* preferred and was rarely found in slow pools and backwaters. However, we did find one live *Taylorconcha* sp. individual in a seasonally stagnant pool with elevated temperature near the mouth of the Imnaha River. This pool appeared to be flushed and recharged by the Snake River only at high flows (Figure 22). One site that had high abundance of *Taylorconcha* sp. was a known fall Chinook salmon spawning location at RM 198.78 (Oregon side). At the tail end of a pool, the substrate was a mixture of large gravel and small to large cobbles lightly embedded in gravel, with high-at substrate velocity of approximately 2 feet per second. The most predictable habitat for locating *Taylorconcha* sp. was the undersides of loose, large cobbles or boulders in back eddies below rapids (Figure 23). Typically, in these habitats, we only found 1 to 20 individuals in a 100 m section of shoreline sampling.

In this study, in the Snake River in Hells Canyon, *Taylorconcha* sp. abundances never approached those of *T. serpenticola* colonies found in some of the locations in the mid-Snake River, near Hagerman, Idaho. At some of these locations, *T. serpenticola* densities approached more than 3,000 specimens/m^2 (Richards 2004). We estimated that, *Taylorconcha* sp.'s highest densities in the Snake River in Hells Canyon never exceeded 300 specimens/m^2. There does not appear to be any lack of suitable substrate habitat for *Taylorconcha* sp. in the Snake River, Hells Canyon. At this point, we cannot explain why their abundances are not higher.

4.2. Habitats Associated with Other Mollusk Species

Fisherola nuttalli and *F. rivularis* were almost always found on cobbles with higher velocities than any of the other mollusks and were often associated with each other (see PCA analysis, Section 3.2.3), although *F. rivularis* also was abundant in slower . This is most likely due to both species ecologies and their propensity to securely attach themselves to hard surfaces in high velocities to avoid competition with other species. However, they did prefer slightly different habitats. *Fisherola nuttalli* occurred primarily in the faster waters, while *F. rivularis* was common in all habitats, although it was appeared to be slightly more abundant in flowing water. Although *F. nuttalli* is a species of concern, it appears to be doing well in the Snake River in Hells Canyon.

We did not find *Fluminicola* sp. in the Snake River between HCD and the confluence with the Salmon River. Richards et al. (2001). Richards (2004) documented that *Fluminicola* sp. and *Taylorconcha* sp. often co-occur in sections of the middle Snake River that appear to be influenced by cold springs. *Fluminicola* sp. drops out of the middle Snake River system in the slower, warmer sections and is possibly replaced by *P. antipodarum* (D. Richards, personal observation). *Fluminicola* sp., however, were found in fairly high abundance in the lower Salmon River less than 1 mile upstream of the confluence with Salmon River and further upstream near Pine Bar and White Bird Creek. *Fluminicola* sp. is a poorly described genus and its status is currently under revision. It is possible that *Fluminicola* sp. in spring-associated habitat in the middle Snake River area and riverine *Fluminicola* sp. in the area of the Snake and Salmon rivers are separate species (D. L. Gustafson, Montana State University, personal communication).

Corbicula fluminea, another invasive species, was the dominant bivalve in this study and often the most dominant mollusk. Our sampling method of cobble counts severely underestimated its abundance, since it was most abundant in the deeper sands and gravels below the surface cobble layer. Its dominance in this system suggests that competition for habitat between it and the native bivalves, *Pisidium* sp., *G. angulata* and *A. californiensis*, could be negatively affecting these natives. *Corbicula fluminea* has an extremely hard shell compared with *A. californiensis*, probably enabling it to better withstand adverse environmental conditions and competition. *Corbicula fluminea* also has a free-living veliger stage and can easily disperse throughout the system (e.g., in bilgewater of boats moving upstream from the lower Snake River where *C. fluminea* is the dominant benthic organism). *Corbicula* were unknown in the reach of the Snaker River prior to 1972 (C.M. Falter, personal communication 2004). Both native unionid bivalves, *G. angulata* and *A. californiensis,* however, have host-specific glochidial stages and are now restricted in their ability to disperse. Live native *G. angulata* specimens were almost completely absent, and live *A. californiensis* were completely absent in our study. It is apparent that other environmental and ecological conditions also affect their abundance. Empty shells of both native unionid bivalves were commonly found on shorelines during wading and dive sampling throughout the Snake River study area. This suggests that populations of both taxa were recently more numerous and dense than at the time of this survey.

Although Neitzel and Frest (1990) and Frest and Johannes (1995) suggested that the Snake River in Hells Canyon should support *Fluminicola columbiana*, we did not find any in the reservoirs or in sections of the Snake River that we surveyed. Reasons for its absence are unknown, but we believe that conditions in the river may limit its distribution. We were able to survey other snail taxa, including three members of the family Hydrobiidae to which *F. columbiana* belongs: *P. antipodarum*, *Taylorconcha* sp., and the common pebblesnail, *Fluminicola* sp. Therefore, we are confident that, if *F. columbiana* were common in our study sites, we would have detected them. In the Salmon River, up to about 2 miles upstream of its confluence with the Snake River and upstream at White Bird Creek and Pine Bar, *Fluminicola* sp. was found to be very common. It was also common downstream of the mixing zone of the Salmon and Snake rivers, at least as far downstream as the confluence with the Grand Ronde River. If conditions allow *Fluminicola* sp. to survive in these sections, then habitat may also be suitable for *F. columbiana,* at least in the Salmon River and possibly in sections of the lower Snake River downstream of the Salmon River.

5. RECOMMENDATIONS

Suction dredging can continue to be the most complete littoral sampling method for mollusks, but cobbles and boulders should be “hand-scrubbed” also. Investigators should not rely on the vacuum alone for complete sampling of the benthic community.

6. CONSULTATION

To successfully complete this study, FERC required IPC consult with USFWS during study plan development as well as during development of the final study report. On July 8, 2004, IPC provided USFWS with a draft study plan. USFWS provided comments on the draft study plan on August 6, and on September 3, IPC submitted a final study plan to FERC that incorporated USFWS comments. On December 10, IPC provided USFWS with a draft completion report and requested comments on the report. USFWS responded with comments on January 18, 2005 (Appendix G). USFWS editorial comments were incorporated into this final report. USFWS suggested that IPC attempt to conduct additional survey work related to the *Anadonta californiensis* shells found near the Burnt River in 2005. The final report was not modified in response to this request because it is beyond the February 4 reporting deadline, however, IPC will attempt to accommodate the USFWS request, if possible.

7. ACKNOWLEDGMENTS

Diving was carried out by IPC technicians Aaron Foster, Mike Stephenson, and Ben Reingold who put in many hours, day after day under the surface of the turbulent Snake River in Hells Canyon. Only through their tireless effort in the tailraces and deeper pools was this work possible. Matt Hall and Jake Howell (EcoAnalysts) and David Hopper (USFWS, Boise Office) were invaluable sampling help in the field. Matt Hall, Jake Howell, and Scott Lindstrom were also invaluable in data organization and continued identification of invertebrate samples collected during this study. Finally, we would like to express our appreciation to Butch and Karen Brown of the Temperance Creek Ranch at RM 225 on the Snake River for their great accommodations and getting us up and down the river by jet boat.

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Table 1. Eigenvectors of the first three principal components for eight mollusk taxa based on densities at seven comparative sites (*N* = 34 samples, densities per 40 cobbles) (Eigenvalues were 1.509, 1.242, and 1.119, and proportions contributed to variability were 0.189, 0.155, and 0.484 for PC1, PC2, and PC3, respectively) (*Fri* = *Ferrissia rivularis*, *Fnu* = *Fisherola nuttalli*, *Pan* = *Potamopyrgus antipodarum*, *Vef* = *Vorticifex effusa*, *T*sp = *Taylorconcha* sp., *Fl*sp = *Fluminicola* sp., *P*sp = *Physa* sp., *Ps*sp = *Pisidium* sp.).

Taxa	**PC1**	**PC2**	**PC3**
Fri	0.073	–0.444	0.528
Fnu	0.029	–0.256	0.624
Pan	–0.039	0.614	0.336
Vef	0.703	–0.010	–0.026
*T*sp	0.047	0.582	0.366
*Fl*sp	–0.005	0.127	–0.107
*P*sp	0.702	0.060	–0.040
*Ps*sp	0.055	0.035	–0.266

Table 2. Two-way analysis of variance (ANOVA) (General Linear Model) of site vs. mollusk taxa (square root transformed) for eight mollusk taxa at seven comparative sites (*N* = five 40-cobble samples/site)(R^2 = 0.83).

Source	***DF***	**Seq SS**	**Adj SS**	**Adj MS**	***F***	***P***
Site	6	12.52	12.52	2.09	3.59	< 0.01
Taxa	7	675.49	687.39	98.20	168.54	< 0.01
Site × Taxa	42	99.85	99.85	2.38	4.09	< 0.01
Error	216	125.70	125.70	0.58		
Total	271	913.56				

Table 3. First three axis values for 10 mollusk taxa abundance relationships using nonmetric multidimensional scaling (NMDS) (*N* = 114 sites, final stress for 3-dimensional solution = 17.79) (*T*sp = *Taylorconcha* sp, *Pan* = *Potamopyrgus antipodarum*, *Cfl* = *Corbicula fluminea*, *Fri* = *Ferrissia rivularis*, *P*sp = *Physa* sp., *Vef* = *Vorticifex effusa*, *Ps*sp = *Pisidium* sp., *Fl*sp = *Fluminicola* sp., *Fnu* = *Fisherola nuttalli*, *Gan* = *Gonidea angulata*).

Taxa	**Axis 1**	**Axis 2**	**Axis 3**
*T*sp	–0.02	0.07	0.29
Pan	–0.01	0.02	0.13
Cfl	–0.07	0.17	–0.08
Fri	0.27	0.15	0.10
*P*sp	–0.10	0.23	0.09
Vef	–0.20	0.18	0.01
*Ps*sp	–0.19	0.11	0.20
*Fl*sp	–1.67	0.33	0.53
Fnu	0.09	0.23	0.07
Gan	–0.68	0.19	–0.24

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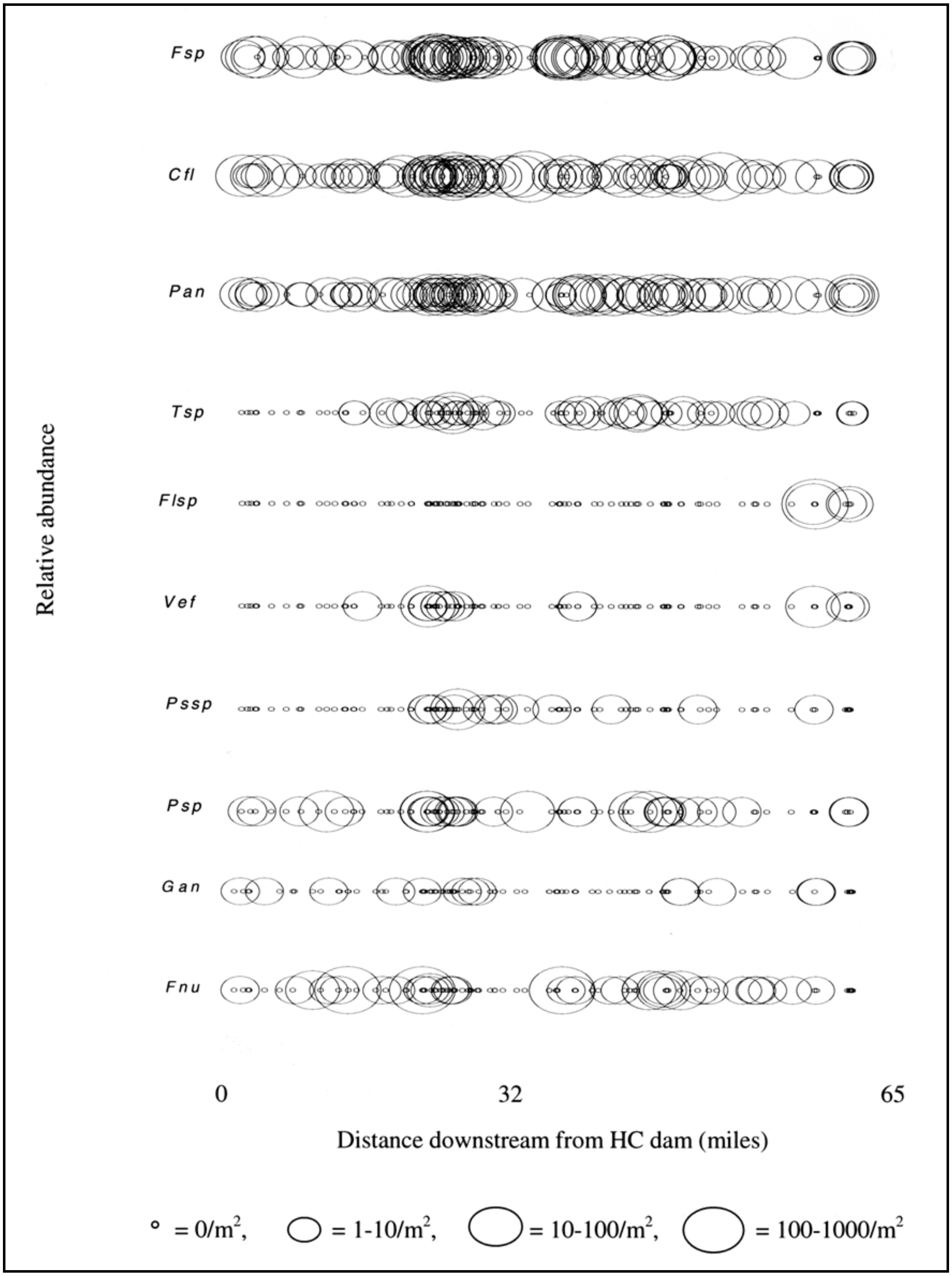

Figure 1. Relative abundance of 10 mollusk taxa in relation to distance downstream of Hells Canyon Dam, Snake River, Idaho and Oregon (Fri = *Ferrissia rivularis*, *Cfl* = *Corbicula fluminea*, *Pan* = *Potamopyrgus antipodarum*, *T*sp = *Taylorconcha* sp, *Fl*sp = *Fluminicola* sp., *Vef* = *Vorticifex effusa*, *Ps*sp = *Pisidium* sp., *P*sp = *Physa* sp., *Gan* = *Gonidea angulata*, *Fnu* = *Fisherola nuttalli*).

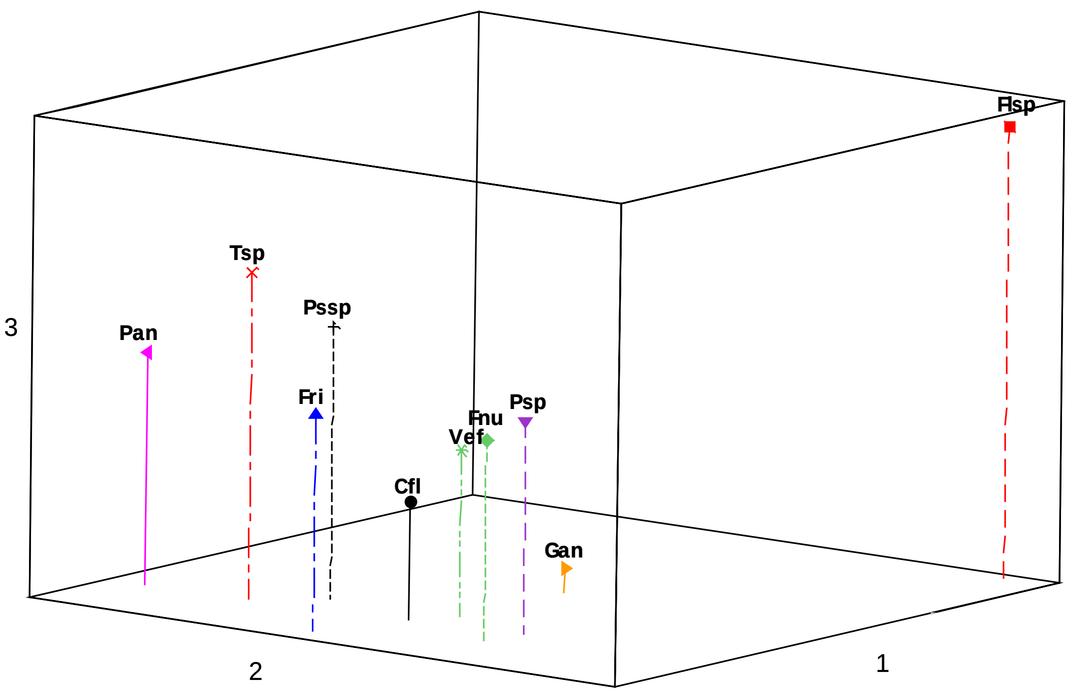

Figure 2. Three-dimensional model using non-metric multidimensional scaling (NMDS) for 10 mollusk taxa based relative abundances at 114 sites in Snake River, Hells Canyon, 2004 (*Pan* = *Potamopyrgus antipodarum*, *T*sp = *Taylorconcha* sp., *Fri* = *Ferrissia rivularis*, *P*ssp = *Pisidium* sp., *Cfl* = *Corbicula fluminea, Vef* = *Vorticifex effusa*, *Fnu* = *Fisherola nuttalli, P*sp = *Physa* sp., *Gan* = *Gonidea angulata, Fl*sp = *Fluminicola* sp.).

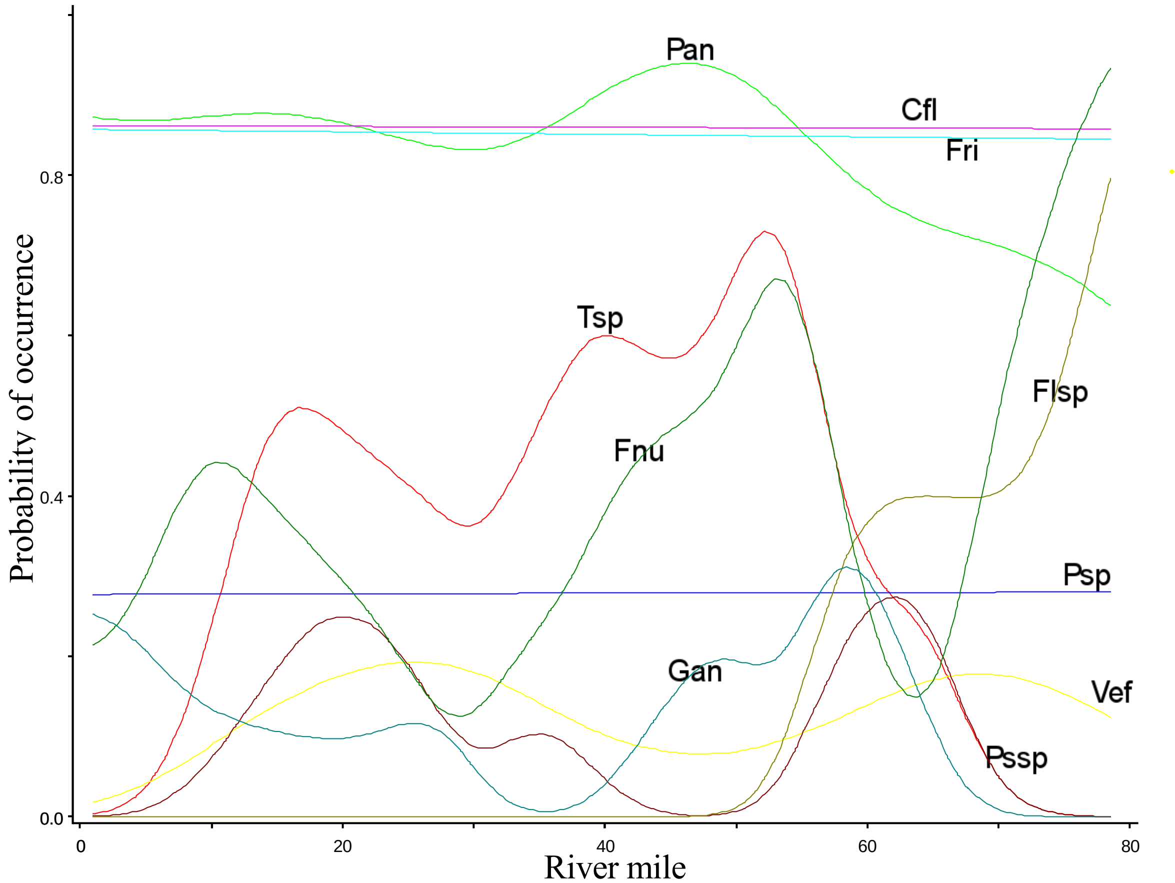

Figure 3. Fitted response curves for probability of occurrence of 10 mollusk taxa in relation to distance (RM) downstream of HC dam. [*Pan* = *Potamopyrgus antipodarum*, *T*sp = *Taylorconcha* sp., *Fri* = *Ferrissia rivularis*, *P*ssp = *Pisidium* sp., *Cfl* = *Corbicula fluminea, Vef* = *Vorticifex effusa*, *Fnu* = *Fisherola nuttalli, P*sp = *Physa* sp., *Gan* = *Gonidea angulata* (based on empty shells*),* *Fl*sp = *Fluminicola* sp.]

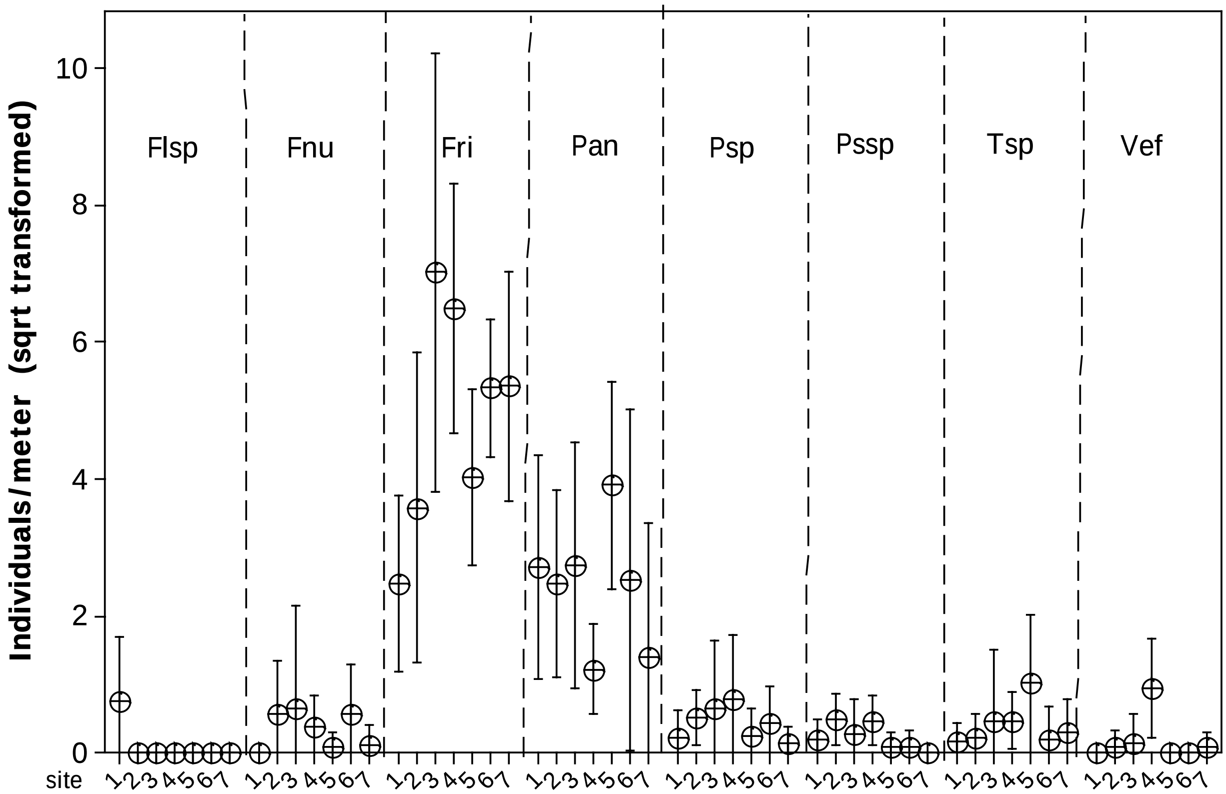

Figure 4. Mean and 95% CI densities (square root transformed) for eight mollusk taxa at seven comparative sites (*N* = five 40-cobble samples/site). Only *F. rivularis* and *P. antipodarum* densities were significantly different between sites using Bonferroni MCT p = 0.05 (*Fl*sp = *Fluminicola* sp., *Fnu* = *Fisherola nuttalli Fri* = *Ferrissia rivularis*, *Pan* = *Potamopyrgus antipodarum*, *P*sp = *Physa* sp., *Ps*sp = *Pisidium* sp., *T*sp = *Taylorconcha* sp., *Vef* = *Vorticifex effusa*).

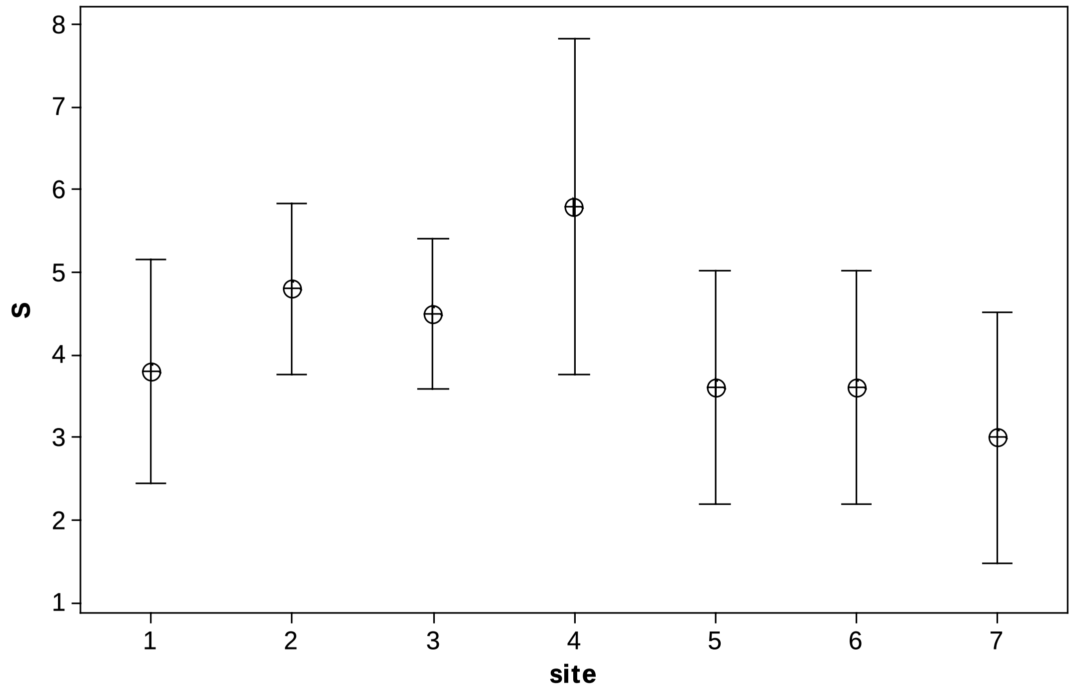

Figure 5. Mean and 95% CIs for mollusk richness (number of taxa, *S*) at seven sites in Hells Canyon, Snake River, 2004 (*N* = five 40-cobble samples/site) (ANOVA site vs. *S*, *p* = 0.01, Bonferroni MCT significant for site 4 vs. site 7).

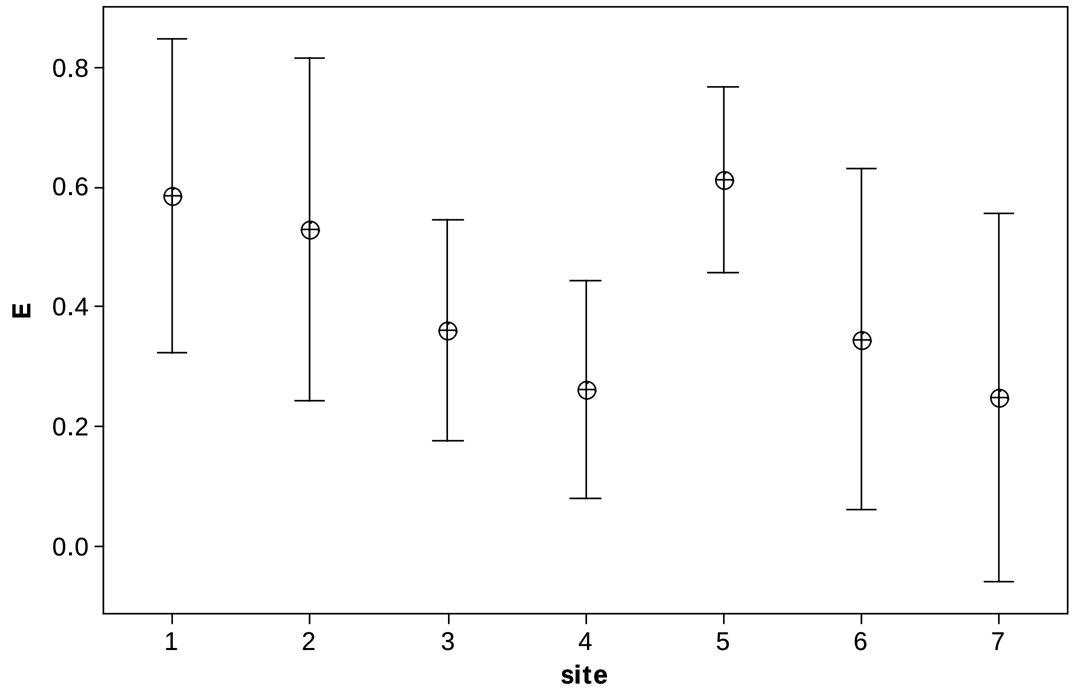

Figure 6. Mean and 95% CIs for mollusk evenness (*E*) at seven sites in Hells Canyon, Snake River, 2004 (*N* = five 40-cobble samples/site) [ANOVA site vs. *E*, *p* = 0.02, Bonferroni MCT marginally significant (p $\leq$ 0.10) for site 4 vs site 5, and site 5 vs. site 7].

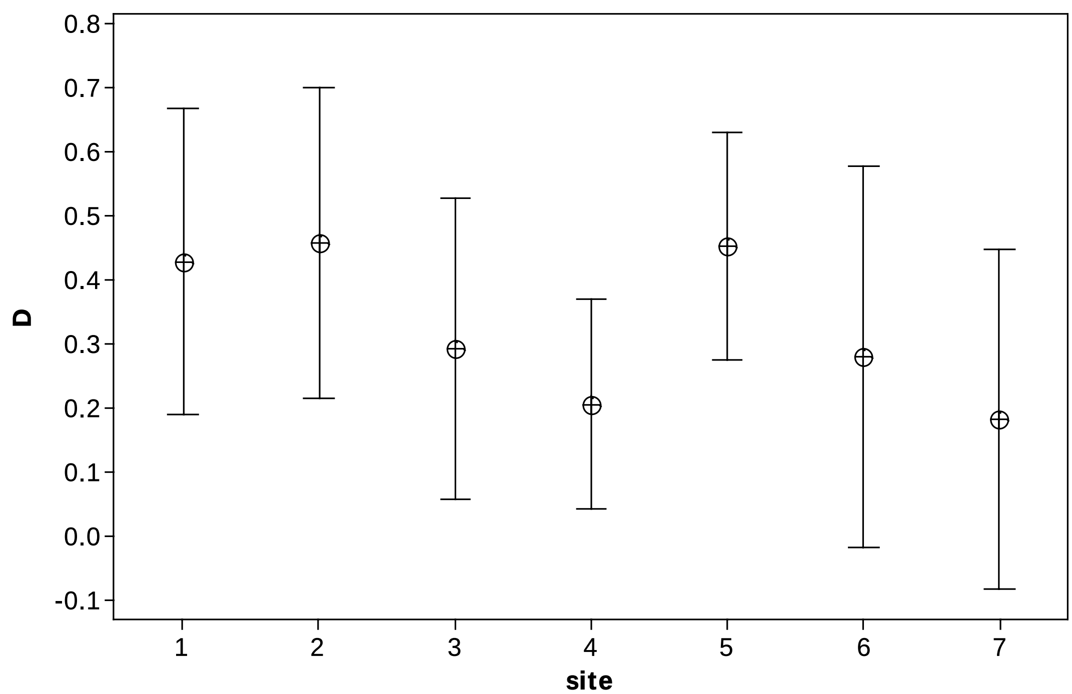

Figure 7. Mean and 95% CIs for mollusk diversity, Simpson's diversity index (*D*) at seven sites in Hells Canyon, Snake River, 2004 (*N* = five 40-cobble samples/site) (ANOVA site vs. *D*, *p* = 0.10).

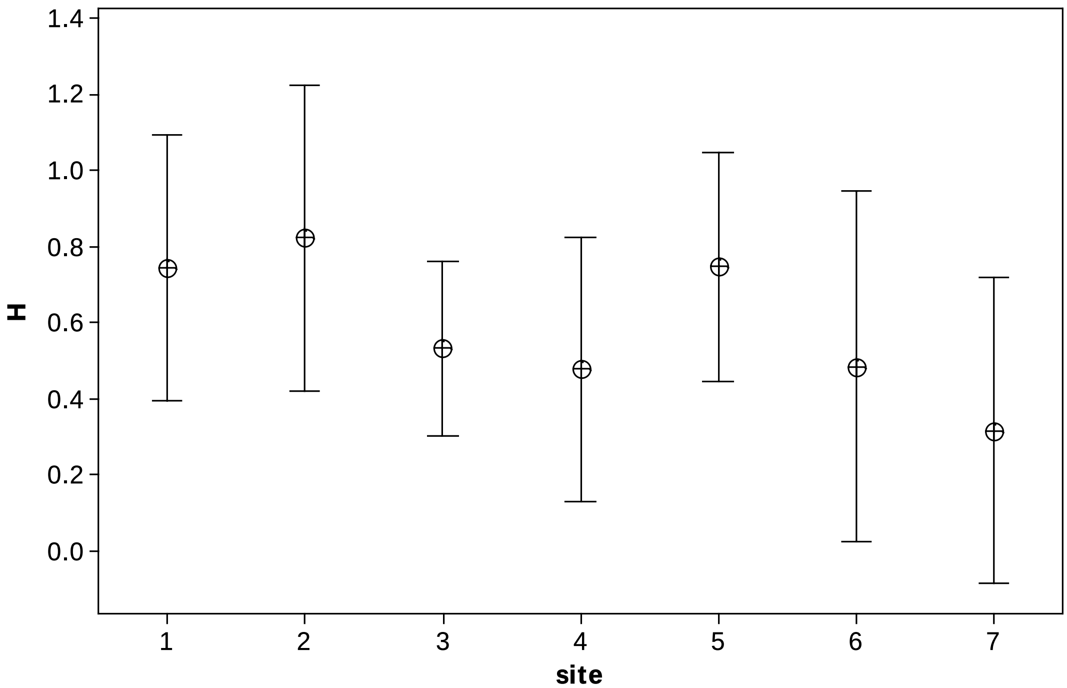

Figure 8. Mean and 95% CIs for mollusk diversity, Shannon diversity index (*H*) at seven sites in Hells Canyon, Snake River, 2004 (*N* = five 40-cobble samples/site) (ANOVA for site vs. *H*, *p* = 0.10).

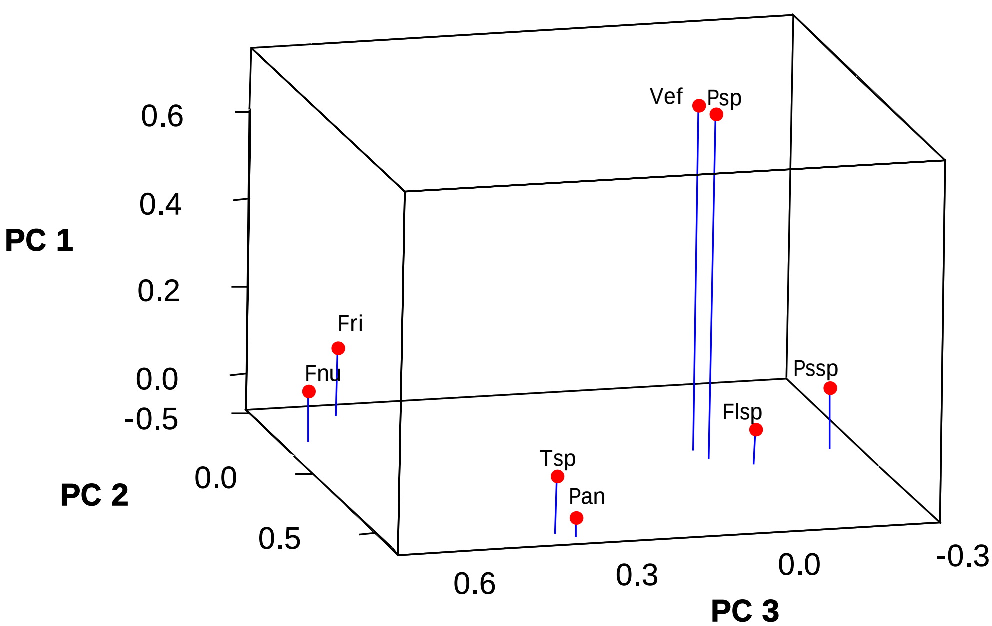

Figure 9. First three principal components for eight mollusk taxa based on densities at seven comparative sites (*N* = 34 samples, densities per 40 cobbles) (cumulative proportion for first three components = 0.484) (*Fnu* = *Fisherola nuttalli*, *Fri* = *Ferrissia rivularis*, *Tsp* = *Taylorconcha* sp., *Pan* = *Potamopyrgus antipodarum*, *Vef* = *Vorticifex effusa*, *Psp* = *Physa* sp., *Flsp* = *Fluminicola* sp., *Pssp* = *Pisidium* sp.).

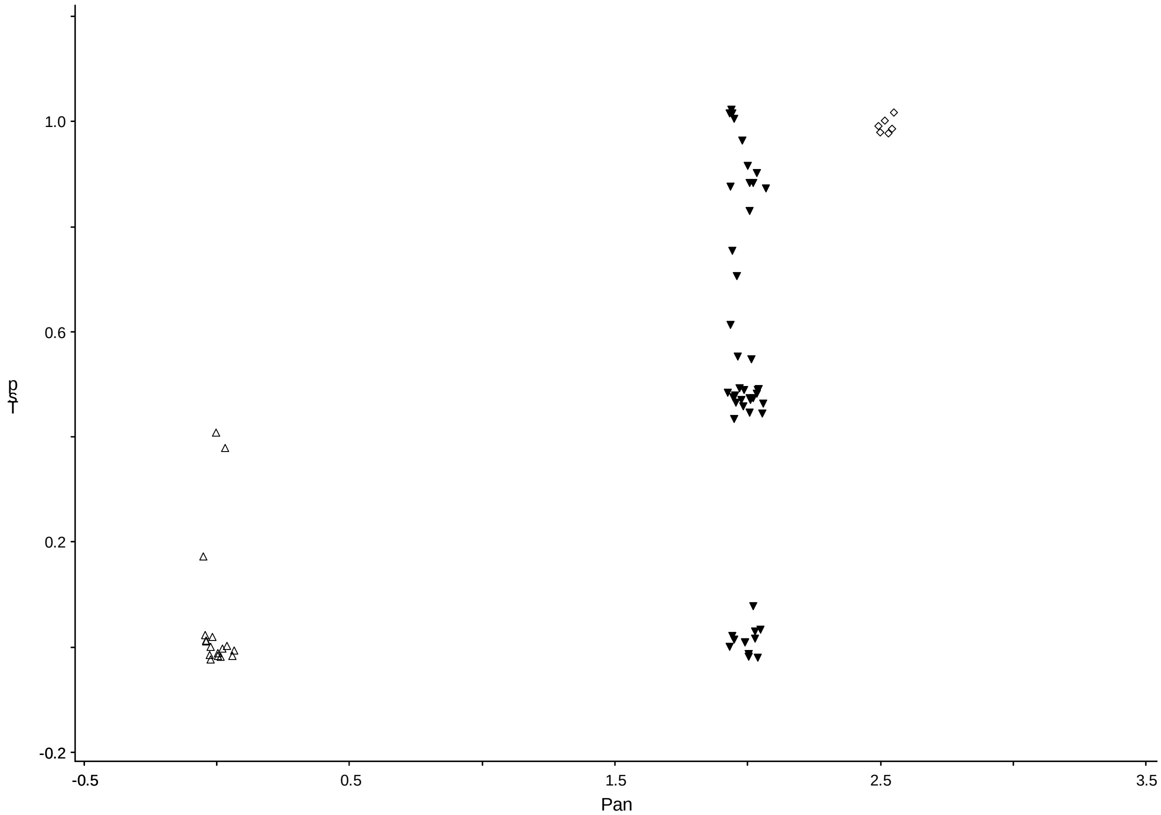

Figure 10. Probability of *Taylorconcha* sp. (Tsp) occurrence in relation to *Potamopyrgus antipodarum* (Pan) relative abundance.

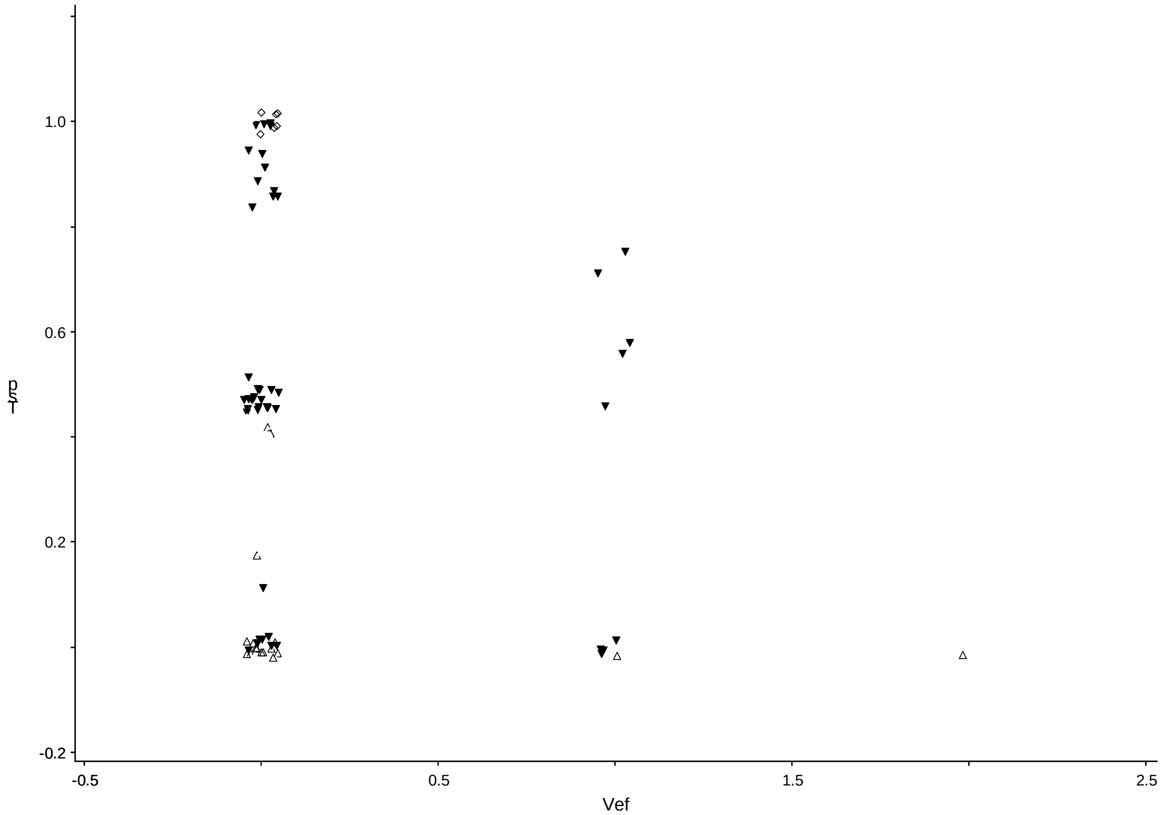

Figure 11. Probability of *Taylorconcha* sp. (Tsp) occurrence in relation to *V. effusa* (Vef) relative abundance.

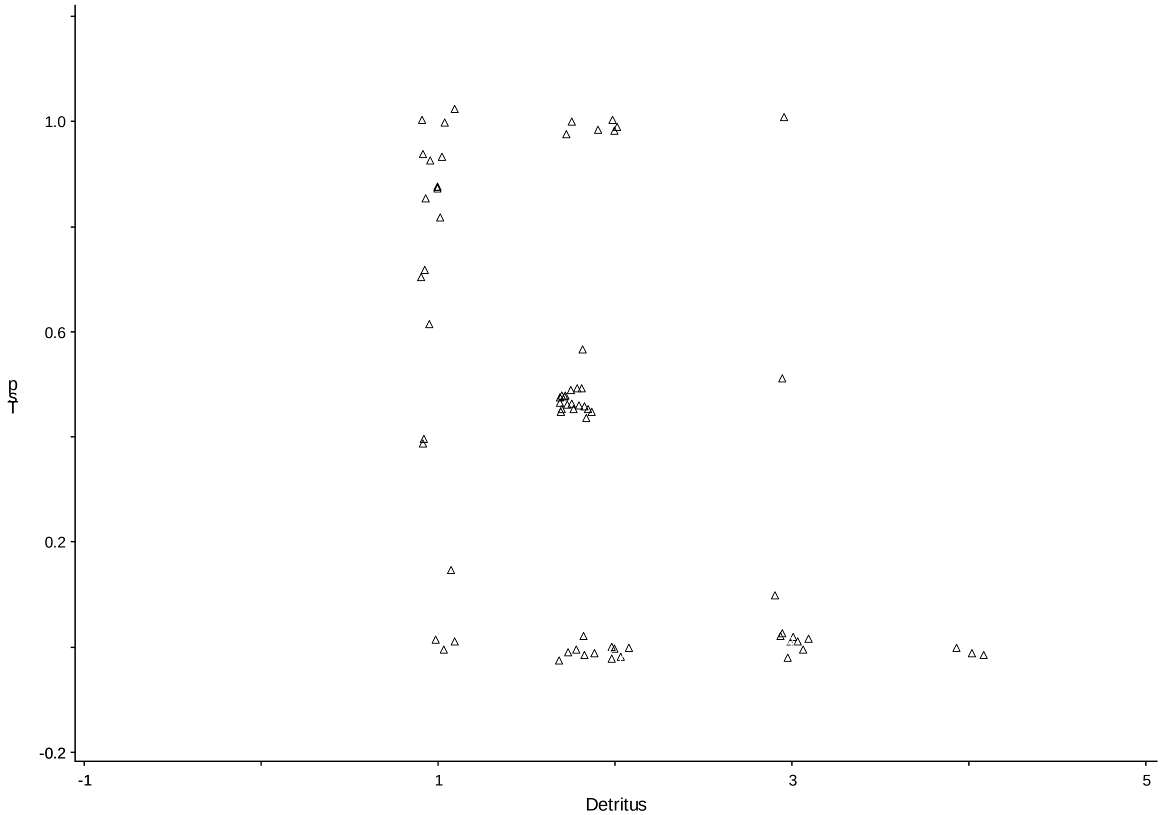

Figure 12. Probability of *Taylorconcha* sp. (Tsp) occurrence in relation to relative abundance of detritus.

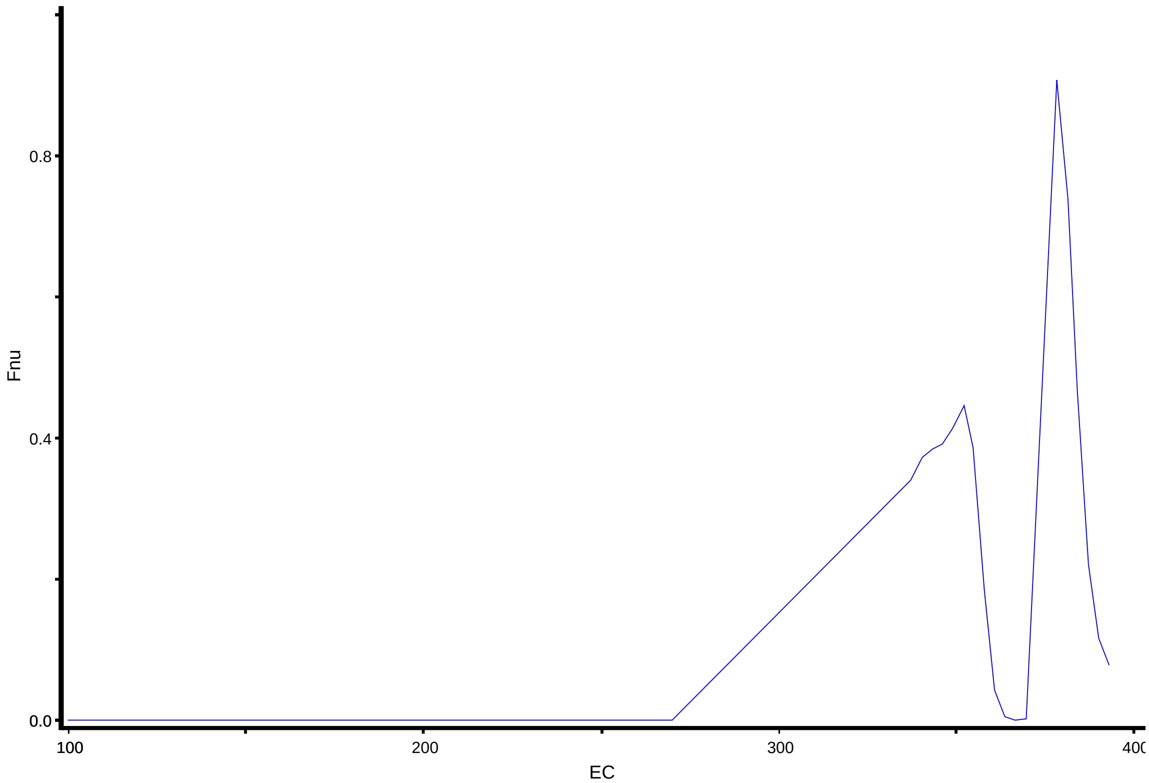

Figure 13. Probability of *Fisherola nuttalli* (Fnu) occurrence in relation to conductivity (EC).

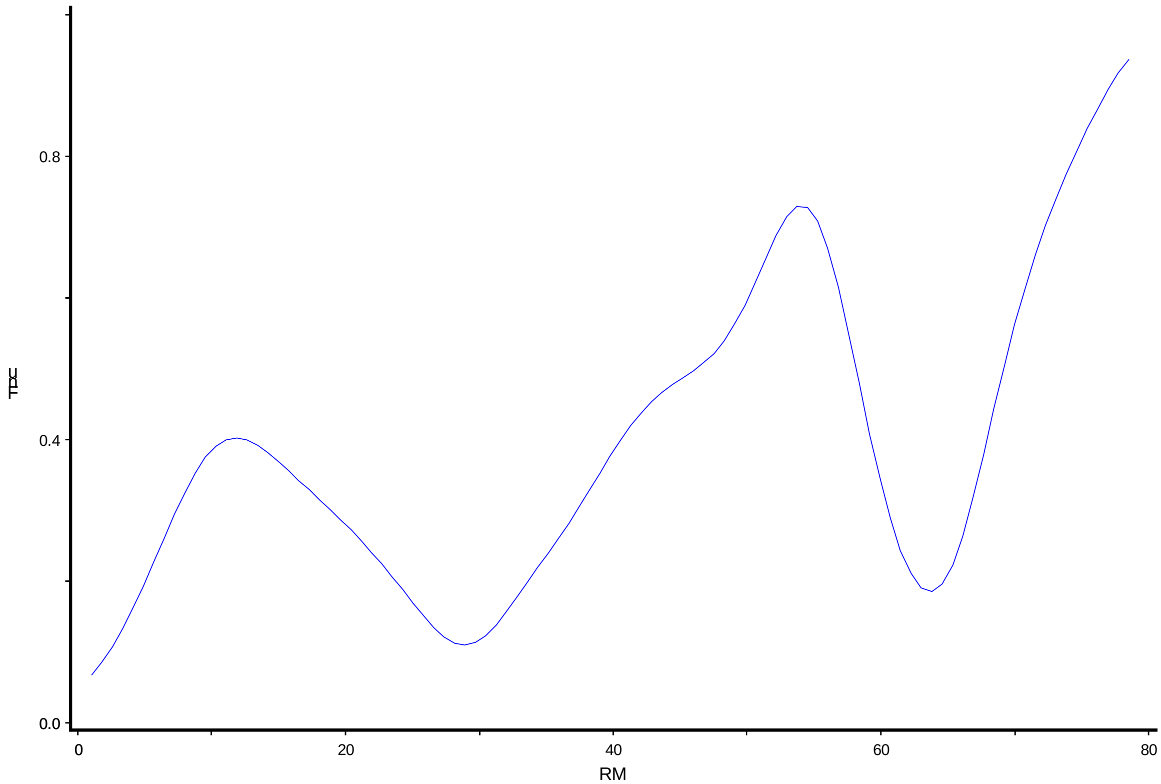

Figure 14. Probability of *Fisherola nuttalli* (Fnu) occurrence in relation to river mile (RM) downstream of HC dam.

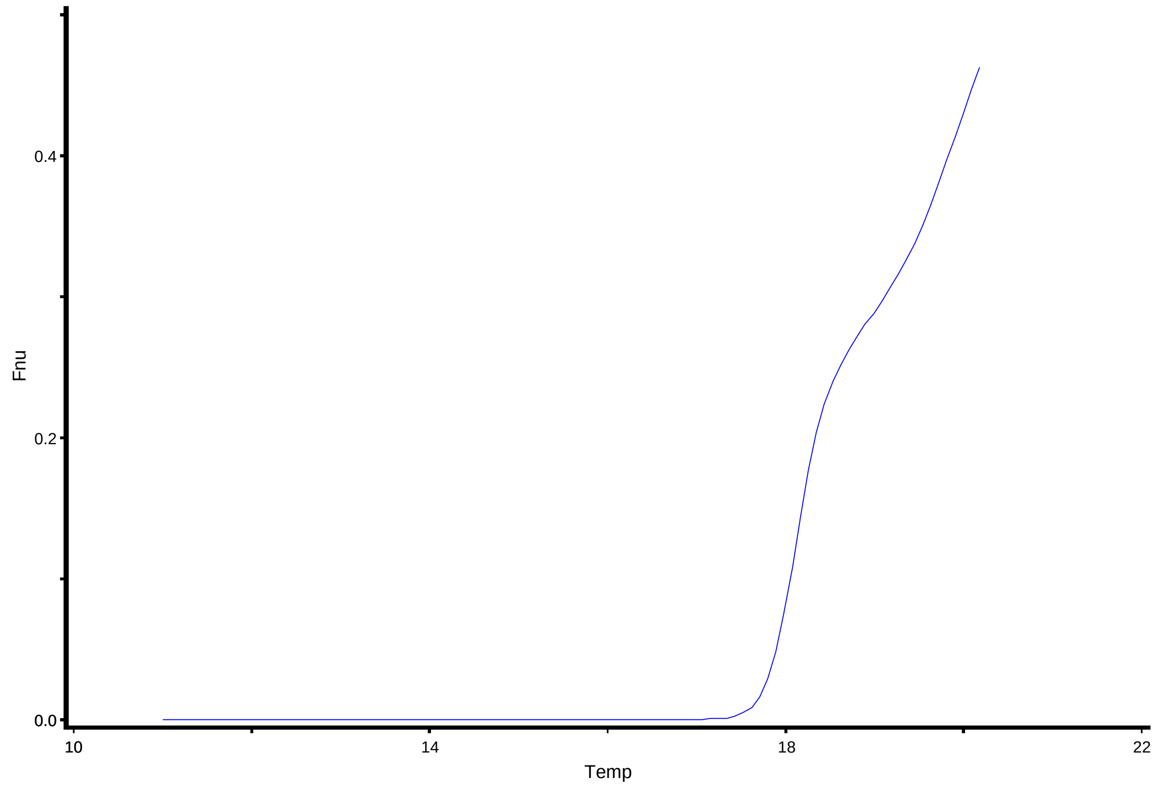

Figure 15. Probability of *Fisherola nuttalli* (Fnu) occurrence in relation to temperature (Temp).

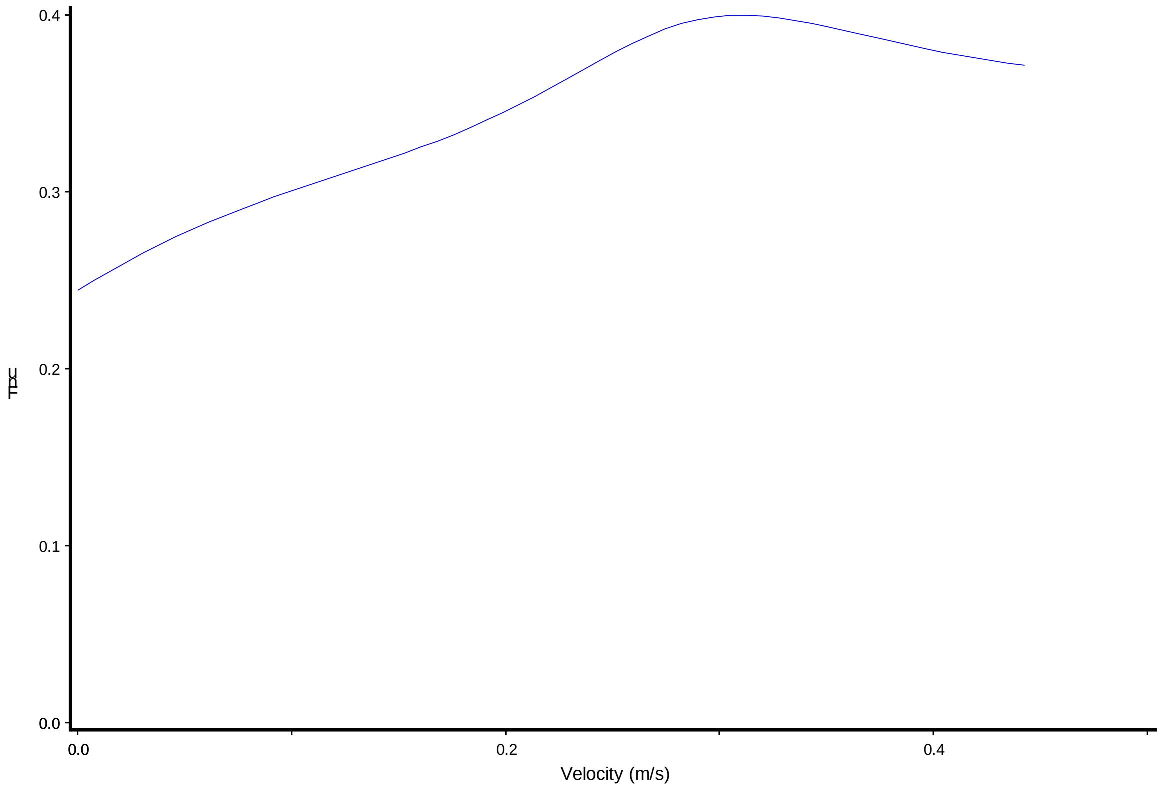

Figure 16. Probability of *Fisherola nuttalli* (Fnu) occurrence in relation to velocity (m/s).

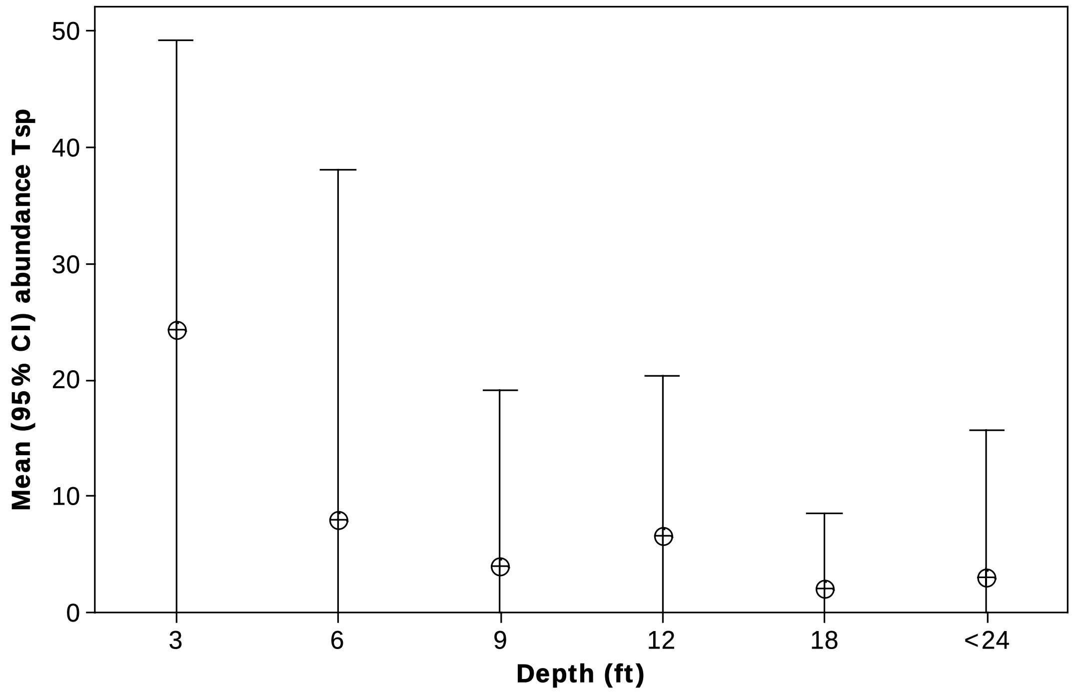

Figure 17. *Taylorconcha* sp. abundance (mean $\pm$ 95% bootstrapped CIs; N = 40 cobbles/depth interval) at six depths in the Snake River, Hells Canyon (with one outlier removed from 12-ft depth). Best-fit regression was *T*sp abundance = 27.47 – 3.12 $\times$ depth + 0.09 $\times$ depth^2, R^2 = 0.52 (p = 0.01).

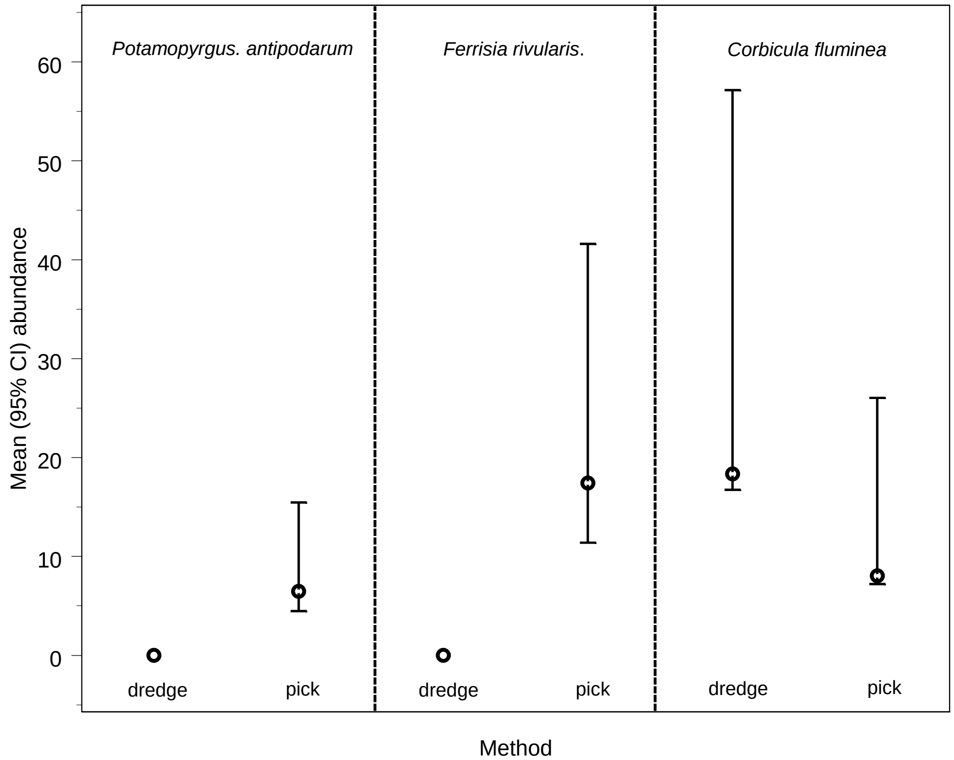

Figure 18. Comparison of suction dredge sampling and handpicking cobbles in a 0.25-m^2 quadrat for *P. antipodarum*, *F. rivularis*, and *C. fluminea* (*N* = 5 samples for each method) (significant difference between handpicking and suction dredge for *P. antipodarum* and *F. rivularis* but not for *C. fluminea*). For comparing methodologies, these three taxa can be used as surrogates for snails, limpets, and bivalves, respectively.

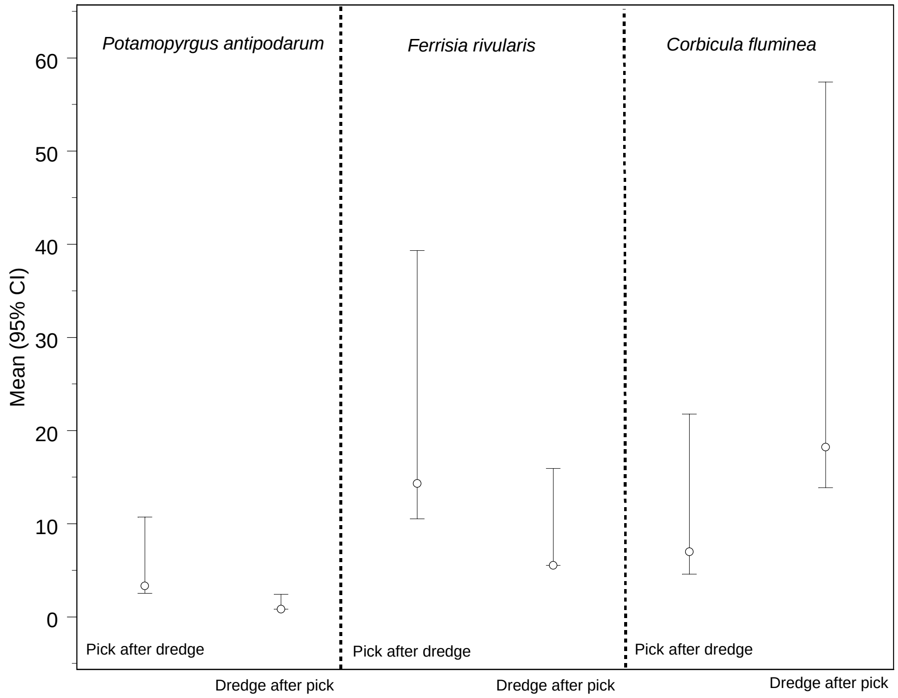

Figure 19. Comparison of mollusks remaining after suction dredge sampling and after handpicking cobbles in a 0.25-m^2 transect (N = 5 samples for each method) (significant difference between picking after dredging and dredging after picking for *P. antipodarum* but not for *F. rivularis* and *C. fluminea*). For comparing methodologies, these three taxa can be used as surrogates for snails, limpets, and bivalves, respectively.

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Figure 20. Underside of a large Snake River cobble showing three *Taylorconcha* sp. living in a fissure in the rock.

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Figure 21. *Potamopyrgus antipodarum* and *Taylorconcha* sp. on the underside of a cobble. *Potamopyrgus antipodarum* is clustered in groups, while a single *Taylorconcha* sp. is disassociated with *P. antipodarum*.

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Figure 22. Atypical *Taylorconcha* sp. habitat. One *Taylorconcha* sp. was found in this stagnant pool near the confluence of the Imnaha and Snake Rivers, Hells Canyon, OR.

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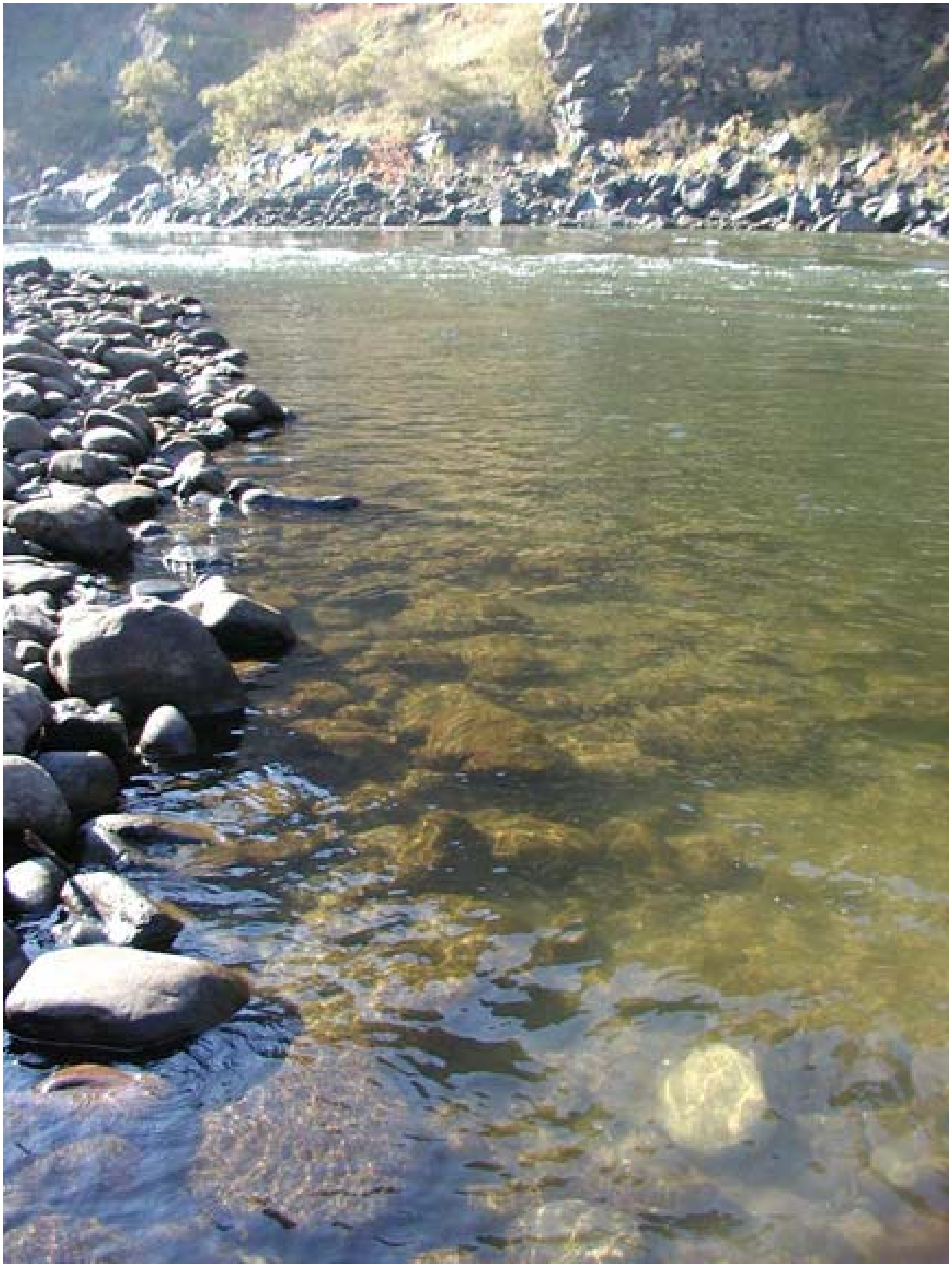

Figure 23. Typical *Taylorconcha* sp. habitat, Snake River, Hells Canyon. *Taylorconcha* sp. would be found on undersides of loose cobbles from the bottom of the photograph up to rapids at the top of the photo. Typically, only one to five *Taylorconcha* sp. individuals would be collected in a site like this using a 40-cobble count sample.

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Figure 24. Granite Creek Rapids with large boulder substrate lateral to rapids. Snake RM 239.15 (OR).

Figure 25. Eddy waters lateral to downstream reach of rapids and downstream of the rock point at head of rapids, Snake RM 214.2 (OR).

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Figure 26. Rush Creek alluvial fan and delta at Snake RM 231.4 (OR).

Figure 27. Back eddy below rapids at Snake RM 240.5 (ID).

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Figure 28. Banks of chutes at Snake RM 215.3 (OR…foreground).

Figure 29. Sheer bedrock walls along deep pools in Hells Canyon at Snake RM 201.9 (OR).

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Figure 30. Low gradient cobble bank at Snake RM 214.35 (OR).

Figure 31. Back eddies and embayments at Snake RM 245.0 (OR).

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Figure 32. Sand bar trending into deep pools at Snake RM 216.4 (OR).

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Appendix A. Non-mollusk invertebrate taxa also collected in association with mollusks in Snake River, Hells Canyon, 2004 (from a 10-cobble scrub).

Taxon	
Acari	*Hydropsyche* sp.
Acentrella insignificans	*Hydroptila* sp.
Asioplax sp.	*Leucotrichia* sp.
Baetis sp.	*Ochrotrichia* sp.
Caecidotea sp.	Oligochaeta
Ceraclea sp.	*Petrophila* sp.
Cheumatopsyche sp.	*Polycentropus* sp.
Chironomidae	*Protoptila* sp.
Crangonyx sp.	*Psephenus* sp.
Erpobdellidae	*Simulium* sp.
Helicopsyche sp.	*Turbellaria*
Heptagenia sp.	*Zaitzevia* sp.
Hyalella sp.	

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Appendix B. Copy of the December 7, 2004, letter from Robert Hershler of Smithsonian National Museum of Natural History.

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December 7, 2004

Ralph Myers
Idaho Power Company
P.O. Box 70
Boise, ID 83707

Dear Ralph:

This is to provide an update regarding progress on our project, "*Genetic Structure of the Bliss Rapids Snail*."

Based on analysis of partial sequences of the mitochondrial cytochrome c oxidase subunit I (COI) gene, the recently discovered populations of *Taylorconcha* from the Owyhee River and Hells Canyon differ from those in the middle Snake River by about 1.00-1.67% (6-11 base pair changes) and form a separate evolutionary clade from the former. This level of divergence is often associated with different species in molecular systematic studies. These two groups are further distinguished from one another by their shells as the Owyhee-Hell Canyon populations have a more globose shape, with well rounded whorls having deep sutures. Our preliminary conclusion based on these observations is that the Owyhee-Hells Canyon snails are not conspecific with the Bliss Rapids Snail but instead represent a second species of *Taylorconcha*.

During the next few months we will be sequencing a nuclear marker (probably ITS1 and ITS2) and performing detailed morphological studies on the newly discovered populations to compare with our previously published description of *T. serpenticola*. Once these data are in hand, we will complete our analyses and arrive at a final decision regarding the taxonomic status of the newly discovered populations.

I hope that this brief letter is sufficient per your needs at this time. If not, please don't hesitate to contact me.

Best Wishes

Robert Hershler
Department of Zoology
Smithsonian Institution
P.O. Box 37012
NHB W-305, MRC 163
Washington, D.C. 20013-7012
phone 202-633-1747
fax 202-357-2343

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Appendix C1. Field data for Mollusk Survey in reservoirs and tributaries 2004

		UTM (unit 11)			
SITE	RM	X-Easting	Y-Northing	Description	DATE
HC-1	248.1	522986	5009103	1rst creek up from HC Dam on OR. Side	9/24/2004
HC-1.1	248.1	522980	5007368		9/24/2004
HC-2.0	250.8	522538	5004873		9/24/2004
HC-2.1	250.8	522959	5004897	Sawpit Creek	9/24/2004
HC-3.0	251.8	522132	5003297	Buck Creek	9/24/2004
HC-4.0	252.8	521595	5001364	Squaw Creek	9/24/2004
HC-5.0	253.8	521498	5000328	Doyle Creek	9/24/2004
HC-6.0	254.4	521280	4999451	Lynch Creek	9/24/2004
HC-6.1	254.4	521621	4999332	Kinney Creek	9/24/2004
HC-7.0	255.8	520713	4997489	Big Bar	9/25/2004
HC-8.0	256.7	51928	4996483	Leep Creek	9/25/2004
HC-8.1	256.7	519779	4996080	Eckels Creek	9/25/2004
HC-9.0	258.4	517948	4994746	Spring Creek	9/25/2004
HC-10.0	259.1	517367	4993928	McGraw Creek	9/25/2004
HC-11.0	259.8	516982	4992870	Nelson Creek	9/25/2004
HC-12.0	260.6	516917	4991702	Copper Creek	9/25/2004
HC-12.1	260.8	516919	4991275	Limepoint Creek	9/25/2004
HC-13.0	261.7	514974	4988413	Ashby Creek	9/25/2004
HC-14.0	264.3	514974	4988413	Herman Creek	9/25/2004
HC-15.0	265.5	512275	4985752	Homestead Creek	9/25/2004
HC-16.0	266.0	512276	4984393	Irondyke Creek	9/25/2004
HC-17.0	266.4	512288	4982952	Holbrook Creek	9/26/2004
HC-18.0	268.9			Hunter Creek	9/26/2004
HC-19.0	269.3	511237	4980431	Hunsaker Creek	9/26/2004
HC-20.0	269.7	511499	4979896	Oxbow Bridge	9/26/2004
OX-1.0	274.6	512135	4977264	Cottonwood Creek	9/26/2004
OX-2.0	275.5	513114	4976458	Warm Springs Creek	9/26/2004
OX-3.0	275.9	513409	4975792	Salt Creek	9/26/2004
OX-4.0	276.0	513428	4975494	Limestone Creek	9/26/2004
OX-6.0	276.9	512989	4974247	Summer Creek	9/26/2004
OX-7.0	277.0	512763	4974389	Unnamed creek	9/26/2004
OX-8.0	277.3	512597	4973561	Unnamed creek	9/26/2004
OX-9.0	278.2	512381	4972185	Williamson Creek	9/26/2004
OX-10.0	278.3	512278	4971730	Cougar Creek	9/26/2004
OX-11.0	279.0	512068	4971121	Jacobs Ladder Creek	9/26/2004
OX-12.0	284.0	511517	4970206	Cliff Creek	9/26/2004

		UTM (unit 11)			
SITE	RM	X-Easting	Y-Northing	Description	DATE
OX-12.1	284.0	511618	4970198	Mid-channel at Cliff Creek	9/27/2004
OX-13.0	280.0	510732	4968657	Eagle Island Creek	9/27/2004
OX-13.1	280.8	510861	4968567	Myra Tree Creek	9/27/2004
OX-14.0	282.8	508439	4966741	Black Canyon Creek	9/27/2004
OX-15.0	283.4	508209	4966234	Wildhorse Creek	9/27/2004
BR-1.0	284.0	507958	4964055	Dukes Creek	9/27/2004
BR-2.0	285.5	507801	4963293	Board Gulch	9/27/2004
BR-3.0	287.0	505423	4961788	Road Canyon Creek	9/27/2004
BR-4.0	287.3	504822	4960782	Ferry Canyon	9/27/2004
BR-5.0	287.4	506895	4959205	Brownlee Creek	9/27/2004
BR-6.0	289.5	503851	4957488	Spring Creek	9/27/2004
BR-7.0	291.3	502329	4956915	Cove Creek	9/27/2004
BR-7.1	291.3	501948	4957776	Cool Cove Creek	9/27/2004
BR-8.0	293.7	499142	4954863	Cottonwood Creek	9/28/2004
BR-9.0	294.5	498017	4955868	Robinete Creek/Tartar Gulch	9/28/2004
BR-10.0	2.5	495248	4957313	Timber Canyon (in Powder River Arm)	9/28/2004
BR-11.0	4.0	492210	4957353	4 mi up Powder River Arm	9/28/2004
BR-12.0	5.0	490873	4957031	5 mi up Powder River Arm	9/28/2004
BR-13.0		489841	4955686	1/2 mi up from Boat launch in Powder R. Arm	9/28/2004
BR-14.0		488944	4955737	2 mi up from Boat launch in Powder R. Arm	9/28/2004
BR-15.0	297.4	495802	4952067	Jackson Gulch (Jack's Gulch)	9/28/2004
OX-16.0	284.3			Brownlee Dam and Tailrace	9/29/2004
HC-22.0	272.6			Oxbow Bypass at spillway	9/29/2004
HC-21.0	271.5	513618	4981054	Oxbow Bypass at Indian Creek	9/29/2004
SR-.5	247.5			Hells Canyon Tailrace	9/30/2004
SR-1.0	246.6	524013	5011406	Above Cliff Rapids	9/30/2004
SR-2.0	245.7	524807	5012608	Lake Bar Lake/Within inlet creek	9/30/2004
SR-2.5	243.7	525705	5013839	Cobbley Point Rapids	9/30/2004
SR-3.0	242.4	525565	5017697	Battle Cr.	9/30/2004
HC-20.5	269.7	511516	4979836	Pine Creek	10/1/2004
HC-20.7	270.4	512442	4980256	Middle of Oxbow Bypass	10/1/2004
BR-16.0	298.5	495456	4950548	unnamed creek	10/2/2004
BR-17.0	299.6	494713	4949208	Lone Pine Gulch	10/2/2004
BR-18.0	300.8	494399	4947610	Sturgill Creek	10/2/2004
BR-19.0	301.7	493601	4946034	Lick Creek	10/2/2004
BR-20.0	302.7	492051	4945091	unnamed creek	10/2/2004
BR-21.0	303.2	492919	4944152	Sheep Creek	10/2/2004
BR-22.0	304.6	492232	4942242	unnamed creek	10/2/2004

		UTM (unit 11)			
SITE	RM	X-Easting	Y-Northing	Description	DATE
BR-23.0	305.1	491021	4941751	Canyon Creek	10/2/2004
BR-24.0	305.9	491105	4940470	unnamed creek	10/2/2004
BR-25.0	306.7	490730	4939469	Wayle Creek	10/2/2004
BR-25.1	306.7	490132	4939577	unnamed creek	10/2/2004
BR-26.0	306.8	490055	4939277	unnamed creek	10/2/2004
BR-27.0	307.5	489894	4938263	Soda Creek	10/2/2004
BR-28.0	308.7	490642	4936762	Raft Creek	10/2/2004
BR-29.0	310.2	488204	4934855	Little Deacon Creek	10/2/2004
BR-30.0	310.6	489157	4934255	Dennnett Creek	10/2/2004
BR-31.0	312.9	488209	4930430	Sumac Creek	10/2/2004
BR-32.0	314.1	486670	4929361	Wolf Creek	10/2/2004
BR-33.0	314.3	485707	4930406	Conner Creek	10/2/2004
BR-34.0	314.7	485833	4929241	Trail Creek	10/2/2004
BR-35.0	315.2	484646	4929185	Fox Creek	10/2/2004
BR-36.0	317.1	483748	4926478	Hibbard Creek	10/3/2004
BR-37.0	318.2	482223	4925808	Morgan	10/3/2004
BR-38.0	319.5	482152	4923778	Bayhorse Creek	10/3/2004
BR-39.0	320.0	483436	4923439	Cobble Creek	10/3/2004
BR-40.0	325.5	480588	4915342	unnamed creek	10/3/2004
BR-41.0	327.7	481619	4912119	Burnt River	10/3/2004
BR-42.0	328.3	482907	4911599	unnamed creek	10/3/2004
BR-43.0	330.2	484778	4909368	Grouse Creek	10/3/2004

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Appendix C2. Field data for Mollusk Survey in reservoirs and tributaries 2004 (ponar depths are in feet).

	Ponar 1					Ponar 2		
SITE	**Depth**	**Substrate**	**Substrate**	**Taxon**	**Number**	**Depth**	**Substrate**	**Substrate**
HC-1	40	CG		NONE	NONE	36	SAND	SILT
HC-1.1	190	SILT		NONE	NONE	100	COBBLE	
HC-2.0	16	CG		NONE	NONE	20	FG	
HC-2.1	29	CG		NONE	NONE	22	CG	
HC-3.0	55	FG	FINES	NONE	NONE	20	SILT	SAND
HC-4.0	47	SAND	SILT	Sphaeriidae	2	46	SILT	
HC-5.0	19	CG	FG/SAND	NONE	NONE	20	FG	SAND
HC-6.0	37	SAND	SILT	NONE	NONE	19	SAND	
HC-6.1	40	CG	FG	Corbicula	1	64	SAND	FG
HC-7.0	15	SILT	FG	NONE	NONE	29	SILT	FG
HC-8.0	19	SILT	SAND	NONE	NONE	30	SILT	
HC-8.1	16	SILT		NONE	NONE	16	SILT	SAND
HC-9.0	20	SILT	SAND	NONE	NONE	11	SAND	CG
HC-10.0	60	SILT	SAND	NONE	NONE	50	SILT	SAND
HC-11.0	10	CG		NONE	NONE	4	FG	SAND
HC-12.0	17	SILT	CPOM	NONE	NONE	10	CG	SAND
HC-12.1	3	SILT		NONE	NONE	9.8	SILT	
HC-13.0	20	SILT	CPOM	NONE	NONE	12	SAND	FG
HC-14.0	20	SILT	CPOM	NONE	NONE	23	SILT	SAND
HC-15.0	NO PONAR GRAB TAKEN AT THIS SITE							
HC-16.0	9	NOTHING		NONE	NONE	45	NOTHING	
HC-17.0	14	SILT	SAND	NONE	NONE	10	SILT	
HC-18.0	FOUR PONAR ATTEMPTS YIELDED NO SUBSTRATE							
HC-19.0	EIGHT PONAR ATTEMPTS IN MID-CHANNEL YIELDED NO SUBSTRATE							
HC-20.0	8 PONAR GRABS YIELDED NO SAMPLE							
OX-1.0	NO PONAR GRABS AT THIS SITE							
OX-2.0	NO PONAR GRABS AT THIS SITE							
OX-3.0	3	SILT		NONE	NONE	20	SILT	CPOM
OX-4.0	10	SILT	SAND	Potamopyrgus	1	7	SILT	SAND
OX-5.0	NO PONAR GRABS AT THIS SITE							
OX-6.0	NO PONAR GRABS AT THIS SITE							
OX-7.0	NO PONAR GRABS AT THIS SITE							
OX-8.0	NO PONAR GRABS AT THIS SITE							
OX-9.0	7	SAND		NONE	NONE	2	SILT	SAND
OX-10.0	NO PONAR GRABS AT THIS SITE							
OX-11.0	NO PONAR GRABS AT THIS SITE							

	Ponar 1					Ponar 2		
SITE	Depth	Substrate	Substrate	Taxon	Number	Depth	Substrate	Substrate
OX-12.0	10	SAND	FG	NONE	NONE	11	SAND	FG
OX-12.1	6 attempts at ponar samples and no successful grabs							
OX-13.0	10	SILT	FPOM	NONE	NONE	9	SILT	FPOM
OX-13.1	13	SAND	FG	NONE	NONE	9	SILT	SAND
OX-14.0	PONARS YIELDED NO SUBSTRATE							
OX-15.0	NO PONAR GRABS AT THIS SITE							
BR-1.0	NO PONAR GRABS AT THIS SITE							
BR-2.0	NO PONAR GRABS AT THIS SITE							
BR-3.0	NO PONAR GRABS AT THIS SITE							
BR-4.0	NO PONAR GRABS AT THIS SITE							
BR-5.0	5	SILT	FPOM	NONE	NONE	6	SILT	FPOM
BR-6.0	NO PONAR GRABS AT THIS SITE							
BR-7.0	6	SILT	SAND	NONE	NONE	15	SILT	SAND
BR-7.1	NO PONAR GRABS AT THIS SITE							
BR-8.0	12	SAND	FG	NONE	NONE	8	SILT	SAND
BR-9.0	8	FPOM	CPOM	Gyraulus	1	5	SAND	FG
BR-10.0	9	SAND	FG	NONE	NONE	5	SILT	SAND
BR-11.0	8	SILT	FPOM	NONE	NONE	10	SILT	FPOM
BR-12.0	NO PONAR GRABS AT THIS SITE							
BR-13.0	NO PONAR GRABS AT THIS SITE							
BR-14.0	NO PONAR GRABS AT THIS SITE							
BR-15.0	NO PONAR GRABS AT THIS SITE							
OX-16.0	NO PONAR GRABS AT THIS SITE					Diving along downStream face of Brownlee Dam		
HC-22.0	NO PONAR GRABS AT THIS SITE					downStream to mouth of Wildhorse Creek.		
						No T&E molluscs or native mussels found in the entire stretch.		
						1.5 hours of diving per diver (2 divers).		
HC-21.0	NO PONAR GRABS AT THIS SITE					Diving 50m upStream and downStream of mouth		
SR-.5	NO PONAR GRABS AT THIS SITE					Diving oppisite mouth of Deep Cr.		
SR-1.0	NO PONAR GRABS AT THIS SITE					Diving on OR. Side, within large eddy before rapids		
SR-2.0	NO PONAR GRABS AT THIS SITE					Diving along shore below rapids		
SR-2.5	NO PONAR GRABS AT THIS SITE							
SR-3.0	NO PONAR GRABS AT THIS SITE					Dive along shore, out to 10m.		

	Ponar 1					Ponar 2		
SITE	**Depth**	**Substrate**	**Substrate**	**Taxon**	**Number**	**Depth**	**Substrate**	**Substrate**
HC-20.5	NO PONAR GRABS AT THIS SITE							
HC-20.7	NO PONAR GRABS AT THIS SITE							
BR-16.0	4	FG	SAND	NONE	NONE	8	CG	SC
BR-17.0	NO PONAR GRABS AT THIS SITE							
BR-18.0	3	SAND	FG	NONE	NONE	4	LC	
BR-19.0	8	FG	SAND	NONE	NONE	6	CG	SAND
BR-20.0	NO PONAR GRABS AT THIS SITE							

SITE	Ponar 1 Depth	Ponar 1 Substrate	Ponar 1 Substrate	Taxon	Number	Ponar 2 Depth	Ponar 2 Substrate
BR-21.0	8	SAND	FG	NONE	NONE	10	FG
BR-22.0	NO PONAR GRABS AT THIS SITE						
BR-23.0	8	FG	SAND	Valvata?	1	11	FG
BR-24.0	NO PONAR GRABS AT THIS SITE						
BR-25.0	8	FG	SAND	Gyraulus	1	6	SAND
BR-25.1	6	SAND	FG	?	1	8	SAND
BR-26.0	9	SILT	SAND	Lymnaidae	shell	6	SAND
				Physa	shell		
BR-27.0	6	SAND	FG	NONE	NONE	10	SILT
BR-28.0	9	SILT	FPOM	Potamopyrgus	1	7	CG
BR-29.0	NO PONAR GRABS AT THIS SITE						
BR-30.0	6.5	SILT	SAND	NONE	NONE	9.5	FG
BR-31.0	NO PONAR GRABS AT THIS SITE						
BR-32.0	5	SILT	SAND	Physa shell		9	SAND
				Lymnaidae shell			
				Gyraulus shell			
BR-33.0	NO PONAR GRABS AT THIS SITE						
BR-34.0	NO PONAR GRABS AT THIS SITE						
BR-35.0	8	SILT	FPOM	NONE	NONE	12	SILT
BR-36.0	NO PONAR GRABS AT THIS SITE						
BR-37.0	9	SAND	FG	?Valvata shells		9	SAND
BR-38.0	NO PONAR GRABS AT THIS SITE						
BR-39.0	4.7	SILT	FPOM	NONE	NONE	4.4	SILT
BR-40.0	NO PONAR GRABS AT THIS SITE						
BR-41.0	10	SILT		Sphaeriidae	several	12	SILT
BR-42.0	NO PONAR GRABS AT THIS SITE						
BR-43.0	NO PONAR GRABS AT THIS SITE						

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Appendix C3. Field data for Mollusk Survey in reservoirs and tributaries 2004.

			COBBLE PICK (20 COBBLES)		
SITE	**Taxon**	**Number**	**Taxon**	**Number**	
HC-1	NONE	NONE	Physa	5	
HC-1.1					
HC-2.0	NONE	NONE	Physa	10	
HC-2.1	NONE	NONE	Physa	8	
HC-3.0	NONE	NONE	Gyraulus	5	
HC-4.0	NONE	NONE	Gyraulus	4	
HC-5.0	NONE	NONE	Gyraulus	6	
HC-6.0	NONE	NONE	Physa	2	
			Gyraulus	2	
HC-6.1	NONE	NONE	Physa	2	
			Lymnaidae	28	
HC-7.0	NONE	NONE	Physa	1	
			Gyraulus	4	
HC-8.0	NONE	NONE	Gyraulus	4	
HC-8.1	NONE	NONE	Gyraulus	1	
HC-9.0	NONE	NONE	Physa	2	
			Gyraulus	1	
HC-10.0	NONE	NONE	NONE	NONE	
HC-11.0	NONE	NONE	Physa	2	
			Gyraulus	3	
HC-12.0	NONE	NONE	Physa	2	
			Gyraulus	3	
HC-12.1	NONE	NONE	NO COBBLE SAMPLE COLLECTED		
HC-13.0	NONE	NONE	Physa	9	
			Gyraulus	4	
HC-14.0	NONE	NONE	Physa	11	
			Gyraulus	1	
HC-15.0			NO COBBLE SAMPLE COLLECTED		
HC-16.0	Tiny bivalves	2	NO COBBLE SAMPLE		
HC-17.0	NONE	NONE	NONE	NONE	NONE
HC-18.0			NONE	NONE	
HC-19.0			NO COBBLE SAMPLE TAKEN - FULL POOL		
HC-20.0			NO COBBLE SAMPLE TAKEN		
OX-1.0			UND'T	12	
OX-2.0			Potamopyrgus	5	
			Physa	3	
			Gyraulus	10	
			Physa	2	(in creek)
OX-3.0	NONE	NONE	Physa	16	(in creek)
OX-4.0	NONE	NONE	Potamopyrgus		
			Gyraulus		
			Physa		

			COBBLE PICK (20 COBBLES)	
SITE	Taxon	Number	Taxon	Number
OX-5.0			Physa	2
			Potamopyrgus	2
OX-6.0			NO COBBLE SAMPLE TAKEN	
OX-7.0			NO COBBLE SAMPLE TAKEN	
OX-8.0			NO COBBLE SAMPLE TAKEN	
OX-9.0	NONE	NONE	NO COBBLE SAMPLE TAKEN	
OX-10.0			NO COBBLE SAMPLE TAKEN	
OX-11.0			NO COBBLE SAMPLE TAKEN	
OX-12.0	NONE	NONE	NO COBBLE SAMPLE TAKEN	
OX-12.1			NO COBLE SAMPLE TAKEN	
OX-13.0	NONE	NONE	NO COBBLE SAMPLE TAKEN	
OX-13.1	NONE	NONE	Gyraulus	2
			Physa	1
OX-14.0			Gyraulus	32
			Physa	2
			Potamopyrgus	14
OX-15.0			Potamopyrgus	
			Ferrisia	
BR-1.0			NONE	
BR-2.0			NONE	
BR-3.0			TINY mollusc	
BR-4.0			NO COBBLE SAMPLE TAKEN	
BR-5.0	NONE	NONE	Physa	MANY
BR-6.0			NO COBBLE SAMPLE TAKEN	
BR-7.0	NONE	NONE	Physa	2
BR-7.1			NONE	
BR-8.0	NONE	NONE	Physa	2
BR-9.0	NONE	NONE	NONE	
BR-10.0	NONE	NONE	NONE	
BR-11.0	NONE	NONE	NONE	
BR-12.0			NONE	
BR-13.0			NONE	
BR-14.0			Physa	few
			Unknown	
BR-15.0			NO COBBLE SAMPLE TAKEN	
OX-16.0				
HC-22.0			Physa	
			Gyraulus	

SITE	Taxon	Number	COBBLE PICK (20 COBBLES) Taxon	Number	
			Potamopyrgus		
			Corbicula		
HC-21.0			Physa		
SR-.5					
			COBBLE PICK (20 COBBLES)		
SITE	Taxon	Number	Taxon	Number	
SR-1.0			Unknown	~6	
SR-2.0			Gyraulus		
			Ferrisia		
			Corbicula		
			Potamopyrgus-In Creek		
SR-2.5			Potamopyrgus		
			Physa		
			Ferrisia		
SR-3.0			Physa		
			Unknown		
			Gyraulus		
			Potamopyrgus		
			Gonidia (shell)		From Dive
			Corbicula		From Dive
HC-20.5			Ferrisia		
			Physa		
HC-20.7			Physa		
			Gyraulus		
			Potamopyrgus		
BR-16.0	NONE	NONE	NONE		
BR-17.0			NO COBBLE SAMPLE TAKEN		
BR-18.0	NONE	NONE	NONE		
BR-19.0	NONE	NONE	NONE		
BR-20.0			NO COBBLE SAMPLE TAKEN		
BR-21.0	NONE	NONE	NO COBBLE SAMPLE TAKEN		
BR-22.0			NO COBBLE SAMPLE TAKEN		
BR-23.0	NONE	NONE	Gyraulus	1	
BR-24.0			NO COBBLE SAMPLE TAKEN		

			COBBLE PICK (20 COBBLES)		
SITE	**Taxon**	**Number**	**Taxon**	**Number**	
BR-25.0	NONE	NONE	Physa	1	
			Potamopyrgus	1	
			unknown	1	
BR-25.1	NONE	NONE	unknown	several	
BR-26.0	NONE	NONE	Lymnaeidae	several	
			?Hydrobiidae	1	
			Physa		
BR-27.0	NONE	NONE	NONE		
BR-28.0	NONE	NONE	Physa	3	
BR-29.0			NO COBBLE SAMPLE TAKEN		
BR-30.0	NONE	NONE	unknown		1
BR-31.0			NO COBBLE SAMPLE TAKEN		
BR-32.0	NONE	NONE	NONE		
BR-33.0			NONE		
BR-34.0			NO COBBLE SAMPLE TAKEN		
BR-35.0	NONE	NONE	NO COBBLE SAMPLE TAKEN		
BR-36.0			NO COBBLE SAMPLE TAKEN		
BR-37.0	NONE	NONE	NONE		
BR-38.0			NO COBBLE SAMPLE TAKEN		
BR-39.0	NONE	NONE	Physa		several
BR-40.0			unknown		several
BR-41.0	NONE	NONE	Anodonta		see notes
			Gonidea		see notes
BR-42.0			NO COBBLE SAMPLE TAKEN		
BR-43.0			NO COBBLE SAMPLE TAKEN		

Appendix C4. Field data for Mollusk Survey in reservoirs and tributaries 2004

SITE	Temp	Cond	DO	pH	Photo #
HC-1	19.62	403	5.52	7.83	075;076
HC-1.1					No photo
HC-2.0	19.64	407	5.88	7.98	No photo
HC-2.1	19.6	407	5.75	8.14	No photo
HC-3.0	19.57	408	6.34	8.47	No photo
HC-4.0	19.54	409	5.65	8.4	77
HC-5.0	19.94	410	6.9	8.55	78
HC-6.0	20.07	411	6.7	8.87	79
HC-6.1	19.77	412	6.2	8.82	82
HC-7.0	19.54	412	6.78	8.13	087;088
HC-8.0	19.39	415	6.05	8.01	89
HC-8.1	19.31	413	5.58	7.91	90
HC-9.0	12.1	214	9.2	9.05	091;092;093
HC-10.0	19.57	417	5.4	7.97	94
HC-11.0	19.38	418	5.3	8.24	95
HC-12.0	19.9	417	6.5	8.58	96;97;98;99
HC-12.1	20.05	418	5.89	8.77	100;101
HC-13.0	19.29	421	4.38	8.52	102;103
HC-14.0	15.27	197	8.74	8.7	104;105
HC-15.0					107;108
HC-16.0	19.5	420	5.56	8.57	109;110
HC-17.0	19.09	422	5.24	7.82	114
HC-18.0	11.85	215	9.3	9.3	115;116
HC-19.0	NO CHEMISTRY TAKEN				117
HC-20.0					
OX-1.0	NO CHEMISTRY DUE TO LOCATION AT CULVERT				118:119
OX-2.0	19.28	433	5.55	8.44	120:121:122:123:124
OX-3.0	13.53	327	9.05	9.16	125
OX-4.0	19.27	427	5.46	8.96	126;127
OX-5.0	15.13	247	8.55	9.6	128;129
OX-6.0	NO CHEMISTRY TAKEN				130
OX-7.0					132
OX-8.0	NO CHEMISTRY TAKEN				131
OX-9.0	19.75	433	5.1	8.82	133
OX-10.0	NO CHEMISTRY TAKEN				134
OX-11.0	NO CHEMISTRY TAKEN				135;136
OX-12.0	18.9	438	4.77	8.67	137

SITE	Temp	Cond	DO	pH	Photo #
OX-12.1					138
OX-13.0	18.4	439	4.3	8.32	139
OX-13.1	18.47	441	4	8.74	140
OX-14.0	19.15	439	4.9	8.69	141
OX-15.0	13.47	186	9.7	9.67	142;143;144;145
BR-1.0	13	318	9.76	9.35	146;147
BR-2.0	14.24	307	9.48	9.73	148
BR-3.0	15.6	260	8.46	9.39	156
BR-4.0	21.24	434	9.56	9.19	155
BR-5.0	15.69	280	8.9	9.53	154
	21.53	423	9.7	9.24	
BR-6.0	NO CHEMISTRY TAKEN				152
BR-7.0	15.7	396	8.54	9.4	149;150
	20.81	427	9.49	9.3	
BR-7.1	NO CHEMISTRY TAKEN				151
BR-8.0	11.66	313	10.07	9.38	158;159
	19.54	423	10.9	8.89	
BR-9.0	14.72	364	8.5	7.72	160;161
	19.4	428	9.45	8.72	
BR-10.0	14.06	208	9.18	7.61	162;163;164
	19.1	412	7.85	8.51	
BR-11.0	17.6	244	8.6	8.6	
	19.18	403	7.8	8.72	165;166
BR-12.0	13.86	397	8.7	9.19	167;168
BR-13.0	13.66	206	9.25	8.82	169;170
BR-14.0	14.25	311	9.4	9.15	171 - 176
BR-15.0	NO CHEMISTRY TAKEN				177
OX-16.0	NO CHEMISTRY TAKEN				
HC-22.0	NO CHEMISTRY TAKEN				
HC-21.0	15.06	122	9.17	9.38	179;180
SR-.5	NO CHEMISTRY TAKEN				181,182
SR-1.0	19.56	410	6.36	8.75	
SR-2.0	15.61	141	9.79	9.13	
	Chem. taken in Lake Bar lake				
SR-2.5	NO CHEMISTRY TAKEN				
SR-3.0	19.6	408	6.55	9.01	
HC-20.5	13.27	162	9.4	8.46	
HC-20.7	18.93	408	10.54	8.62	

SITE	Temp	Cond	DO	pH	Photo #
BR-16.0	NO CHEMISTRY TAKEN IN STREAM - FLOW TOO SMALL				
	18.78	440	8.36	8.6	186;187;188
BR-17.0					189
BR-18.0	10.08	467	10.08	9.67	190-192
	18.78	437	8.8	8.66	
BR-19.0	18.84	4.38	9	8.61	193-194
BR-20.0					195
BR-21.0	18.8	4.43	8.28	8.6	196
BR-22.0					197
BR-23.0	14.5	454	9	9.48	198-200
BR-25.0	19.24	452	8.49	9.21	202-204
BR-25.1	19.47	445	8.6	9.12	205-207
BR-26.0	20	438	9.65	9.58	208-210
BR-27.0	14.5	308	9.25	9.99	211-213
	19.45	443	8.1	9.42	
BR-28.0	14.45	1489	8.31	9.4	214-215
	20.3	455	8.98	9.34	
BR-29.0	NO CHEMISTRY TAKEN				216
BR-30.0	16.5	65	9.35	9.51	217-218
	19	4.51	9.19	9.47	
BR-31.0	NO CHEMISTRY TAKEN				219
BR-32.0	16	514	8.67	9.71	220-221
	21.11	450	10.78	9.28	
BR-33.0	14.57	387	9.06	9.59	222-224
	20.28	447	9.58	8.78	
BR-34.0					225
BR-35.0	20.37	444	11.7	9.23	226
BR-36.0	NO CHEMISTRY TAKEN				227
BR-37.0	11.62	812	10.54	8.51	228
	18.92	456	9.5	8.8.	
BR-38.0	NO CHEMISTRY TAKEN				230
BR-39.0	15.75	425	6.78	8.11	231-232
	18	466	9.07	8.81	
BR-40.0	NO CHEMISTRY TAKEN				233
BR-41.0	14.55	504	10.97	9.49	234
BR-42.0	NO CHEMISTRY TAKEN				236
BR-43.0	NO CHEMISTRY TAKEN				237

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Appendix C5. Field data for Mollusk Survey in reservoirs and tributaries 2004

SITE	Notes
HC-1	
HC-1.1	Mid-channel grabs at lowest boat launch above dam
HC-2.0	
HC-2.1	Ponar #3 was mid channel
HC-3.0	
HC-4.0	
HC-5.0	
HC-6.0	
HC-6.1	Cobble scrapes taken above the road
HC-7.0	
	6 ponars collected - see diagram on field sheet; nothing found in ponars
HC-8.0	
HC-8.1	
HC-9.0	Water quality taken in mouth of creek
HC-10.0	
HC-11.0	
HC-12.0	
HC-12.1	6 ponars collected; see sketch on field sheet
HC-13.0	
HC-14.0	Water quality collected in creek
HC-15.0	No samples collected after visually inspecting all available habitat
HC-16.0	
HC-17.0	No cobble sample taken - full pool
HC-18.0	Cobble sample and Chemistry in creek; no snails found
HC-19.0	
HC-20.0	
OX-1.0	
OX-2.0	Most snails at mouth in river: 2 Physa in Stream above hot pool
OX-3.0	Chemistry and cobble sample taken in Stream
OX-4.0	
OX-5.0	Chemistry taken in creek; Muddy creek mouth with few cobbles
OX-6.0	Mud flat, no water from Stream
OX-7.0	No water from creek, no distinct habitat = no samples collected
OX-8.0	No water from creek, no distinct habitat = no samples collected
OX-9.0	
OX-10.0	No water from creek, no distinct habitat = no samples collected
OX-11.0	No water from creek, no distinct habitat = no samples collected

SITE	Notes
OX-12.0	
OX-12.1	
OX-13.0	
OX-13.1	
OX-14.0	
OX-15.0	Chemistry in creek
OX-15.0	Chemistry in reservoir
BR-1.0	Lots of Baetis and Simuliidae in creek
	Chemistry in creek; Creek actively downcutting due to reservoir level being low.
BR-2.0	Area above high water mark infested with poison ivy: did not sample in there
BR-3.0	Chemistry in creek
BR-4.0	
BR-5.0	Chemistry taken in creek
	Chemistry taken in reservoir
BR-6.0	
BR-7.0	Chemistry taken in creek
	Chemistry taken in reservoir
BR-7.1	Picked cobbles in seep inlet; nothing found
BR-8.0	Chemistry taken in Stream
	Chemistry taken in reservoir
BR-9.0	Chemistry taken in Stream
	Chemistry taken in reservoir
BR-10.0	Chemistry taken in Stream
	Chemistry taken in reservoir
BR-11.0	Chemistry taken in Stream
	Chemistry taken in reservoir; Stream was off our field maps
BR-12.0	Chemistry taken in Stream
BR-13.0	Chemistry taken in Stream
BR-14.0	Chemistry taken in Stream
	Seeps on wall below irrigated fields; extensive mudflats
	in reservoir with no real habitat
BR-15.0	Stream was dry, no distinct habitat to sample
	Divers surveyed plunge pool behind dam;
OX-16.0	Matt and Gary picked cobbles along 200 meters of shoreline.
HC-22.0	
HC-21.0	Chemistry taken in Stream
SR-.5	Dive covered both deep and shallow habitats. ~80m of river inspected
	Dive within large eddy, out to main channel.
SR-1.0	Cobbles picked along shore out to arms depth.

SITE	Notes
SR-2.0	Lake has poor substrate, few cobbles
SR-2.5	
	On bar oppisite rapids
SR-3.0	No snails of Interest
	Chemistry taken in Stream. Divers covered all the deeper water
HC-20.5	in mouth of Pine Creek and down to Oxbow bridge.
HC-20.7	Chemistry taken in river; divers covered all the deeper water in the area.
BR-16.0	
BR-17.0	creek was dry
BR-18.0	Chemistry taken in creek
	Chemistry taken in reservoir
BR-20.0	dry Stream, no unique habitat
BR-21.0	Chemistry taken in reservoir; creek was dry
BR-22.0	No Chemistry taken, creek was dry
BR-23.0	Chemistry taken in creek
	Chemistry taken in reservoir
BR-24.0	Stream was dry
BR-25.0	Chemistry taken in reservoir; only small seep on cliff, but bed was dry
BR-25.1	Chemistry taken in reservoir; low flow in creek
BR-26.0	Chemistry taken in reservoir; creek was too low
BR-27.0	Chemistry taken in Stream
	Chemistry taken in reservoir
BR-28.0	Chemistry taken in Stream
	Chemistry taken in reservoir
BR-29.0	creek was dry
BR-30.0	Chemistry taken in Stream
	Chemistry taken in reservoir
BR-31.0	Stream was dry
BR-32.0	Chemistry taken in Stream
	Chemistry taken in reservoir
BR-33.0	Chemistry taken in Stream
	Chemistry taken in reservoir
BR-34.0	Stream was dry
BR-35.0	Chemistry taken in reservoir; no sample collected in creek - private property
BR-36.0	Stream was dry
BR-37.0	Chemistry taken in Stream
	Chemistry taken in reservoir
BR-38.0	Stream was dry

SITE	Notes
BR-39.0	Chemistry taken in Stream
	Chemistry taken in reservoir
BR-40.0	cobble pick in seep area
	visual inspection of area found several fresh mussel shells,
BR-41.0	one with dead animal still inside.
BR-42.0	Stream was dry
BR-43.0	Stream was dry

Appendix D1. Snake River, Hells Canyon Mollusk Survey, 2004. Sample number, River Mile (RM), bank, UTM coordinates, and site description.

			UTM Coordinates (Unit 11)		
Sample	RM	Bank	X-Easting	Y-Northing	Site Description
1	224.62	OR	536811	5042938	20 yds upStream Temperance Crk ranch
2	225.65	ID	536843	5042882	Across from Temperance Crk ranch
3	223.75	OR	536811	5042971	1/4 mile downStream of Temperance Creek
4	223.15	OR	537087	5043750	Hominy Creek
5	223.75	OR	536997	5044616	Salt Creek upStream of inflow
6	223.15	ID	537067	5044586	Vertical Basalt Face
7	222.95	OR	537212	5044773	Alluvial fan Below Two Corral Creek
8	222.90	ID	537387	5044835	Gracie Bar
9	222.25	OR	539582	5046854	*
10	220.96	ID	540342	5047807	Below Slaughterhouse Gulch Rapids
11	218.30	ID	541622	5049734	Large cobble bar nearly crosses river
12	219.70	OR	541762	5051256	Cobbley Shore above Fish Trap Bar
13	219.70	OR	541822	5051372	Fish Trap Bar
14	214.20	OR	540328	5054143	Below Point
15	213.75	ID	539937	5054670	Fast Chute
16	210.74	ID	537184	5058314	30m below Big Canyon Creek
16a	210.74	ID	537243	5058316	Big Canyon Creek
17	210.13	OR	536599	5059144	Below Summers Creek mouth
18	220.48	ID	539109	5046262	Kirkwood Creek to 30 ft downStream river
19	224.52	ID	536467	5041843	Myers Creek below trib
20	227.50	OR	534879	5038095	Pine Bar
21	227.75	OR	534806	5037817	Pine Bar Rapids
22	227.75	ID	534855	5037751	Pine Bar, Eddy below rapids
23	229.35	ID	534772	5035054	Alluvial fan Below Sheep Creek
24	231.76	OR	532404	5032487	Below mouth of Sluice Creek
25	232.40	ID	531990	5030960	Straight Channel
26	234.30	ID	531341	5028642	Below large spring Seep
27	235.19	ID	530330	5027716	Below Bernard Creek rapids
28	231.40	ID	532964	5033071	Below Rush Creek
29	229.40	ID	534805	5034945	Above Sheep Creek
30	209.00	OR	536028	5060504	Cottonwood Rapids
31	207.95	ID	535936	5062501	Lookout Creek Rapids, below point
32	207.50	ID	536007	5063113	Straight Run
33	207.00	ID	536076	5063484	Straight shore
34	206.46	ID	536013	5064909	Below High Range Rapids, eddy

			UTM Coordinates (Unit 11)		
Sample	RM	Bank	X-Easting	Y-Northing	Site Description
35	217.50	ID	541697	5049773	1/2 mile above Corral Creek, slack water behind gravel bar
36	206.27	OR	535913	5065084	Lower end of High Range rapids
37	205.03	OR			
38	205.06	ID			
39	203.15	ID	532555	5068656	Below Wolf Creek mouth
40	201.94	ID	531071	5069676	Below Cobble point of Five Pine rapids
41	201.90	OR	530947	5069587	Below large basalt wall with eddy
42	200.19	OR	528494	5070157	Flat Point bar
43	199.95	ID	527980	5069814	Point bar below rapids
44	199.09	ID	526845	5069596	
45	199.09	OR	526828	5069618	Below Deep Creek on fan
46	236.00	OR	529439	5026672	Below Saddle Creek
47	236.10	OR	529461	5026546	Above Saddle Creek
48	237.10	ID	529168	5025805	
49	237.90	ID	528147	5023880	Below Three Creek rapids
50	238.70	OR	527703	5023030	Below point of rapids
51	240.50	ID	527043	5021707	1\2 mile below Cobbley Bar camp, below point of rapids
52	243.50	ID	525751	5015460	Below Cobbley Point rapids
53	245.10	ID	525526	5013602	.2 mile above Brush Creek rapids
54	245.90	OR	524410	5012514	Below Stud Creek
55	230.40	ID	533840	5033870	Above Johnson Bar
56	198.28	OR	525908	5069935	Below Robinson Gulch creek
57	195.70	ID	523963	5073034	Below lower Doug Bar rapids
58	194.47	OR	522919	5074387	
59	194.30	OR	522280	5074807	
60	193.19	ID	520421	5074815	Below divide creek
61	190.70	OR	517502	5074434	
62	188.40	OR	516012	5077960	.05 mile above Salmon River
63	Sal. R. 1.1	ID			
64	Sal. R. 1.5	ID			
65		ID	514081	5080846	Below Salmon River - Snake River mixing zone
66		ID	512510	5081888	Below Salmon River - Snake River mixing zone
67		OR	510957	5083554	Below Salmon River - Snake River mixing zone
68		OR	510943	5083619	Below Salmon River - Snake River mixing zone
69		ID	510922	5083785	Below Salmon River - Snake River mixing zone
70	Sal R Mouth	ID	516007	5078105	Sand and gravel bars at Salmon River mouth
71	224.70	ID	536276	5041396	About 0.2 miles above Myers Creek

			UTM Coordinates (Unit 11)		
Sample	RM	Bank	X-Easting	Y-Northing	Site Description
72	224.95	ID	536144	5041123	Below rapids
73	224.96	ID	536111	5041135	Below rapids
74	224.97	ID	536050	5041111	Below rapids
75	225.86	ID	535550	5040040	Below Hutton Gulch Creek
76	226.40	OR	534648	5039351	
77	226.45	OR	534648	5039351	Rapids eddy ~80ft below rapids
78	227.00	ID	534580	5038897	
79	227.00	ID	534580	5038897	
80	No Sample		na	na	
81	227.72	ID	na	na	
82	227.70	ID	na	na	
83	227.68	ID	na	na	
84	227.66	ID	na	na	
85	227.64	ID	na	na	
86	212.40	ID	538546	5056615	Davis Rapids eddy,
87	212.39	ID	538531	5056641	
88	212.38	ID	538530	5056695	
89	212.40	OR	538440	5056798	
90	212.39	OR	538394	5056827	
91	203.60	ID	532939	5068268	
92	203.65	ID	533023	5068226	
93	203.70	ID	533104	5068154	Lee of rapids
94	203.30	OR	532754	5068417	
95	203.35	OR	532765	5068415	
96	213.35	OR	539851	5055295	
97	214.30	OR	540279	5054040	
98	214.31	OR	540287	5054053	
99	214.33	OR	540322	5054080	
100	215.02	ID	540821	5053343	
101	215.03	OR	540907	5053175	
102					
103					
104					
105	246.50	OR	523870	5011563	Eddy below large cobble/small bolder bar
106	245.58	OR	524808	5013042	
107					
108	245.00	OR	525736	5014550	
109	242.00	OR	525500	5017924	

			UTM Coordinates (Unit 11)		
Sample	RM	Bank	X-Easting	Y-Northing	Site Description
110	240.68	OR	526207	5020098	1/4 mile below Cobbley Bar, steep shore
111	240.68	ID	528121	5023856	
112	240.70	ID			Springs along shore
113	235.14	ID	530333	5027717	Below Bernard Creek (repeat)
114	226.82	OR	534503	5039091	Below Pine bar same spot sampled by Hershler 2004
115	226.80	ID	534627	5039079	Below Pine bar below point
116	226.80	ID	534627	5039079	Below Pine bar below point
117	226.50	OR	534907	5039560	Eddy below High Bar rapids
118	225.25	OR	535874	5040986	Across from Caribou Creek
119	225.25	ID	535937	5040965	across from 118
120	222.10	ID	537080	5044746	
121	220.50	OR	539023	5046295	in Cougar creek
122	220.45	OR	539109	5046262	in Kirkwood creek
123	Salmon R.	ID	552785	5065325	0.5 mi. <Whitebird Bridge
124	Salmon R.	ID	548669	5083012	1.0 mi. > Pine Bar
125	Salmon R.	ID			0.9 mi. < Pine Bar @ bridge
126	181.2	ID	509911	5087190	50 yd < Cottonwood Crk.
127	Cttnwd Crk	ID	509612	5087622	Cottonwood Crk. Mouth
128	179.60	ID	509216	5089562	Eddy > Cougar Crk.
129	177.03	OR	507403	5092377	Eddy below head of Cache Crk. Rapids
130	177.05	ID	507404	5092376	Open shoreline opposite Cache Crk.
131	177.03	ID	507405	5092378	DownStream of 130 ~ 100 yds.
132	175.80	ID	506559	5093606	Inside eddy downStream of China Gardens Creek
133	172.70	ID	505362	5098356	Inside eddy downStream of Wild Goose Rapids
134	169.00	WA	502219	5102546	Rogersburg; wave-washed sandy eddy

Appendix D2. Snake River, Hells Canyon Mollusk Survey, 2004. Sample number, relative abundance of 11 mollusk taxa (0 = absent to 5 = very abundant; see text for description), and date of collection.

Sample	Tsp	Pan	Cfl	Fsp	Psp	Vef	Pssp	Flsp	Fnu	Gan	Aca	Date
1	0	0	3	3	0	2	0	0	0	0	0	9/20
2	0	0	2	3	0	0	0	0	0	0	0	9/20
3	1	2	0	2	0	0	0	0	0	0	0	9/20
4	1	0	0	3	0	0	0	0	0	0	0	9/21
5	0	1	3	1	0	0	0	0	0	1	0	9/21
6	0	0	0	0	0	0	0	0	0	0	0	9/21
7	0	2	2	2	0	0	0	0	0	0	0	9/21
8	0	3	3	3	0	0	0	0	0	1	0	9/21
9	2	2.5	1	3	0	0	0	0	0	1	0	9/21
10	1	2	0	0	1	1	0	0	0	0	0	9/21
11	0	2	3	1	0	1	0	0	0	0	0	9/21
12	0	na	na	na	na	na	na	na	na	na	na	9/21
13	0	0	3	0	0	0	0	0	0	0	0	9/21
14	0	0	0	3	0	0	0	0	0	0	0	9/21
15	0	0	0	3	0	0	0	0	3	0	0	9/21
16	2	3	1	2	0	0	0	0	0	0	0	9/21
16a	0	2	0	0	0	0	0	0	0	0	0	9/21
17	0	2	1	2	0	0	0	0	0	0	0	9/21
18	1	1	1	1	0	1	0	0	0	0	0	9/21
19	0	2	2	2	1	0	0	0	0	0	0	9/22
20	0	2	2	2	1	0	0	0	0	0	0	9/22
21	1	1	3	1.5	0	0	0	0	3	1	0	9/22
22	0	1	1	3	2	0	0	0	3	0	0	9/22
23	1.5	2	0	2	0	0	0	0	0	0	0	9/22
24	1.5	2	1	2	0	0	0	1	1	0	0	9/22
25	0	0	1	1	0	0	0	0	0	0	0	9/22
26	0	1	1	0	0	0	1	0	0	0	0	9/22
27	1	2	2	2	0	0	0	0	3	0	0	9/22
28	1	2	2	2	0	0	0	0	0	0	0	9/22
29	0	1	1	0	0	0	0	0	0	0	0	9/22
30	1	3	2	3	0	1	0	0	1	0	0	9/23
31	1.75	2	3	2	0	0	0	0	1	0	0	9/23
32	1.5	2.5	1	3	0	0	0	0	0	0	0	9/23
33	0	1	0	1	0	0	0	0	0	0	0	9/23
34	2.5	2	1	2	2	0	0	0	0	0	0	9/23
35	0	0	4.5	0	2	0	0	0	0	0	0	9/23

Sample	Tsp	Pan	Cfl	Fsp	Psp	Vef	Pssp	Flsp	Fnu	Gan	Aca	Date
36	2	2	2	2	1	0	0	0	0	0	0	9/24
37	1	1	1	2	0	0	0	0	2	0	0	9/24
38	1	3	3	0	2	0	0	0	2	0	0	9/24
39	0	2	1	1	0	0	0	0	0	0	0	9/24
43	1	2	1	1	0	0	0	0	1	0	0	9/24
44	1	2	1	1	0	0	0	0	1	0	0	9/24
45	0	1	1	0	0	0	0	0	0	0	0	9/24
46	0	1	1	0	0	0	0	0	1	0	0	9/25
47	0	1	2	1	1	0	0	0	0	0	0	9/25
48	0		1	1	0	0	0	0	1	1	0	9/25
49	0	2	1	1	2	0	0	0	0	0	0	9/25
50	0	0	1	1	0	0	0	0	2	0	0	9/25
51	0	1	0	3	0	0	0	0	1	0	0	9/25
52	0	1	3	1	0	0	0	0	0	1	0	9/25
53	0	1	1	0	0	0	0	0	0	0	0	9/25
54	0	1.5	1	1	1	0	0		0	1	0	9/25
55	1	2	3	2	0	0	0	0	1	1	0	9/25
56	1	2	4	1	1	0	0	0	0	1	0	9/25
57	1	2.5	2	1	1	0	0	0	1	0	0	9/25
58	1	1	1	1	0	0	0	0	1	0	0	9/26
59	2	2	2	2	0	0	0	0	1	0	0	9/26
60	1.5	2	1	1	0	0	0	0	1	0	0	9/26
61	1	2.5	2	3	0	0	0	0	1	0	0	9/26
62	0	2	2	0	0	1	0	0	1	1	0	9/26
63	na	na	na	na	na	na	na	na	na	na	na	9/26
64	na	na	na	na	na	na	na	na	na	na	na	9/26
65	0	1	1	2	0	0	1	0	0	0	0	9/27
66	0	2	2	2	0	0	0	1	0	0	0	9/27
67	1	3	2	1	1	0	0	0	0	0	0	9/27
68	1	2	1	2	1	0	0	1.5	0	0	0	9/27
69	0	1	1	2	0	0	1	0	0	0	0	9/27
70	0	0	0	0	0	0	2	2	0	0	0	9/27
71	1	1	3	2	1	0	0	0	1	0	0	9/28
72	0	1	1	1	0	0	1	0	1	0	0	9/28
73	0	3	2	3	1	0	1	0	1	0	0	9/28
74	1	2	2	1	0	1	1	0	0	0	0	9/28
75	0	1	1	3.5	1	0	1	0	0	0	0	9/28
76	0	2	0	3.5	1	0	1	0	0	0	0	9/28

Sample	Tsp	Pan	Cfl	Fsp	Psp	Vef	Pssp	Flsp	Fnu	Gan	Aca	Date
77	0	3	3	3.5	0	0	1	0	0	0	0	9/28
78	1	2	1	4	0	0	0	0	1.5	0	0	9/28
79	1	2	2	4	0	1	0	0	1	0	0	9/28
80	na	na	na	na	na	na	na	na	na	na	na	9/28
81	0	1	0	3	0	0	1	0	0	0	0	9/28
82	1	1	3	3.5	1	1	0	0	1	0	0	9/28
83	1	1	2.5	2	2	1	2	0	1	0	0	9/28
88	2	2.5	2	2.5	1	0	0	0	1	0	0	9/29
89	2	3	2	3	1	0	0	0	0	0	0	9/29
90	0	2	1	3.5	0	0	0	0	0	0	0	9/29
91	1	3	2	3.5	1	0	0	0	2	0	0	9/29
92	0	3	1	3.5	1	0	0	0	1.5	0	0	9/29
93	0	2	0	3.5	1	0	0	0	1	0	0	9/29
94	0	1	1	2.5	0	0	0	0	0	0	0	9/29
95	0	1	1	2.5	1	0	0	0	0	0	0	9/29
96	1	2.5	3	3	0	0	0	0	1	0	0	10/2
97	0	1	2	3.5	0	0	0	0	0	0	0	10/2
98	0	0	1	3.5	0	0	0	0	0	0	0	10/2
99	1	1	1	3	0	0	0	0	0	0	0	10/2
100	0	2	1	2	0	1	0	0	0	0	0	10/2
101	0	2	2	2.5	0	0	0	0	0	0	0	10/2
102	0	1	0	2	0	0	0	0	0	0	0	10/2
103	na	na	na	na	na	na	na	na	na	na	na	10/3
104	na	na	na	na	na	na	na	na	na	na	na	10/3
105	0	2	3	3	0	0	0	0	0	0	0	10/3
106	0	1	1	3	0	0	0	0	0	0	0	10/3
107	na	na	na	na	na	na	na	na	na	na	na	10/3
108	0	2	3	3	1	0	0	0	0	0	0	10/3
109	0	0	1	1	0	0	0	0	0	0	0	10/3
110	0	1	1	1	1	0	0	0	0	0	0	10/3
111	0	1	3	2	0	0	0	0	0	0	0	10/3
112	0	1	1	2	0	0	0	0	0	0	0	10/3
113	1	1	1	2	0	0	0	0	0	0	0	10/3
114	2	2	1	2	0	0	0	0	0	0	0	10/4
115	0	2	1	2	0	0	0	0	0	0	0	10/4
116	0	1	1	2	0	0	0	0	0	0	0	10/4
117	0	1	2	2	0	0	0	0	0	0	0	10/4
118	3	2	4	2	0	0	0	0	0	0	0	10/4

Sample	Tsp	Pan	Cfl	Fsp	Psp	Vef	Pssp	Flsp	Fnu	Gan	Aca	Date
119	2	1	2	2	0	0	0	0	0	0	0	10/4
120	0	2	2	1	0	1	0	0	0	0	0	10/4
121	0	1	2	2	0	0	0	0	0	0	0	10/4
122	0	1	2	2	0	0	2	0	0	0	0	10/4
123	0	0	0	0	3	0	0	3	1	0	0	10/6
124	0	0	0	0	3	0	0	3	2	0	0	10/6
125	0	0	0	0	3	0	0	3	2	0	0	10/6
126	0	2	3	2	0	1	0	0	0	0	0	10/21
127	0	0	0	0	0	0	0	0	3	0	0	10/21
129	0	2	3	2	0	0	0	3	1	0	0	10/21
130	0	0	0	2	0	0	0	0	0	0	0	10/21
131	0	2	0	2	2	0	0	0	1	0	0	10/21
132	0	1	1	2	0	0	0	0	1	0	0	10/21
133	0	1	2	3	0	0	0	3.5	2.5	0	0	10/21
134	0	0	1	2	0	0	0	4	3	0	0	10/21

Appendix D3. Snake River, Hells Canyon Mollusk Survey, 2004. Sample number, estimated velocity, substrate type, temperature, conductivity, pH, estimated relative abundance of periphyton and detritus.

Sample	Velocity	Substrate	Temp	EC	pH	Periphyton	Detritis
1	0 fps	Lrg Cobble				0	3
2		Small Boulders, Steep bank				2	2
3	~0 fps	Boulders-Lrg Cobble				2	2
4	~1 fps	Lrg Bolder- Cobble	19.25	393	8.32	1	1
5	~1 fps	Lrg Bolder- Cobble				1	1
6	*	*				1	1
7	0 - 0.2	Cobble, Gravel, Sand	19.23	392	8.31	3	3
8	slow	BedCobble, Cobbles, BFR	19.3	392	8.3	3	3
9	See notes	Cobble, small boulders, angular	19.3	392	8.31	2	1
10	*	Boulders	19.37	392	8.31	2	1
11	0 fsp	Cobbles	19.46	393	8.34	3	3
12	0.3 fps	Small Boulders				1	1
13	0 fsp	Sand	19.7	392	8.37	1	2
14	Mod	Lrg loose round cobbles to small boulders				2	1
15	~1	Lrg Cobbles, Small Boulders	19.71	391	8.38	2	2
16	0 fsp	Lrg Cobbles	19.62	391	8.44	3	3
16a	2 - 3 fps	Cobbles	19.66	391	8.4	1	1
17	0 fsp	Cobbles				3	3
18	0 fsp	Cobbles on sandy bottom	19.58	385	8.39	3	3
19	0.2 fsp	Angular Cobbles	18.77	385	8.36	3	3
20	0 fsp	Angular Cobbles - Gravel	19.19	393	8.29	3	3
21	Slow	Angular Basalt Cobbles - Lrg Boulders	19.28	384	8.29	1	1
22	0.5 - 1 fps	Lrg Cobbles -small boulders over sand	19.39	380	8.28	3	1
23	0.5 - 1 fps	Angular Cobbles - Boulders	19.36	370	8.29	1	1
24	~1 fsp	Lrg Cobbles	19.76	381	8.33	3	3
25	~0 fsp	Lrg Boulders	19.82	344	8.29	1	1
26			19.41	342	8.3		
27	2 - 3 fsp	Cobbles small boulders	20	343	8.26	2	1
28	Wave Wash	Large Cobbles on sand	20	349	8.28	1	1
29	Wave Wash	Cobbles					
30	0.2 - 0.4 fps	Lrg Cobbles Small boulders over sand	19.71	344	8.48	3	3
31	0.1 - 0.2 fps	Cobbles to small boulders	20.18	356	8.39		
32	mod	Angular large cobbles small boulders	19.82	344	8.38	1	1
33	0 fps	Angular large cobbles	19.94	344	8.39	2	3
34		Lrg Cobbles to Small boulders					
35							

Sample	Velocity	Substrate	Temp	EC	pH	Periphyton	Detritis
36	0 - 0.2 fsp	Lrg Cobbles	19.42	347	8.36	2	2
37	0.3 fps	Angular small cobbles	19.67	348	8.4	2	1
38	0 - 0.1 fps	Angular Large Cobbles	19.7	350	8.4	2	1
39		Sub-angular cobbles	19.79	277	8.63	3	3
42	0.3 - 1 fps	Sub-angular large cobbles	20.18	349	8.37	0	1
43	0.3	Sub-angular cobbles to boulders	19.92	347	8.37	1	1
44	0.2 - 0.4 fps					2	1
45							
46							
47			19.34	351	8.26		
48		Med. Boulders					
49		Med Boulders					
50			19.73	352	8.24		
51	0.2 - 0.3 fps	Rounded basalt cobbles - boulders	19.81	353	8.2	1	1
52	0 fps	Sand	19.85	353	8.14		
53							
54	~0 fps	Angular Cobbles	19.6	353	8.07	2	2
55		Rounded boulders - large cobbles	20	351	8.4		
56		Small boulders	19.6	350	8.41		
57		Med Boulders to cobbles	19.63	349	8.38	3	3
58		Angular cobbles	19.76	349	8.44		
59		Large cobbles	19.69	350	8.39		
60		Rounded cobble				2	2
61			19.71	346	8.4		
62			19.77	346	8.4		
63			17.71	265	8.38	1	3
64	0.1 fps	Med cobbles	17.83	265	8.47		
65		Angular Basalt	17.7	265	8.36		
66		Rounded basalt, small boulders	17.69	248	8.42		
67			17.82	265	8.35	1	0
68			16.3	174	8.35		
69		Very angular basalt	19.1	353	8.31	2	0
70							
71		Angular basalt, Cobbles embedded				3	0
72	0.5 fps						
73	0.5 fps		19.28	353	8.31	1	0
74	0.1 fps	Sub-angular to rounded					
75	wave action	Angular basalt	19.75	352	8.47		

Sample	Velocity	Substrate	Temp	EC	pH	Periphyton	Detritis
76		Flattened round cobbles	19.88	352	8.34	2	2
77						2	1
78							
79		Loose round cobbles, rapids eddy					
80							
81							
82							
85						2	1
86		Flattened round cobbles	19.11	354	8.34	2	1
87						2	1
88							
89	0 - 0.1 fps						
90							
91	0.5 - 1 fps		19.51	353	8.35	2	2
92	0.5 - 1 fps	Flattened cobbles					
93	0.3 fps		19.5	352	8.34		
94			18.81	358	8.33		
95			18.85	359	8.31		
96			19.25	358	8.31		
97			18.98	359	8.32	3	3
98			19.05	358	8.32		
99			19.28	358	8.33		
100							
101							
102							
103							
104							
105	0.2 fps	Large cobbles small boulders					
106	0.3 fps	Large cobbles small boulders				3	2
107						3	1
108	0 fps	Sand gravel	19.5	364	8.1		
109	0 fps	Angular gravel over sand					
110		Angular basalt, large cobble over sand	11	100	7.7		
111		Angular cobble over sand					
112			18.72	364	8.27		
113							
114							
115	0 - 0.2 fps	Sand under med rounded cobbles	18.94	364	8.3	4	2

Sample	Velocity	Substrate	Temp	EC	pH	Periphyton	Detritis
116		Sub-anguler med cobble over sand	19.07	363	8.29	3	3
117	0 - 0.1 fps	Sub-angular small bolder				4	1
118	0 fps	1 to 6 ft boulders	19.3	364	8.22	4	4
119	0 - 0.2 fps	Med to large boulders	19.29	363	8.26		
120	1 - 2 fps	Large sub-angular boulders to cobbles					
121						4	4
122						4	4
123	0 - 1 fps	Cobbles in sand; reducing < 1"				4	3
124	0 - 0.1 fps	Cobbles in sand; reducing < 1"				2	1
126	0 fps	Cobbles				1	1
127	1 fps	Cobbles; very heavy siltation					
128	0 - 0.5 fps	Heavy boat wake effects					
129	0 - 0.5 fps	Cobble - small boulders					
130	0 - 0.2 fps	Mixed cobble over reducing sand/silt muck					
131	0 -1 fps	Mixed cobble over reducing sand/silt muck					
132	0 - 0.5 fps	Cobble over sand					
133	0.5 - 1.0 fps	Cobble - small boulders					
134	0 fps	Cobbles on sand flat					

Appendix D4. Snake River, Hells Canyon Mollusk Survey, 2004. Sample number and additional field notes

Sample	Notes
1	
2	
3	Tight colonies of TSP
4	2 of 20 Cobbles w/ 2 and 6 TSP each
5	
6	Qual. Sample of D-net scrapings
7	About 2 degrees warmer
8	Basalt and granite outcrop
9	TSP see drawing on field notes, Wave influence from rapids
10	TSP see drawing on field notes, Abundant leaches but not on TSP Cobble
11	
12	Cobbley shore
13	sand bar (Fish Trap bar)
14	
15	
16	TSP on undersides of Cobbles, 2 Cobbles had 3 Tsp each
16a	
17	Somers Cr. mouth
18	mouth of Kirkwood Cr., Disturbed site from boat landings
19	mouth of Meyers Cr.
20	Pine Bar
21	TSP, see drawing, dive site
22	
23	mouth of Sheep Cr., TSP, 2 Cobbles, 6 and 2 TSP in fissures
24	mouth of Sluice Cr., 4 TSP
25	
26	
27	Bernard Cr. Rapids, TSP
28	Rush Cr.,TSP,
29	Sheep Cr.
30	TSP, scrubbed 60 Cobbles w/ no TSP but found one in rapids
31	Lookout Cr. Rapids
32	Most Tsp under lee of large boulders
33	
34	High Range Rapids. TSP ave. ~10 per M2
35	.5 mi.> Corral Cr. Lymnaeid - 2
36	

Sample	Notes
37	
38	
39	Wolf Cr.
40	5-pine rapids, 0ne Cobble with 10 TSP, 4 other Cobbles had 6, 2, 3, 2 TSP
41	
43	Big Sulfur Cr. Rapids
44	
45	Deep Cr.
46	Saddle Cr., Gammarids - 3
47	
48	Three Cr. Rapids
49	
50	
51	.5 mi. < Cobbley Bar CG
52	Cobbly Point Rapids
53	Brush Cr. Rapids, hab = "good" TSP
54	Stud Cr., Gammarids abundant
55	Above Johnson Bar, TSP under boulders
56	Robinson Gulch
57	Lower Dug Bar Rapids, TSP mean 0.1 per Cobble
58	
59	4 TSP on one Cobble, one on each of 3 Cobbles
60	Divide Cr., 10 TSP on 5 Cobbles
61	
62	.05 mi. > Salmon, very depauparate mollusks
63	
64	
65	Rep I
66	Rep II
67	Rep III
68	Rep IV
69	Rep V
70	
71	Rep I
72	Rep II
73	Rep III; site could be too swift and angular for Tsp
74	Rep IV
75	Rep V

Sample	Notes
76	Rep I
77	Rep II
78	Rep III
79	Rep IV
80	No data for Rep V
81	Rep I
82	Rep II
83	Rep III
84	Rep IV
87	Rep II
88	Rep III
89	Rep IV
90	Rep V
91	Rep I
92	Rep II
93	Rep III
94	Rep IV
95	Rep V
96	Rep I
97	Rep II
98	Rep III
99	Rep IV
100	Rep I
101	Rep II
102	RepIII
103	Rep IV
104	Rep V
105	dug 6 holes to pan layer
106	
107	
108	
109	
110	Gammarids 1
111	Gammarids 3
112	
113	
114	One Cobble = 9 TSP, one Cobble = 8 TSP
115	

Sample	Notes
116	coordinates between 115 and 117
117	
118	many Cobbles with 4-8 TSP per Cobble, a 5 Cobble series… 16, 6, 5, 4, 2
119	
120	very strong algae smell
121	in fluctuation zone fauna limited to Simulium and Ephermeroptera
122	zone of IPC influence, dive team starts here
123	Fine detrital deposits of sand…boat action?
124	Very heavy fine detrital deposits of sand…boat action?
125	Very heavy fine detrital deposits of sand…boat action?
126	
128	
130	Exceptionally poor benthic habitat
131	Poor benthic habitat even though wave-swept
132	
133	Good benthic habitat; compable to good habitat upStream; Flsp ~ 100/sq m
134	Densities of Fnu and Flsp up to ~3,000/sq m

Appendix D5. Mollusk taxa occurrence in 40-cobble littoral samples from the Hells Canyon reach of the Snake River downstream of Hells Canyon Dam (replicate 40-cobble samples were taken at different 40 m stretches at a sampling site)(taxa values are number of individuals/cobble).

Accession#: 065 **RM** **Lat./Long.: N 45° 52.862' / W 116° 49.112'**

Date: 9/27/2004 **UTM**

Temp: 17.71°C **EC: 265** **pH: 8.38**

Replicate 1

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	2.3	0.8	0	0	0	0	0	0	0	0	0
2	2	1.5	0	0	0	0	0	0	0	0	0
3	6.3	1.1	12	0	0	0	0	0	0	0	0
4	4	1.8	0	0	1	0	0	0	0	0	0
5	3.1	1.1	0	0	0	0	0	0	0	0	0
6	6.1	0.5	0	0	0	0	0	0	0	0	0
7	4.2	1.1	0	0	0	0	0	0	0	0	0
8	4.3	0.6	0	0	0	0	0	0	0	0	0
9	5.1	1.8	0	0	0	0	0	0	0	0	0
10	3	1	0	0	0	0	0	0	0	0	0
11	1.5	0.8	0	0	0	0	0	0	0	0	0
12	4.2	1.1	0	0	0	0	0	0	0	0	0
13	2.6	1	0	0	0	0	0	0	0	0	0
14	3.1	1.4	0	0	0	0	0	0	0	0	0
15	1.5	1	0	0	0	0	0	0	0	0	0
16	4.2	1	0	0	0	0	0	0	0	0	0
17	3.1	1.9	0	0	1	0	0	0	0	0	0
18	1.2	0.2	0	0	0	0	0	0	0	0	0
19	3.5	1.3	0	0	0	0	0	0	0	0	0
20	2.4	2.6	0	0	0	0	0	0	0	0	0
21	5	0.8	0	0	0	0	0	0	0	0	0
22	2.2	0.9	0	0	0	0	0	0	0	0	0
23	4	2.2	0	0	0	0	0	0	0	0	0
24	6	0.5	0	0	0	0	0	0	0	0	0
25	6.3	0.5	1	0	0	0	0	0	0	0	1
26	2.2	0.8	0	0	0	0	0	0	0	0	0
27	3.6	0.9	1	0	0	0	0	0	0	0	0
28	4	1	0	0	0	0	0	0	0	0	0
29	2.3	1	0	0	0	0	0	0	0	0	0
30	7	1.1	0	0	0	0	0	0	0	0	0
31	3.9	0.8	0	0	0	0	0	0	0	0	0
32	5	1.1	0	0	0	0	0	0	0	0	0
33	6.1	1.5	0	0	0	0	0	0	0	0	0

Accession#: 065 **RM** **Lat./Long.: N 45° 52.862' / W 116° 49.112'**

Date: 9/27/2004 **UTM**

Temp: 17.71°C **EC: 265** **pH: 8.38**

Replicate 1

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
34	4.8	0.9	0	0	0	0	0	0	0	0	0
35	3.8	0.9	0	0	0	0	0	0	0	0	0
36	2.6	1	0	0	0	0	0	0	0	0	0
37	6.5	1.8	0	0	0	0	0	0	0	0	0
38	4.9	0.8	1	0	0	0	0	0	0	0	0
39	1.1	1.8	0	0	0	0	0	0	0	0	0
40	4.5	0.7	1	0	0	0	0	0	0	0	0
Mean	3.8375	1.115	0.4	0	0.05	0	0	0	0	0	0.03

Notes: (Rep I); No Tsp; 1 picture - card 8; 2 Corbicula, Stonefly, & Mayfly

Accession#: 066 **RM** **Lat./Long.: N 45° 53.427' / W 116° 50.325'**

Date: 9/27/2004 **UTM**

Temp: 17.83°C **EC: 265** **pH: 8.47**

Replicate 2

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	2.5	1.5	0	0	7	0	0	0	0	0	0
2	3.1	3	33	0	2	0	0	0	0	0	0
3	3	1.5	1	0	0	0	0	0	0	0	0
4	2.5	1.2	0	0	1	0	0	0	0	0	0
5	0.2	3	0	0	0	0	0	0	0	0	0
6	1	2.5	0	0	0	0	0	0	0	0	0
7	2	1	0	0	1	0	0	0	0	0	0
8	6.5	0.5	2	0	0	0	0	0	0	0	0
9	2.1	1	0	0	2	0	0	0	1	0	0
10	2	1	0	0	0	0	0	0	0	0	0
11	1.1	0.8	0	0	1	0	0	0	0	0	0
12	3.1	1.2	0	0	2	0	0	0	0	0	0
13	2.3	1.7	1	0	1	0	0	0	0	0	0
14	5.3	1	10	0	18	0	0	0	0	0	0
15	4.3	0.9	0	0	0	0	0	0	0	0	0
16	1.1	0.8	0	0	0	0	0	0	0	0	0
17	1.1	2.8	0	0	0	0	0	0	0	0	0
18	3	1	0	0	0	0	0	0	0	0	0

Accession#: 066 **RM** **Lat./Long.: N 45° 53.427' / W 116° 50.325'**

Date: 9/27/2004 **UTM**

Temp: 17.83°C **EC: 265** **pH: 8.47**

Replicate 2

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
19	2	1.4	0	0	0	0	0	0	0	0	0
20	2.8	0.7	0	0	0	0	0	0	0	0	0
21	3.5	1.2	0	0	0	0	0	0	0	0	0
22	4.1	1.4	8	0	0	0	0	0	0	0	0
23	2.6	1.2	0	0	0	0	0	0	0	0	0
24	7	0.4	0	0	0	0	0	0	0	0	0
25	1.5	1.5	0	0	2	0	0	0	0	0	0
26	4.8	0.8	15	0	0	0	0	0	0	0	0
27	3	1.2	0	0	0	0	0	0	1	0	0
28	4.8	1.5	3	0	0	0	0	0	0	0	0
29	0.5	0.5	0	0	0	0	0	0	0	0	0
30	2.1	1.1	0	0	6	0	0	0	0	0	0
31	3	2.8	0	0	0	0	0	0	0	0	0
32	3	1	0	0	0	0	0	0	1	0	0
33	1.5	0.5	0	0	0	0	0	0	0	0	0
34	2.1	0.8	0	0	0	0	0	0	0	0	0
35	3.5	0.7	0	0	0	0	0	0	0	0	0
36	2.5	1.5	0	0	2	0	0	0	2	0	0
37	3.5	1	0	0	0	0	0	0	0	0	0
38	2.4	0.6	0	0	2	0	0	0	0	0	0
39	2.5	2	0	0	0	0	0	0	1	0	0
40	3	1.5	0	0	5	0	0	0	3	0	0
Mean	2.7975	1.2925	1.83	0	1.3	0	0	0	0.23	0	0

Notes: (Rep 2); 1 picture – card 8; Good looking site but no Tsp; some CFL; Crayfish

Accession#: 067 **RM** **Lat./Long.: N 45° 53.328' / W 116° 51.524'**

Date: 9/27/2004 **UTM**

Temp: 17.70°C **EC: 265** **pH: 8.36**

Replicate 3

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	1.8	2.1	0	0	3	0	0	0	0	0	0
2	0.5	2	0	0	0	0	0	0	0	0	0
3	1.9	2.9	0	0	9	0	0	0	0	0	0
4	0.1	1.8	0	0	4	0	0	0	0	0	0
5	3.3	1.5	0	0	0	0	0	0	0	0	0
6	2.8	1.4	0	0	3	0	0	0	0	0	0

Accession#: 067 **RM** **Lat./Long.: N 45° 53.328' / W 116° 51.524'**

Date: 9/27/2004 **UTM**

Temp: 17.70°C **EC: 265** **pH: 8.36**

Replicate 3

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
7	0.5	2	0	0	1	0	0	0	0	0	0
8	4.5	1.8	0	0	0	0	0	0	0	0	0
9	4.5	1.8	0	0	4	0	0	0	0	0	0
10	1.8	3	0	0	3	0	0	0	0	0	0
11	3	2.8	0	0	6	0	0	0	0	0	0
12	2.5	2.1	0	0	12	0	0	0	0	0	0
13	5.6	1.8	0	0	13	0	0	0	0	0	0
14	1.8	1.8	0	0	0	0	0	0	0	0	0
15	6.6	0.5	0	0	0	0	0	0	1	0	0
16	1	1.3	0	0	2	0	0	0	0	0	0
17	7.5	1	0	0	1	0	0	0	0	0	0
18	3.2	1.2	0	0	1	0	0	0	0	0	0
19	5	0.8	0	0	2	0	0	0	0	0	0
20	2.8	1.4	0	0	3	0	0	0	0	0	0
21	2	1.4	0	0	5	0	0	0	0	0	0
22	2.2	1.8	0	0	13	0	0	0	0	0	0
23	6	1.1	0	0	1	0	0	0	0	0	0
24	2.1	1.9	0	0	4	0	0	0	0	0	0
25	5.3	0.7	0	0	2	0	0	0	0	0	0
26	1.8	1.8	0	0	2	0	0	0	0	0	0
27	1.5	2.1	0	0	0	0	0	0	0	0	0
28	3.5	1.5	0	0	0	0	0	0	0	0	0
29	1.9	2.5	0	0	0	0	0	0	0	0	0
30	1.8	1.5	0	0	4	0	0	0	0	0	0
31	6.6	1	1	0	2	0	0	0	0	0	0
32	4.5	1.2	1	0	4	0	0	0	0	0	0
33	2.5	2	0	0	1	0	0	0	1	0	0
34	5.5	1.9	0	0	1	0	0	0	1	0	0
35	2.2	1.9	2	0	5	0	0	0	0	0	0
36	2.2	1.2	2	0	0	0	1	0	0	2	0
37	1.6	2.5	2	0	13	0	0	0	0	0	0
38	1.8	1.6	0	0	1	0	0	0	0	0	0
39	1	2.1	0	0	4	0	0	0	0	0	0
40	5.5	3	0	0	0	0	0	0	0	0	0
Mean	3.055	1.7425	0.2	0	3.23	0	0.03	0	0.08	0.1	0

Notes: (Rep 3); Tsp present

Accession#: 068 **RM** **Lat./Long.: N 45° 54.365' / W 116° 51.535'**

Date: 9/27/2004 **UTM**

Temp: 17.69°C **EC: 248** **pH: 8.42**

Replicate 4

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	0.5	1.4	0	0	0	0	1	0	0	0	0
2	2.9	2.4	0	0	0	0	0	0	0	0	0
3	2.1	1.1	0	0	1	0	0	0	0	0	0
4	2.1	1.1	0	0	0	0	0	0	1	0	0
5	2.8	1	0	0	3	0	0	0	1	0	0
6	2.1	0.9	2	0	3	0	0	0	1	0	0
7	5	2	1	0	1	0	0	0	0	0	0
8	1.6	1.6	0	0	0	0	0	0	0	0	0
9	2.4	1.8	0	0	2	0	0	0	2	2	0
10	1.5	1.5	0	0	2	0	0	0	0	0	0
11	2	1	2	0	1	0	0	0	0	0	0
12	1.1	1.2	0	0	2	0	0	0	0	0	0
13	1.2	0.8	0	0	0	0	0	0	0	0	0
14	1.8	2.2	0	0	11	0	0	0	0	0	0
15	4.5	0.4	0	0	0	0	0	0	0	0	0
16	1.2	1.8	0	0	2	0	0	0	0	0	0
17	4	3	0	0	1	0	0	0	1	0	0
18	1	1	0	0	2	0	0	0	0	0	0
19	5.9	1	6	0	2	0	0	0	2	0	0
20	0.2	2.4	0	0	0	0	0	0	0	0	0
21	0.4	0.5	0	0	2	0	0	0	0	0	0
22	5	1	0	0	1	0	0	0	0	0	0
23	0.1	1.4	0	0	0	0	0	0	0	0	0
24	6	0.9	10	0	1	0	0	0	2	0	0
25	0.5	1.5	0	0	1	0	0	0	0	0	0
26	4.5	1.5	3	0	1	0	0	0	0	0	0
27	0.7	2	0	0	0	0	0	0	0	0	0
28	2	1.5	0	0	0	0	0	0	0	0	0
29	1.8	1.5	6	0	7	0	0	0	4	0	0
30	5	2.3	0	0	0	0	0	0	0	0	0
31	1	1	0	0	0	0	0	0	0	0	0
32	4.5	0.5	7	0	1	0	0	0	0	0	0
33	3.8	2.1	3	0	0	0	0	0	0	0	0
34	4.8	1.2	0	0	0	0	0	0	0	0	0
35	2.1	1	0	0	0	0	0	0	0	0	0
36	3.5	1.5	0	0	0	0	0	0	3	0	0
37	1.4	2	0	0	0	0	0	0	0	0	0
38	1.6	2	0	0	1	0	0	0	0	0	0

Accession#: 068 **RM** **Lat./Long.: N 45° 54.365' / W 116° 51.535'**

Date: 9/27/2004 **UTM**

Temp: 17.69°C **EC: 248** **pH: 8.42**

Replicate 4

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
39	0.8	1.5	0	0	0	0	0	0	0	0	0
40	2.2	1	0	0	0	0	0	0	0	0	0
Mean	2.44	1.4375	1	0	1.2	0	0.03	0	0.43	0.1	0

Notes: (Rep 4); Tsp present; 2 pictures - card 8

Accession#: 069 **RM** **Lat./Long.: N 45° 54.453' / W 116° 51.551'**

Date: 9/27/2004 **UTM**

Temp: 17.82°C **EC: 265** **pH: 8.35**

Replicate 5

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	3.2	1.6	0	0	0	0	0	0	0	0	0
2	2.1	1.8	0	0	1	0	0	0	0	0	0
3	0.3	1.3	0	0	0	0	0	0	0	0	0
4	2.1	1	0	0	0	0	0	0	0	0	0
5	1.2	1	0	0	2	0	0	0	0	0	0
6	3.3	0.9	0	0	0	0	0	0	0	0	0
7	0.9	0.9	0	0	0	0	0	0	0	0	0
8	0.5	0.8	0	0	0	0	0	0	0	0	0
9	6.3	1.5	1	0	1	0	0	0	0	0	0
10	1.8	2.6	0	0	0	0	0	0	0	0	0
11	3.8	0.2	0	0	1	0	0	0	0	0	0
12	2.8	1.1	0	0	0	0	0	0	0	0	0
13	3.9	0.4	1	0	0	0	0	0	0	0	0
14	5	0.5	0	0	0	0	0	0	0	0	0
15	0.8	1.4	0	0	2	0	0	0	0	0	0
16	0.8	0.9	0	0	0	0	0	0	0	0	0
17	5	1	0	0	0	0	0	0	0	0	0
18	2.4	3	0	0	0	0	0	0	0	0	0
19	3.5	2	0	0	0	0	0	0	0	0	0
20	2.2	1.1	0	0	1	0	0	0	0	0	0
21	2.8	2	1	0	2	0	0	0	0	0	0
22	2.1	1.2	0	0	0	0	0	0	0	0	0
23	5.9	1.5	0	0	0	0	0	0	0	0	0
24	1.5	1.6	0	0	6	0	0	0	0	0	0
25	3.1	2.1	0	0	0	0	0	0	0	0	1

Accession#: 069 **RM** **Lat./Long.: N 45° 54.453' / W 116° 51.551'**

Date: 9/27/2004 **UTM**

Temp: 17.82°C **EC: 265** **pH: 8.35**

Replicate 5

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
26	2.3	0.8	0	0	0	0	0	0	0	0	0
27	3.8	2	0	0	0	0	0	0	0	0	0
28	2.8	3.1	7	0	1	0	0	0	0	0	0
29	5.2	1.1	0	0	0	0	0	0	0	0	0
30	5.5	1.6	0	0	0	0	0	0	0	0	0
31	0.5	1.2	0	0	0	0	0	0	0	0	0
32	1	2.8	0	0	0	0	0	0	0	0	0
33	3	1.7	12	0	0	0	0	0	0	0	0
34	1.5	1	0	0	6	0	0	0	0	0	0
35	2.2	0.8	0	0	0	0	0	0	0	0	0
36	3.5	1	9	0	0	0	0	0	0	0	0
37	2.5	0.8	0	0	4	0	0	0	0	0	0
38	7.1	2	20	0	0	0	0	0	0	0	0
39	3.8	0.5	0	0	0	0	0	0	0	0	0
40	2.2	1.5	0	0	9	0	0	0	0	0	0
Mean	2.855	1.3825	1.28	0	0.9	0	0	0	0	0	0.03

Notes: (Rep 5); No Tsp; 1 picture - card 8

Accession#: 071 **RM 224.7 (ID)** **Lat./Long.: N 45° 31.509' / W 116° 32.128'**

Date: 9/28/2004 **UTM**

Temp: 19.1°C **EC: 353** **pH: 8.31**

Replicate 1

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	3.1	2.5	2	0	0	0	0	0	0	0	0
2	4.2	0.8	0	0	0	0	0	0	0	0	0
3	4	1.1	0	0	0	0	0	0	0	0	0
4	3.5	0.8	1	0	2	0	0	0	0	0	0
5	3.2	0.5	1	0	0	0	0	0	0	0	0
6	3.5	1.5	0	0	0	0	0	0	0	0	0
7	4	1	2	0	0	0	0	0	0	0	0
8	1.8	2.3	2	0	0	0	0	0	0	0	0
9	1.9	1.9	12	0	0	0	0	0	0	0	0
10	5.5	1.6	12	0	0	0	0	0	0	0	0
11	3.2	2.8	0	1	1	0	0	0	0	0	0
12	4.5	1.2	5	0	0	0	0	0	0	0	0

Accession#: 071 **RM 224.7 (ID)** **Lat./Long.: N 45° 31.509' / W 116° 32.128'**

Date: 9/28/2004 **UTM**

Temp: 19.1°C **EC: 353** **pH: 8.31**

Replicate 1

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
13	3.4	0.9	0	0	0	0	0	0	0	1	0
14	1	1.2	0	0	0	0	0	0	0	0	0
15	3.8	2	0	0	0	0	1	0	0	0	0
16	5	0.6	0	0	0	0	0	0	0	0	0
17	7	2.2	0	0	0	0	0	0	0	0	0
18	4.2	1.2	1	0	0	0	0	0	0	0	0
19	5.5	1	0	0	0	0	0	0	0	0	0
20	2	4.1	0	0	8	0	0	0	0	0	0
21	5	1.6	3	0	1	0	0	0	0	0	0
22	5	0.3	0	0	0	0	0	0	0	0	0
23	2.8	0.6	0	0	0	0	0	0	0	0	0
24	3.2	0.7	1	0	0	0	0	0	0	0	0
25	3.2	1.1	0	0	0	0	0	0	0	0	0
26	2.1	1	3	0	0	0	0	0	0	0	0
27	3.5	2.5	4	0	0	0	0	0	0	0	0
28	2.9	1.1	2	0	0	0	0	0	0	0	0
29	2	1.3	0	0	6	0	0	0	0	1	0
30	2	0.8	0	0	0	0	0	0	0	0	0
31	4	1.7	0	0	0	0	0	0	0	0	0
32	4.2	1.3	1	0	0	0	0	0	0	0	0
33	4	0.4	0	0	0	0	0	0	0	0	0
34	2.2	2	1	0	0	0	0	0	0	0	0
35	4	1.9	3	0	0	0	0	0	0	0	0
36	1	2.8	0	0	3	0	0	0	0	0	0
37	3	0.9	0	0	0	0	0	0	0	0	0
38	1.8	1.4	0	0	1	0	0	0	0	0	0
39	3	1.6	0	0	2	0	0	0	0	0	0
40	1.6	0.8	0	1	0	0	0	1	0	0	0
Mean	3.37	1.425	1.4	0.05	0.6	0	0.03	0.03	0	0.1	0

Notes: (Rep I); Tsp present

Accession#: 072 **RM 224.95 (ID)** **Lat./Long.: N 45° 32.362' / W 116° 32.231'**

Date: 9/28/2004 **UTM**

Temp: °C **EC:** **pH:**

Replicate 2

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	1.3	1.8	1	0	0	0	0	0	0	0	0
2	2.3	1.8	0	0	0	0	0	0	0	0	0
3	2.2	1.1	0	0	2	0	0	0	0	0	0
4	2.1	2.5	5	0	0	0	0	0	0	0	0
5	1.5	0.5	0	0	0	0	0	0	0	0	0
6	2.8	1.8	0	0	0	0	0	0	0	0	0
7	1.8	1.8	0	0	0	0	0	0	0	0	1
8	1.2	1.8	0	0	0	0	0	0	0	0	0
9	1.5	1.1	2	0	0	0	0	0	0	0	0
10	2.2	0.4	0	0	0	0	0	0	0	0	0
11	0.8	0.9	1	0	0	0	0	0	0	0	0
12	2.9	0.5	1	0	0	0	0	0	0	0	0
13	2.2	1.1	0	1	0	0	0	0	0	0	0
14	3	0.4	0	0	0	0	0	0	0	0	0
15	2.5	1.3	0	1	0	0	0	0	0	0	0
16	1.9	1.3	0	0	0	0	0	0	0	0	0
17	1.5	1	1	0	2	0	0	0	0	0	0
18	0.5	0.4	0	0	0	0	0	0	0	0	0
19	1	0.9	0	0	0	0	0	0	0	0	0
20	3	1.1	2	0	0	0	0	0	0	0	0
21	2.3	1.6	0	0	0	0	0	0	0	0	0
22	2.2	0.4	0	0	0	0	0	0	0	0	0
23	4	0.9	0	0	0	0	0	0	0	0	0
24	2	0.4	0	0	0	0	0	0	0	0	0
25	3.5	0.6	1	0	0	0	0	0	0	0	0
26	4	0.6	0	0	0	0	0	0	0	0	0
27	4.2	1.5	2	6	3	0	0	0	0	0	0
28	3	3	0	0	1	0	0	0	0	0	1
29	2.5	0.8	0	0	0	0	0	0	0	0	0
30	3	1.2	3	0	0	0	0	0	0	0	0
31	2.6	0.5	0	0	0	0	0	0	0	0	0
32	2.1	0.8	0	0	0	0	0	0	0	0	0
33	3.1	0.8	0	0	0	0	0	0	0	0	0
34	6.5	1.1	1	0	0	0	0	0	0	0	0
35	0.5	1.8	0	0	0	0	0	0	0	0	0
36	5	0.6	0	2	0	0	0	0	0	0	0
37	1.1	1.8	1	0	0	0	0	0	0	0	0
38	1.8	0.9	0	0	0	0	0	0	0	0	0

Accession#: 072	RM 224.95 (ID)					Lat./Long.: N 45° 32.362' / W 116° 32.231'						
Date: 9/28/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 2												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
39	1.5	1	0	0	0	0	0	0	0	0	0	
40	4.8	0.9	0	0	1	0	0	0	0	0	1	
Mean	2.4475	1.1175	0.53	0.25	0.23	0	0	0	0	0	0.08	

Notes: (Rep 2); No Tsp; Site too swift and angular for Tsp?

Accession#: 073	RM 224.96 (ID)					Lat./Long.: N 45° 32.369' / W 116° 32.256'						
Date: 9/28/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 3												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
1	3	1.2	4	0	2	0	0	0	0	0	0	
2	2	1.6	3	1	4	0	0	0	0	0	0	
3	1.9	1.4	0	0	0	0	0	0	0	0	0	
4	2.2	2.5	0	0	10	0	0	0	0	0	0	
5	2.6	2	3	0	1	0	0	0	0	0	0	
6	2.1	1.3	0	1	2	0	0	0	0	0	1	
7	2.6	2.1	3	0	5	0	0	0	0	0	0	
8	2.1	2.3	0	0	2	0	0	0	0	0	0	
9	2.2	1	0	0	0	0	0	0	0	0	0	
10	2.8	2.4	2	1	2	0	0	0	0	0	0	
11	3.4	2.3	0	0	2	0	0	0	0	0	0	
12	3.1	1.1	0	0	0	0	0	0	0	0	0	
13	1.8	2	30	0	0	0	0	0	0	0	0	
14	3	1.9	8	0	0	0	0	0	0	0	0	
15	3	2.2	4	0	4	0	0	0	0	0	0	
16	2.5	2.2	2	1	17	0	0	0	0	0	0	
17	1	2.2	5	0	2	0	0	0	0	0	0	
18	2	2.8	0	0	7	0	0	0	0	0	0	
19	0.9	1	0	0	3	0	0	0	0	0	0	
20	2.2	1.8	0	0	3	0	0	0	0	0	0	
21	2.3	2.5	0	0	3	0	0	0	0	0	0	
22	2.5	2	19	0	2	0	0	0	0	0	0	
23	2.5	1.9	0	0	0	0	0	0	0	0	0	
24	2.6	1.3	1	0	0	0	0	0	0	0	0	
25	2.7	2.3	0	0	3	0	0	0	0	0	0	

Accession#: 073	RM 224.96 (ID)				Lat./Long.: N 45° 32.369' / W 116° 32.256'							
Date: 9/28/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 3												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
26	1.8	1.9	2	0	0	0	0	0	0	0	0	
27	2	2.8	0	0	2	0	0	0	0	0	0	
28	1.2	1	0	0	2	0	0	0	0	0	0	
29	3.2	2.6	0	0	0	0	0	0	0	0	0	
30	2.9	1.6	0	0	0	0	0	0	0	0	0	
31	0.9	1.3	0	0	0	0	0	0	0	0	0	
32	3	0.9	0	0	0	0	0	0	0	0	0	
33	0.5	1	0	0	2	0	0	0	0	1	0	
34	2.8	1.6	0	0	1	0	0	0	0	0	0	
35	1.2	1.7	0	0	3	0	0	0	0	0	0	
36	1	1.3	1	0	1	0	0	0	0	0	0	
37	0.8	1.3	4	0	1	0	0	0	0	1	0	
38	1.1	0.9	1	0	2	0	0	0	0	0	0	
39	2.2	1.7	0	0	0	0	0	0	0	0	0	
40	0.6	1.8	1	0	2	0	0	0	0	1	1	
Mean	2.105	1.7675	2.5	0.06	2.25	0	0	0	0	0.1	0.03	

Notes: (Rep 3); No Tsp

Accession#: 074	RM 224.97 (ID)				Lat./Long.: N 45° 32.356' / W 116° 32.303'						
Date: 9/28/2004					UTM						
Temp: °C			EC:		pH:						
Replicate 4											
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**
1	2.2	1.8	2	0	2	0	1	0	0	0	0
2	2.9	2.1	3	0	0	0	0	0	0	0	0
3	2.6	2.1	0	0	0	0	0	0	0	0	0
4	2.7	1.1	0	0	0	0	0	0	0	0	0
5	1.6	1.2	0	0	1	0	0	0	0	0	1
6	2.3	1.2	1	0	3	0	0	0	0	0	0
7	2.9	1.2	1	0	4	0	0	0	0	0	0
8	2	1.2	1	0	0	0	0	0	0	0	0
9	2	1	1	0	0	0	0	0	0	0	0
10	1.1	1.6	0	0	1	0	0	0	0	0	0
11	2.8	2.9	3	0	3	0	0	0	0	0	0
12	2.4	1.3	0	0	0	0	0	0	0	0	0

Accession#: 074	RM 224.97 (ID)					Lat./Long.: N 45° 32.356' / W 116° 32.303'						
Date: 9/28/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 4												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
13	2.1	1.5	1	0	0	0	0	0	0	0	0	
14	2.2	2	0	0	6	0	0	0	0	0	0	
15	2.3	1.3	0	0	1	0	0	0	0	0	0	
16	2.1	0.9	0	0	0	0	0	0	0	0	1	
17	2	1.6	2	0	3	0	0	0	0	0	0	
18	1.9	1.8	2	0	1	0	1	0	0	0	0	
19	2	1.1	0	0	1	0	0	0	0	0	0	
20	2	1.3	2	0	1	0	0	0	0	1	0	
21	2.2	1.9	1	0	1	0	0	0	0	0	0	
22	2.1	2.5	0	0	7	1	0	0	0	0	0	
23	2	0.8	0	0	1	0	0	0	0	0	0	
24	1.5	1	0	0	6	0	0	0	0	0	0	
25	2.1	2.2	0	0	0	0	0	0	0	0	0	
26	2.1	1.8	3	0	0	0	0	0	0	0	0	
27	1.5	1	2	0	1	0	0	0	0	0	0	
28	1.8	1.1	0	0	1	0	0	0	0	0	0	
29	1	1.1	0	0	1	0	0	0	0	0	0	
30	1	1	0	0	1	0	0	0	0	0	0	
31	1.1	1.5	0	0	10	0	0	0	0	0	0	
32	1.8	2	0	0	0	0	0	0	0	0	0	
33	1	1	0	0	2	0	0	0	0	0	0	
34	1.5	2	2	0	8	0	0	0	0	0	0	
35	0.5	0.8	0	0	1	0	0	0	0	0	0	
36	1	0.8	0	0	1	0	0	0	0	0	0	
37	1.5	0.9	0	0	3	0	0	0	0	0	0	
38	0.8	1	3	0	5	0	0	0	0	0	0	
39	1.4	0.9	0	0	1	0	0	0	0	0	0	
40	0.8	0.5	0	0	0	0	0	0	0	0	0	
Mean	1.82	1.4	0.75	0	1.93	0.03	0.05	0	0	0	0.05	

Notes: (Rep 4); Tsp present

Accession#: 075 **RM 225.86 (ID)** **Lat./Long.: N 45° 30.779' / W 116° 32.692'**

Date: 9/28/2004 **UTM**

Temp: 19.28°C **EC: 353** **pH: 8.31**

Replicate 5

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	1.1	0.6	3	0	0	0	0	0	0	0	0
2	1	1	0	0	0	0	0	0	0	0	0
3	1.5	0.5	3	0	0	0	0	0	0	0	0
4	2.3	2.4	5	0	0	0	0	0	0	0	0
5	2.4	0.5	0	0	0	0	0	0	0	0	0
6	2.8	3	25	0	0	0	0	0	0	0	0
7	3	0.6	0	0	2	0	0	0	0	0	0
8	2.4	0.7	1	0	0	0	0	0	0	0	0
9	2.1	1.7	7	0	0	0	0	0	0	0	0
10	4.3	0.5	6	0	0	0	0	0	0	0	0
11	4.1	1.9	1	0	0	0	0	0	0	0	0
12	5.8	2.8	5	0	3	0	0	0	0	0	1
13	3.1	2.9	3	0	2	0	0	0	0	0	0
14	4	0.3	0	0	0	0	0	0	0	0	0
15	2	1	4	0	0	0	0	0	0	0	0
16	3.4	2.3	0	0	0	0	0	0	0	0	0
17	2	1.4	5	0	1	0	0	0	0	3	0
18	3	2	0	0	1	0	0	0	0	0	0
19	2	1.2	5	0	0	0	0	0	0	0	0
20	2.5	0.6	20	0	0	0	0	0	0	0	0
21	2.2	1.1	1	0	0	0	0	0	0	1	0
22	2	0.4	5	0	0	0	0	0	0	0	0
23	3	0.8	2	0	0	0	0	0	0	0	0
24	2.1	1	6	0	0	0	0	0	0	0	0
25	1.6	2.3	30	0	0	0	0	0	0	0	0
26	1.5	0.6	0	0	2	0	0	0	0	0	0
27	1	0.5	0	0	0	0	0	0	0	0	0
28	2.1	1	8	0	0	0	0	0	0	0	0
29	3	1.6	12	0	0	0	0	0	0	0	0
30	1	0.5	13	0	0	0	0	0	0	0	0
31	2.1	0.8	17	0	0	0	0	0	0	0	0
32	3.2	0.6	0	0	0	0	0	0	0	0	0
33	2	1	5	0	0	0	0	0	0	0	0
34	1.1	2.4	10	0	1	0	0	0	0	0	0
35	7	1.1	0	0	0	0	0	0	0	0	0
36	2.8	1.4	5	0	0	0	0	0	0	0	0
37	4	1	0	0	0	0	0	0	0	0	0
38	5	0.7	3	0	0	0	0	0	0	0	0

Accession#: 075 **RM 225.86 (ID)** **Lat./Long.: N 45° 30.779' / W 116° 32.692'**

Date: 9/28/2004 **UTM**

Temp: 19.28°C **EC: 353** **pH: 8.31**

Replicate 5

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
39	5	1.3	3	0	0	0	0	0	0	0	0
40	4.5	2.1	10	0	0	0	0	0	0	0	0
Mean	2.775	1.2525	5.58	0	0.3	0	0	0	0	0.1	0.03

Notes: (Rep 5); No Tsp

Accession#: 076 **RM 226.40 (OR)** **Lat./Long.: N 45° 30.410' / W 116° 33.388'**

Date: 9/28/2004 **UTM**

Temp: °C **EC:** **pH:**

Replicate 1

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	2.5	2.6	30	0	0	0	0	0	0	0	0
2	3	1.3	6	0	1	0	0	0	0	0	0
3	3	1	9	0	0	0	0	0	0	0	0
4	4	0.8	4	0	1	0	0	0	0	0	0
5	2	1.7	35	0	1	0	0	0	0	0	0
6	3.2	0.9	1	0	0	0	0	0	0	0	0
7	4.2	1.5	6	0	0	0	0	0	0	0	0
8	2.2	1.2	23	0	0	0	0	0	0	0	0
9	3	2.5	15	0	3	0	0	0	0	0	0
10	2.2	2.1	10	0	0	0	0	0	0	0	0
11	1	2.3	6	0	2	0	0	0	0	0	0
12	1.6	1.6	25	0	0	0	0	0	0	0	0
13	1.8	1.5	30	0	0	0	0	0	0	0	0
14	2.3	1.8	11	0	6	0	0	0	0	1	0
15	3	3	50	0	0	0	0	0	0	0	0
16	2.3	1.3	12	0	7	0	0	0	0	0	0
17	2	3	8	0	1	0	0	0	0	0	0
18	2	1	20	0	0	0	0	0	0	5	0
19	2	2.1	6	0	2	0	0	0	0	0	0
20	1.5	1.4	17	0	6	0	0	0	0	0	0
21	0.5	2.5	8	0	0	0	0	0	0	6	0
22	1.8	1.8	0	0	6	0	0	0	0	0	0
23	0.7	0.8	0	0	0	0	0	0	0	0	0
24	1	0.8	0	0	1	0	0	0	0	0	0
25	2	3	0	0	0	0	0	0	0	0	0

Accession#: 076	RM 226.40 (OR)						Lat./Long.: N 45° 30.410' / W 116° 33.388'					
Date: 9/28/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 1												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
26	1.5	1.1	0	0	2	0	0	0	0	0	0	
27	2	2.2	15	0	0	0	0	0	0	0	0	
28	2	1.8	28	0	0	0	0	0	0	0	0	
29	2.3	1.5	14	0	0	0	0	0	0	3	1	
30	2	0.8	3	0	0	0	0	0	0	0	0	
31	1.8	0.5	15	0	0	0	0	0	0	0	0	
32	1.8	1.8	6	0	0	0	0	0	0	0	0	
33	1.8	2	30	0	0	0	0	0	0	0	0	
34	1	1.6	4	0	0	0	0	0	0	0	2	
35	2.3	0.4	1	0	1	0	0	0	0	0	0	
36	1.6	2.4	12	0	0	0	0	0	0	0	0	
37	2	1.4	5	0	0	0	0	0	0	0	0	
38	1.8	1.7	2	0	0	0	0	0	0	0	0	
39	1.2	2.1	8	0	0	0	0	0	0	0	0	
40	2.4	3.8	50	0	2	0	0	0	0	0	0	
Mean	2.0575	1.715	13.1	0	1.05	0	0	0	0	0.4	0.08	

Notes: (Rep I); No Tsp

Accession#: 077	RM 226.45 (OR)						Lat./Long.: N 45° 30.410' / W 116° 33.388'				
Date: 9/28/2004					UTM						
Temp: 19.75°C			EC: 352		pH: 8.47						
Replicate 2											
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**
1	1	1	0	0	10	0	0	0	0	0	0
2	1	1.5	0	0	1	0	0	0	0	1	0
3	2.2	1.7	0	0	0	0	0	0	0	0	0
4	1	2	0	0	8	0	0	0	0	0	0
5	2	2	0	0	6	0	0	0	0	0	0
6	1.5	0.6	0	0	0	0	0	0	0	0	0
7	1.9	1.8	0	0	4	0	0	0	0	0	0
8	1.8	3	1	0	6	0	0	0	0	0	0
9	1.8	1.6	0	0	6	0	0	0	0	0	0
10	2.6	2.1	10	0	0	0	0	0	0	0	0
11	0.5	3.4	0	0	4	0	0	0	0	0	0
12	2.8	1.6	6	0	0	0	0	0	0	0	0

Accession#: 077 **RM 226.45 (OR)** **Lat./Long.: N 45° 30.410' / W 116° 33.388'**

Date: 9/28/2004 **UTM**

Temp: 19.75°C **EC: 352** **pH: 8.47**

Replicate 2

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
13	1.9	0.9	0	0	6	0	0	0	0	0	0
14	1.9	2	0	0	3	0	0	0	0	0	0
15	4	2	0	0	0	0	0	0	0	0	0
16	1.5	1.4	0	0	5	0	0	0	0	0	0
17	3.9	2.2	12	0	0	0	0	0	0	0	0
18	1	1.4	0	0	5	0	0	0	0	0	0
19	1.1	1	0	0	2	0	0	0	0	0	0
20	3	2.9	20	0	0	0	0	0	0	0	0
21	1	1	0	0	5	0	0	0	0	0	0
22	0.5	1	0	0	1	0	0	0	0	0	0
23	1.7	1	0	0	1	0	0	0	0	0	0
24	1.5	0.6	1	0	0	0	0	0	0	0	0
25	1.2	1.1	0	0	0	0	0	0	0	0	0
26	2.1	2.5	0	0	1	0	0	0	0	0	0
27	1.2	1.1	0	0	0	0	0	0	0	0	0
28	1.8	1	0	0	0	0	0	0	0	0	0
29	2	1.6	4	0	3	0	0	0	0	0	0
30	1.6	1.7	0	0	8	0	0	0	0	0	0
31	1.5	1	0	0	3	0	0	0	0	0	0
32	1.8	1.2	10	0	6	0	0	0	0	0	0
33	2	1.7	0	0	3	0	0	0	0	0	1
34	2	1.6	15	0	0	0	0	0	0	0	0
35	1.5	0.9	2	0	10	0	0	0	0	0	0
36	2	1	4	0	1	0	0	0	0	0	0
37	1.5	1.1	1	0	1	0	0	0	0	0	0
38	2.6	2.1	35	0	1	0	0	0	0	0	0
39	0.9	1.8	0	0	2	0	0	0	0	0	0
40	2	0.6	1	0	2	0	0	0	0	0	0
Mean	1.77	1.5425	3.05	0	2.85	0	0	0	0	0	0.03

Notes: (Rep 2); No Tsp

Accession#: 078 **RM 227.0 (ID)** **Lat./Long.: N 45° 30.165' / W 116° 33.442'**

Date: 9/28/2004 **UTM**

Temp: 19.88°C **EC: 352** **pH: 8.34**

Replicate 3

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	3.5	1.8	11	0	0	0	0	0	0	0	0
2	4	2.2	60	0	0	0	0	0	0	0	0
3	3.4	0.9	1	0	0	0	0	0	0	0	0
4	2.2	4.5	30	0	0	0	0	0	0	0	0
5	3.6	2.2	40	0	0	0	0	0	0	0	0
6	3.8	1.1	6	0	0	0	0	0	0	0	0
7	2.5	2	6	0	0	0	0	0	0	0	0
8	3	1.9	5	0	0	0	0	0	0	0	0
9	2	1	11	0	0	0	1	0	0	0	0
10	2	1.9	8	0	3	0	0	0	0	0	0
11	2.5	1.5	5	0	0	0	0	0	0	0	0
12	2.8	1	8	0	1	0	0	0	0	1	0
13	2.5	1.3	15	0	1	0	0	0	0	0	0
14	2.3	0.6	1	0	0	0	0	0	0	0	0
15	2.4	1.7	14	0	0	0	0	0	0	0	0
16	1.8	1.1	10	0	0	0	0	0	0	0	0
17	1.8	0.6	10	0	0	0	0	0	0	0	0
18	2.5	2.5	10	0	0	0	0	0	0	0	0
19	2.5	2.4	6	0	0	0	0	0	0	0	0
20	3.6	1.8	20	0	0	0	0	0	0	0	0
21	4.1	1	3	0	0	0	1	0	0	0	0
22	3	2	5	0	3	0	0	0	0	0	0
23	3.8	0.6	5	0	0	0	0	0	0	0	0
24	2.6	1.7	8	0	0	0	0	0	0	2	0
25	3.8	1	2	0	0	0	0	0	0	0	0
26	4	2	30	0	0	0	0	0	0	0	0
27	2.1	3	20	0	0	0	0	0	0	0	0
28	1.8	2	6	0	0	0	0	0	0	0	0
29	2.6	3.3	45	0	1	0	0	0	0	0	0
30	1.5	2.1	8	0	0	0	0	0	0	0	0
31	2.6	3.2	1	0	1	0	13	0	0	0	0
32	2.5	2.6	30	0	3	0	0	0	0	0	0
33	3.2	0.9	3	0	0	0	0	0	0	0	0
34	2.5	3.5	20	0	1	0	0	0	0	0	0
35	2.5	2.5	5	0	5	0	0	0	0	0	0
36	4.1	3.6	40	30	0	0	0	0	0	0	0
37	2.5	2.3	0	0	0	0	0	0	0	0	0
38	2.2	1.7	18	0	0	0	0	0	0	0	0

Accession#: 078 **RM 227.0 (ID)** **Lat./Long.: N 45° 30.165' / W 116° 33.442'**

Date: 9/28/2004 **UTM**

Temp: 19.88°C **EC: 352** **pH: 8.34**

Replicate 3

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
39	3.8	1.1	10	0	0	0	0	0	0	0	0
40	1.1	0.9	6	0	0	0	0	0	0	1	0
Mean	2.775	1.875	13.6	0.75	0.48	0	0.38	0	0	0.1	0

Notes: (Rep 3); Tsp present

Accession#: 079 **RM 227.0 (ID)** **Lat./Long.: N 45° 30.165' / W 116° 33.442'**

Date: 9/28/2004 **UTM**

Temp: 19.88°C **EC: 352** **pH: 8.34**

Replicate 4

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	1.8	2.8	10	0	0	0	0	0	0	0	0
2	2.3	2	20	0	5	0	1	0	0	0	0
3	2.4	1.6	3	0	0	0	0	0	0	0	0
4	1.8	1.3	4	0	0	0	0	0	0	0	0
5	3.5	2	6	0	4	0	0	0	0	0	0
6	2.6	3	20	0	10	0	0	0	0	0	0
7	2	1.5	7	0	2	0	0	0	0	0	0
8	2.8	0.9	2	0	0	0	0	0	0	0	0
9	2	0.8	0	0	0	0	0	0	0	0	0
10	2.6	3	20	0	0	0	0	0	0	0	0
11	1.2	1.3	0	0	0	0	0	0	0	0	0
12	1.5	2.1	9	0	0	0	0	0	0	0	0
13	1	3	1	0	0	0	0	0	0	0	0
14	2	1.4	0	0	0	0	0	0	0	0	0
15	2.1	0.6	0	0	0	0	0	0	0	0	0
16	2.1	2	0	1	0	0	0	0	0	0	0
17	1.8	2.5	16	0	0	0	0	0	0	0	0
18	2	2.6	0	0	9	0	0	0	0	0	0
19	2	2	1	0	1	0	0	0	0	0	0
20	1.8	2.4	2	0	3	0	0	0	0	0	0
21	2.5	2.2	7	0	0	0	0	0	0	0	0
22	1.1	0.4	1	0	1	0	0	0	0	0	0
23	1	1.6	14	0	2	0	0	0	0	0	0
24	1.8	2.6	5	0	4	0	0	0	0	0	0
25	2.2	2.5	20	1	2	0	0	0	0	0	0

Accession#: 079	RM 227.0 (ID)	Lat./Long.: N 45° 30.165' / W 116° 33.442'
Date: 9/28/2004	UTM	
Temp: 19.88°C	EC: 352	pH: 8.34

Replicate 4

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
26	1.6	1.7	5	0	0	0	0	0	0	0	0
27	2.2	0.4	12	0	2	0	0	0	0	0	0
28	2	1.8	10	0	0	0	0	0	0	0	0
29	1.8	2.1	8	0	0	0	0	0	0	0	0
30	1.6	1.5	10	0	0	0	0	0	0	0	0
31	2.8	2.3	20	0	0	0	0	0	0	0	0
32	1.7	1.6	15	0	0	0	0	0	0	0	0
33	3	1.8	5	0	0	0	0	0	0	0	0
34	1	0.7	3	0	0	1	0	0	0	0	0
35	3	0.2	1	0	0	0	0	0	0	0	0
36	1.8	1.6	0	0	0	1	0	0	0	0	0
37	1	0.4	9	0	0	0	0	0	0	0	0
38	1.5	2.3	9	0	0	0	0	0	0	0	0
39	1	1	3	0	0	0	0	0	0	0	0
40	1	0.8	1	0	2	0	0	0	0	0	0
Mean	1.9225	1.7075	6.98	0.05	1.18	0.05	0.03	0	0	0	0

Notes: (Rep 4); Tsp present; Rep 5 not taken.

Accession#: 081	RM 227.72 (ID)	Lat./Long.: N 45° ?' / W 116° ?'
Date: 9/28/2004	UTM	
Temp: °C	EC:	pH:

Replicate 1

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	2.8	2	1	0	0	0	0	0	0	0	0
2	5.5	2.5	5	0	0	0	0	0	0	0	0
3	4	4.5	0	0	0	0	0	0	0	0	0
4	4	0.5	0	0	0	0	0	0	0	0	0
5	4.5	1.1	6	0	0	0	0	0	0	0	0
6	4	0.6	0	0	0	0	0	0	0	0	0
7	5	1.2	10	0	0	0	0	0	0	0	0
8	2.8	1.8	10	0	0	0	0	0	0	0	0
9	6	2	12	0	0	0	0	0	0	0	0
10	3	1.2	6	0	0	0	0	0	0	0	0
11	5	0.8	1	0	0	0	0	0	0	0	0
12	3	1	0	0	0	0	0	0	0	0	0

Accession#: 081	RM 227.72 (ID)				Lat./Long.: N 45° ?' / W 116° ?'							
Date: 9/28/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 1												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
13	3.5	0.6	0	0	0	0	0	0	0	0	0	
14	3.8	2	6	0	0	0	0	0	0	0	0	
15	3.8	0.6	5	0	0	0	0	0	0	0	0	
16	4.2	1.6	15	0	0	0	0	0	0	0	0	
17	2.1	2.8	30	0	0	0	0	0	0	0	0	
18	6	1	15	0	0	0	0	0	0	0	0	
19	3.8	0.8	0	0	0	0	0	0	0	0	0	
20	3.7	1	2	0	0	0	0	0	0	0	0	
21	3	0.8	1	0	0	0	0	0	0	0	0	
22	3.8	1.8	10	0	0	0	0	0	0	0	0	
23	3.2	0.6	8	0	0	0	0	0	0	0	0	
24	5	2.2	20	0	0	0	0	0	0	0	0	
25	1.9	1.1	0	0	0	0	0	0	0	0	0	
26	1.5	0.5	1	0	0	0	0	0	0	0	0	
27	6	1.5	12	0	0	0	0	0	0	0	0	
28	1.4	1	2	0	0	0	0	0	0	0	0	
29	1.3	1.8	6	0	0	0	0	0	0	0	0	
30	2.6	1.1	20	0	0	0	0	0	0	0	0	
31	1.5	2.4	9	0	0	0	0	0	0	0	0	
32	4.5	1.1	25	0	0	0	0	0	0	0	0	
33	1.1	0.5	15	0	0	0	0	0	0	0	0	
34	4.5	1.3	15	0	0	0	0	0	0	0	0	
35	1.1	3.5	31	0	0	0	0	0	0	0	0	
36	2.3	1	1	0	0	0	0	0	0	0	1	
37	4.3	1.5	13	0	0	0	0	0	0	0	0	
38	2.2	0.7	22	0	0	0	0	0	0	0	0	
39	4	0.9	2	0	2	0	0	0	0	0	0	
40	2.4	0.4	6	0	0	0	0	0	0	0	0	
Mean	3.4525	1.3825	8.58	0	0.05	0	0	0	0	0	0.03	

Notes: (Rep I); No Tsp

Accession#: 082 **RM 227.7 (ID)** **Lat./Long.: N 45° ?' / W 116° ?'**

Date: 9/28/2004 **UTM**

Temp: °C **EC:** **pH:**

Replicate 2

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	1.8	1	5	0	0	0	0	0	0	0	0
2	3	1.5	1	0	0	0	0	0	0	0	0
3	3.2	1.4	20	1	0	0	0	0	0	0	0
4	2.5	2	4	0	0	0	0	0	0	0	0
5	2.8	1.1	7	0	0	0	0	0	0	0	0
6	3.1	2.2	5	0	0	0	0	0	0	0	0
7	6	0.5	5	0	0	0	0	0	0	0	0
8	3	0.9	4	0	0	0	0	0	0	0	0
9	4.5	2.1	20	0	0	0	0	0	0	0	0
10	2.5	0.9	10	0	0	0	0	0	0	0	0
11	0.5	0.5	7	0	1	0	0	0	0	1	0
12	3.1	0.7	5	0	0	0	0	0	0	0	0
13	2	1.9	8	0	0	0	0	0	0	0	0
14	2.6	0.8	14	0	0	0	0	0	0	0	0
15	3	0.5	0	0	1	0	0	0	0	0	0
16	2.2	1	1	0	0	0	0	0	0	0	0
17	2.8	0.8	6	0	0	0	0	0	0	0	0
18	4	0.4	3	0	0	0	0	0	0	0	0
19	2.2	2.1	3	0	0	0	0	0	0	0	0
20	3	2	2	0	0	0	0	0	0	0	0
21	2.1	1.8	5	0	0	0	0	0	0	0	0
22	3	1.1	16	0	0	0	0	0	0	0	0
23	3.3	1.8	7	1	0	0	0	0	0	0	0
24	4.8	3.7	11	0	1	0	0	0	0	0	0
25	2.3	0.5	5	0	0	0	0	0	0	0	0
26	2.3	3.5	20	1	2	0	0	0	0	0	0
27	4.5	1.6	11	0	0	0	0	0	0	0	0
28	1	1.8	6	0	0	0	0	0	0	0	0
29	3	1.5	20	1	0	0	0	0	0	1	0
30	2.2	2	0	0	0	0	0	0	0	0	0
31	4	0.3	0	0	0	0	0	0	0	0	0
32	2.5	1.8	10	0	0	0	1	0	0	0	0
33	3	1.5	15	0	0	5	0	0	0	0	0
34	3	0.9	13	0	0	0	0	0	0	0	0
35	1.8	2.1	0	0	3	0	0	0	0	0	0
36	1.4	2.8	0	0	1	0	1	0	0	0	0
37	1	1.3	6	0	0	1	0	0	0	0	0
38	1	1	8	0	0	1	0	0	0	0	0

Accession#: 082		RM 227.7 (ID)				Lat./Long.: N 45° ?' / W 116° ?'						
Date: 9/28/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 2												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
39	0.9	1.4	1	0	0	0	0	0	0	0	0	
40	1	2.4	1	0	2	0	0	0	0	0	0	
Mean	2.6475	1.4775	7.13	0.1	0.28	0.18	0.05	0	0	0.1	0	

Notes: (Rep 2); Tsp present

Accession#: 083		RM 227.68 (ID)				Lat./Long.: N 45° ?' / W 116° ?'					
Date: 9/28/2004					UTM						
Temp: °C			EC:		pH:						
Replicate 3											
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**
1	4	0.3	3	0	0	0	0	0	0	0	0
2	5.2	1.4	0	0	0	0	0	0	0	0	0
3	4.8	1.8	0	0	0	0	0	0	0	0	0
4	5.3	1	10	0	1	0	0	1	0	0	0
5	3.2	2.1	13	0	0	0	0	0	0	0	0
6	5.1	1.4	6	0	0	0	0	0	0	0	0
7	3.5	2.4	5	0	0	0	0	0	0	0	0
8	3	1.5	0	0	0	0	0	0	0	0	0
9	5.2	2	0	0	0	0	0	0	0	0	0
10	3	2	15	1	0	4	0	0	0	0	0
11	2.8	1.7	3	0	0	1	0	0	0	0	0
12	6.2	0.6	6	0	0	0	0	0	0	0	0
13	4.4	1.9	3	0	0	0	0	0	0	0	0
14	5.6	1.1	20	0	0	1	1	0	0	1	0
15	1.6	1.6	0	0	1	0	0	0	0	0	0
16	5.2	0.4	4	0	0	0	0	0	0	0	0
17	3.6	0.7	13	0	0	1	0	0	0	0	0
18	5.3	1.2	0	0	0	0	0	0	0	0	0
19	2	0.9	3	0	0	0	0	0	0	0	0
20	4.9	1.1	10	0	0	0	0	0	0	0	0
21	1.5	2.3	0	0	1	0	0	0	0	0	0
22	3.5	1	12	0	0	0	0	0	0	0	0
23	1	0.8	0	0	0	0	0	0	0	0	0
24	4	1.1	15	0	0	0	0	0	0	0	0
25	2.9	1.9	8	0	0	0	0	0	0	0	0

Accession#: 083	RM 227.68 (ID)					Lat./Long.: N 45° ?' / W 116° ?'						
Date: 9/28/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 3												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
26	2.9	1.3	8	0	0	0	0	0	0	0	0	
27	4	1.1	0	0	0	0	0	0	0	0	0	
28	5.3	0.8	16	0	0	0	0	0	0	0	0	
29	1.8	2.6	3	0	0	0	0	0	0	0	0	
30	7	1.1	25	0	0	0	0	0	0	0	0	
31	2.4	0.7	0	0	0	0	0	0	0	0	0	
32	3.1	0.9	5	0	0	0	0	0	0	0	0	
33	3.9	1	0	0	0	0	0	0	0	2	0	
34	4	1.2	30	0	0	0	0	0	0	0	0	
35	3.7	1	4	0	0	0	0	0	0	0	0	
36	2	1.5	0	0	0	0	0	0	0	1	0	
37	1.2	2.2	40	0	0	0	0	0	0	0	0	
38	1.2	2	0	0	0	0	0	0	0	0	3	
39	5	0.9	0	0	0	6	0	0	0	19	0	
40	0.1	1	0	0	0	0	0	0	0	0	0	
Mean	3.61	1.3375	7	0.03	0.08	0.33	0.03	0.03	0	0.6	0.08	

Notes: (Rep 3); Tsp present

Accession#: 084	RM 227.66 (ID)					Lat./Long.: N 45° ?' / W 116° ?'					
Date: 9/28/2004					UTM						
Temp: °C			EC:		pH:						
Replicate 4											
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**
1	3.6	1.6	10	0	0	0	0	0	0	0	0
2	6	0.3	1	0	0	0	0	0	0	0	0
3	3.2	0.5	0	0	0	0	0	0	0	0	0
4	3.2	3.3	15	0	0	1	0	0	0	2	0
5	3.1	0.5	3	0	0	0	0	0	0	0	0
6	3	0.8	3	0	0	0	0	0	0	0	0
7	5.3	1.6	10	2	0	1	0	0	0	0	0
8	5	1.8	24	0	0	0	0	0	0	0	0
9	1.9	1.5	4	0	0	0	0	0	0	0	0
10	4	0.6	3	0	0	0	0	0	0	0	0
11	4.3	1.7	7	0	0	0	0	0	0	0	0
12	3.5	0.9	4	0	0	0	0	0	0	0	0

Accession#: 084		RM 227.66 (ID)				Lat./Long.: N 45° ?' / W 116° ?'						
Date: 9/28/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 4												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
13	2.5	1.6	12	0	0	1	0	0	0	0	0	
14	2	2	6	0	0	0	0	0	0	0	0	
15	3.1	1.2	6	0	0	0	0	0	0	0	0	
16	2	1.2	2	0	0	0	0	0	0	0	0	
17	4	1.6	0	0	6	2	1	0	0	0	1	
18	6	0.4	4	0	0	0	0	0	0	0	0	
19	3.4	1.5	3	0	0	0	0	0	0	0	0	
20	2.9	1.6	0	0	0	0	0	0	0	0	0	
21	2.3	0.7	10	0	1	0	0	0	0	0	0	
22	3.8	2	3	0	1	0	0	0	0	0	0	
23	3	1	0	0	0	0	0	0	0	0	0	
24	6.5	1.2	0	0	0	0	0	0	0	0	0	
25	3	2	0	0	0	0	0	0	0	0	0	
26	7	1.9	0	0	0	0	0	0	0	0	0	
27	5.4	1.7	10	0	11	0	0	0	0	0	0	
28	2.1	0.7	2	0	0	0	0	0	0	0	0	
29	1.4	1.1	0	0	0	0	0	0	0	0	0	
30	3	2.2	0	0	0	0	0	0	0	0	0	
31	2.5	1.8	20	0	0	0	0	0	0	0	0	
32	3.2	1.9	0	0	0	1	0	0	0	0	0	
33	3	1.7	0	0	0	0	0	0	0	0	0	
34	2.4	1	17	0	0	0	0	0	0	0	0	
35	4	1.7	1	0	0	0	0	0	0	0	0	
36	3	1.1	20	0	0	0	0	0	0	0	0	
37	3.2	2.6	1	0	0	0	0	0	0	0	0	
38	3.1	0.9	20	0	0	2	0	0	0	0	0	
39	3.4	1.1	2	0	0	0	0	0	0	0	1	
40	2.5	1.1	5	0	0	0	0	0	0	0	0	
Mean	3.495	1.39	5.7	0.05	0.48	0.2	0.03	0	0	0.1	0.05	

Notes: (Rep 4); Tsp present

Accession#: 085	RM 227.64 (ID)				Lat./Long.: N 45° ?' / W 116° ?'						
Date: 9/28/2004				UTM							
Temp: °C		EC:		pH:							
Replicate 5											
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**
1	3.6	3.1	18	0	0	0	4	0	0	0	0
2	3.4	1.5	10	0	0	0	0	0	0	0	0
3	4.3	1.6	7	0	0	0	0	0	0	0	0
4	4	1.8	8	0	0	0	0	0	0	0	0
5	2.5	2	0	0	0	0	0	0	0	0	0
6	4.1	2.1	0	0	1	0	0	0	0	0	0
7	0.5	1.3	0	0	0	1	0	0	0	0	0
8	2.8	2.6	8	0	0	0	0	0	0	0	0
9	5	2.8	20	0	1	0	0	0	0	0	0
10	3	2	0	0	0	0	0	0	0	0	0
11	4.5	2.2	0	0	0	0	0	0	0	0	0
12	4.5	0.8	0	0	0	2	0	0	0	0	0
13	3.5	1.5	2	0	0	0	0	0	0	0	0
14	4	1.4	0	0	0	0	0	0	0	1	0
15	3.9	1.2	0	0	0	0	0	0	0	0	0
16	4	0.9	10	0	0	0	0	0	0	0	0
17	3.4	1.9	0	0	0	0	0	0	0	0	0
18	2.5	1.1	0	0	0	0	0	0	0	0	0
19	4	1	0	0	4	0	0	0	0	0	0
20	1	0.8	0	0	0	0	0	0	0	0	0
21	0.5	0.5	0	0	0	1	0	0	0	0	0
22	3.4	1.8	0	0	4	0	0	0	0	0	0
23	0.5	0.7	0	0	0	0	0	0	0	0	0
24	0.7	0.8	0	0	0	0	0	0	0	0	0
25	4	1.9	0	0	0	0	0	0	0	0	0
26	1	0.6	0	0	0	0	0	0	0	0	0
27	4.2	2	0	0	0	0	0	0	0	0	0
28	4.4	2.3	3	0	0	0	0	0	0	0	1
29	4.3	1.1	0	0	0	0	0	0	0	0	0
30	4	0.7	0	0	0	0	0	0	0	0	0
31	4.2	2	0	0	0	0	0	0	0	0	0
32	4.1	1.2	3	0	0	0	0	0	0	0	0
33	3.9	1.5	4	0	0	0	0	0	0	1	0
34	5.1	1	0	0	0	0	0	0	0	0	0
35	4.5	1.2	0	0	0	0	0	0	0	0	0
36	4.2	0.8	2	0	0	0	0	0	0	0	1
37	3	1.1	0	0	0	0	0	0	0	0	0
38	4.2	1	3	0	0	1	0	0	0	0	0

Accession#: 085	RM 227.64 (ID)						Lat./Long.: N 45° ?' / W 116° ?'					
Date: 9/28/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 5												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
39	3.3	2.9	2	0	4	0	1	0	0	0	0	
40	3	2.2	0	0	0	0	0	0	0	0	0	
Mean	3.375	1.5225	2.5	0	0.35	0.13	0.13	0	0	0.1	0.05	

Notes: (Rep 5); Tsp present

Accession#: 086	RM (ID)						Lat./Long.: N 45° 39.721' / W 116° 30.312'				
Date: 9/29/2004					UTM						
Temp: °C			EC:		pH:						
Replicate 1											
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**
1	2.5	2.4	6	0	11	0	0	0	0	0	0
2	2.8	2.2	9	0	0	0	0	0	0	0	0
3	3.6	2.5	2	0	6	0	0	0	0	0	0
4	3.4	1	0	0	0	0	0	0	0	0	0
5	2.4	0.6	1	0	0	0	0	0	0	0	0
6	3.6	1.6	0	0	1	0	0	0	0	0	0
7	2.2	1.8	3	0	0	0	0	0	0	0	0
8	3.6	2.5	0	0	4	0	0	0	0	0	0
9	2	2.4	3	0	5	0	0	0	0	0	0
10	3.8	2.8	4	0	0	0	0	0	0	0	0
11	3.9	1.7	2	0	0	0	0	0	0	0	0
12	2.6	0.5	3	0	6	0	0	0	0	0	0
13	1.5	1.7	5	0	2	0	0	0	0	0	0
14	2.8	2	10	0	0	0	0	0	0	0	0
15	1.2	2.5	20	0	2	0	0	0	0	0	0
16	2.1	1.6	3	0	2	0	0	0	0	0	0
17	2	1.2	3	0	3	0	0	0	0	0	0
18	0.6	1.3	5	0	11	0	0	0	0	0	0
19	2.4	1	0	0	2	0	0	0	0	0	0
20	1.1	1	2	0	5	0	0	0	0	0	0
21	3.4	1.9	3	0	0	0	1	0	0	0	0
22	1.3	2.4	0	0	3	0	1	0	0	0	0
23	4.2	2	5	0	1	0	0	0	0	0	0
24	1.2	1.2	0	0	0	0	0	0	0	0	0
25	2.8	1.2	3	0	4	0	0	0	0	0	0

Accession#: 086	RM (ID)					Lat./Long.: N 45° 39.721' / W 116° 30.312'						
Date: 9/29/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 1												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
26	3	2.1	0	0	1	0	0	0	0	0	0	
27	2.5	2.6	0	0	1	0	0	0	0	0	0	
28	2.7	1	1	0	0	0	0	0	0	0	0	
29	2.9	1.6	0	0	0	0	0	0	0	0	0	
30	2.4	2.5	0	0	12	0	0	0	0	0	0	
31	3.2	1.7	1	0	2	0	0	0	0	0	0	
32	2.7	1.1	1	0	12	0	0	0	0	0	0	
33	2.8	1.7	2	0	0	0	0	0	0	0	0	
34	2.8	0.4	0	0	0	0	0	0	0	0	0	
35	3.4	2	2	0	0	0	0	0	0	0	0	
36	1	2.4	0	0	0	0	0	0	0	0	0	
37	4.5	1	0	0	0	0	0	0	0	0	0	
38	1.2	1	1	0	1	0	0	0	0	0	0	
39	3.7	1.9	5	0	0	0	0	0	0	0	0	
40	1.2	1.3	0	0	1	0	0	0	0	0	0	
Mean	2.575	1.6825	2.63	0	2.45	0	0.05	0	0	0	0	

Notes: (Rep I); Tsp present

Accession#: 087	RM (ID)					Lat./Long.: N 45° 39.735' / W 116° 30.323'					
Date: 9/29/2004					UTM						
Temp: °C			EC:		pH:						
Replicate 2											
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**
1	3.8	1.8	0	0	0	0	0	0	0	0	0
2	3.8	2	1	0	0	0	0	0	0	0	0
3	4.4	1.6	0	0	0	0	0	0	0	0	0
4	3.2	1.2	0	0	1	0	0	0	0	0	0
5	3	0.5	0	0	4	0	0	0	0	0	0
6	4	1.7	0	0	30	0	0	0	0	0	0
7	2.8	2.4	0	0	17	0	0	0	0	0	0
8	4.4	1.5	0	0	1	0	0	0	0	0	0
9	3	1	0	0	2	0	0	0	0	0	0
10	2.8	1.4	0	0	12	0	0	0	0	0	0
11	5.2	2	6	0	0	0	1	0	0	0	0
12	2.6	1.8	0	0	7	0	0	0	0	0	0

Accession#: 087	RM (ID)					Lat./Long.: N 45° 39.735' / W 116° 30.323'						
Date: 9/29/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 2												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
13	4.2	1.8	0	0	4	0	0	0	0	0	0	
14	6.2	1.9	0	0	8	0	0	0	0	0	0	
15	4.1	1.8	0	0	0	0	0	0	0	0	0	
16	4.8	1.7	0	0	0	0	0	0	0	0	0	
17	5.5	1.4	2	0	4	0	0	0	0	0	0	
18	5.8	1.2	3	0	0	0	0	0	0	0	0	
19	4.1	1.6	0	0	0	0	0	0	0	0	0	
20	6	2.1	3	0	22	0	1	0	0	0	0	
21	1.2	0.8	0	0	0	0	0	0	0	0	0	
22	4	0.8	10	0	1	0	0	0	0	0	0	
23	5.6	1.4	0	0	6	0	0	0	0	0	0	
24	3.4	1.1	5	0	5	0	0	0	0	0	0	
25	6	0.8	0	0	7	0	0	0	0	0	0	
26	1.1	2.5	10	0	1	0	0	0	0	0	0	
27	1.6	1.6	0	0	0	0	0	0	0	0	0	
28	4.1	1.5	0	0	13	0	0	0	0	0	0	
29	3	2.3	0	0	14	0	0	0	0	0	0	
30	4.2	2	0	0	3	0	0	0	0	0	0	
31	2.5	4	2	0	3	0	0	0	0	0	0	
32	2.2	2	0	0	0	0	0	0	0	0	0	
33	2.3	1.9	0	0	0	0	0	0	0	0	0	
34	4.1	2.1	3	0	0	0	0	0	0	0	1	
35	2	1	0	0	0	0	0	0	0	0	0	
36	3.1	2.2	3	0	2	0	0	0	0	0	0	
37	5.6	1.8	0	0	13	0	2	0	0	0	0	
38	2.9	2.7	4	0	3	0	0	0	0	0	0	
39	2.6	1.9	0	0	41	0	1	0	0	0	0	
40	3.1	1.8	0	0	6	0	0	0	0	0	0	
Mean	3.7075	1.715	1.3	0	5.75	0	0.13	0	0	0	0.03	

Notes: (Rep 2); Tsp present

Accession#: 088	RM (ID)		Lat./Long.: N 45° 39.764' / W 116° 30.324'
Date: 9/29/2004		UTM	
Temp: 19.11°C	EC: 354	pH: 8.34	
Replicate 3			

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	3	2.1	25	0	0	0	0	0	0	0	0
2	3.7	2.1	0	0	0	0	4	0	0	0	0
3	4	0.7	5	0	0	0	0	0	0	0	0
4	3	0.8	0	0	0	0	0	0	0	0	0
5	3.2	1.1	5	0	0	0	0	0	0	0	0
6	3.9	1.3	0	0	0	0	0	0	0	0	0
7	3.5	1.4	0	0	2	0	1	0	0	0	0
8	2.8	1	0	0	0	0	1	0	0	0	0
9	5.5	1	0	0	0	0	0	0	0	0	0
10	5.2	1.6	3	0	0	0	0	0	0	0	0
11	4	1.1	18	0	0	0	0	0	0	0	0
12	4.2	1.9	3	0	2	0	2	0	0	0	0
13	3.2	2	4	0	0	0	0	0	0	2	0
14	3	1.6	0	0	0	0	0	0	0	0	0
15	3.1	0.9	0	0	1	0	0	0	0	0	0
16	7.5	2	0	0	11	0	0	0	0	0	0
17	4	3.9	3	0	6	0	0	0	0	0	0
18	5.5	1.2	3	0	0	0	0	0	0	0	0
19	5	2.2	6	0	0	0	0	0	0	0	0
20	4.3	1.2	0	0	17	0	1	0	0	0	0
21	5	2	0	0	0	0	0	0	0	0	0
22	4.6	1	5	0	10	0	0	0	0	0	0
23	4.6	1	0	0	4	0	0	0	0	0	0
24	5.5	1.8	0	0	17	0	2	0	0	0	0
25	1.1	0.6	2	0	0	0	0	0	0	0	0
26	3	2.6	10	0	5	0	0	0	0	0	0
27	4.5	1	1	0	0	0	0	0	0	0	0
28	1.5	1.6	0	0	0	0	0	0	0	0	0
29	4	1	6	1	0	0	0	0	0	0	0
30	4.5	1.5	3	0	0	0	0	0	0	0	0
31	4	2.2	3	0	0	0	0	0	0	0	0
32	3.5	1.1	6	0	2	0	2	0	0	0	0
33	3	2	26	0	0	0	0	0	0	0	0
34	2.5	1.5	0	0	3	0	2	0	0	0	0
35	2.5	0.8	2	0	0	0	0	0	0	0	0
36	3.9	1.4	0	0	0	0	0	0	0	0	0
37	4.1	1.6	3	0	2	0	0	0	0	0	0
38	3.8	1.1	0	0	0	0	0	0	0	0	0

Accession#: 088 **RM (ID)** **Lat./Long.: N 45° 39.764' / W 116° 30.324'**

Date: 9/29/2004 **UTM**

Temp: 19.11°C **EC: 354** **pH: 8.34**

Replicate 3

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
39	5	4.6	0	0	1	0	0	0	0	0	0
40	5.6	2	1	0	2	0	2	0	0	0	0
Mean	3.945	1.5875	3.58	0.03	2.13	0	0.43	0	0	0.1	0

Notes: (Rep 3); Tsp present

Accession#: 089 **RM 212.4 (OR)** **Lat./Long.: N 45° 39.820' / W 116° 30.393'**

Date: 9/29/2004 **UTM**

Temp: °C **EC:** **pH:**

Replicate 4

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	4	3	0	0	7	0	14	0	0	2	0
2	3	3	6	0	10	0	0	0	0	0	0
3	3.8	3.6	7	0	8	0	0	0	0	0	0
4	4.5	2.3	20	0	0	0	0	0	0	0	0
5	4.1	2.3	0	0	8	0	2	0	0	0	0
6	2.7	3	0	0	10	0	0	0	0	0	0
7	5.2	3.2	0	0	30	0	9	0	0	0	0
8	2	0.8	0	0	0	0	0	0	0	0	0
9	0.5	1.8	5	0	10	0	0	0	0	0	0
10	6	2	1	0	2	0	2	0	0	0	0
11	4.1	0.6	0	0	0	0	0	0	0	0	0
12	1.1	3	0	0	0	0	0	0	0	0	0
13	1	2	0	0	0	0	0	0	0	0	0
14	1	0.6	0	0	0	0	0	0	0	0	0
15	2.4	2.5	0	0	1	0	0	0	0	0	0
16	3.8	2.2	0	0	8	0	0	0	0	0	0
17	2.3	2.3	0	0	0	0	0	0	0	1	0
18	2.2	1.9	0	0	0	0	0	0	0	0	0
19	3.1	0.6	12	0	0	0	0	0	0	0	0
20	4.1	2.2	4	0	0	0	0	0	0	0	0
21	2.7	2.3	0	0	4	0	0	0	0	0	0
22	5	1.3	5	0	0	0	0	0	0	0	0
23	2.4	1.2	0	0	0	0	0	0	0	0	0
24	6	1.9	0	0	0	0	0	0	0	0	0
25	0.5	0.6	0	0	0	0	0	0	0	0	0

Accession#: 089	RM 212.4 (OR)					Lat./Long.: N 45° 39.820' / W 116° 30.393'						
Date: 9/29/2004					UTM							
Temp: °C			EC:		pH:							
Replicate 4												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
26	5.8	1.9	5	0	10	0	0	0	0	0	0	
27	3.6	2.3	1	0	0	0	0	0	0	0	0	
28	1	1.3	0	0	0	0	0	0	0	0	0	
29	2.9	1	0	0	1	0	0	0	0	0	0	
30	2.8	2.6	6	0	0	0	1	0	0	0	0	
31	4.2	1.2	4	0	0	0	0	0	0	0	0	
32	3	0.6	0	0	0	0	0	0	0	0	0	
33	4.8	2.5	0	0	1	0	1	0	0	0	0	
34	2.4	1	0	0	1	0	0	0	0	0	0	
35	2.3	0.3	0	0	0	0	0	0	0	0	0	
36	4.2	1.2	5	0	0	0	0	0	0	0	0	
37	1	1	0	0	0	0	0	0	0	0	0	
38	4.3	1.9	0	0	0	0	0	0	0	0	0	
39	2.1	1.4	0	0	0	0	0	0	0	0	0	
40	2.6	2	0	0	0	0	0	0	0	0	0	
Mean	3.1125	1.81	2.03	0	2.78	0	0.73	0	0	0.1	0	

Notes: (Rep 4); Very Heavy Tsp; Pocket below trib, no surface flow, in fan;
see drawing on field notes.

Accession#: 090	RM					Lat./Long.: N 45° 39.836' / W 116° 30.428'					
Date: 9/29/2004					UTM						
Temp: °C			EC:		pH:						
Replicate 5											
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**
1	3.6	3.1	4	0	2	0	0	0	0	0	0
2	3	1.6	20	0	0	0	0	0	0	0	0
3	4.1	0.8	3	0	0	0	0	0	0	0	0
4	4.1	1.2	5	0	0	0	0	0	0	0	0
5	3.8	2.8	0	0	3	0	0	0	0	0	0
6	4.3	2.2	4	0	0	0	0	0	0	0	0
7	4.1	1.9	0	0	1	0	0	0	0	0	0
8	4.1	3.1	6	0	0	0	0	0	0	0	0
9	5.3	1.2	1	0	0	0	0	0	0	0	0
10	4.6	1.1	0	0	5	0	0	0	0	0	0
11	5	1.5	6	0	0	0	0	0	0	0	0

Accession#: 090	RM				Lat./Long.: N 45° 39.836' / W 116° 30.428'							
Date: 9/29/2004				UTM								
Temp: °C		EC:		pH:								
Replicate 5												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
12	4.6	0.9	0	0	0	0	0	0	0	0	0	
13	5.6	1.8	6	0	0	0	0	0	0	0	0	
14	4.5	1	0	0	4	0	0	0	0	0	0	
15	4.8	1.5	0	0	0	0	0	0	0	0	0	
16	5	0.9	0	0	1	0	0	0	0	0	0	
17	4.9	1.8	0	0	2	0	0	0	0	0	0	
18	4	1.6	1	0	1	0	0	0	0	0	0	
19	4.8	2	4	0	0	0	0	0	0	0	0	
20	5	2.6	11	0	0	0	0	0	0	0	0	
21	4	1.2	3	0	0	0	0	0	0	0	0	
22	4.8	1.6	10	0	1	0	0	0	0	0	0	
23	3.8	1.8	0	0	1	0	0	0	0	0	0	
24	3.7	1.1	0	0	5	0	0	0	0	0	0	
25	4.5	1	20	0	0	0	0	0	0	0	0	
26	3.2	1.7	0	0	0	0	0	0	0	0	0	
27	3.3	1.6	1	0	0	0	0	0	0	0	0	
28	4	0.9	10	0	1	0	0	0	0	0	0	
29	5	1.4	5	0	3	0	0	0	0	0	0	
30	3.6	0.9	1	0	0	0	0	0	0	0	0	
31	5.2	1	4	0	0	0	0	0	0	0	0	
32	5.2	2.3	0	0	1	0	0	0	0	0	0	
33	4.6	1.8	20	0	0	0	0	0	0	0	0	
34	3.6	1.8	4	0	0	0	0	0	0	0	0	
35	4	2.8	30	0	0	0	0	0	0	0	0	
36	3.2	0.9	0	0	1	0	0	0	0	0	0	
37	4.1	1.6	3	0	1	0	0	0	0	0	0	
38	4.2	0.9	0	0	3	0	0	0	0	0	0	
39	5	1	0	0	0	0	0	0	0	0	0	
40	4.6	1.6	0	0	0	0	0	0	0	0	0	
Mean	4.32	1.5875	4.55	0	0.9	0	0	0	0	0	0	

Notes: (Rep 5); no Tsp

Accession#: 091	RM 203.6 (ID)		Lat./Long.: N 45° 46.031' / W 116° 34.583'
Date: 9/29/2004		UTM	
Temp: °C	EC:	pH:	

Replicate 1

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	4	1	0	0	0	0	0	0	0	0	0
2	3.6	2.1	0	0	0	0	0	0	0	0	0
3	5	1	0	0	0	0	0	0	0	1	0
4	4	1.8	0	0	0	0	0	0	0	0	0
5	4.5	2	2	0	0	0	0	0	0	0	0
6	3.8	1.8	6	0	0	0	0	0	0	0	0
7	3.6	1.9	9	0	0	0	0	0	0	0	0
8	0.6	0.9	0	0	0	0	0	0	0	0	0
9	3.5	1	3	0	5	0	0	0	0	0	0
10	3	1.1	0	0	4	0	0	0	0	0	0
11	3.6	2	5	0	1	0	0	0	0	0	0
12	5	2.1	0	0	4	0	4	0	0	0	0
13	3.8	4.1	20	4	0	0	0	0	0	0	0
14	6.3	1.3	0	0	9	0	0	0	0	0	0
15	4	1	0	0	0	0	0	0	0	0	0
16	5.5	1.4	10	0	1	0	0	0	0	0	0
17	4.6	0.6	5	0	4	0	0	0	0	0	0
18	2	1.5	0	0	5	0	0	0	0	0	0
19	2.6	1	0	0	2	0	0	0	0	0	0
20	4	1.7	6	0	10	0	0	0	0	0	0
21	2.6	1.1	0	0	2	0	0	0	0	0	0
22	4.2	1.5	6	0	4	0	0	0	0	0	0
23	2.7	1	7	0	0	0	0	0	0	0	0
24	2	1.9	6	0	2	0	1	0	0	0	0
25	2.4	2.3	0	0	0	0	0	0	0	0	0
26	3	1.1	0	0	12	0	0	0	0	0	0
27	3.3	0.9	5	0	10	0	0	0	0	0	0
28	3	2.3	20	0	0	0	0	0	0	0	0
29	5	2	10	1	0	0	0	0	0	0	0
30	6	1.7	0	0	13	0	0	0	0	1	0
31	3.6	2	0	0	3	0	0	0	0	0	0
32	3	2.2	0	0	6	0	0	0	0	0	0
33	3.3	1	10	0	0	0	0	0	0	0	0
34	3	1.9	15	0	0	0	0	0	0	0	0
35	5.8	2.4	1	0	1	0	0	0	0	0	0
36	1.2	2.3	3	0	1	0	0	0	0	0	0
37	7	0.5	3	0	2	0	0	0	0	0	0

Accession#: 091 **RM 203.6 (ID)** **Lat./Long.: N 45° 46.031' / W 116° 34.583'**

Date: 9/29/2004 **UTM**

Temp: °C **EC:** **pH:**

Replicate 1

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
38	0.6	0.4	0	0	0	0	0	0	0	0	0
39	1.3	1.1	3	0	0	0	0	0	0	0	0
40	6	0.9	5	0	1	0	0	0	0	1	0
Mean	3.65	1.545	4	0.13	2.55	0	0.13	0	0	0.1	0

Notes: (Rep I); No Tsp

Accession#: 092 **RM 203.65 (ID)** **Lat./Long.: N 45° 46.008' / W 116° 34.518'**

Date: 9/29/2004 **UTM**

Temp: °C **EC:** **pH:**

Replicate 2

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	3.2	1.1	2	0	0	0	0	0	0	0	0
2	3.3	1.4	2	0	2	0	0	0	0	0	0
3	4.1	2	2	0	2	0	0	0	0	0	0
4	2.5	1.6	0	0	0	0	0	0	0	0	0
5	4.8	1.5	10	0	3	0	0	0	0	0	0
6	2.5	1.7	0	0	0	0	0	0	0	0	0
7	5	1.3	2	0	0	0	0	0	0	0	0
8	4.8	2	4	0	0	0	0	0	0	0	0
9	5	1	5	0	1	0	0	0	0	0	0
10	4	2.2	0	0	10	0	0	0	0	0	0
11	4.1	1.6	6	0	1	0	0	0	0	0	0
12	5.4	1.6	5	0	0	0	0	0	0	0	0
13	3.9	1.7	5	0	14	0	0	0	0	0	0
14	5	0.9	20	0	0	0	0	0	0	0	0
15	3.8	1	0	0	0	0	0	0	0	0	0
16	3.7	1.5	20	0	0	0	0	0	0	0	0
17	3.2	1.2	0	0	0	0	0	0	0	0	0
18	4	1	3	1	0	0	0	0	0	0	0
19	3.5	1	0	0	0	0	0	0	0	0	0
20	4.1	2	10	0	0	0	0	0	0	0	0
21	3.4	0.8	0	0	0	0	0	0	0	0	0
22	4.5	0.7	6	0	1	0	0	0	0	0	0
23	3.5	1.3	0	0	3	0	0	0	0	0	0

Accession#: 092 **RM 203.65 (ID)** **Lat./Long.: N 45° 46.008' / W 116° 34.518'**

Date: 9/29/2004 **UTM**

Temp: °C **EC:** **pH:**

Replicate 2

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
24	3.3	0.8	0	2	0	0	0	0	0	0	0
25	7	1.6	0	2	20	0	0	0	0	0	0
26	3.3	2	0	1	1	0	0	0	0	0	0
27	4.5	1.1	6	0	0	0	0	0	0	0	0
28	5.2	1	0	0	10	0	0	0	0	0	0
29	5.4	1.1	7	0	0	0	0	0	0	0	0
30	5	2	10	0	0	0	0	0	0	0	0
31	6	1.9	20	1	20	0	0	0	0	0	0
32	5.2	2.5	10	1	11	0	0	0	0	0	0
33	4	0.6	1	0	0	0	0	0	0	0	0
34	6	2.3	0	0	1	0	0	0	0	0	1
35	6.2	1.6	20	0	8	0	0	0	0	0	0
36	5.5	1	0	0	0	0	0	0	0	0	0
37	5	1.6	20	0	12	0	0	0	0	0	0
38	4.5	1.5	5	0	11	0	0	0	0	0	0
39	4.5	1.6	8	0	5	0	0	0	0	0	0
40	3.5	1	0	2	2	0	0	0	0	0	0
Mean	4.385	1.4325	5.23	0.25	3.45	0	0	0	0	0	0.03

Notes: (Rep 2); No Tsp

Accession#: 093 **RM 203.7 (ID)** **Lat./Long.: N 45° 45.969' / W 116° 34.456'**

Date: 9/29/2004 **UTM**

Temp: 19.51°C **EC: 353** **pH: 8.35**

Replicate 3

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	5	2.4	10	0	0	0	0	0	0	0	0
2	5	1.5	20	0	0	0	0	0	0	0	0
3	5	1.6	5	0	0	0	0	0	0	0	0
4	6	1	5	0	1	0	0	0	0	0	0
5	5.6	3.3	5	0	0	0	0	0	0	0	0
6	6.1	1.1	10	0	0	0	0	0	0	0	0
7	4.9	0.8	0	0	2	0	0	0	0	0	0
8	6.2	1	20	0	0	0	0	0	0	0	0
9	4.8	2.8	2	0	4	0	0	0	0	0	0
10	6.1	1.2	10	0	0	0	0	0	0	0	0

Accession#: 093 **RM 203.7 (ID)** **Lat./Long.: N 45° 45.969' / W 116° 34.456'**

Date: 9/29/2004 **UTM**

Temp: 19.51°C **EC: 353** **pH: 8.35**

Replicate 3

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
11	4.6	3.4	0	0	0	0	0	0	0	0	0
12	6	0.9	9	0	0	0	0	0	0	0	0
13	4.5	0.7	5	0	0	0	0	0	0	0	0
14	3.5	0.8	3	0	0	0	0	0	0	0	0
15	5.5	1.4	12	0	2	0	0	0	0	0	0
16	4.6	1	10	0	0	0	0	0	0	0	0
17	4	1	5	0	1	0	0	0	0	2	0
18	5	1.8	20	0	2	0	0	0	0	0	0
19	3.4	0.7	0	0	0	0	0	0	0	0	0
20	5.1	1.8	10	1	0	0	0	0	0	0	0
21	5	1.2	15	0	0	0	0	0	0	0	0
22	6	0.5	0	2	0	0	0	0	0	0	0
23	4.5	1	10	0	2	0	0	0	0	0	0
24	5.5	1.8	20	0	10	0	0	0	0	1	0
25	4.6	29	12	0	8	0	0	0	0	0	0
26	5	2	10	0	0	0	0	0	0	0	0
27	4.3	1.5	1	0	0	0	0	0	0	0	0
28	6.1	0.9	5	0	2	0	0	0	0	0	0
29	3.3	0.6	2	0	0	0	0	0	0	3	0
30	5.8	1.5	10	0	12	0	0	0	0	0	0
31	3.8	1	0	0	0	0	0	0	0	0	0
32	6.2	1	15	0	1	0	0	0	0	0	0
33	4.5	0.8	3	0	0	0	0	0	0	0	0
34	5	2	30	0	5	0	0	0	0	0	0
35	3	1.1	1	0	0	0	0	0	0	0	0
36	4.3	1.1	10	0	0	0	0	0	0	0	0
37	3	1.5	10	0	2	0	0	0	0	0	0
38	6	1.2	5	0	0	0	0	0	0	1	0
39	4.8	0.9	2	0	1	0	0	0	0	0	0
40	3.8	1.6	7	0	2	0	0	0	0	0	0
Mean	4.885	2.06	8.23	0.08	1.43	0	0	0	0	0.2	0

Notes: (Rep 3); No Tsp water rising; water 3.5 dm above algae line

Accession#: 094	RM 203.3 (OR)				Lat./Long.: N 45° 46.112' / W 116° 34.275'							
Date: 9/29/2004				UTM								
Temp: °C		EC:		pH:								
Replicate 4												
Cobble	**Depth (dm)**	**Width (dm)**	**Fsp.**	**Fnu.**	**Pan.**	**Vef.**	**Tsp.**	**Cfl.**	**Flsp.**	**Psp.**	**Pssp.**	
1	5	2	2	0	0	0	0	0	0	0	0	
2	5.1	1.8	0	0	0	0	0	0	0	0	0	
3	6	0.5	0	0	0	0	0	0	0	0	0	
4	5.5	1.7	16	0	0	0	0	0	0	0	0	
5	6.3	1.5	0	0	0	0	0	0	0	0	0	
6	5.5	1.1	1	0	0	0	0	0	0	0	0	
7	6	0.9	0	0	0	0	0	0	0	0	0	
8	5.1	1.1	1	0	0	0	0	0	0	0	0	
9	7	1.2	5	0	0	0	0	0	0	0	0	
10	6	1.8	4	0	0	0	0	0	0	0	0	
11	5.5	0.9	0	0	0	0	0	0	0	0	0	
12	6	1	0	0	0	0	0	0	0	0	0	
13	9	0.8	15	0	0	0	0	0	0	0	0	
14	9	0.9	20	0	0	0	0	0	0	0	0	
15	8	0.9	0	0	0	0	0	0	0	0	0	
16	8	1.1	0	0	0	0	0	0	0	0	0	
17	9	1	0	0	1	0	0	0	0	0	0	
18	9	0.7	0	0	0	0	0	0	0	0	0	
19	9	1	2	0	0	0	0	0	0	0	0	
20	10	1.8	0	0	0	0	0	0	0	0	0	
21	8	1.1	1	0	0	0	0	0	0	0	0	
22	8	2.2	3	0	0	0	0	0	0	0	0	
23	7.5	1.6	0	0	0	0	0	0	0	0	0	
24	10	1.4	0	0	0	0	0	0	0	0	0	
25	8	1.2	1	0	0	0	0	0	0	0	0	
26	9.5	1.6	0	0	0	0	0	0	0	0	0	
27	12	2	1	0	0	0	0	0	0	0	0	
28	10	1.4	2	0	0	0	0	0	0	0	0	
29	9	1.3	3	0	0	0	0	0	0	0	0	
30	8	1	0	0	0	0	0	0	0	0	0	
31	8.5	0.6	1	0	0	0	0	0	0	0	0	
32	6	1	0	0	0	0	0	0	0	0	0	
33	9.5	1.3	1	0	0	0	0	0	0	0	0	
34	9	1.6	7	0	0	0	0	0	0	0	0	
35	5	2	1	0	0	0	0	0	0	0	0	
36	8.5	2	10	0	0	0	0	0	0	0	0	
37	8	1.6	0	0	0	0	0	0	0	0	0	
38	7	2.2	0	0	0	0	0	0	0	0	0	

Accession#: 094 **RM 203.3 (OR)** **Lat./Long.: N 45° 46.112' / W 116° 34.275'**

Date: 9/29/2004 **UTM**

Temp: °C **EC:** **pH:**

Replicate 4

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
39	7	0.9	1	0	0	0	0	0	0	0	0
40	8	2.9	20	0	0	0	0	0	0	0	0
Mean	7.6625	1.365	2.95	0	0.03	0	0	0	0	0	0

Notes: (Rep 4); No Tsp; Water 4.5 dm above algae line

Accession#: 095 **RM 203.35 (OR)** **Lat./Long.: N 45° 46.111' / W 116° 34.717'**

Date: 9/29/2004 **UTM**

Temp: 19.5°C **EC: 352** **pH: 8.34**

Replicate 5

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	11	1.6	1	0	0	0	0	0	0	0	0
2	11	1.4	7	0	0	0	0	0	0	0	0
3	9	1.8	5	0	0	0	0	0	0	0	0
4	7	2.8	0	0	0	0	0	0	0	0	0
5	8	1.6	0	0	0	0	0	0	0	0	0
6	10	1.8	3	0	0	0	0	0	0	0	0
7	10	1.5	0	0	0	0	0	0	0	0	0
8	10	1.3	1	0	1	0	0	0	0	0	0
9	9	2.4	1	0	0	0	0	0	0	0	0
10	8	1.1	6	0	0	0	0	0	0	0	0
11	8.5	0.6	3	0	0	0	0	0	0	0	0
12	9.2	1	0	0	0	0	0	0	0	0	0
13	8.3	2.6	0	0	0	0	0	0	0	0	0
14	8.1	1.5	0	0	0	0	0	0	0	0	0
15	9.3	1.6	0	0	0	0	0	0	0	0	0
16	9.3	1	0	0	0	0	0	0	0	0	0
17	7	2	10	0	0	0	0	0	0	0	0
18	9.1	1.2	0	0	0	0	0	0	0	0	0
19	10.2	1.7	0	0	0	0	0	0	0	0	0
20	12	1.7	1	0	1	0	0	0	0	0	0
21	13.5	0.9	2	0	0	0	0	0	0	0	0
22	9.8	2.2	20	0	0	0	0	0	0	0	0
23	10.2	1.6	0	0	0	0	0	0	0	0	0
24	5.6	2	0	0	0	0	0	0	0	0	0
25	5.6	1	0	0	0	0	0	0	0	0	0

Accession#: 095 **RM 203.35 (OR)** **Lat./Long.: N 45° 46.111' / W 116° 34.717'**

Date: 9/29/2004 **UTM**

Temp: 19.5°C **EC: 352** **pH: 8.34**

Replicate 5

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
26	10	2	0	0	0	0	0	0	0	0	0
27	10	1.4	1	0	0	0	0	0	0	0	0
28	8	1.1	8	0	0	0	0	0	0	0	0
29	9.1	1.2	9	0	0	0	0	0	0	0	0
30	9.5	1.1	11	0	0	0	0	0	0	1	0
31	5.5	0.8	2	0	0	0	0	0	0	0	0
32	11	1.3	0	0	0	0	0	0	0	0	0
33	9.5	1.1	11	0	0	0	0	0	0	0	0
34	11.5	1.6	2	0	0	0	0	0	0	0	0
35	9.5	1	0	0	0	0	0	0	0	0	0
36	9.1	1	2	0	0	0	0	0	0	1	0
37	9	0.4	3	0	0	0	0	0	0	0	0
38	10	2	10	0	0	0	0	0	0	0	0
39	10	2.6	1	0	0	0	0	0	0	0	0
40	11	2	5	0	0	0	0	0	0	0	0
Mean	9.285	1.5125	3.13	0	0.05	0	0	0	0	0.1	0

Notes: (Rep 5); No Tsp

Accession#: 096 **RM 213.35 (OR)** **Lat./Long.: N 45° 39.007' / W 116° 29.005'**

Date: 10/2/2004 **UTM: 11T 0539851 / UTM 5055295**

Temp: 18.81°C **EC: 358** **pH: 8.33**

Replicate 1

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	2.8	2.4	11	0	0	0	0	0	0	0	0
2	3.8	1	6	0	0	0	0	0	0	0	0
3	5	2.1	0	0	0	0	0	0	0	0	0
4	2	1.7	2	0	0	0	0	0	0	0	0
5	1.1	1.5	10	0	0	0	0	0	0	0	0
6	2.4	2.8	0	0	19	0	0	0	0	0	0
7	4.2	1.1	12	0	0	0	0	0	0	0	0
8	2.2	1.8	4	0	0	0	0	0	0	0	0
9	2.5	1.7	20	0	0	0	0	0	0	0	0
10	3.5	1.8	0	0	0	0	0	0	0	0	0
11	3.8	1.4	0	2	1	0	0	0	0	0	0

Accession#: 096 **RM 213.35 (OR)** **Lat./Long.: N 45° 39.007' / W 116° 29.005'**

Date: 10/2/2004 **UTM: 11T 0539851 / UTM 5055295**

Temp: 18.81°C **EC: 358** **pH: 8.33**

Replicate 1

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
12	3.8	2.2	0	0	39	0	3	1	0	0	0
13	3.8	3	2	0	0	0	0	0	0	0	0
14	1.8	1.3	0	0	0	0	0	0	0	0	0
15	5.4	1	2	0	0	0	0	0	0	0	0
16	3.2	2.6	6	0	0	0	0	0	0	0	0
17	5.6	2.1	0	0	0	0	0	0	0	0	0
18	5	1.4	4	0	0	0	0	0	0	0	0
19	2	0.4	1	0	0	0	0	0	0	0	0
20	4.5	1.8	0	0	0	0	0	0	0	0	0
21	3	1.1	0	0	38	0	0	0	0	0	0
22	4.6	1.6	0	0	0	0	0	0	0	0	0
23	4.2	1.6	2	0	0	0	0	0	0	0	0
24	2.8	1.4	0	0	0	0	0	0	0	0	0
25	4.5	2.2	0	0	0	0	0	0	0	0	0
26	4.1	1.6	0	0	0	0	1	0	0	0	0
27	4.1	2.4	3	0	0	0	0	0	0	0	0
28	5.7	1.8	1	0	0	0	0	1	0	0	0
29	3.2	1	10	0	0	0	0	0	0	0	0
30	4.3	1.8	12	0	0	0	0	0	0	0	0
31	3.4	1	1	0	0	0	0	0	0	0	0
32	3.8	3	14	0	0	0	0	3	0	0	0
33	5.2	1.5	2	0	0	0	0	0	0	0	0
34	6.5	1.6	0	0	0	0	0	1	0	0	0
35	2.8	1.8	12	0	0	0	0	0	0	0	0
36	2.2	0.9	5	0	0	0	0	0	0	0	0
37	2.9	1.1	0	0	0	0	0	0	0	0	0
38	4.2	1.1	2	0	0	0	0	0	0	0	0
39	1.5	2.5	3	0	0	0	0	0	0	0	0
40	1	1.9	0	0	0	0	0	0	0	0	0
Mean	3.56	1.7	3.68	0.05	2.43	0	0.1	0.15	0	0	0

Notes: (Rep I); Tsp present; Possible Gan dive site

Accession#: 097 **RM 214.3 (OR)** **Lat./Long.: N 45° 38.325' / W 116° 28.990'**

Date: 10/2/2004 **UTM: 11T 0540279 / UTM 5054040**

Temp: 18.85°C **EC: 359** **pH: 8.31**

Replicate 2

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	2.4	1.9	1	0	0	0	0	0	0	0	0
2	4	1.1	0	0	0	0	0	0	0	0	0
3	2.3	1	1	0	0	0	0	0	0	0	0
4	2.1	1.9		0	0	0	0	0	0	0	0
5	4	1.3	5	0	0	0	0	0	0	0	0
6	2.9	1.8	3	0	0	0	0	0	0	0	0
7	3.1	1.3	3	0	0	0	0	0	0	0	0
8	5	2.4	5	0	0	0	0	0	0	1	0
9	1.8	1.1	0	0	0	0	0	0	0	0	0
10	1.1	1.2	9	0	0	0	0	0	0	0	0
11	6.2	1.4	0	0	0	0	0	0	0	0	0
12	6	1.1	6	0	0	0	0	0	0	0	0
13	2.4	1	12	0	0	0	0	0	0	0	0
14	5.5	1.1	3	0	0	0	0	0	0	0	0
15	2.8	0.8	0	0	0	0	0	0	0	0	0
16	3.1	3.2	8	0	0	0	0	0	0	0	0
17	4.8	1.1	1	0	0	0	0	0	0	0	0
18	2.9	2.2	6	0	0	0	0	0	0	0	0
19	2.8	0.8	2	0	0	0	0	0	0	0	0
20	0.2	0.6	4	0	0	0	0	0	0	0	0
21	2.9	1.4	5	0	0	0	0	0	0	0	0
22	0.9	0.4	2	0	0	0	0	0	0	0	0
23	1.9	2.2	16	0	0	0	0	0	0	0	0
24	1.5	1.3	9	0	0	0	0	0	0	0	0
25	2.4	1.5	12	0	0	0	0	0	0	0	0
26	1.6	2.2	5	0	0	0	0	0	0	0	0
27	4.5	1.8	1	0	0	0	0	0	0	0	0
28	1.6	1.8	9	0	0	0	0	0	0	0	0
29	2	2.4	4	0	0	0	0	0	0	0	0
30	3.4	1.3	7	0	1	0	0	0	0	0	0
31	3.8	2.1	6	0	0	0	0	0	0	0	0
32	1.2	1.4	5	0	0	0	0	0	0	0	0
33	2.9	2.1	10	0	0	0	0	0	0	0	0
34	2	2.2	13	0	0	0	0	0	0	0	0
35	3.6	1	14	0	0	0	0	0	0	0	0
36	1.4	0.6	9	0	0	0	0	0	0	0	0
37	3.6	1.1	3	0	0	0	0	0	0	0	0
38	2	2.5	2	0	0	0	0	0	0	0	0

Accession#: 097 **RM 214.3 (OR)** **Lat./Long.: N 45° 38.325' / W 116° 28.990'**

Date: 10/2/2004 **UTM: 11T 0540279 / UTM 5054040**

Temp: 18.85°C **EC: 359** **pH: 8.31**

Replicate 2

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
39	2.4	1.7	8	0	0	0	0	0	0	0	0
40	3.6	0.6	6	0	0	0	0	0	0	0	0
Mean	2.865	1.4975	5.92	0	0.03	0	0	0	0	0	0

Notes: (Rep 2); No Tsp

Accession#: 098 **RM 214.31 (OR)** **Lat./Long.: N 45° 38.325' / W 116° 28.979'**

Date: 10/2/2004 **UTM: 11T 0540287 / UTM 5054053**

Temp: 19.25°C **EC: 358** **pH: 8.31**

Replicate 3

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	3.5	1.9	5	0	0	0	0	0	0	0	0
2	2.6	1.1	12	0	0	0	0	0	0	0	0
3	3.3	2.2	22	0	0	0	0	0	0	0	0
4	3.3	1.8	7	0	0	0	0	0	0	0	0
5	3.3	1.4	19	0	0	0	0	0	0	0	0
6	3.2	1.8	16	0	0	0	0	0	0	0	0
7	4.2	1.3	8	0	0	0	0	0	0	0	0
8	4.2	1.9	1	0	0	0	0	0	0	0	0
9	3.3	0.9	14	0	0	0	0	0	0	0	0
10	4.4	0.5	12	0	0	0	0	0	0	0	0
11	5	2	5	0	0	0	0	0	0	0	0
12	5.1	1.1	1	0	0	0	0	0	0	0	0
13	3.2	1.8	4	0	0	0	0	0	0	0	0
14	5.2	1	1	0	0	0	0	0	0	0	0
15	2.2	2.4	45	0	0	0	0	0	0	0	0
16	3.6	2.1	5	0	0	0	0	0	0	0	0
17	2.4	1.2	1	0	0	0	0	0	0	0	0
18	3.4	1.9	6	0	0	0	0	0	0	0	0
19	2.1	1.1	12	0	0	0	0	0	0	0	0
20	2	2.1	6	0	0	0	0	0	0	0	0
21	1.1	1.2	8	0	0	0	0	0	0	0	0
22	1.2	2.2	7	0	0	0	0	0	0	0	0
23	1.8	1.6	0	0	0	0	0	0	0	0	0
24	1.1	2.1	8	0	0	0	0	0	0	0	0
25	1.4	1.7	11	0	0	0	0	0	0	0	0

Accession#: 098 **RM 214.31 (OR)** **Lat./Long.: N 45° 38.325' / W 116° 28.979'**

Date: 10/2/2004 **UTM: 11T 0540287 / UTM 5054053**

Temp: 19.25°C **EC: 358** **pH: 8.31**

Replicate 3

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
26	1	1.1	4	0	0	0	0	0	0	0	0
27	2.2	1.7	3	0	0	0	0	0	0	0	0
28	2.2	1.7	8	0	0	0	0	0	0	0	0
29	1.7	1.1	9	0	0	0	0	0	0	0	0
30	2.1	2.7	6	0	0	0	0	0	0	0	0
31	2.2	1.8	32	0	0	0	0	0	0	0	0
32	3.1	1.4	0	0	0	0	0	0	0	0	0
33	6	2.3	18	0	0	0	0	0	0	0	0
34	5.2	1.7	8	0	0	0	0	0	0	0	0
35	4.2	1.8	9	0	0	0	0	0	0	0	0
36	6.8	1.6	3	0	0	0	0	0	0	0	0
37	2.3	1.7	5	0	0	0	0	0	0	0	0
38	2	1.5	1	0	0	0	0	0	0	0	0
39	1.2	2.2	14	0	0	0	0	0	0	0	0
40	1.1	1.2	1	0	0	0	0	0	0	0	0
Mean	2.985	1.645	8.93	0	0	0	0	0	0	0	0

Notes: (Rep 3); No Tsp

Accession#: 099 **RM 214.33 (OR)** **Lat./Long.: N 45° 38.347' / W 116° 28.957'**

Date: 10/2/2004 **UTM: 11T 0540322 / UTM 5054080**

Temp: 18.98°C **EC: 359** **pH: 8.32**

Replicate 4

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	3.4	3.4	5	0	0	0	0	0	0	0	0
2	1.9	1.9	5	0	0	0	0	0	0	0	0
3	2.3	2.3	3	0	0	0	0	0	0	0	0
4	2.3	2.3	0	0	1	0	1	0	0	0	0
5	3.4	3.4	2	0	0	0	2	0	0	0	0
6	2.2	2.2	0	0	1	0	2	0	0	0	0
7	5	5	4	0	0	0	0	0	0	0	0
8	2.4	2.4	0	0	0	0	0	0	0	0	0
9	3	3	8	0	0	0	0	0	0	0	0
10	4.4	4.4	0	0	0	0	0	0	0	0	0
11	3.8	3.8	1	0	0	0	0	0	0	0	0
12	3.4	3.4	7	0	0	0	0	0	0	0	0

Accession#: 099 **RM 214.33 (OR)** **Lat./Long.: N 45° 38.347' / W 116° 28.957'**

Date: 10/2/2004 **UTM: 11T 0540322 / UTM 5054080**

Temp: 18.98°C **EC: 359** **pH: 8.32**

Replicate 4

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
13	3.8	3.8	0	0	0	0	0	0	0	0	0
14	2.6	2.6	7	0	0	0	0	0	0	0	0
15	4.5	4.5	4	0	0	0	0	0	0	0	0
16	4.4	4.4	12	0	0	0	0	0	0	0	0
17	4.2	4.2	6	0	0	0	0	0	0	0	0
18	5.3	5.3	7	0	0	0	0	0	0	1	0
19	4.5	4.5	6	0	0	0	0	0	0	0	0
20	6.2	6.2	0	0	1	0	1	0	0	0	0
21	3	3	5	0	0	0	0	0	0	0	0
22	6.1	6.1	2	0	0	0	0	0	0	0	0
23	5.8	5.8	8	0	0	0	0	0	0	0	0
24	2.1	2.1	5	0	0	0	0	0	0	0	0
25	2.5	2.5	6	0	0	0	0	0	0	0	0
26	5.9	5.9	0	0	0	0	0	0	0	0	0
27	2.1	2.1	11	0	0	0	0	0	0	0	0
28	3.3	3.3	3	0	0	0	0	0	0	0	0
29	1.5	1.5	18	0	0	0	0	0	0	0	0
30	2.4	2.4	0	0	0	0	0	0	0	0	0
31	2.1	2.1	3	0	0	0	0	0	0	0	0
32	2.4	2.4	6	0	1	0	0	0	0	0	0
33	3	3	1	0	0	0	0	0	0	0	0
34	1.2	1.2	12	0	0	0	0	0	0	0	0
35	2.1	2.1	13	0	0	0	0	0	0	0	0
36	3.4	3.4	8	0	0	0	0	0	0	0	0
37	2.8	2.8	7	0	0	0	0	0	0	0	0
38	2.6	2.6	5	0	0	0	0	0	0	0	0
39	4.3	4.3	10	0	0	0	0	0	0	0	0
40	2.2	2.2	7	0	0	0	0	0	0	0	0
Mean	3.345	3.345	5.18	0	0.1	0	0.15	0	0	0	0

Notes: (Rep 4); Tsp present

Accession#: 100 **RM 215.02 (ID)** **Lat./Long.: N 45° 37.947' / W 116° 28.573'**

Date: 10/2/2004 **UTM: 11T 0540821 / UTM 5053343**

Temp: 19.05°C **EC: 358** **pH: 8.32**

Replicate 1

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	1.2	1.6	1	0	1	0	0	0	0	0	0
2	6.5	1	1	0	0	0	0	0	0	0	0
3	3	1.4	0	0	0	0	0	0	0	0	0
4	1.3	2.3	11	0	13	0	0	0	0	0	0
5	5.2	1.1	0	0	0	0	0	0	0	0	0
6	6.5	1.9	6	0	0	0	0	0	0	0	0
7	2.7	1.3	2	0	0	0	0	0	0	0	0
8	6.6	1.1	7	0	0	0	0	0	0	0	0
9	3.3	1.5	2	0	0	0	0	0	0	0	0
10	4.1	1.1	0	0	0	0	0	0	0	0	0
11	4.1	2.3	1	0	0	0	0	0	0	0	0
12	5.5	1.1	0	0	0	0	0	0	0	0	0
13	6.1	1.2	0	0	0	0	0	0	0	0	0
14	3.2	1.4	4	0	0	0	0	0	0	0	0
15	5.6	1.5	0	0	0	0	0	0	0	0	0
16	5.4	1.5	6	0	0	0	0	0	0	0	0
17	3.3	1.3	3	0	1	0	0	0	0	0	0
18	4.7	2.2	0	0	0	0	0	0	0	0	0
19	2.3	1.3	21	0	0	0	0	0	0	0	0
20	4.2	1.1	5	0	0	0	0	1	0	0	0
21	2.5	1.2	18	0	0	0	0	0	0	0	0
22	2.4	1.2	8	0	0	0	0	0	0	0	0
23	2.2	2.5	18	0	0	0	0	0	0	0	0
24	2.8	1.9	0	0	1	0	0	0	0	0	0
25	2.1	1	2	0	2	0	0	0	0	0	0
26	2.2	1.5	0	0	5	0	0	0	0	0	0
27	2.8	1.8	8	0	1	0	0	0	0	0	0
28	3.2	1.7	0	0	3	0	0	0	0	0	0
29	3.6	1.7	3	0	0	0	0	0	0	0	0
30	2.4	0.8	1	0	0	0	0	0	0	0	0
31	1.8	0.8	0	0	0	0	0	0	0	0	0
32	3.2	1.6	0	0	0	0	0	0	0	0	0
33	3.9	2.8	0	0	0	0	0	0	0	0	0
34	3.1	2.2	6	0	0	0	0	0	0	0	0
35	3.8	2.4	8	0	0	0	0	0	0	0	0
36	3.5	1.8	0	0	1	0	0	0	0	0	0
37	2.1	1.1	0	0	0	1	0	0	0	0	0
38	2.5	1.6	0	0	1	0	0	0	0	0	0

Accession#: 100 **RM 215.02 (ID)** **Lat./Long.: N 45° 37.947' / W 116° 28.573'**

Date: 10/2/2004 **UTM: 11T 0540821 / UTM 5053343**

Temp: 19.05°C **EC: 358** **pH: 8.32**

Replicate 1

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
39	3	1	2	0	1	0	0	0	0	0	0
40	2.8	1.8	1	0	0	0	0	0	0	0	0
Mean	3.5175	1.54	3.63	0	0.75	0.03	0	0.03	0	0	0

Notes: (Rep 1); no Tsp present

Accession#: 101 **RM 215.03 (OR)** **Lat./Long.: N 45° 37.859' / W 116° 28.512'**

Date: 10/2/2004 **UTM: 11T 0540907 / UTM 5053175**

Temp: 19.28°C **EC: 358** **pH: 8.33**

Replicate 2

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
1	3	1.9	8	0	0	0	0	0	0	0	0
2	4	2	10	0	0	0	0	0	0	0	0
3	4.2	1.3	3	0	0	0	0	0	0	0	0
4	3.2	2.1	12	0	0	0	0	0	0	0	0
5	3.9	1.2	0	0	0	0	0	0	0	0	0
6	2.8	1.3	4	0	0	0	0	0	0	0	0
7	4.1	1.5	3	0	0	0	0	0	0	0	0
8	5	2	2	0	0	0	0	0	0	0	0
9	1.6	1.4	2	0	0	0	0	0	0	0	0
10	3.5	1.8	1	0	0	0	0	0	0	0	0
11	0.3	1.7	14	0	0	0	0	0	0	0	0
12	2.8	1.9	4	0	0	0	0	0	0	0	0
13	2.1	0.9	2	0	0	0	0	0	0	0	0
14	2.7	2.3	6	0	0	0	0	0	0	0	0
15	4	1.3	2	0	0	0	0	0	0	0	0
16	4.1	1	3	0	0	0	0	0	0	0	0
17	1.5	1.1	5	0	0	0	0	0	0	0	0
18	4.3	1	2	0	0	0	0	0	0	0	0
19	1.9	2	11	0	0	0	0	0	0	0	0
20	3.8	1.1	12	0	0	0	0	0	0	0	0
21	1.9	1.5	4	0	1	0	0	0	0	0	0
22	3.3	1.3	0	0	0	0	0	0	0	0	0
23	1.6	1.8	6	0	0	0	0	0	0	0	0
24	3.8	3	15	0	0	0	0	0	0	0	0
25	2.1	2.4	28	0	0	0	0	0	0	0	0

Accession#: 101 **RM 215.03 (OR)** **Lat./Long.: N 45° 37.859' / W 116° 28.512'**

Date: 10/2/2004 **UTM: 11T 0540907 / UTM 5053175**

Temp: 19.28°C **EC: 358** **pH: 8.33**

Replicate 2

Cobble	Depth (dm)	Width (dm)	Fsp.	Fnu.	Pan.	Vef.	Tsp.	Cfl.	Flsp.	Psp.	Pssp.
26	2.3	2.4	8	0	0	0	0	0	0	0	0
27	2	0.8	5	0	0	0	0	0	0	0	0
28	2.1	1.2	8	0	0	0	0	0	0	0	0
29	2.2	1.2	16	0	0	0	0	0	0	0	0
30	0.8	2.2	13	0	0	0	0	0	0	0	0
31	2.1	1.8	1	0	0	0	0	0	0	0	0
32	2.3	2.1	5	0	0	0	0	0	0	0	0
33	1	1.2	9	0	0	0	0	0	0	0	0
34	2	1.3	4	0	0	0	0	0	0	0	0
35	2.1	2	16	0	0	0	0	0	0	0	0
36	2.1	0.6	0	0	0	0	0	0	0	0	0
37	2.1	2.2	14	0	0	0	0	0	0	0	0
38	1.8	2.4	20	0	0	0	0	0	0	0	0
39	1.1	2.1	10	0	0	0	0	0	0	0	0
40	2.2	1.1	8	0	0	0	0	0	0	0	0
Mean	2.5925	1.635	7.4	0	0.03	0	0	0	0	0	0

Notes: (Rep 2); No Tsp

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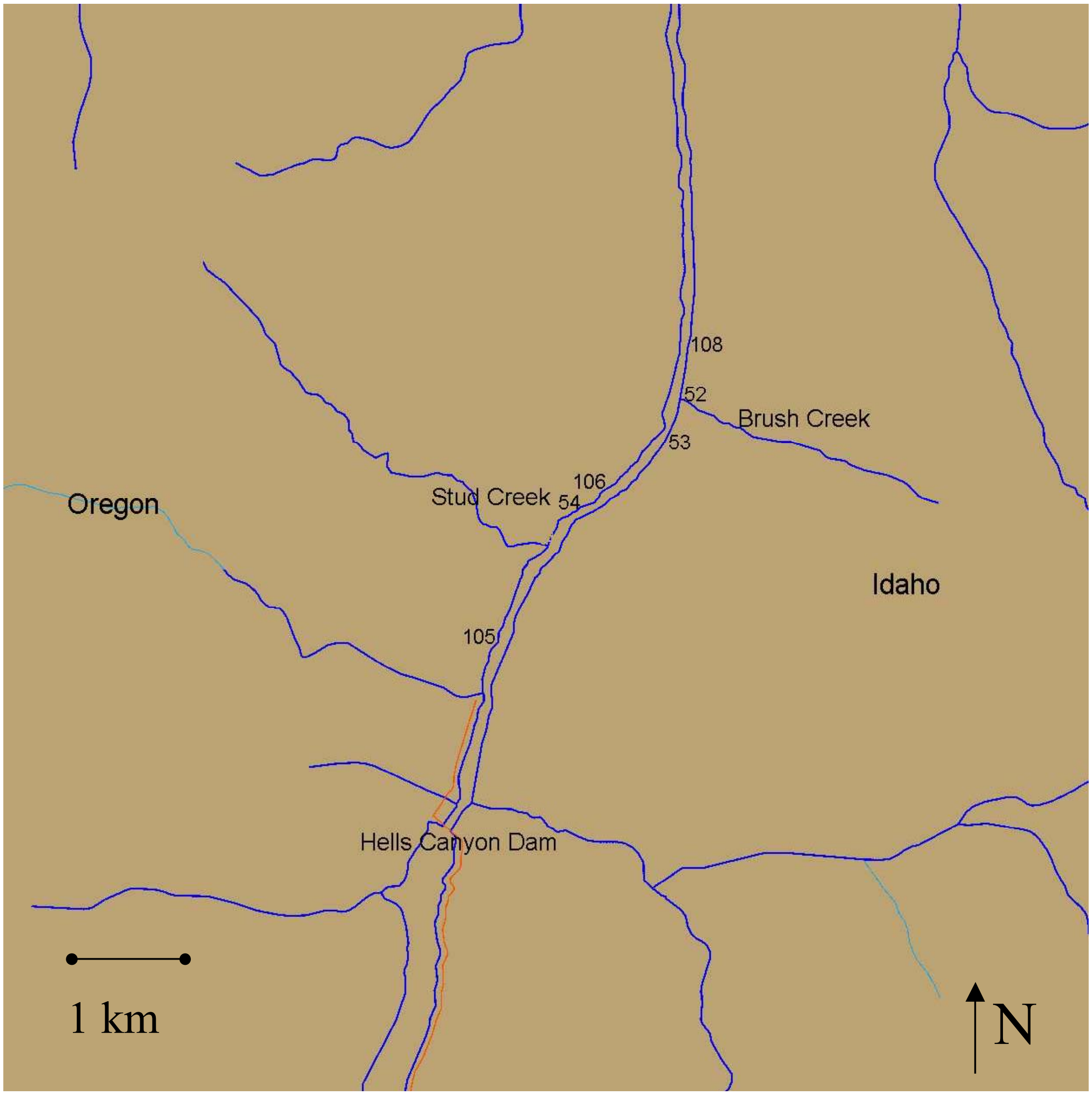
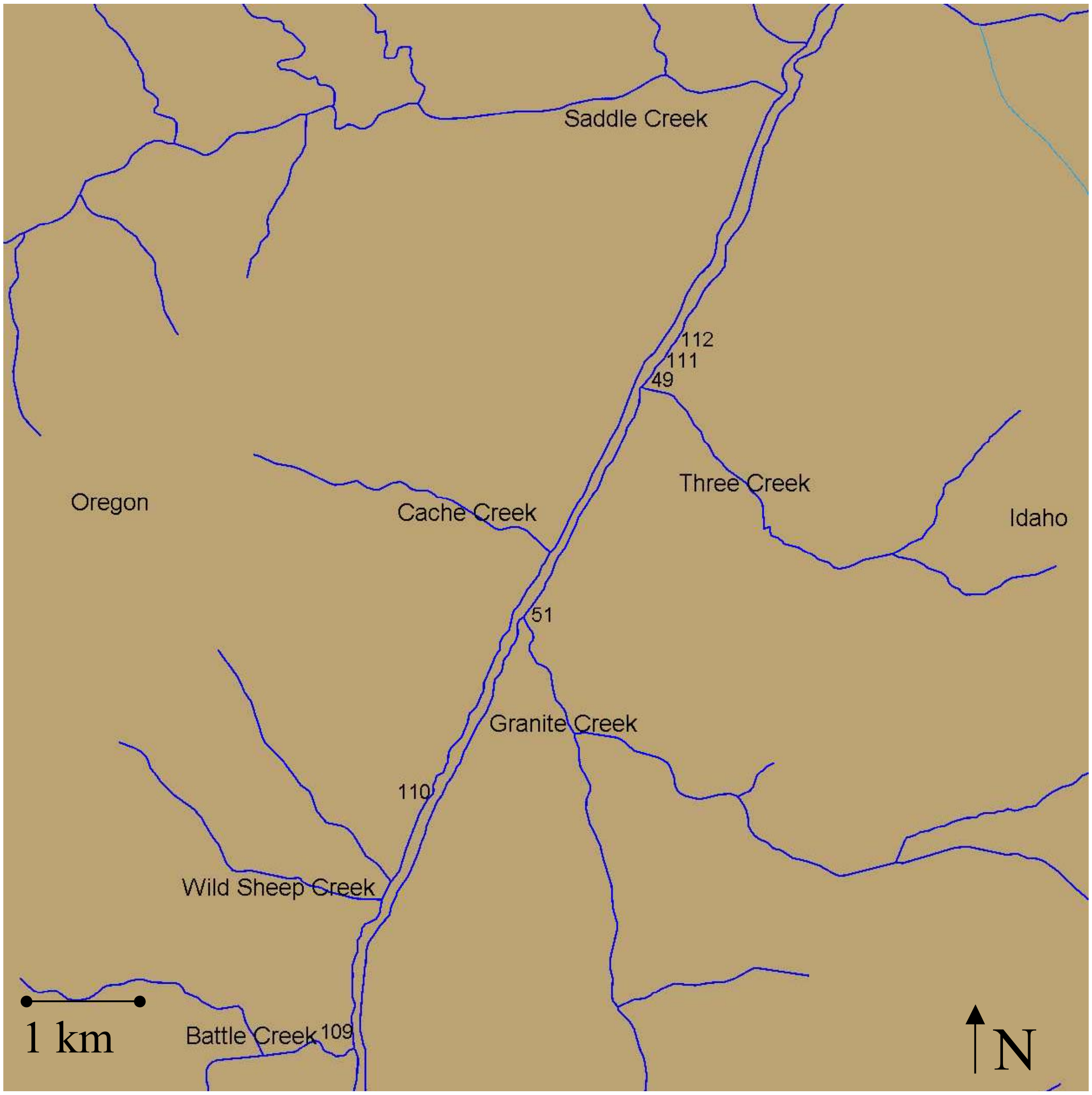
Appendix E. Maps of shoreline sampling for Mollusk Survey Snake River, Hells Canyon 2004 (number indicates sample number and location on either shore. UTM coordinates for all sites are in Appendix 2a)



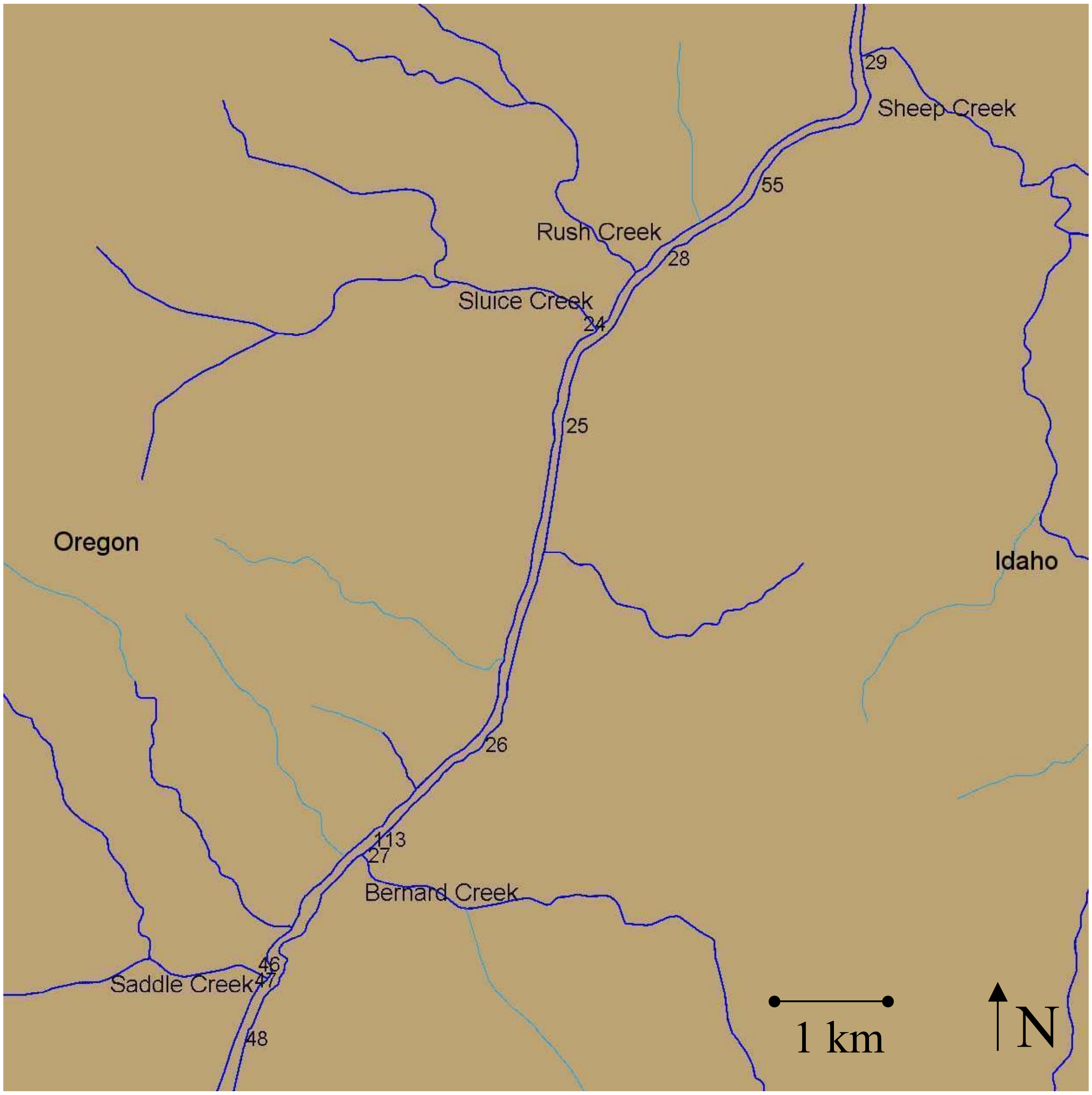
Map 1.

Appendix E. (Continued)



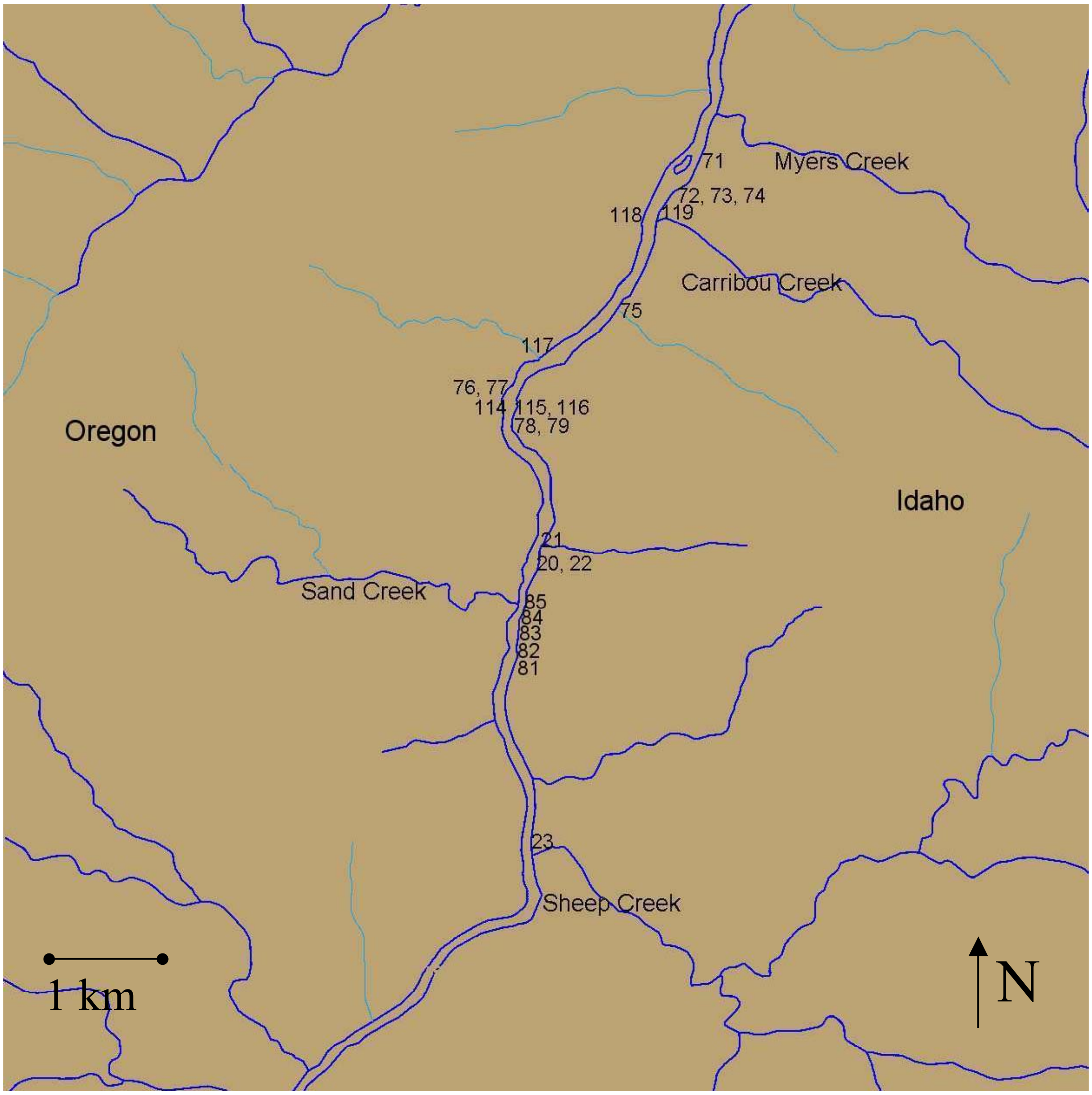
Map 2.

Appendix E. (Continued)



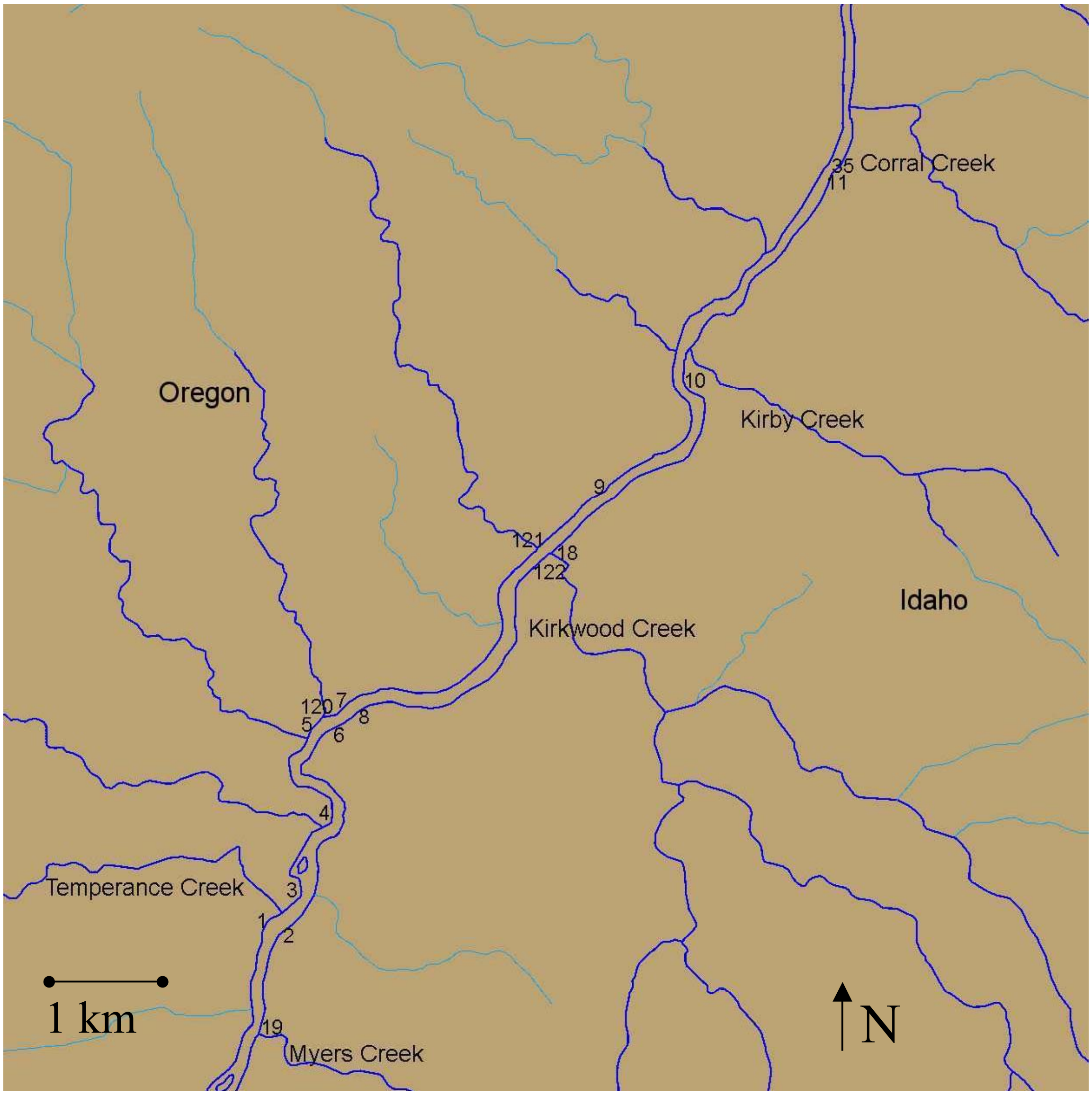
Map 3.

Appendix E. (Continued)



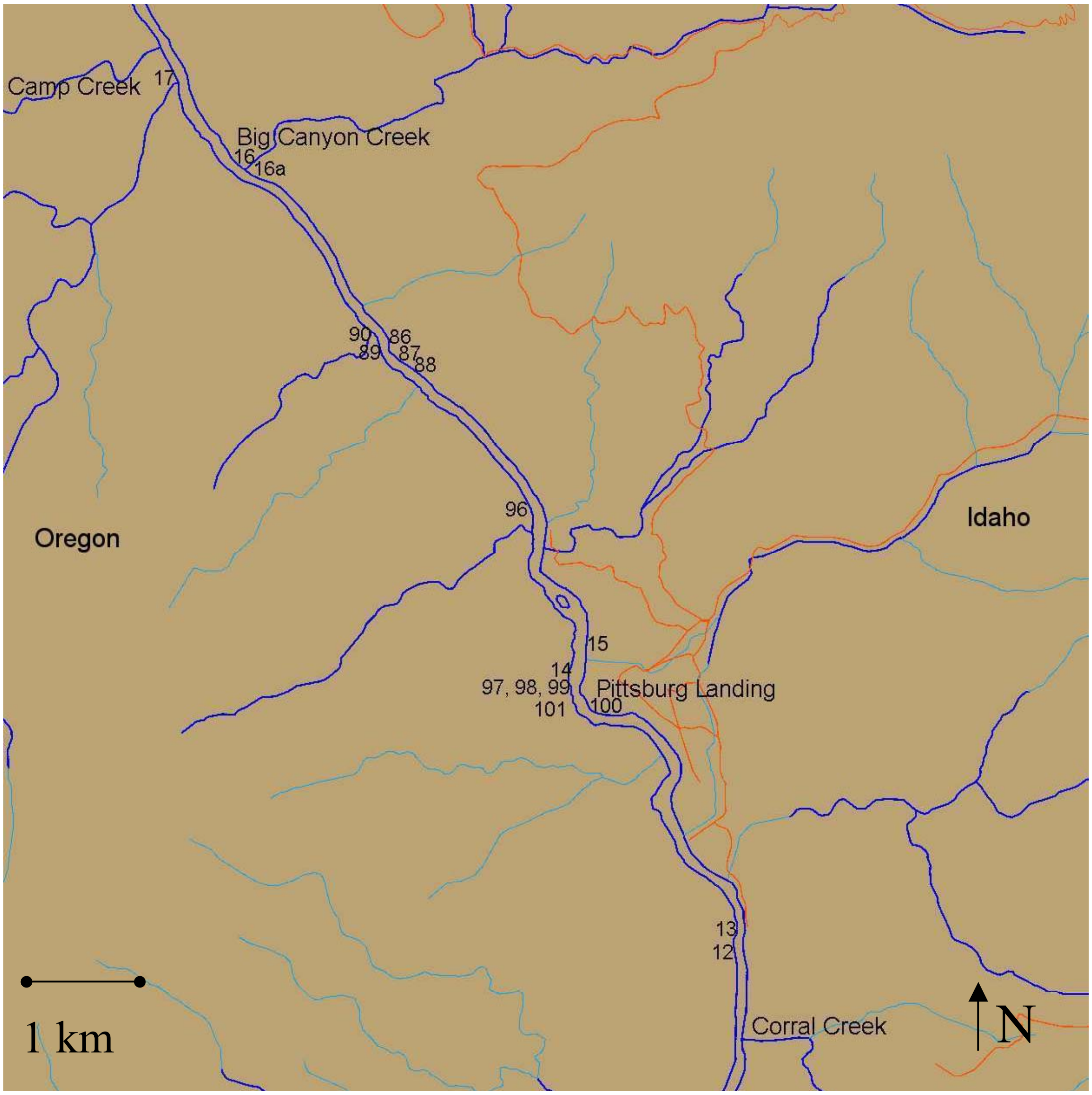
Map 4.

Appendix E. (Continued)



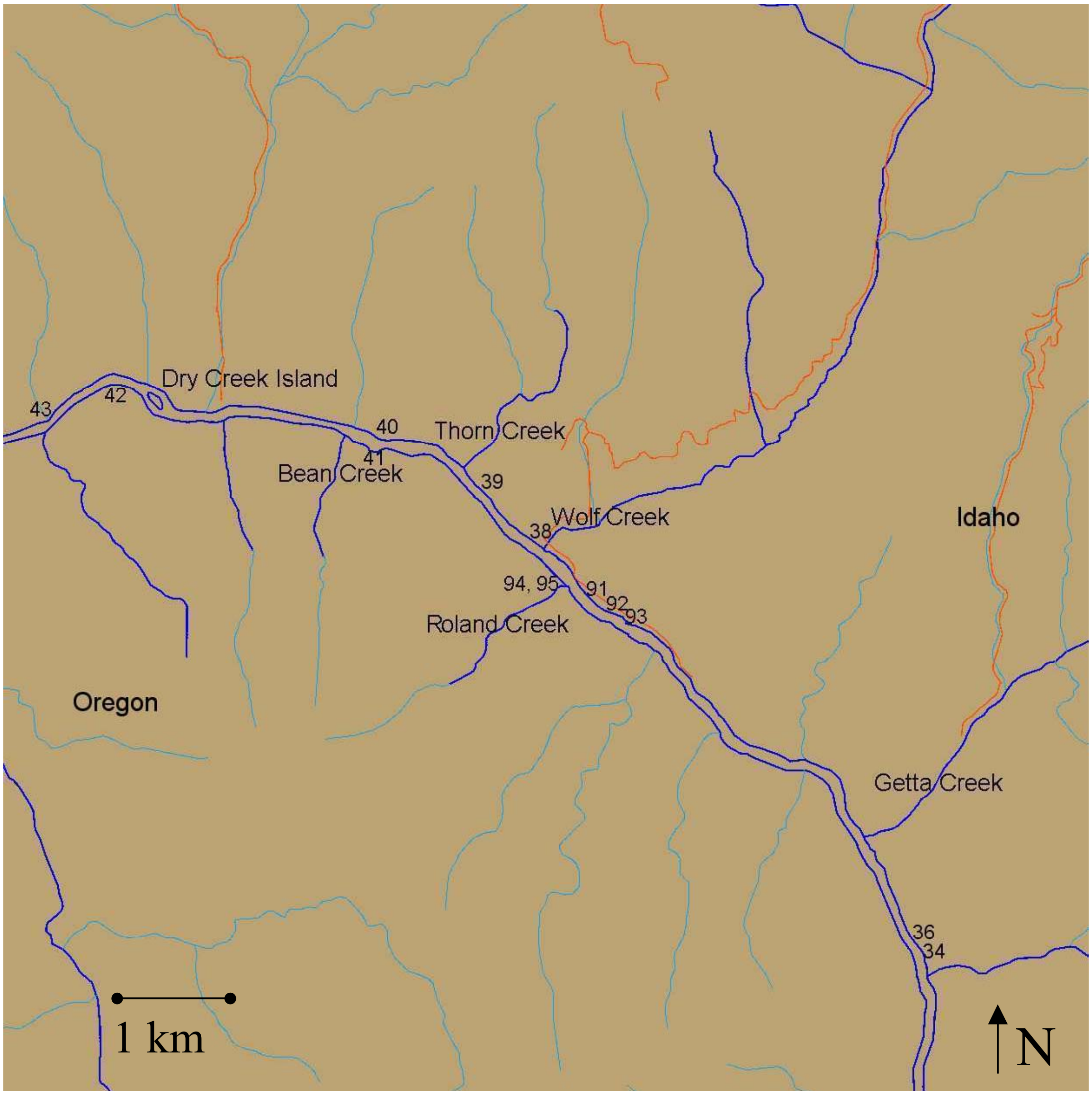
Map 5.

Appendix E. (Continued)



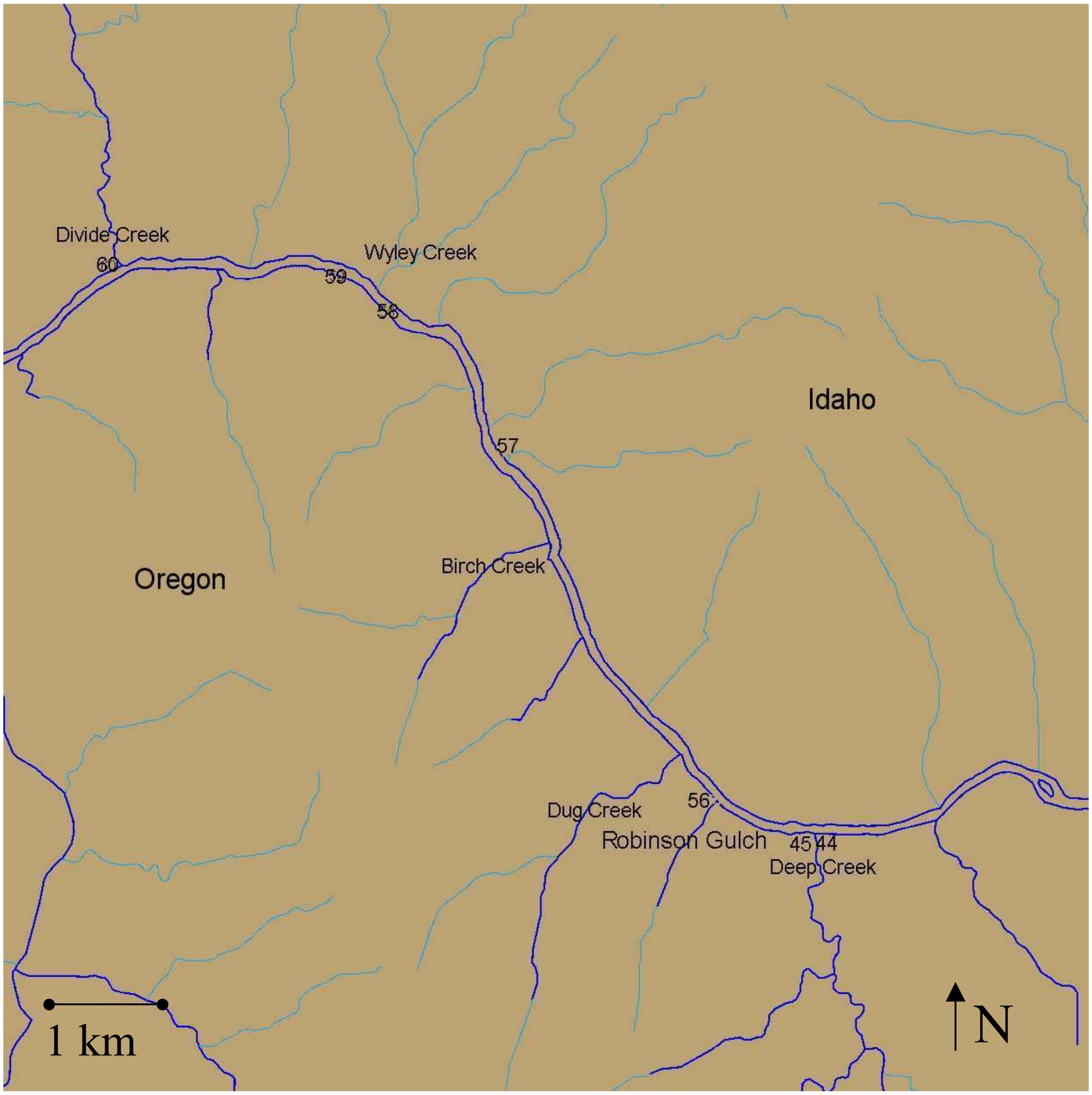
Map 6.

Appendix E. (Continued)



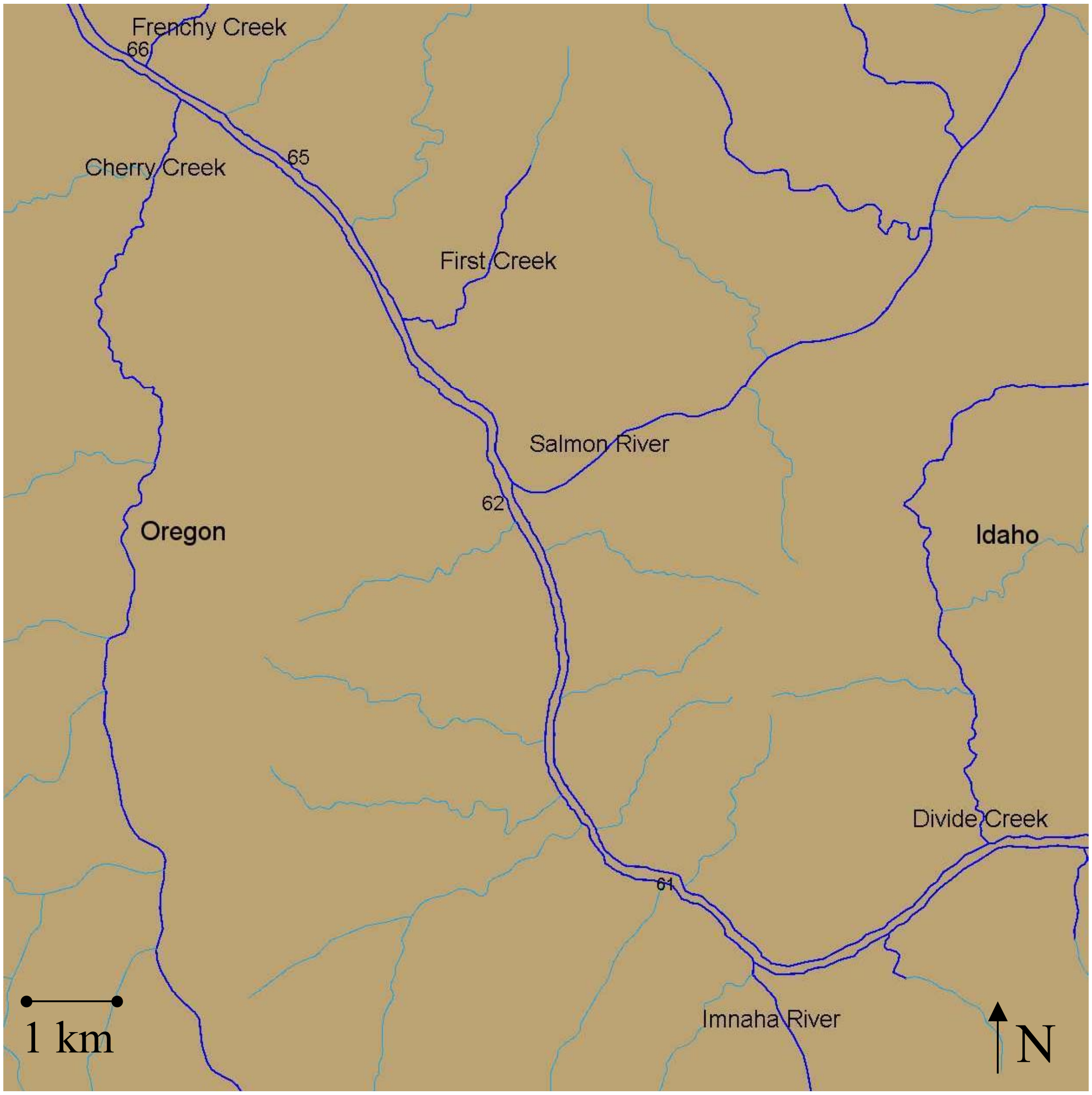
Map 7.

Appendix E. (Continued)



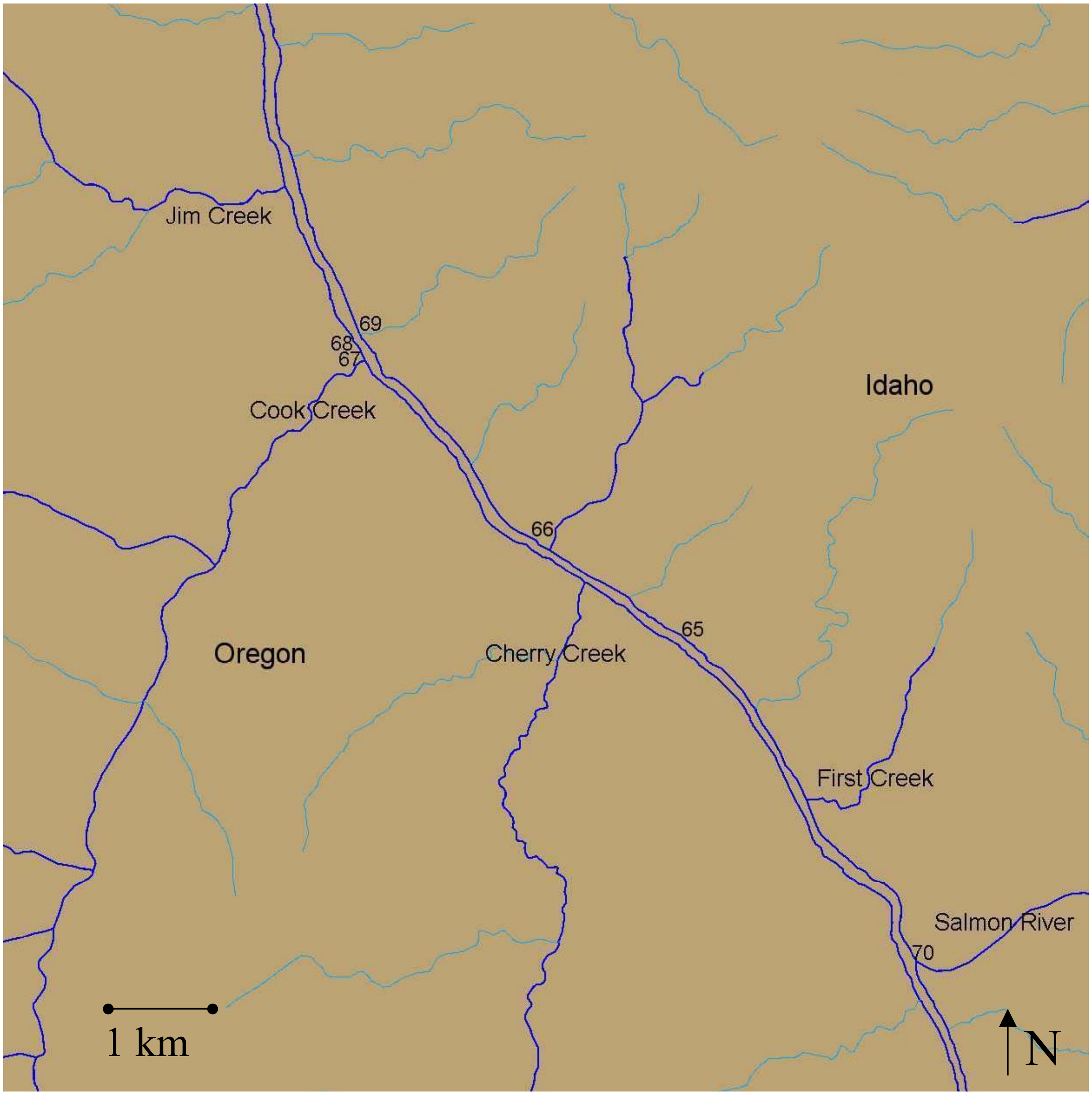
Map 8.

Appendix E. (Continued)



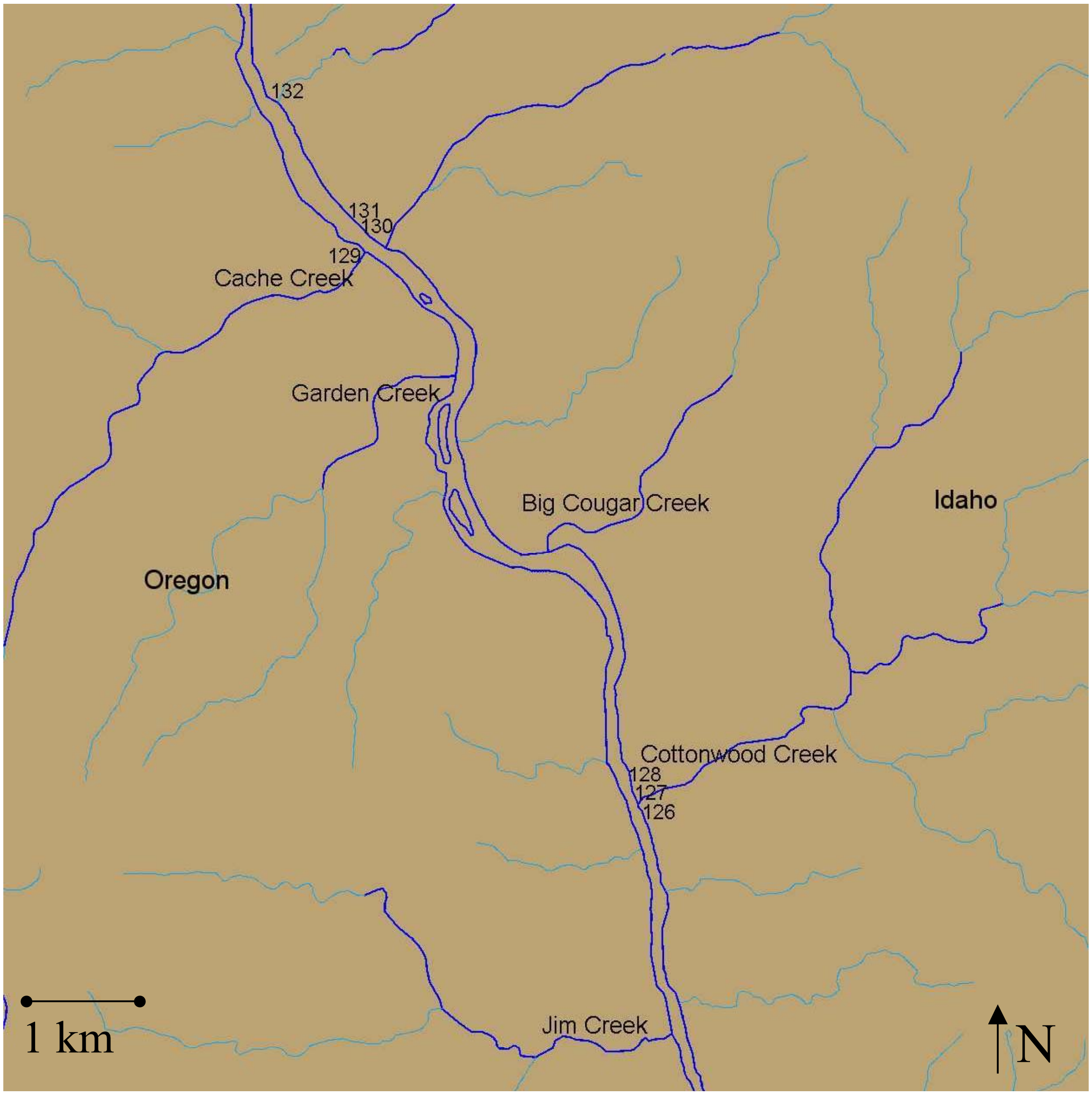
Map 9.

Appendix E. (Continued)



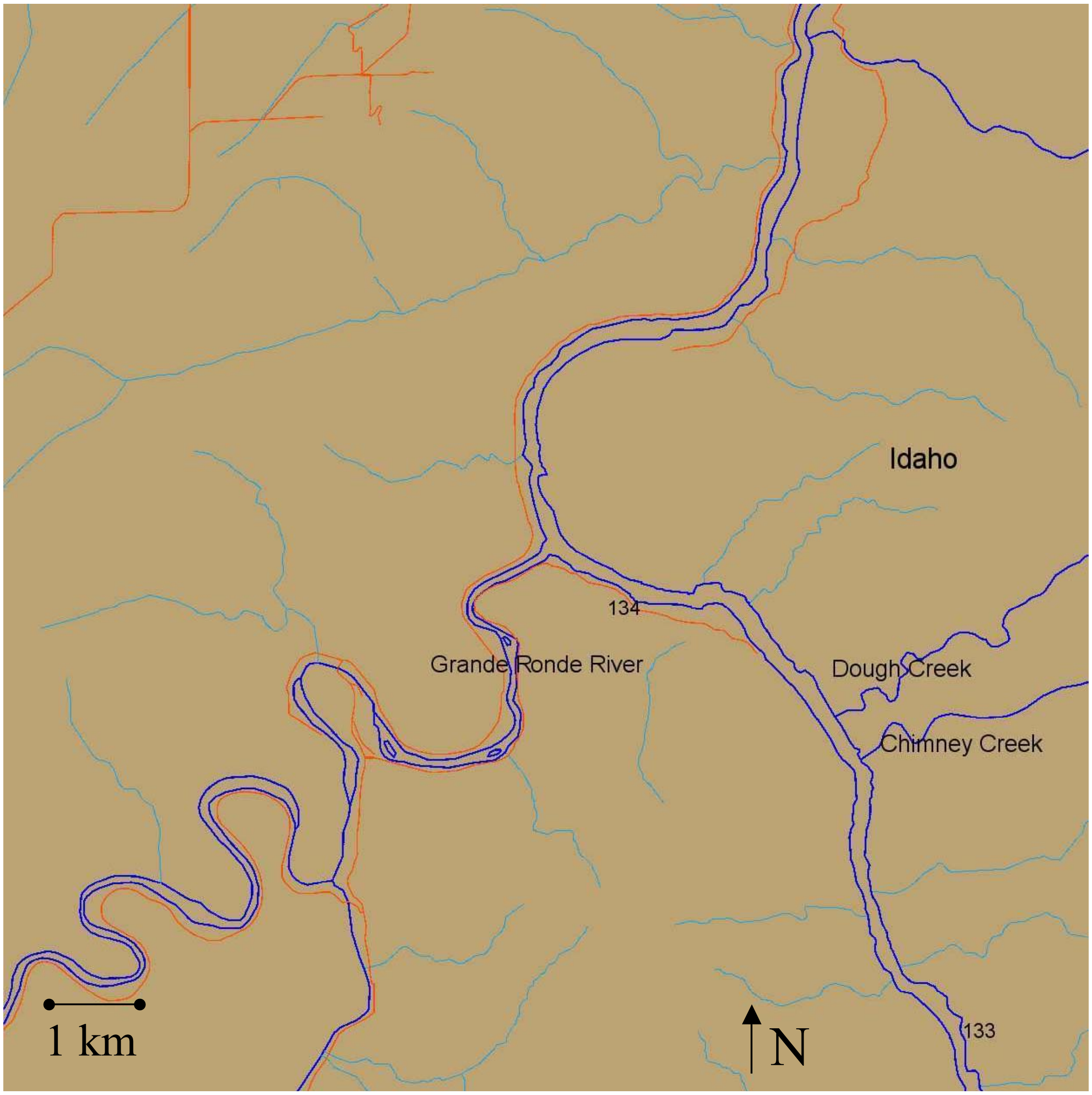
Map 10.

Appendix E. (Continued)



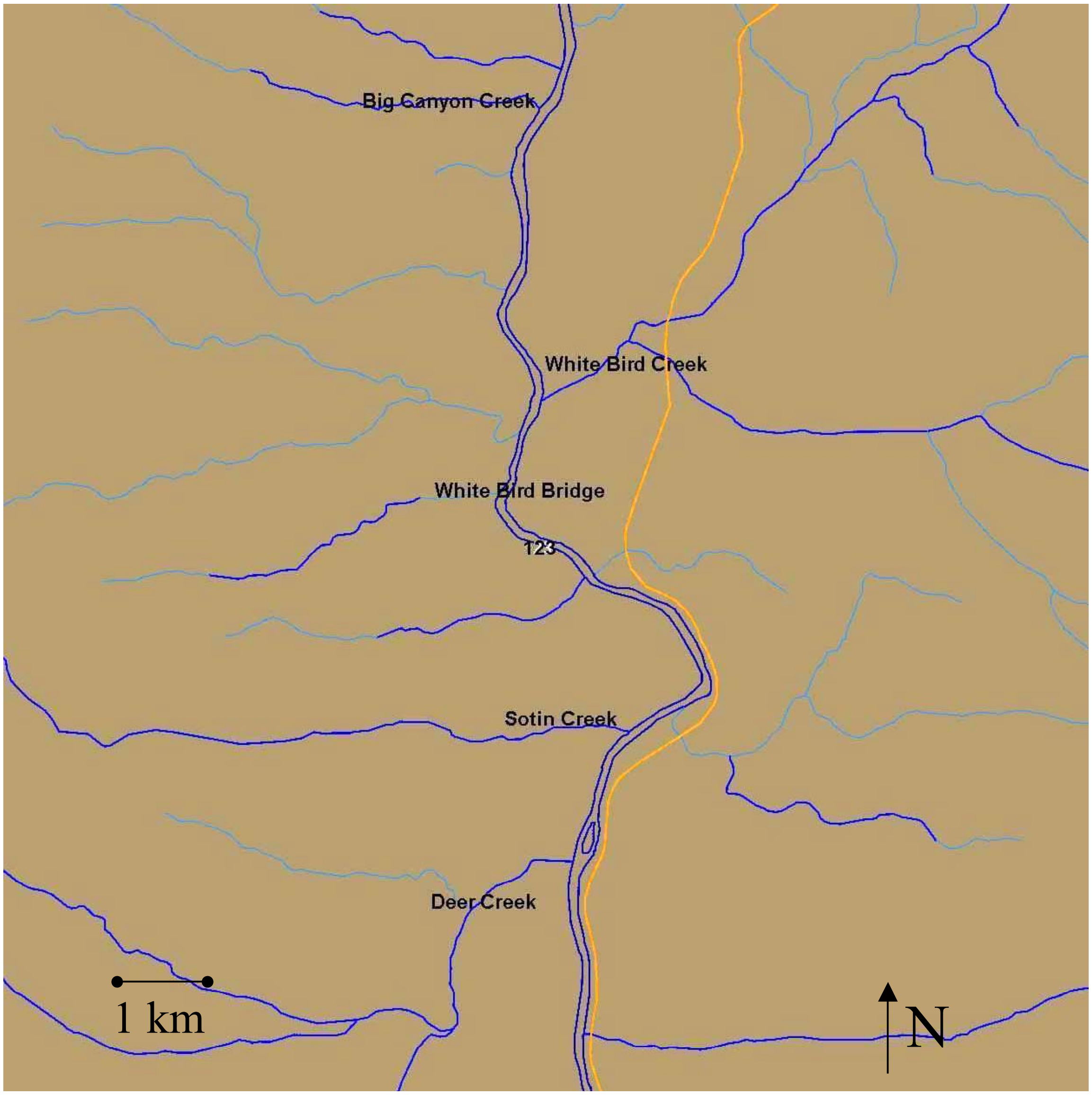
Map 11.

Appendix E. (Continued)



Map 12.

Appendix E. (Continued)



Map 13.

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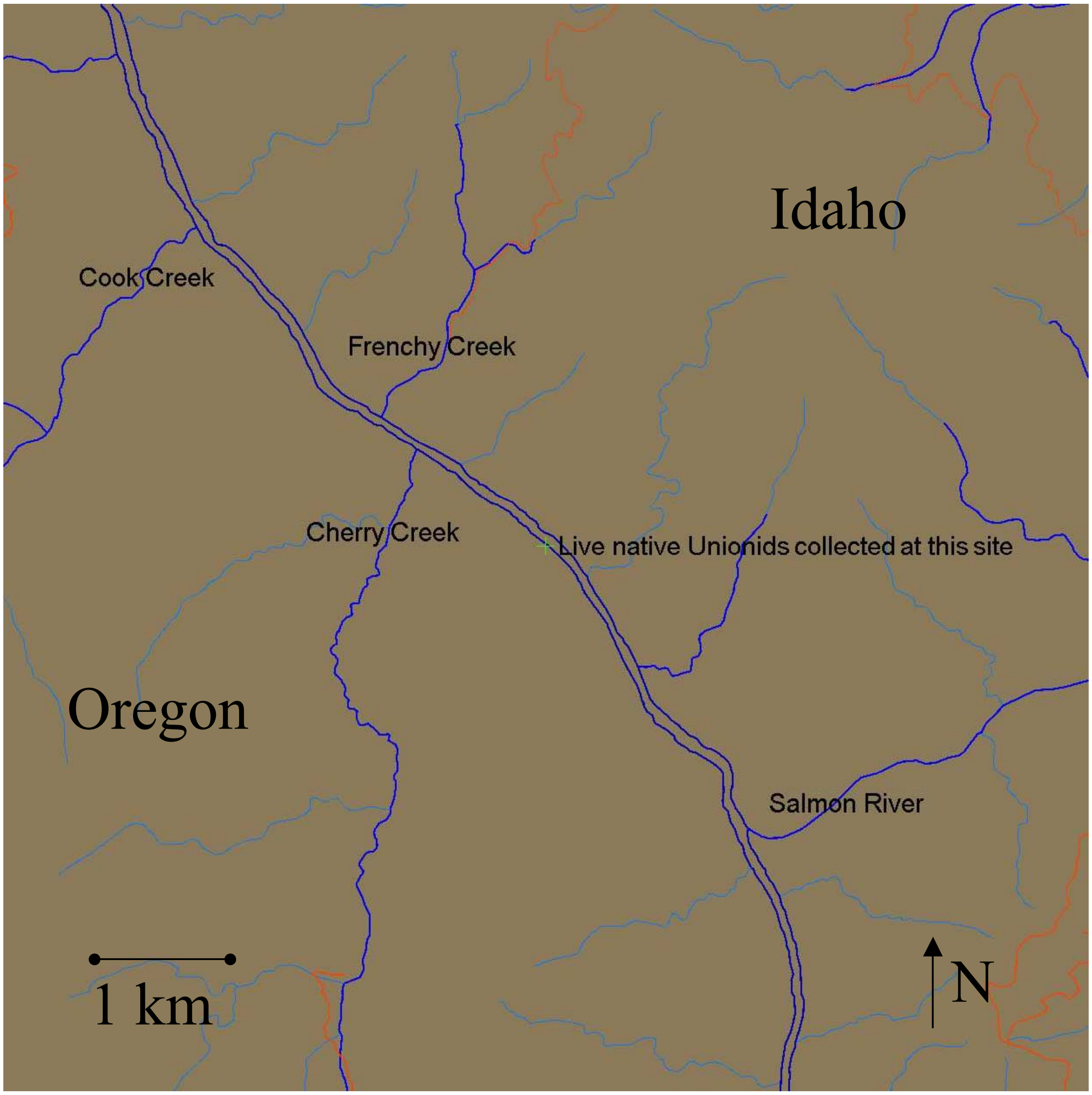
Appendix F. Location of live *G. angulata* colony collected using SCUBA. Site was located at river mile 185.5 on the Idaho side of the Snake River.



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Appendix G. Letter received from the USFWS providing IPC with their comments on the draft study completion report.

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IDAHO POWER COMPANY
P.O. BOX 70
BOISE, IDAHO 83707

Ralph Myers | Phone 208-388-2358
Water Quality Program Supervisor | Fax 208-388-6902
Environmental Affairs | E-Mail rmyers@idahopower.com

December 10, 2004

Jeffrey Foss
US Fish and Wildlife Service
1387 South Vinnell Way, Suite 368
Boise, ID 83709

Re: Hells Canyon Additional Information Request AR-2 (Listed Mollusks)

Dear Mr. Foss:

On May 4, the Federal Energy Regulatory Commission (FERC) sent a request for additional information to Idaho Power Company (IPC). One item requested included a study to search for listed, rare, or sensitive mollusc species in areas affected by the Hells Canyon Complex Hydroelectric Project. The request specifically directed IPC to send a draft study report to the Fish and Wildlife Service for your comment prior to submittal of the final report to FERC on February 4, 2005.

Because of the tight time constraints imposed by the FERC for this AIR, your comments must be delivered to me by no later than January 15, 2005 for inclusion in the final response to this AIR that will be filed with the FERC. Comments received after this 30-day review period may not be included in the final response.

If you have any questions, please do not hesitate to call me at 388-2358.

Sincerely,

Ralph Myers

Ralph Myers
Water Quality Program Supervisor

REM/da
Enclosure
Cc: Jim Tucker, IPC
Nathan Gardiner, IPC
Craig Jones, IPC
Jim Vasile, DWT

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United States Department of the Interior
FISH AND WILDLIFE SERVICE
Snake River Fish and Wildlife Office
1387 S Vinnell Way, Suite 368
Boise, Idaho 83709

TAKE PRIDE IN AMERICA

JAN 18 2005

Ralph Myers
Idaho Power Company
P.O. Box 70
Boise, ID 83707

Subject: Hells Canyon Hydroelectric Project, Snake River, Idaho and Oregon – Comments on the Draft Additional Information Request – AR2 Listed, Rare, or Sensitive Mollusks.
File #FERC 1971 OALS #05-0220

Ralph
Dear Mr. Myers,

On December 10, 2005, the U.S. Fish and Wildlife Service (Service) received a draft Additional Information Request regarding the distribution and status of listed, rare, and sensitive mollusks in the Hells Canyon Complex project area (AR2) from the Idaho Power Company (Company). The Service has reviewed AR2 and find that it substantially increases our understanding of the distribution and status of rare and sensitive mollusks within the project area. We have provided minor comments and recommendations below.

Of significance, the recent surveys identified large colonies of a snail species, similar to the Bliss Rapids snail, below Hells Canyon Dam and preliminary findings suggesting that this snail may be a related, but separate species of *Taylorconcha*. We look forward to receiving a report that will more thoroughly describe these findings.

Specific Comments

Page19, Paragraph 3, last sentence: "...*Taylorconcha* spp. are relatively slow dispersers..." Please provide any references or unpublished observations (e.g., personal observations/ communications) that would support this statement.

Table 3, Figures 1, 2, 3, and 8: The abbreviations in Table 1 identify Ferrissia rivularis as Fri. This abbreviation should be consistently used throughout the document. Make the necessary corrections to the noted tables and figures.

Recommendations

The results section of AR2 states that the shells of recently living *Anodonta californiensis* were found in a river-reservoir section of the Burnt River, on the Oregon side of Brownlee Reservoir. The intent of this additional information request was to conduct surveys to locate, and if possible monitor populations of listed, rare, and sensitive species. The finding of *A. californiensis* shells within the project area is significant and follow-up surveys should be conducted in the confluence area of the Burnt River and the reservoir. Future surveys and monitoring for this or other species in the area should be coordinated by Idaho Power Company with the Fish and Wildlife Service and agencies such as Oregon Department of Fish and Game. Every attempt should be made to complete follow-up surveys during the 2005 field season.

If you have any comments on the above comments, please contact my Hydropower relicensing coordinator Michael Morse at 208/378-5261, or Biologist Dave Hopper at 208/685-6957. Thank you for the opportunity to provide comment on this document. We look forward to continued cooperation on future project planning.

Sincerely,

for Jeffery L. Foss, Field Supervisor
Snake River Fish and Wildlife Office