Placer County Water Agency
Middle Fork American River Project
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FINAL

AQ 3 - MACROINVERTEBRATE AND AQUATIC MOLLUSK TECHNICAL STUDY REPORT - 2007



Placer County Water Agency
P.O. Box 6570
Auburn, CA 95604

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1.0 INTRODUCTION

This report describes the macroinvertebrate and aquatic mollusk study conducted by the Placer County Water Agency (PCWA) in 2007 in accordance with the AQ 3 - Macroinvertebrate and Aquatic Mollusk Technical Study Plan (AQ 3 - TSP) for the Middle Fork American River Project (MFP or Project). The stakeholder-approved TSP was included in Supporting Document (SD) H of the Pre-Application Document (PAD) filed with the Federal Energy Regulatory Commission (FERC or Commission) on December 13, 2007 (PCWA 2007a). A draft report was distributed to the Aquatics Technical Working Group (TWG) on May 19, 2008 for a 60 day comment period. The comment period ended on July 18, 2008. No oral or written comments were received.

The macroinvertebrate study was conducted in the vicinity of the MFP during the spring and fall of 2007 to: (1) characterize the benthic macroinvertebrate (BMI) community in the peaking, bypass, and comparison reaches; and (2) document the seasonal density and size distribution of drifting macroinvertebrates for input into bioenergetics modeling (see AQ 5 - Bioenergetics TSP (AQ 5 - TSP)). The study consisted of field sampling, analyzing the field data, and data analyses. The data analyses included longitudinal trends along the Rubicon River and Middle Fork American River peaking reach, comparisons of the peaking reach, bypass reach, and comparison stream sampling sites, and comparisons with data from previous studies in the study area and data in Rehn (2008) (review of data from other hydroelectric projects in the Sierra Nevada).

The following sections provide a detailed description of the study objectives, study implementation, extent of the study area, study approach, study results, and literature cited.

2.0 STUDY OBJECTIVES

The objectives of the macroinvertebrate and aquatic mollusk study in the AQ 3 - TSP include the following:

- Document the BMI community in the peaking reach and compare to adjacent bypass and comparison reaches to characterize general habitat conditions.

- Sample the BMI community at long-term United States Department of Agriculture - Forest Service (USDA-FS) sampling sites to supplement existing data sets.

- Document the BMI community in the bypass reaches downstream of each large reservoir (Middle Fork American River below French Meadows Reservoir and Rubicon River below Hell Hole Reservoir).

- Document the BMI community in areas with known water quality issues, if any, as determined in the AQ 11 - Water Quality Technical Study Report (AQ 11 - TSR) (PCWA 2007a).

- Document the seasonal density and size distribution of drifting macroinvertebrates in selected bypass reaches and the peaking reach for input to bioenergetics growth and habitat modeling.

- Determine the presence or absence of three special-status[1] mollusk species (California Floater, *Anodonta californiensis*, scalloped juga, *Juga occata*, and Great Basin rams-horn snail, *Helisoma newberryi*) and identify potentially suitable habitat for these species (Furnish 2007).

3.0 STUDY IMPLEMENTATION

Figure AQ 3-1 shows the AQ 3 - TSP objectives and the study elements and activities that relate to completion of the study. It also shows how the information developed during the study will be documented and provided to the stakeholders. The following sections summarize the study elements completed, any deviations from the TSP and the rationale, outstanding study elements, and proposed modifications to the TSP.

3.1 STUDY ELEMENTS COMPLETED

The following study elements have been completed:

- Surface Water Ambient Monitoring Program (SWAMP) (Ode 2007) benthic sampling at 14 sampling sites on bypass and peaking reaches and comparison stream reaches in September and October, 2007;

- California Stream Bioassessment Procedure (CSBP) (CDFG 2003) benthic sampling at seven sampling sites currently being monitored for the ongoing Ralston Afterbay Sediment Management Project (RASMP) on bypass and peaking reaches and comparison stream reaches;

- SWAMP benthic sampling at the long-term agency CSBP sampling sites above and below the diversions on Duncan and South Fork Long Canyon creeks;

- SWAMP benthic sampling downstream of French Meadows Reservoir on the Middle Fork American River and downstream of Hell Hole Reservoir on the Rubicon River;

- BMI samples processed at the BLM/USU National Aquatic Monitoring Center, Department of Aquatic, Watershed, and Earth Resources (AWER), Utah State University, Logan Utah (USU Bug Lab);

- Comparison of SWAMP and CSBP benthic sampling results between reaches and with data reported in the literature; and

[1] Special-status species is defined as any species that is listed as rare, threatened, or endangered or as a species of special concern by a federal, state, or local agency. The species identified are USDA-FS sensitive species.

- Drift sampling at seven sampling sites on the bypass and peaking reaches in June, July/August, and September/October 2007 using a sampling methodology similar to that used in Hayes et al. (2000).

3.2 DEVIATIONS FROM TECHNICAL STUDY PLAN

The macroinvertebrate and aquatic mollusk study proceeded as described in the AQ 3 - TSP except for the following variance:

- The TSP states that the macroinvertebrate metrics will be reported as outlined in Rehn et al. (2007). The macroinvertebrate metrics were reported as outlined in an updated study by Rehn (2008).

3.3 OUTSTANDING STUDY ELEMENTS

The following study elements will be completed in 2008 and presented in the reports listed below:

- Conduct special-status aquatic mollusk sampling in the summer of 2008. This information will be presented to the TWG in the 2009 Macroinvertebrate TSR (AQ 3 - TSR).

- Complete drift sample analysis for inclusion in the AQ 5 - TSR to be distributed to the TWG in 2009.

- If water quality issues are identified in the AQ 11 - TSR, determine in collaboration with the Aquatic TWG if 2008 macroinvertebrate contingency studies are needed. The study results of any contingency studies will be presented to the TWG in the 2009 AQ 3 - TSR.

3.4 PROPOSED MODIFICATION TO TECHNICAL STUDY PLAN

There are no proposed modifications to the AQ 3 - TSP.

4.0 EXTENT OF STUDY AREA

The study area included accessible bypass reaches, the peaking reach, and potential comparison reaches. The BMI sampling locations are listed in Table AQ 3-1 and are shown on Map AQ 3-1. The BMI sampling locations where historical data have been collected on the peaking reach (including adjacent bypass and comparison reaches), Duncan Creek, and South Fork Long Canyon Creek are listed in Tables AQ 3-2 and AQ 3-3, and are also shown on Map AQ 3-1. The locations where drift sampling was completed are listed in Table AQ 3-4 and are shown on Map AQ 3-1.

5.0 STUDY APPROACH

This section describes the BMI sampling and the macroinvertebrate drift sampling methods.

5.1 BMI SAMPLING

The BMI field sampling protocols, field sampling design, sample processing, and data analyses are described below.

5.1.1 BMI Field Sampling Protocols

Two different, but comparable, BMI sampling protocols, SWAMP and CSBP, were used to collect BMI data (Table AQ 3-1). The CSBP protocol, superseded by the SWAMP protocol beginning in 2007, was used to sample seven study sites that have been monitored using CSBP since 2001 as part of the Ralston Sediment Management Project (RASMP) (Jones and Stokes 2002; PCWA 2007b). The SWAMP protocol was used to sample all the other study sites. The targeted riffle sampling component of the SWAMP and CSBP protocols are similar composite riffle sampling approaches and the results from the two protocols were assumed to be equivalent (Rehn 2008; Ode 2007).

SWAMP includes two BMI sampling methods: (1) targeted riffle composite (TRC); and (2) reachwide benthos (RWB). The TRC sample consisted of a composite of eight sub-samples randomly selected from the riffle habitats within the study site. The RWB sampling did not target any specific type of meoshabitat. RWB samples collected from each sampling site were a composite of 11 sub-samples, each taken from one of 11 equally spaced transects. The transects were spaced 15 meters apart, or 25 meters if the wetted width of the channel was greater than 10 meters wide. Sub-sampling alternated between left-center, center, and right-center locations on each sequential transect. Physical habitat measurements were also collected at the transects.

The CSBP sampling sites established previously as part of the ongoing RASMP (Jones and Stokes 2002; PCWA 2007b) (Table AQ 3-2), typically consisted of three transects located in riffle habitats. A composite sample composed of three sub-samples was collected from each transect.

5.1.2 BMI Field Sampling Design

The field sampling program was structured to collect data to: (1) identify longitudinal trends in BMI community metrics in the Rubicon River and Middle Fork American River, with emphasis on the peaking reach; (2) compare the BMI communities between sites in the peaking and bypass reaches affected by MFP operations with comparable sites unaffected by the MFP operations (i.e., above Project diversion or nearby unimpaired river reaches); and (3) characterize inter-annual trends in BMI community metrics at long-term sampling sites.

Twenty-one representative BMI study sites, 14 SWAMP and 7 CSBP, were located in the Project area (Table AQ 3-1 and Map AQ 3-1). The sampling design was based primarily on using the targeted riffle samples (TRC) from each of the 21 study sites (both SWAMP and CSBP). Where applicable, the RWB data from the 14 SWAMP sampling sites were also used in the analysis, but kept separate from the TRC analysis. Many of the 21 sampling sites were included in multiple comparisons (e.g., Project versus non-Project comparisons, longitudinal comparisons, and temporal comparisons).

The study sites contained meso-habitat types similar to those in the larger river reach based on the meso-habitat mapping completed as part of the 2006 Aquatic Habitat Characterization Study (PCWA 2007a).

The sampling design is summarized below. The sampling sites included in each comparison analyses are identified in Table AQ 3-1 and Map AQ 3-1.

Unimpaired Comparison Sites - Five sampling sites were located in river reaches unaffected by Project operations. Results from the sites were used to compare biological conditions between Project and non-Project affected river reaches. Two sites, D9.0 and SFLC4.2, were located in the higher elevation, small streams above Project diversions and three sites were located in unimpaired low elevation, larger rivers, NF31.3, NFMF2.3, and NFMF0.1.

Longitudinal Trends - Sampling sites were used to identify longitudinal gradients in biological conditions in the Middle Fork American River peaking reach and in the Rubicon River. Four sampling sites were located along the length of the Rubicon River downstream of Hell Hole Reservoir (R25.7, R20.9, R3.5, and R0.9) and seven sampling sites were located in the Middle Fork American River downstream of Ralston Afterbay along the length of the peaking reach (MF24.2, MF23.6, MF20.9, MF19.1, MF14.3, MF14.1, and MF4.8).

Peaking Reach Comparison - The seven sampling sites in the peaking reach downstream of Ralston Afterbay (see above) were paired with an equal number of adjacent non-peaking comparison river sampling sites. Three of the non-peaking comparison sites were the unimpaired comparison sites (NF31.3, NFMF2.3, and NFMF0.1) and the other four non-peaking sampling sites were located in the Middle Fork American River and Rubicon River bypass reaches just upstream of Ralston Afterbay (R0.9, R3.5, MF26.0, and MF26.2).

Above and Below Diversions - BMI sampling was conducted at two sites in Duncan Creek (D9.0 and D6.3) and two sites in South Fork Long Canyon Creek (SFLC4.2 and SFLC2.3) to compare BMI metrics above and below the diversions.

Bypass Reaches Below Large Reservoirs - BMI sampling was also conducted in the bypass reaches downstream of French Meadows Reservoir on the Middle Fork American River (MF44.7) and downstream of Hell Hole Reservoir on the Rubicon River (R25.7 and R20.9) to characterize BMI metrics downstream of the large reservoirs.

Long-term BMI Sampling Sites - To characterize inter-annual trends in BMI community metrics, BMI samples were collected at several long-term sampling sites. The seven sampling sites associated with the RASMP (Jones and Stokes 2002; PCWA 2007b) were resampled in the fall of 2007. These sites are located in the peaking reach and adjacent bypass and unimpaired comparison reaches (Tables AQ 3-1, AQ 3-2, and Map AQ 3-1). The CSBP protocol was used historically to collect BMI data associated with the RASMP (2001-2006). To ensure that the 2007 data collected as part of this study was consistent with data collected during previous years, staff that participated in the

previous RASMP monitoring assisted with the 2007 sampling and the data were collected using the same CSBP protocol.

BMI samples were also collected in Duncan Creek and South Fork Long Canyon Creek (D9.0 and SFLC2.3) to compare to USDA-FS historical data (Tahoe and Eldorado National Forests). An approach consistent with the CSBP protocol was used historically to collect data by USDA-FS at these locations and at one additional location on Duncan Creek (D4.5). In this study, a BMI sample at instream flow study site D6.3 was compared to the historical USDA-FS D4.5 site. In 2007, the sites were sampled using the SWAMP protocol. The SWAMP TRC samples were compared to the historical USDA-FS BMI data. The historical data were obtained from the USU Bug Lab. Duncan Creek data was available from 2000 to 2003. Data was available for the South Fork Long Canyon Creek from 1999 and 2000.

5.1.3 BMI Sample Processing

The samples collected during the 2007 field season (SWAMP and CSBP) were processed by the USU Bug Lab. At the laboratory, the samples were processed following SWAMP protocols and the samples were prepared following the methods recommended by the United States Geological Survey (Cuffney et al. 1993) and described in Vinson and Hawkins (1996). The standard procedures that were used at the USU Bug Lab for sorting and analyzing samples and their quality control/assurance measures are described in Appendix A. The USU Bug Lab provided data for 300 and 500 organism count sub-samples, which included species abundances and numerous BMI metrics for each sampling site. The USU Bug Lab metric calculations were based on the Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) taxonomic level 2 (Richards and Rogers 2006). Generally this is a genus-species level of taxonomic identification.

The historical USDA-FS samples from Duncan Creek and South Fork Long Canyon Creek were also processed at the USU Bug Lab following generally the same protocols and procedures.

The historical RASMP samples were processed by Jones and Stokes according to the CSBP protocol as described in PCWA (2007b).

5.1.4 BMI Data Analyses

BMI Metrics

A number of metrics can be calculated to describe the BMI community at a sampling site. Based on previous studies, some metrics discriminate between impaired and unimpaired sites better than others. For this study, the metrics calculated for the BMI samples were the hydropower metrics used by Rehn (2008) and those necessary to compare with the previous sampling analysis from the RASMP study (Jones and Stokes 2002; PCWA 2007b). The metrics required for each of these analyses are described below.

Rehn (2008) developed a multi-metric index of biotic integrity (IBI) for streams and rivers influenced by hydropower projects. The hydropower IBI is a combination of metrics that can be used to identify trends in BMI data and facilitate comparisons among sites. Each metric used to determine the hydropower IBI (Rehn 2008) is briefly described in Table AQ 3-5.

The hydropower IBI was developed from statistical analyses of data collected above and below hydropower reservoirs and from existing hydropower BMI datasets that had been collected using a variety of methods, including TRC and RWB sampling methods from above and below diversions and dams. Longitudinal trends in the hydropower IBI scores were evaluated by Rehn (2008) in relation to the distance downstream from a diversion or dam. However, the most downstream site included in the dataset was 3 km (1.9 miles), thereby, limiting the longitudinal scope of Rehn's analysis. In addition, all of the sites included in Rehn's analyses were located above 2,913 feet in elevation.

For the BMI data collected in 2007 and the historic USDA-FS samples, the 500 organism count data was used to calculate the hydropower IBI metrics at each sampling site (21 sites total) as described in Rehn (2008). This was completed for each of the sample types (SWAMP TRC, CSBP TRC, and SWAMP RWB). The hydropower TRC IBI scores (both SWAMP and RASMP CSBP) were used together in the comparative analysis as they are analogous sample types. The hydropower TRC IBI scores were graphed by site and contrasted and compared with each other and with the hydropower IBI scores in Rehn (2008). The hydropower SWAMP RWB IBI scores were graphed separately and the sites with RWB samples were contrasted and compared with each other and with the hydropower IBI scores in Rehn (2008), as appropriate.

Additional BMI metrics were calculated at the RASMP sampling sites to compare with the analyses completed in previous studies (Jones and Stokes 2002; PCWA 2007b). These metrics are briefly described in Table AQ 3-6. The BMI samples collected previously (2001-2006) for the RASMP were historically processed in the lab according to the CSBP taxa identification Level 1 laboratory procedures using 300 organism count data. The 2007 USU Bug Lab identifications at the RASMP sampling sites were, therefore, adjusted to CSBP Level 1 using the 300 organism count data for calculations of these BMI metrics. The metric results for the three composite samples (one from each transect) were then averaged to create a single BMI metric for each sampling site. All of the data, 2001-2007, were then compared to identify any temporal and spatial trends in the BMI metrics.

Sample Site Characterization

Sampling site location information, habitat conditions, and photographs illustrating the site characteristics are provided in Appendix B. Average August 2007 water temperatures in the study streams are shown on Map AQ 3-2. Copies of the SWAMP datasheets are provided in Appendix C.

5.2 MACROINVERTEBRATE DRIFT SAMPLING METHOD

Drift samples were collected from June 14 through June 26, 2007; July 30 through August 8, 2007; and September 24 through October 8, 2007 at seven sampling sites on the bypass and peaking reaches. These locations are also AQ 1 - Instream Flow TSP study sites (AQ 1 - TSP) (PCWA 2007a) and are shown in Table AQ 3-4 and Map AQ 3-1 (PCWA 2007a). At each sampling site, two representative riffles were identified for sampling. At the downstream end of each riffle, three drift samples were collected using a sampling methodology similar to that used in Hayes et al. (2000). Drift samples were collected twice during the day (mid-morning and mid-afternoon). The results of the drift sampling will be included in the AQ 5 - TSR.

6.0 STUDY RESULTS

6.1 OVERVIEW

The following briefly summarizes the key study findings.

6.1.1 Longitudinal Trends in BMI Community Metrics

Hydropower TRC IBI scores were higher (indicating better biological conditions) at the higher elevation, colder water sampling sites than at the lower elevation, warmer water sampling sites in the study area, suggesting that the hydropower IBI is correlated with elevation and water temperature (Tables AQ 3-1, AQ 3-7, Figure AQ 3-2, and Map AQ 3-2).

- Interpretations of longitudinal trends in BMI metrics over the long reaches of the Rubicon River and the peaking reach should consider the observed relationships between hydropower IBI scores and water temperature and elevation.
- In the Rubicon River, hydropower TRC IBI scores generally declined with distance downstream of Hell Hole Reservoir (IBI scores decreased from 66 to 44) (Figure AQ 3-3).
- In the peaking reach, hydropower TRC IBI scores were: comparatively low at the top of reach immediately downstream of Ralston Afterbay Dam and Oxbow Powerhouse, MF24.4 and MF23.6 (IBI scores of 40 and 61); higher through the middle portion of the reach, MF14.3, MF19.1, and MF20.9 (IBI scores from 63 to 71 similar to unimpaired comparison sites); and typically slightly lower in the farthest downstream portions of the peaking reach, MF4.8 and MF14.1 (IBI scores of 54) (Figure AQ 3-3).

6.1.2 Comparison of Peaking Reach with Adjacent Bypass and Comparison Reaches

In combination, the hydropower TRC IBI and individual metric scores indicated lower biological conditions at the top of the Middle Fork American River peaking reach immediately below Ralston Afterbay Dam (MF24.4) and immediately below Oxbow Powerhouse (MF23.6), compared to the adjacent bypass (MF26.0, MF26.2, R0.9, and

R3.5) and comparison sites (NFMF0.1, NFMF2.4, and NF31.3) (Figures AQ 3-3a, AQ 3-4a, AQ 3-5, AQ 3-6, and Tables AQ 3-7 and AQ 3-8).

- The hydropower TRC IBI score in the short bypass reach immediately below Ralston Afterbay Dam (MF24.4) was the lowest of the scores (IBI score of 40) at all sampling sites (Table AQ 3-7).

- Although the individual metrics were variable from year-to-year (2001-2007) at the RASMP monitoring sites, the results consistently indicated lower biological condition metric scores at the two sites immediately downstream of Ralston Afterbay Dam and Oxbow Powerhouse (MF24.4 and MF23.6). There were fewer intolerant EPT taxa, more high tolerance individuals, and lower taxa richness (Figure AQ 3-5).

At sites downstream from the top of the peaking reach (MF20.9 to MF4.8) biological conditions (IBI and individual scores) were similar to those in non-peaking comparison sites (unimpaired comparison rivers and the Middle Fork American River and Rubicon River immediately upstream of Ralston Afterbay), although some variability occurs based on the individual metric examined (Figures AQ 3-3, AQ 3-4, AQ 3-5, AQ 3-6, and Table AQ 3-7).

- Hydropower TRC IBI scores were similar or higher in the downstream peaking reach sites, MF20.9 through MF4.8 (IBI scores from 71 to 54), than those in the non-peaking comparison sites, NF31.3, MF26.0, MF26.2, NFMF0.1, NFMF2.4, R0.9, and R3.5 (IBI scores from 71 to 44) (Figures AQ 3-3a and AQ 3-4a).

- The downstream peaking reach sampling sites (MF20.9 to MF4.8) had lower California Tolerance Values and similar or higher percentages of intolerant individuals (indicating better biological conditions) and similar EPT and ET Index values compared to sampling sites from the non-peaking comparison reaches (NF31.3, MF26.0, MF26.2, NFMF0.1, NFMF2.4, R0.9, and R3.5) (Figure AQ 3-5 and Table AQ 3-7).

- In contrast, the downstream peaking reach sampling sites, MF20.9 to MF4.8, overall had slightly lower taxa richness (Figure AQ 3-5) (indicating poorer biological conditions) and some differences in functional feeding groups (percentage collector-gatherers, scrapers, and collector-filters) compared to the non-peaking comparison sampling sites (NF31.3, MF26.0, MF26.2, NFMF0.1, NFMF2.4, R0.9, and R3.5) (Figures AQ 3-5, AQ 3-6, and Table AQ 3-7). The functional feeding group differences likely reflect the greater abundance of filamentous algae that was observed in the peaking reach compared to other reaches.

The hydropower IBI scores from the RWB sampling were slightly different than the TRC scores in the peaking reach and adjacent non-peaking bypass and comparison stream reaches. Hydropower RWB IBI scores were slightly lower in the downstream part of the peaking reach, MF4.8 and MF14.1 (IBI scores from 40 to 49), compared to sites in the non-peaking comparison river reaches, NFMF2.4 and NF31.3 (IBI scores from 60 to

54), and bypass reaches immediately above Ralston Afterbay, MF26.2 and R3.5 (IBI scores from 73 to 63) (Figures AQ 3-4b, AQ 3-7, and Table AQ 3-8).

- The community described from the RWB sampling in the non-peaking comparison reaches (NFMF2.4, NF31.3, MF26.2, and R3.5) had higher ET taxa richness, lower percentage of non-insect taxa, higher percentage of scraper individuals, and higher diversity than the community in the peaking reach (MF4.8, MF14.1, and MF19.1) (Table AQ 3-9).

Above and Below Diversions

Hydropower IBI scores from the TRC and RWB sampling in Duncan Creek and South Fork Long Canyon Creek in 2007 indicate somewhat lower scores below the diversions than above the diversions. Long-term data in Duncan Creek, however, contradicts this observation (Figures AQ 3-3, AQ 3-4a, AQ 3-4b, AQ 3-7 and Tables AQ 3-7, AQ 3-9, and AQ 3-10).

- Repeated annual sampling results from above and below Duncan Creek Diversion do not indicate a consistent difference in hydropower IBI scores (Figure AQ 3-8). Higher hydropower IBI scores occurred downstream of the Duncan Creek Diversion, D4.5 and D6.3 (IBI scores from 63 to 86) than above the diversion, D9.0 (IBI scores from 44 to 91) during two of the three sampling years.
- On the South Fork Long Canyon Creek, repeated annual sampling only exists below the diversion, precluding further comparison. The range of variability of the hydropower IBI scores between sampling years at the sampling site downstream of the diversion, SFLC2.3 (IBI scores of 73, 80, and 81) was of similar magnitude as the observed 2007 difference between upstream, SFLC4.2 (IBI score of 84) and downstream, SFLC2.3 (IBI score of 81) sampling sites (Figure AQ 3-8).

The TRC and RWB sampling approaches generally showed similar above and below diversion trends and hydropower IBI scores. The results from the two different sampling approaches were consistent for Duncan Creek, but there was a slight difference for the South Fork Long Canyon Creek (Figures AQ 3-3c and AQ 3-7c).

- On the South Fork Long Canyon Creek, the difference between hydropower IBI scores from the above and below diversion sites was very small for the TRC sampling, but slightly greater based on the RWB sampling.

Bypass Reaches Below Large Reservoirs

Hydropower TRC IBI scores downstream of French Meadows and Hell Hole reservoirs were relatively high and within the range of those observed in unimpaired river reaches above hydropower reservoirs by Rehn (2008) (Table AQ 3-7, Figures AQ 3-3 and AQ 3-4a).

- The hydropower IBI scores in the Rubicon River below Hell Hole Reservoir (IBI scores of 60 and 66) were on the ‘high end’ of the range observed for sites below

hydropower reservoirs and on the 'lower end' of the range of scores for sites above reservoirs (Figure AQ 3-3b).

- The hydropower IBI scores on the Middle Fork American River below French Meadows Reservoir (IBI scores of 81 and 84) were very high and were on the 'high end' of the range observed for reference sites above reservoirs (Rehn 2008).

The hydropower TRC and RWB IBI scores below the reservoirs were similar (Figures AQ 3-3 and AQ 3-7).

6.1.3 Long-term BMI Sampling Sites

RASMP Sampling Sites

- At all the RASMP sampling locations, inter-annual variability in the individual metrics and the relative abundance of the different functional feeding groups was high (Figures AQ 3-5 and AQ 3-6).

- Since 2001, the BMI communities in the two sites immediately downstream from Ralston Afterbay and Oxbow Powerhouse (MF24.4 and MF23.6) had poorer individual metric scores than the sites farther downstream in the peaking reach and in the adjacent non-peaking bypass and comparison reaches (Figures AQ 3-5 and AQ 3-6).

- Since 2001, in the two most downstream sites in the peaking reach the BMI communities had slightly lower taxa richness than the non-peaking bypass and comparison river reaches (lower biological condition). However, EPT index values were greater and California Tolerance values were lower compared to the non-peaking bypass and comparison river reaches (better biological condition) (Figure AQ 3-5).

- Since 2001, chironomid midges have been one of the most abundant taxa at most of the sampling sites during the annual sampling (Table AQ 3-11).

    - Chironomid midges have been particularly dominant at the site in the short bypass reach below Ralston Afterbay Dam (MF24.4) and the upper peaking reach site (MF23.6).

USDA-FS Long-term Sampling Sites

In the South Fork Long Canyon Creek downstream of the diversion, hydropower IBI scores have slightly increased since 1999, from 73 to 81 (Figure AQ 3-8 and Table AQ 3-10).

In Duncan Creek, hydropower IBI scores have varied substantially over time and the scores have been alternately higher or lower below versus above the diversion (Figure AQ 3-8 and Table AQ 3-10). Also, hydropower IBI scores both upstream and

downstream of the diversions were lowest in 2002, one year after the Star Fire, and have generally increased since 2003.

6.2 DETAILED STUDY RESULTS

Detailed study results are presented in the sections below. The hydropower IBI scores discussed are based on those from the TRC sampling. As discussed above, the results from the RWB were different from the TRC results at some sites, but the overall trends were generally similar.

6.2.1 Longitudinal Trends in BMI Community Metrics

Rubicon River

In the Rubicon River, the hydropower IBI scores were considerably higher (66 and 64) in the two upstream sampling sites (R25.7 and R20.9) than the sampling site just upstream from Ralston Afterbay (44 at R3.5). The upstream hydropower IBI scores were in the middle to low end of the range of scores for sites above reservoirs evaluated by Rehn (2008; see Figure 2, which is provided in Appendix D) (Figure AQ 3-3b and Table AQ 3-7), while the hydropower IBI score (44) was similar to the scores for the sites downstream of reservoirs evaluated by Rehn (2008). Water temperature was considerably higher at the downstream sampling site compared to sampling sites farther upstream (Map AQ 3-2 and Figure AQ 3-2).

The percentage of intolerant individuals and ET taxa richness were lower, and percentage of non-insect taxa was greater at the downstream sampling site compared to the two upstream sampling sites. The percentage of scrapers was also lower in the most downstream sampling site than the upstream sampling sites.

Middle Fork American River - Peaking Reach

In the peaking reach, the hydropower IBI scores ranged from a low of 40 at MF24.4 (short bypass reach immediately below Ralston Afterbay Dam) to a high of 71 at MF20.9 (Table AQ 3-7). The hydropower IBI scores gradually increased downstream from MF24.4 to MF20.9, and then decreased with continued distance downstream. The lowest hydropower IBI scores were of similar magnitude to the hydropower IBI scores calculated for BMI communities downstream from dams and diversions in Rehn (2008) (Appendix D). In comparison, the higher IBI scores from the sites in the middle section of the peaking reach (e.g., MF19.1 and MF20.9), were within the range of hydropower IBI scores for unimpaired BMI communities upstream of hydropower dams that were evaluated in Rehn (2008).

The BMI community just downstream of Ralston Afterbay Dam (MF24.4) had low individual metric scores compared to those in the peaking reach sampling sites further downstream (Table AQ 3-7). ET taxa richness, percent intolerant and predator individuals, and the diversity of the BMI community were low compared to those in the peaking reach sites further downstream. In addition, the percent of non-insect taxa

within the community was higher than all the other sampling sites in the peaking reach. The BMI communities in the two most downstream sampling sites in the peaking reach also had lower individual metric scores compared to those in the middle sections of the reach. The BMI communities at these two sites were comprised of fewer ET taxa, with a lower percentage of intolerant and predator individuals compared to the middle section of the peaking reach. Diversity was also lower. This declining trend in the biological condition of the BMI community in the lower portion of the reach may be reflective of increased water temperature or decreased elevation with downstream distance in the peaking reach (e.g., Map AQ 3-2).

6.2.2 Comparison of Peaking Reach with Adjacent Bypass and Comparison Reaches

The hydropower IBI scores in the peaking reach were comparable to those in the two comparison sampling sites on the North Fork of the Middle Fork American River (hydropower IBI scores of 49 and 61) and the comparison site on the North Fork American River (hydropower IBI score of 69). The metrics describing the BMI communities in the comparison streams differed in some respects from those along the peaking reach. The ET taxa richness was often greater and the community was typically comprised of more scrapers and fewer predators compared to the communities in the peaking reach.

On the Middle Fork American River upstream of Ralston Afterbay, the hydropower IBI scores for the two sampling sites were slightly greater (hydropower IBI scores of 71 and 76) than those in the peaking reach, and were greater than those calculated for the BMI communities downstream of dams and diversions evaluated by Rehn (2008) (i.e., typical of scores upstream of dams) (Appendix D). The BMI communities upstream of Ralston Afterbay typically had higher ET taxa richness and a comparatively higher percentage of scrapers compared with the peaking reach communities. The hydropower IBI scores at the sites on the Middle Fork American River were higher than those on the unregulated comparison stream reaches. The diversity and percentage of predators was also greater compared to the communities on the unregulated comparison streams.

In comparison, the hydropower IBI scores for the two sampling sites on the Rubicon River upstream of Ralston Afterbay (hydropower IBI scores of 50 and 44) were lower than those on the Middle Fork American River upstream of Ralston Afterbay and the middle portion of the peaking reach. These sites had warmer temperatures than the peaking reach or Middle Fork American River sites just upstream of Ralston Afterbay (Map AQ 3-2). The hydropower IBI scores for the BMI communities on the Rubicon River were similar to the sites downstream from impoundments in Rehn (2008), but were also similar to the North Fork of the Middle Fork American River unregulated comparison site (NFMF2.4). The communities on the Rubicon River immediately upstream of Ralston Afterbay had a lower percentage of intolerant individuals and predators, but a slightly higher percentage of scrapers compared with the peaking reach communities.

The hydropower IBI scores were averaged for the sampling sites in the peaking reach and the non-peaking comparison stream reaches. The average, minimum, and maximum hydropower IBI scores are shown in Figure AQ 3-4a. The average hydropower IBI scores were similar for the peaking reach and non-peaking comparison reach sampling sites.

Above and Below Diversions

In 2007, study sites were sampled upstream and downstream from the South Fork Long Canyon and Duncan Creek diversions. In both streams, the hydropower IBI scores were slightly higher upstream from the diversion than downstream (Table AQ 3-7). In South Fork Long Canyon Creek, the proportion of intolerant individuals and scrapers within the BMI community and the diversity of the community were higher upstream of the diversion than downstream. In both Duncan Creek and South Fork Long Canyon Creek upstream of the diversions, the BMI communities were comprised of a lower proportion of predator individuals compared to the communities downstream from the diversions. The hydropower IBI scores for the sampling sites both above and below the diversions on South Fork Long Canyon and Duncan creeks were above the median hydropower IBI scores for streams located upstream of dams and diversions evaluated by Rehn (2008) (Appendix D).

Bypass Reaches Below Large Reservoirs

One study site was sampled approximately 2.5 miles downstream of French Meadows Dam on the Middle Fork American River. The hydropower IBI score for this location was 84, which is higher than the median hydropower IBI score for rivers located above reservoirs (Rehn 2008) (Appendix D).

Two study sites were sampled on the Rubicon River downstream of Hell Hole Dam. The study sites were located 4.8 miles and 9.6 miles downstream of the dam (R25.7 and R20.9, respectively). The hydropower IBI score for the upstream location (R25.7) was 66. The hydropower IBI score for the lower site located near Ellicot Bridge (R20.9) was 64. The hydropower IBI scores for these sampling sites were similar to river sites located above reservoirs evaluated by Rehn (2008).

6.2.3 Long-term BMI Sampling Sites

Ralston Afterbay Sediment Management Project

Nine BMI metrics were evaluated at the seven RASMP monitoring sites to describe the long-term trends in the BMI communities. The metrics included BMI density, taxa richness, EPT index, weighted California tolerance value, and the percentages of shredder, scraper, collector-filterer, collector-gatherer, and predator individuals. The 2007 RASMP results are summarized in Table AQ 3-8. The 2007 BMI results were compared with the results from 2001 - 2006 (Figures AQ 3-5 and AQ 3-6) and are summarized below.

BMI Density

In 2007, BMI density ranged from 2,385 individuals per square meter in MF14.3 to 5,684 individuals per square meter in MF23.6 (Figure AQ 3-6). With the exception of the most upstream sampling sites in the peaking reach (MF23.6, MF24.4), the densities were slightly greater in 2007 than those calculated in 2006. Density at the sampling site immediately downstream from Oxbow Powerhouse (MF23.6) was extremely high in 2006 at one transect compared to 2007 and previous years (PCWA 2007b). Densities have been variable through time, with the highest variation in the two most upstream sampling sites in the peaking reach (MF23.6 and MF24.4).

Taxa Richness

Taxa richness was similar throughout the peaking reach, except for the short bypass reach immediately below Ralston Afterbay Dam (MF24.4). The number of different taxa in this sampling site (MF24.4) in 2007 was lower than the sampling sites farther downstream (MF14.3, MF20.9, and MF23.6). In addition, similar to the previous years, taxa richness tended to be slightly lower in the peaking reach compared to the BMI communities in the unregulated comparison river reach (NFMF0.1) and non-peaking bypass reaches just upstream of Ralston Afterbay (MF26.0 and R0.9).

EPT Index

The percent EPT values have been highly variable through time. In 2007, the EPT values were relatively high at all sites, similar to 2005. For 2007, the peaking reach EPT index values ranged from 4% in the short bypass reach immediately downstream from Ralston Afterbay Dam (MF24.4) to 51% in MF14.3. In the non-peaking bypass and comparison reaches, the EPT index values ranged from 35% in the Rubicon River upstream from Ralston Afterbay (R0.9) to 46% in the North Fork of the Middle Fork American River (NFMF0.1). Similar to trends between 2001 and 2006, EPT index values in 2007 were considerably lower in the two most upstream reaches in the peaking reach (MF23.6, MF24.4) compared to the reaches farther downstream and in the non-peaking comparison and bypass reaches. With increased distance downstream from Ralston Afterbay, the relative abundance of EPT individuals in the BMI community increased. In the sampling sites downstream of MF23.6, EPT index values were of similar magnitudes or greater than the EPT index values in the non-peaking comparison and bypass sampling sites.

California Tolerance Values

In 2007, the weighted California tolerance values in the peaking reach followed trends observed in previous years. The California tolerance value decreased (indicating better biological conditions) with distance downstream of Ralston Afterbay from 5.05 in MF24.4 to 3.10 in MF14.3. Similar to previous years, the California tolerance value was high (indicating poorer biological conditions) in the two most upstream sampling sites (MF23.6 and MF24.4) compared to the other sampling sites farther downstream in the

peaking reach and in the non-peaking bypass and comparison sampling sites. Tolerance values were lowest in the two most downstream peaking reach sites.

Dominant Taxa

Dominant taxa in 2007 included chironomid midges (*Chironomidae*), mayflies (*Rhithrogena, Baetis*, and *Ephemerellidae*), caddisflies (*Hydropsyche, Lepidostoma*, and *Cheumatopsyche*), craneflies (*Antocha*), stoneflies (*Sweltsa* and *Isoperla*), black flies (*Simulium*), and riffle beetles (*Optioservus*). The dominant taxa identified in 2007 are compared with those from the previous years by reach in Table AQ 3-11.

Three taxa were identified as potentially useful indicators of changes in the RASMP study, including chironomid midges, *Rhithrogena* mayflies, and *Baetis* mayflies (PCWA 2007b). Chironomid midges have been one of the most numerically abundant taxa at most of the sampling sites during the annual sampling, however, chironomids have been particularly dominant at the site in the short bypass reach below Ralston Afterbay Dam (MF24.4) and the upper peaking reach site (MF23.6). The relative abundance of *Baetis* mayflies, *Rhithrogena* mayflies and other taxa has changed from year to year, and a specific pattern of taxa dominance is not readily discernable.

Functional Feeding Groups

In 2007, collector-gatherers were the dominant functional feeding group in the majority of the reaches (Table AQ 3-8 and Figure AQ 3-6). Collector-filterers (greater than 30% of the communities), in which *Hydropsyche* caddisflies were the dominant taxa, were dominant in two sampling sites, MF14.3 in the peaking reach, and R0.9 in the Rubicon River upstream from Ralston Afterbay. Collector-gatherers comprised more than 40% of the BMI communities in the upper portion of the peaking reach (MF20.9, MF23.6, MF24.4), in which chironomid midges, which tend to be in greater abundance in impaired habitat, were the dominant taxa. Compared to previous years, however, the relative abundance of collector-gatherers in the BMI communities in all the reaches was lower in 2007 (Figure AQ 3-6).

Scrapers were found in relatively low abundance in the upper portion of the peaking reach (MF20.9, MF23.6, and MF24.4) in 2007. The trend in the proportion of scrapers within the community likely reflects the greater abundance of filamentous algae observed in the more upstream peaking reach sampling sites compared to the other sites. The relative abundance of scrapers decreased compared to 2006 abundances in the middle and lower peaking reach sites (MF14.3 and MF20.9), and increased in relative abundance at all other sampling sites.

The relative abundance of predators increased in all sampling sites in 2007 compared to 2006. The greatest relative change occurred in the peaking reach. The greatest abundances of predators (greater than 20% of the community) occurred in the Middle Fork American River in the peaking reach (MF14.3 and MF23.6), and upstream from Ralston Afterbay (MF26.0).

Shredders were a relatively small component (<1%) of all the BMI communities except in the North Fork of the Middle Fork American River (NFMF0.1) (13% of the community). The relative abundance of shredders has consistently been higher at this sampling site compared to all the other sampling sites since 2001.

Individuals in other functional feeding groups were also present in all the sampling sites. Since 2001, the relative proportion has varied, ranging from less than 1% to more than 15% of the community. In 2007, the greatest relative abundance of other functional feeding groups occurred in one site in the peaking reach (MF20.9) and on the Middle Fork American River upstream from Ralston Afterbay (MF26.0).

South Fork Long Canyon Creek and Duncan Creek

BMI data collected by Eldorado National Forest in South Fork Long Canyon Creek (1999 and 2000) were obtained from the USU Bug Lab. The hydropower IBI scores from 1999, 2000, and 2007 are compared in Figure AQ 3-8 and summarized in Table AQ 3-10. The hydropower IBI scores were similar among the 3 years (hydropower IBI scores of 73, 80, and 81, respectively). The metrics describing the BMI communities were similar among the years, except for greater ET taxa richness and a lower percentage of scraper individuals in 2007 compared with the previous years' communities. A study site upstream of the diversion (SFLC4.2) was also evaluated in 2007. The hydropower IBI score was similar to those calculated at the downstream site (hydropower IBI score of 84). The community upstream of the diversion was similar to the downstream sampling sites, except the upstream community was comprised of higher percentage of intolerant individuals and a lower percentage of predators.

BMI data collected by Tahoe National Forest in Duncan Creek (2000-2003) were obtained from the USU Bug Lab. In 2007, the hydropower IBI score was higher above the diversion than below (77 versus 66). The BMI community at the sampling site downstream of the diversion was comprised of fewer predator and scraper individuals and slightly fewer intolerant individuals than the community upstream of the diversion. The above and below diversion hydropower IBI scores in 2002 and 2003, however, were the opposite of that found in 2007. The highest hydropower IBI scores were downstream of the diversion. The historical BMI results could be confounded due to the 2001 Star Fire. The Star Fire burned within close proximity to all of the sampling sites.

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TABLES

Table AQ 3-1. Benthic Macroinvertebrate 2007 Sampling Site Locations.

Site	Bypass Reach	Peaking Reach	Comparison Reach	Sampling Protocol (SWAMP[1], CSBP[2])	Sampling Type (TRC[3], RWB[4])	2007 Sampling Month	Elevation (feet)	Average August Temperature (^{o}F)	Sampling Design					
									Unimpaired Comparisons	Longitudinal Trends	Peaking Reach Comparisons	Above and Below Diversions	Bypass Reaches Below Large Reservoirs	Long-term BMI Sampling
Middle Fork American River Downstream of Ralston Afterbay														
BMI MF 4.8		●		SWAMP	TRC, RWB	October	643	61.8		●	●			
BMI MF14.1		●		SWAMP	TRC, RWB	October	797	57.8		●	●			
BMI MF14.3		●		CSBP	TRC	October	803	57.8		●	●			●
BMI MF19.1		●		SWAMP	TRC, RWB	October	888	56.4		●	●			
BMI MF20.9		●		CSBP	TRC	October	948	55.0		●	●			●
BMI MF23.6		●		CSBP	TRC	October	1,049	54.4		●	●			●
BMI MF24.4		●		CSBP	TRC	October	1,103	59.6		●	●			●
Middle Fork American River from Middle Fork Interbay to Ralston Afterbay														
BMI MF26.0	●			CSBP	TRC	October	1,178	67.5			●			●
BMI MF26.2	●			SWAMP	TRC, RWB	October	1,188	67.5			●			
Middle Fork American River from French Meadows Reservoir to Middle Fork Interbay														
BMI MF44.7	●			SWAMP	TRC, RWB	September	4,505	56.5					●	
Rubicon River														
BMI R0.9	●			CSBP	TRC	October	1,184	73.2		●	●			●
BMI R3.5	●			SWAMP	TRC, RWB	September	1,325	71.1		●	●			
BMI R20.9	●			SWAMP	TRC, RWB	September	3,350	60.8		●				
BMI R25.7	●			SWAMP	TRC, RWB	September	3,927	55.7		●			●	
South Fork Long Canyon Creek														
BMI SFLC2.3	●			SWAMP	TRC, RWB	September	4,514	58.1				●		●
BMI SFLC4.2			●	SWAMP	TRC, RWB	September	4,820	55.3	●			●		
Duncan Creek														
BMI D6.3	●			SWAMP	TRC, RWB	September	4,787	66.2				●		
BMI D9.0			●	SWAMP	TRC, RWB	September	5,338	63.5	●			●		●
North Fork of the Middle Fork American River														
BMI NFMF0.1 and 2.3			●	CSBP	TRC	August, October	1,056	70.0	●		●			●
BMI NFMF2.3			●	SWAMP	TRC, RWB	October	1,263	70.0	●		●			
North Fork American River														
BMI NF31.3			●	SWAMP	TRC, RWB	October	781	74.7	●		●			

[1] SWAMP: Surface Water Ambient Monitoring Program
[2] CSBP: California Stream Bioassessment Procedure
[3] TRC: Targeted riffle composite benthos sampling
[4] RWB: Reachwide benthos sampling

Table AQ 3-2. Long-term Benthic Macroinvertebrate Sampling Site Locations Associated with the Ralston Afterbay Sediment Management Project (RASMP) [1,2].

2007 Study Site Name	RASMP Transects	Bypass Reach	Peaking Reach	Comparison Reach	RASMP Sampling Years	2007 Sampling Month
Middle Fork American River Downstream of Ralston Afterbay						
BMI MF14.3	Reach 1 (1, 3, 7)		●		2001, 2002, 2004, 2005, 2006	October
BMI MF20.9	Reach 2 (9, 11, 13)		●		2001, 2002, 2004, 2005, 2006	October
BMI MF23.6	Reach 3 (16, 19a)		●		2001, 2002, 2004, 2005, 2006	October
BMI MF24.4	Reach 4 (20, 23)		●		2001, 2002, 2004, 2005, 2006	October
Middle Fork American River from Middle Fork Interbay to Ralston Afterbay						
BMI MF26.0	Reach 5 (25, 27, 29)	●			2001, 2002, 2004, 2005, 2006	October
Rubicon River						
BMI R0.9	Reach 7 (36, 40, 43)	●			2001, 2002, 2004, 2005, 2006	October
North Fork of the Middle Fork American River						
BMI NFMF0.1 and 2.3	Reach 6 (31, 33, 35)			●	2001, 2002, 2004, 2005, 2006	August, October

[1]Prior to 2007, this site was sampled as part of the Ralston Afterbay Sediment Management Project (RASMP) (PCWA 2007b). The same location was sampled in 2007 as part of this study.

[2]The Ralston Afterbay Sediment Management Project and the 2007 sampling at these sites used the California Stream Bioassessment Procedure (CSBP) sampling protocols.

Table AQ 3-3. Long-term Benthic Macroinvertebrate Sampling Site Locations in Duncan Creek and South Fork Long Canyon Creek[1].

Historical and 2007 BMI Sampling Site	Bypass Reach	Peaking Reach	Comparison Reach	Historical Year Sampled	2007 Sampling Type[2,3]	2007 Sampling Month
South Fork Long Canyon Creek						
BMI SFLC2.3	●			1999, 2000	SWAMP TRC	October
Duncan Creek						
BMI D4.5	●			2002, 2003		
BMI D6.3	●			no long-term sampling	SWAMP TRC	July, August
BMI D9.0			●	2000, 2001, 2002, 2003	SWAMP TRC	October

[1]The California Stream Bioassessment Procedure (CSBP) approach was used historically to collect data by the USDA-FS.

[2]SWAMP: Surface Water Ambient Monitoring Program

[3]TRC: Targeted riffle composite benthos sampling

Table AQ 3-4. Drift Macroinvertebrate Sampling Site Locations.

Study River and Site ID	Bypass Reach	Peaking Reach	Comparison Reach	Sample Date		
				1st	2nd	3rd
Middle Fork American River						
DMI MF4.8		●		6/22/07, 6/25/07[1]	7/30/07	10/8/07
DMI MF14.1		●		6/20/07	8/1/07	10/9/07
DMI MF19.1		●		6/27/07	8/2/07	10/15/07
DMI MF26.2	●			6/15/07	8/8/07	10/2/07
Rubicon River						
DMI R1.2	●			6/21/07	7/31/07	9/21/07
DMI R20.9	●			6/26/07	8/7/07	9/25/07
DMI R25.7	●			6/14/07	8/3/07	10/24/07
North Fork of the Middle Fork American River						
DMI NFMF2.3			●	6/28/07	8/9/07	10/3/07
North Fork American River						
DMI NF31.3			●	6/29/07	8/10/07	10/4/07

[1]The afternoon sampling was not conducted on June 22, 2007 due to rising water levels. This sampling was completed on June 25, 2007.

Table AQ 3-5. Summary of Macroinvertebrate Metrics for the Multi-metric Index of Biotic Integrity.[1]

Metric	Description	Response to Pollution and Impairment
ET Taxa Richness	Total number of individual taxa within the Ephemeroptera (mayflies) and Trichoptera (caddisflies) orders.	These taxa are most sensitive to changes in water quality and habitat suitability. The number of taxa decreases in response to poorer water quality and habitat conditions (CDFG 2004; Rehn et al 2007).
Percent Intolerant Individuals	The relative number organisms in the sub-sample that is considered to be sensitive to various types of perturbations or pollution. The number of intolerant individuals was based on the California Tolerance Value (Ode 2003), which is based on the Hilsenhoff Biotic Index. The Hilsenhoff Biotic Index has been used as a general index of pollution tolerance, based on a ranking scale from 0 (highly intolerant) to 10 (highly tolerant) of the sensitivity of different taxa to polluted waters.	Individuals with an index value of 0 are typically only found in high quality unpolluted waters, while those with a value of 10 are the only taxa found in severely polluted waters. The individuals within taxa with tolerance values of 0, 1, and 2 were included in this analysis (Ode 2003; CDFG 2004; Rehn et al 2007).
Percent Tolerant Individuals	The relative number of individuals in the sub-sample that is considered tolerant of pollution (Ode 2003).	The individuals within taxa with tolerance values of 8, 9, and 10 were included in this analysis (Ode 2003; CDFG 2004).
Percent Non-insect Taxa	Relative number of non-insect taxa within the sub-sample.	The percent of non-insect taxa tends to be higher in impaired systems (CDFG 2004).
Functional Feeding Groups	Common classification system to categorize macroinvertebrates by their feeding acquisition mechanisms. The categories are based on the size of the food particles and the location of the food. The categories reflect the major source of the food (e.g. from within the stream or adjacent riparian or upland areas), as well as the primary location (e.g. erosional or depositional environment). The functional feeding groups were defined by Merritt et al (2007). Merritt et al (2007) identify 6 functional feeding groups; two of which are included in the hydropower IBI score.	Establishes a linkage to the aquatic food resources available in the stream and the macroinvertebrates.
Percent Predator Individuals	The relative abundance of organisms in the sub-sample that feed on living animal tissue (Merritt et al 2007).	Predators may vary in relative abundance in response to impairment (CDFG 2004; Merritt et al 2007).

Table AQ 3-5. Summary of Macroinvertebrate Metrics for the Multi-metric Index of Biotic Integrity (continued).[1]

Metric	Description	Response to Pollution and Impairment
Percent Scraper Individuals	The relative abundance of organisms in the sub-sample that feed on periphyton dominated by single cell or small colonial algae (Merritt et al 2007).	The response is often variable to impairment, but scraper abundance typically decreases in response to sedimentation and high levels of pollution and nutrient enrichment. The percent scraper individuals tend to increase with increases in diatoms and decrease with increased abundances of filamentous algae, moss, and vascular plants (CDFG 2004; Merritt et al 2007).
Shannon Diversity	Describes the relationship between the number of distinct taxa and their relative abundances in the sample. It is a measure of community structure. The calculations followed those described by Ludwig and Reynolds (1988, equation 8.9, page 92).	Diversity may decrease with impairment and pollution (CDFG 2003; CDFG 2004; Rehn et al 2007).

[1]Rehn (2008).

Table AQ 3-6. Summary of Macroinvertebrate Metrics for Comparison with Historical Data from the Ralston Afterbay Sediment Management Project (RASMP).[1]

Metric	Description	Response to Pollution and Impairment
Invertebrate Density	The total number of individual invertebrates per square meter. This is a measure of overall habitat utilization by the macroinvertebrates and food available for fish (PCWA 2007b).	Typically, densities remain relatively stable. Sudden fluctuations (up or down) indicate changes in habitat or water quality (PCWA 2007b; Rehn et al 2007).
Taxa Richness	Total number of distinct taxonomic groups in the sub-sample (PCWA 2007b).	In general, taxa richness is relatively high in streams with good water quality and a variety of suitable habitats. It tends to decrease with impairment and pollution (CFDG 2003; CDFG 2004; PCWA 2007b).
EPT Ratio	Abundance of invertebrate individuals in the Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) orders (PCWA 2007b).	Organisms within these orders are generally considered sensitive to pollutants and relative abundance decreases with impairment (CDFG 2004; PCWA 2007b).
Percent Chironomidae	Percent of midge larvae in the sample (PCWA 2007b).	Abundance of midge larvae increases with impairment (CDFG 2004; PCWA 2007b).
California Tolerance Value	California Tolerance Value (Ode 2003) is based on the Hilsenhoff Biotic Index. Refer to the discussion above on tolerant individuals. For the taxa identified in the study area, California Tolerance Values are the same as the Hilsenhoff tolerance values. The tolerance value is the weighted average of the known tolerance values based on the relative abundance of each taxon (PCWA 2007b).	Taxa with an index value of 0 are typically only found in high quality unpolluted waters, while taxa with a value of 10 are found in severely polluted waters (PCWA 2007b).
Functional Feeding Groups	See description above. The functional feeding groups were defined by CAMLNet (Ode 2003).	
Percent Collector-Gatherer Individuals	The relative abundance of organisms in the sample that feed on deposited fine particulate organic matter (Merritt et al 2007; PCWA 2007b).	Collector-gatherers are sensitive to deposited toxicants. Abundance may vary with impairment (CDFG 2004; Merritt et al 2007; PCWA 2007b).

Table AQ 3-6. Summary of Macroinvertebrate Metrics for Comparison with Historical Data from the Ralston Afterbay Sediment Management Project (RASMP) (continued).[1]

Metric	Description	Response to Pollution and Impairment
Percent Collector-Filterer Individuals	The relative abundance of organisms in the sample that feed on suspended fine particulate organic matter (Merritt et al 2007; PCWA 2007b).	Collector-filterers are sensitive to toxicants in the water column and to pollutants that adhere to organic matter. Abundance may vary with impairment (CDFG 2004; Merritt et al 2007; PCWA 2007b).
Percent Scraper Individuals	The relative abundance of organisms in the sub-sample that feed on attached periphyton dominated by single cell or small colonial algae (Merritt et al 2007; PCWA 2007b).	The response is often variable to impairment, but scraper abundance typically decreases in response to sedimentation and high levels of pollution and nutrient enrichment. The percent scraper individuals tend to increase with increases in diatoms and decrease with increased abundances of filamentous algae, moss, and vascular plants (CDFG 2004; Merritt et al 2007; PCWA 2007b).
Percent Predator Individuals	The relative abundance of organisms in the sub-sample that feed on living animal tissue (Merritt et al 2007; PCWA 2007b).	Predators may vary in relative abundance in response to impairment (CDFG 2004; Merritt et al 2007; PCWA 2007b).
Percent Shredder Individuals	The relative abundance of organisms in the sub-sample that feed on both living vascular hydrophytes and decomposing vascular plant tissue – coarse particulate organic matter (Merritt et al 2007; PCWA 2007b).	Shredders are sensitive to changes in riparian vegetation (abundance of leaf litter). They can be good indicators of toxicants that adhere to organic matter. Abundance may vary with impairment (CDFG 2004; Merritt et al 2007; PCWA 2007b).
Dominant Taxa	Taxonomic groups greater in abundance relative to other taxa. Dominant taxa occur in great abundance throughout their range and are typically generalists (Merritt et al 2007; PCWA 2007b).	Dominant taxa percentages increase with impairment. Greater percentages of dominant taxa are typically associated with greater disturbance or impairment (CDFG 2004; Merritt et al 2007; PCWA 2007b).

[1]PCWA (2007b)

Table AQ 3-7. Summary of Metric Scores for the Component Metrics of the Hydropower IBI for 2007 SWAMP Targeted Riffle Composite (TRC) and California Stream Bioassessment Procedure (CSBP) Sampling Sites.[1,2,3]

Site[4]	Sampling Type (SWAMP TRC or CSBP)	IBI Score	ET Taxa Richness	Metric Score	% Intolerant Individuals	Metric Score	% Scraper Individuals	Metric Score	% Non-Insect Taxa	Metric Score	Shannon Diversity	Metric Score	% Predator Individuals	Metric Score	% Tolerant Individuals	Metric Score
Middle Fork American River - Peaking Reach																
MF4.8	TRC	**54**	15	6	15%	3	4%	1	4%	10	2.57	2	13%	6	0%	10
MF14.1	TRC	**54**	14	6	17%	3	4%	1	6%	10	2.24	0	15%	8	0%	10
MF14.3 (Reach 1)	CSBP	**63**	15	6	26%	6	5%	1	10%	8	2.70	3	26%	10	0%	10
MF19.1	TRC	**70**	19	9	22%	5	1%	0	10%	8	3.20	7	17%	10	0%	10
MF20.9 (Reach 2)	CSBP	**71**	15	6	33%	7	3%	1	7%	10	2.99	6	19%	10	0%	10
MF23.6 (Reach 3)	CSBP	**61**	12	5	32%	7	3%	1	10%	8	2.82	4	15%	8	2%	10
MF24.4 (Reach 4)	CSBP	**40**	10	4	3%	0	9%	2	15%	4	1.93	0	15%	8	1%	10
Comparison Reaches																
NFMF0.1 & 2.3 (Reach 6)	CSBP	**61**	16	7	24%	5	12%	3	6%	10	2.68	3	12%	5	1%	10
NFMF2.4	TRC	**49**	18	8	16%	3	8%	2	6%	10	2.46	1	2%	0	1%	10
NF31.3	TRC	**69**	21	10	3%	0	22%	5	4%	10	3.29	8	12%	5	0%	10
Bypass Reaches above Ralston Afterbay																
MF26.0 (Reach 5)	CSBP	**71**	16	7	16%	3	16%	4	8%	10	3.05	6	19%	10	0%	10
MF26.2	TRC	**76**	22	10	21%	4	15%	3	10%	8	3.27	8	24%	10	1%	10
R0.9 (Reach 7)	CSBP	**50**	14	6	8%	1	18%	4	5%	10	2.87	4	7%	0	1%	10
R3.5	TRC	**44**	15	6	6%	1	10%	2	9%	9	2.70	3	7%	0	0%	10
Bypass Reaches Below Dams – Middle Fork American River and Rubicon River																
MF44.7	TRC	**84**	23	10	48%	10	10%	2	2%	9	3.27	8	17%	10	0%	10
R20.9	TRC	**64**	19	9	44%	10	6%	1	0%	10	2.67	3	9%	2	0%	10
R25.7	TRC	**66**	25	10	25%	5	18%	4	0%	10	3.07	7	7%	0	0%	10
Bypass Reaches Above and Below Diversions – South Fork Long Canyon Creek and Duncan Creek																
SFLC2.3	TRC	**81**	25	10	30%	7	11%	2	2%	10	3.24	8	19%	10	0%	10
SFLC4.2	TRC	**84**	33	10	46%	10	18%	4	5%	10	3.50	10	12%	5	0%	10
D6.3	TRC	**66**	26	10	27%	6	8%	2	6%	10	3.14	7	8%	1	0%	10
D9.0	TRC	**77**	26	10	32%	7	15%	3	7%	10	3.33	8	13%	6	0%	10

[1]Values are from Table 4 in Rehn (2008). The final IBI score has been adjusted to a 100-point scale.
[2]Where necessary, when separate scoring for Level 1 and Level 2 taxonomy was provided, Level 2 was used.
[3]See Map AQ-1 for sampling locations.
[4]Reach number refers to the corresponding RASMP monitoring site (PCWA 2007b).

Table AQ 3-8. Summary of Ralston Afterbay Sediment Management Project (RASMP) Benthic Macroinvertebrate Monitoring Metrics at the RASMP Sampling Sites, October 2007.

Site[1]	Density (sq. meter)	Taxa Richness	EPT Ratio	Weighted California Tolerance Value	Functional Feeding Groups				
					% Shredders	% Scrapers	% Collector-filterers	% Collector-gatherers	% Predators
T1, OC-1	1563	19	36%	3.51	1%	10%	49%	19%	20%
T3, OC-2	2394	21	54%	2.87	1%	25%	27%	18%	27%
T7, OC-3	3197	23	63%	2.92	0%	30%	29%	9%	29%
MF14.3 (Reach 1)	2385	21	51%	3.10	1%	22%	35%	15%	25%
T9, VC-1	4050	22	36%	3.86	1%	9%	12%	64%	11%
T11, VC-2	4387	19	52%	3.15	0%	11%	11%	52%	16%
T13, VC-3	5778	21	50%	3.08	0%	15%	18%	44%	18%
MF20.9 (Reach 2)	4738	21	46%	3.37	0%	12%	14%	53%	15%
T16, JB-1	6880	21	31%	4.52	1%	11%	29%	44%	13%
T18, JB-3	4488	19	33%	4.31	0%	5%	18%	62%	15%
MF23.6 (Reach 3)	5684	20	32%	4.41	0%	9%	20%	53%	14%
T20, IB-1	2409	14	3%	5.09	0%	6%	3%	80%	10%
T23, IB-2	2614	15	4%	5.01	0%	18%	2%	66%	13%
MF24.4 (Reach 4)	2512	15	4%	5.05	0%	11%	9%	66%	12%
T25, MF-1	4603	25	37%	3.82	0%	16%	39%	23%	18%
T27, MF-2	6805	30	40%	4.05	3%	31%	13%	29%	17%
T29, MF-3	3326	32	36%	4.39	0%	17%	14%	38%	26%
MF26.6 (Reach 5)	4911	29	38%	4.09	1%	21%	22%	30%	21%
T31, NF-1	3097	21	27%	4.33	1%	14%	31%	48%	5%
T33, NF-2	4603	21	51%	3.14	14%	34%	7%	28%	17%
T35, NF-3	2194	25	60%	2.96	23%	33%	4%	26%	13%
NFMF0.1 and 2.3 (Reach 6)	3298	22	46%	3.48	13%	27%	14%	34%	12%
T36, RU-1	2704	28	35%	4.21	1%	34%	20%	35%	8%
T40, RU-2	2507	25	36%	4.04	0%	35%	32%	22%	9%
T43, RU-3	6233	20	36%	4.10	0%	25%	45%	25%	5%
R0.9 (Reach 7)	3815	24	35%	4.12	0%	31%	32%	28%	7%

[1]See PCWA (2007b) for details on the sampling locations and transects. Reach number refers to the corresponding RASMP monitoring site (PCWA 2007b).

Table AQ 3-9. Summary of Metric Scores for the Component Metrics of the Hydropower IBI for 2007 SWAMP Reachwide Benthos (RWB) Sampling Sites.[1,2,3]

Site[4]	IBI Score	ET Taxa Richness	Metric Score	% Intolerant Individuals	Metric Score	% Scraper Individuals	Metric Score	% Non-Insect Taxa	Metric Score	Shannon Diversity	Metric Score	% Predator Individuals	Metric Score	% Tolerant Individuals	Metric Score
Middle Fork American River - Peaking Reach															
MF4.8	**40**	14	6	11%	2	1%	0	13%	6	2.26	0	11%	4	0%	10
MF14.1	**49**	15	6	12%	2	6%	1	15%	4	2.39	1	25%	10	0%	10
MF19.1	**64**	16	7	21%	4	3%	1	12%	7	2.99	6	34%	10	1%	10
Comparison Reaches															
NFMF2.4	**60**	24	10	13%	2	18%	4	9%	9	3.15	7	4%	0	1%	10
NF31.3	**54**	21	10	12%	2	5%	1	2%	10	2.87	5	7%	0	1%	10
Bypass Reaches above Ralston Afterbay															
MF26.2	**73**	19	9	17%	3	19%	4	11%	7	3.33	8	24%	10	2%	10
R3.5	**63**	22	10	7%	1	23%	5	11%	7	2.91	5	13%	6	3%	10
Bypass Reaches Below Dams – Middle Fork American River and Rubicon River															
MF44.7	**81**	25	10	39%	9	7%	1	5%	10	3.18	7	21%	10	0%	10
R20.9	**69**	19	9	25%	5	26%	6	5%	10	2.73	4	11%	4	0%	10
R24.7	**60**	25	10	25%	5	12%	3	6%	10	2.81	4	6%	0	0%	10
Bypass Reaches Above and Below Diversions – South Fork Long Canyon Creek and Duncan Creek															
SFLC2.3	**74**	19	9	30%	7	5%	1	5%	10	2.89	5	26%	10	0%	10
SFLC4.2	**86**	26	10	45%	10	10%	2	5%	10	3.22	8	19%	10	0%	10
D6.3	**74**	18	8	22%	5	17%	4	5%	10	2.94	5	25%	10	0%	10
D9.0	**83**	18	8	38%	9	23%	5	6%	10	3.04	6	22%	10	1%	10

[1]Values are from Table 4 in Rehn (2008). The final IBI score has been adjusted to a 100-point scale.
[2]Where necessary, when separate scoring for Level 1 and Level 2 taxonomy was provided, Level 2 was used.
[3]See Map AQ-1 for sampling locations.
[4]Reach number refers to the corresponding RASMP monitoring site (PCWA 2007b).

Table AQ 3-10. Summary of Metric Scores for the Component Metrics of the Hydropower IBI for the SWAMP Targeted Riffle Composite (TRC) and California Stream Bioassessment Procedure (CSBP) USDA-Forest Service South Fork Long Canyon Creek and Duncan Creek Sampling Sites.[1,2,3]

Site[4]	Year	Sampling Type (SWAMP TRC or CSBP)	IBI Score	ET Taxa Richness	Metric Score	% Intolerant Individuals	Metric Score	% Scraper Individuals	Metric Score	% Non-Insect Taxa	Metric Score	Shannon Diversity	Metric Score	% Predator Individuals	Metric Score	% Tolerant Individuals	Metric Score
South Fork Long Canyon Creek Bypass Reach																	
SFLC2.3	1999	CSBP	**73**	15	6	24%	5	19%	4	4%	10	2.97	6	19%	10	0%	10
SFLC2.3	2000	CSBP	**80**	19	9	30%	7	15%	3	4%	10	3.24	8	16%	9	0%	10
SFLC2.3	2007	TRC	**81**	25	10	30%	7	11%	2	2%	10	3.24	8	19%	10	0%	10
Above South Fork Long Canyon Creek Diversion																	
SFLC4.2	2007	TRC	**84**	33	10	46%	10	18%	4	5%	10	3.50	10	12%	5	0%	10
Duncan Creek Bypass Reaches																	
D4.5	2002	CSBP	**63**	23	10	16%	3	17%	4	0%	10	2.97	6	8%	1	0%	10
D4.5	2003	CSBP	**86**	27	10	30%	7	23%	6	0%	10	3.31	8	16%	9	0%	10
D6.3	2007	TRC	**66**	26	10	27%	6	8%	2	6%	10	3.14	7	8%	1	0%	10
Above Duncan Creek Diversion																	
D9.0	2000	CSBP	**91**	25	10	43%	10	30%	7	0%	10	3.27	8	16%	9	0%	10
D9.0	2001	CSBP	**79**	25	10	48%	10	23%	5	2%	10	3.32	8	9%	2	0%	10
D9.0	2002	CSBP	**44**	6	1	3%	0	1%	0	4%	10	1.73	0	18%	10	0%	10
D9.0	2003	CSBP	**76**	26	10	22%	5	10%	2	0%	10	3.23	8	15%	8	0%	10
D9.0	2007	TRC	**77**	26	10	32%	7	15%	3	7%	10	3.33	8	13%	6	0%	10

[1]Values are from Table 4 in Rehn (2008). The final IBI score has been adjusted to a 100-point scale.
[2]Where necessary, when separate scoring for Level 1 and Level 2 taxonomy was provided, Level 2 was used.
[3]See Map AQ-1 for sampling locations.
[4]Reach number refers to the corresponding RASMP monitoring site (PCWA 2007b).

Table AQ 3-11. Percent Composition of Dominant Taxa at each Ralston Afterbay Sediment Management Project (RASMP) Monitoring Site in October 2001, 2002, 2004, 2005, 2006, and 2007.

Site	2007		2006[1]		2005		2004		2002		2001	
	Dominant Taxa	Percent Dominance	Dominant Taxa	Percent Dominance	Dominant Taxa	Percent Dominance	Dominant Taxa	Percent Dominance	Dominant Taxa	Percent Dominance	Dominant Taxa	Percent Dominance
MF14.3 (Reach 1)												
Middle Fork American River near Otter Creek												
1	Hydropsyche	27.8%	Chironomidae	25.0%	Rhithrogena	29.7%	Simulium	29.7%	Hydropsyche	28.2%	Hydropsyche	34.0%
2	Rhithrogena	11.0%	Glossosoma	21.4%	Simuliidae	23.6%	Baetis	23.6%	Rhithrogena	16.9%	Rhithrogena	18.5%
3	Sweltsa	10.6%	Hydropsyche	14.1%	Baetis	8.6%	Chironomidae	8.6%	Chironomidae	11.5%	Glossosoma	17.6%
4	Isoperla	10.2%	Rhithrogena	12.7%	Calineuria californica	6.3%	Oligochaeta	5.9%	Baetis	7.2%	Chironomidae	5.0%
5	Baetis	5.6%	Baetis	7.3%	Chironomidae	5.5%	Sweltsa	5.4%	Isoperla	4.6%	Cheumatopsyche	3.9%
MF20.9 (Reach 2)												
Middle Fork American River near Volcano Creek												
1	Chironomidae	22.6%	Chironomidae	48.3%	Chironomidae	22.8%	Chironomidae	28.6%	Chironomidae	27.8%	Oligochaeta	37.9%
2	Ephemerellidae	12.7%	Rhithrogena	13.1%	Rhithrogena	17.3%	Oligochaeta	16.9%	Hydropsyche	11.2%	Ephemerellidae	14.9%
3	Baetis	7.9%	Baetis	11.1%	Ephemerellidae	13.7%	Baetis	16.0%	Baetis	9.6%	Chironomidae	6.9%
4	Isoperla	7.6%	Calineuria californica	4.0%	Calineuria californica	6.0%	Serratella	7.7%	Rhithrogena	8.8%	Baetis	6.9%
5	Simulium	6.6%	Glossosoma	3.2%	Baetis	5.2%	Simulium	4.7%	Isoperla	8.6%	Serratella	6.9%
MF23.6 (Reach 3)												
Middle Fork American River at Junction Bar												
1	Chironomidae	20.8%	Chironomidae	63.0%	Chironomidae	58.0%	Chironomidae	37.2%	Oligochaeta	28.5%	Oligochaeta	47.6%
2	Simulium	19.8%	Oligochaeta	22.2%	Rhithrogena	7.5%	Baetis	17.7%	Chironomidae	22.6%	Simulium	10.3%
3	Antocha	8.7%	Baetis	5.3%	Ephemerellidae	6.2%	Oligochaeta	12.9%	Baetis	7.4%	Ephemerella	6.7%
4	Ephemerellidae	8.2%	Simuliidae	1.3%	Oligochaeta	4.3%	Simulium	6.4%	Serratella	7.1%	Chironomidae	5.0%
5	Sweltsa	7.3%	Calineuria californica	0.8%	Leucrocuta/Nixe	3.0%	Antocha	5.5%	Antocha	6.2%	Baetis	5.0%
MF24.4 (Reach 4)												
Middle Fork American River at Indian Bar												
1	Chironomidae	66.5%	Chironomidae	61.7%	Chironomidae	47.9%	Chironomidae	31.8%	Chironomidae	43.4%	Simulium	32.9%
2	Optioservus	9.7%	Oligochaeta	34.6%	Simuliidae	25.1%	Simulium	20.8%	Simulium	9.1%	Chironomidae	23.8%
3	Baetis	4.7%	Hydroptilidae	1.3%	Baetis	6.7%	Oligochaeta	7.2%	Acentrella	8.9%	Acentrella	4.4%
4	Hygrobates	3.5%	Serratella	0.7%	Plecoptera	2.3%	Baetis	5.5%	Oligochaeta	6.7%	Antocha	2.3%
5	Lebertia	3.0%	Antocha	0.5%	Oligochaeta	2.2%	Hydroptila	3.8%	Gyraulus	6.6%	Gyraulus	2.3%
MF26.0 (Reach 5)												
Middle Fork American River Above Ralston Afterbay												
1	Chironomidae	15.0%	Chironomidae	66.4%	Chironomidae	25.4%	Baetis	26.3%	Baetis	21.4%	Chironomidae	18.8%
2	Hydropsyche	10.9%	Hydroptilidae	5.8%	Baetis	15.6%	Epeorus	15.3%	Chironomidae	18.9%	Baetis	16.3%
3	Optioservus	10.8%	Rhithrogena	4.9%	Epeorus	11.9%	Chironomidae	7.7%	Hydropsyche	12.2%	Hydropsyche	11.1%
4	Baetis	8.3%	Baetis	4.2%	Rhithrogena	11.4%	paraleptophlebia	5.4%	Epeorus	4.5%	Cheumatopsyche	8.1%
5	Sweltsa	4.6%	Calineuria californica	2.9%	Ephemerellidae	3.6%	Simulium	5.1%	Cheumatopsyche	4.3%	Optiocervus	6.2%
NFMF0.1 and 2.3 (Reach 6)												
North Fork of the Middle Fork of the American River												
1	Baetis	17.7%	Chironomidae	44.6%	Chironomidae	31.8%	Chironomidae	17.3%	Chironomidae	18.9%	Hydropsyche	20.1%
2	Lepidostoma	12.2%	Hydroptilidae	16.2%	Baetis	11.7%	Rhithrogena	10.6%	Rhithrogena	18.3%	Chironomidae	15.5%
3	Chironomidae	11.7%	Hydropsyche	5.1%	Rhithrogena	10.1%	Optioservus	7.8%	Baetis	12.0%	Baetis	8.8%
4	Rhithrogena	9.3%	Simuliidae	4.8%	Hydropsyche	9.6%	Baetis	7.7%	Hydropsyche	7.2%	Cheumatopsyche	8.2%
5	Optioservus	5.8%	Rhithrogena	4.7%	Lepidostoma	6.4%	Hydropsyche	5.7%	Hydroptilidae	5.5%	Rhithrogena	8.2%
R0.9 (Reach 7)												
Rubicon River Above Ralston Afterbay												
1	Hydropsyche	15.4%	Chironomidae	49.2%	Rhithrogena	20.4%	Baetis	13.7%	Chironomidae	25.9%	Hydropsyche	30.8%
2	Chironomidae	11.9%	Hydropsyche	9.0%	Baetis	18.8%	Chironomidae	13.3%	Baetis	12.5%	Baetis	13.2%
3	Baetis	10.0%	Psephenus falli	7.2%	Chironomidae	14.7%	Psephenus falli	13.1%	Hydropsyche	7.1%	Chironomidae	9.2%
4	Cheumatopsyche	9.9%	Baetis	5.9%	Epeorus	10.7%	Hydropsyche	10.2%	Psephenus falli	7.0%	Optiocervus	8.4%
5	Optioservus	6.6%	Rhithrogena	4.1%	Psephenus falli	5.7%	Epeorus	7.9%	Argia	5.5%	Cheumatopsyche	6.6%

[1] Data prior to 2007 were collected as part of the Ralston Afterbay Sediment Management Project (PCWA 2007b). Reach number refers to the corresponding RASMP monitoring site (PCWA 2007b).

FIGURES

Figure AQ 3-1. Macroinvertebrate and Special-status Aquatic Mollusk Objectives and Related Study Elements and Reports.

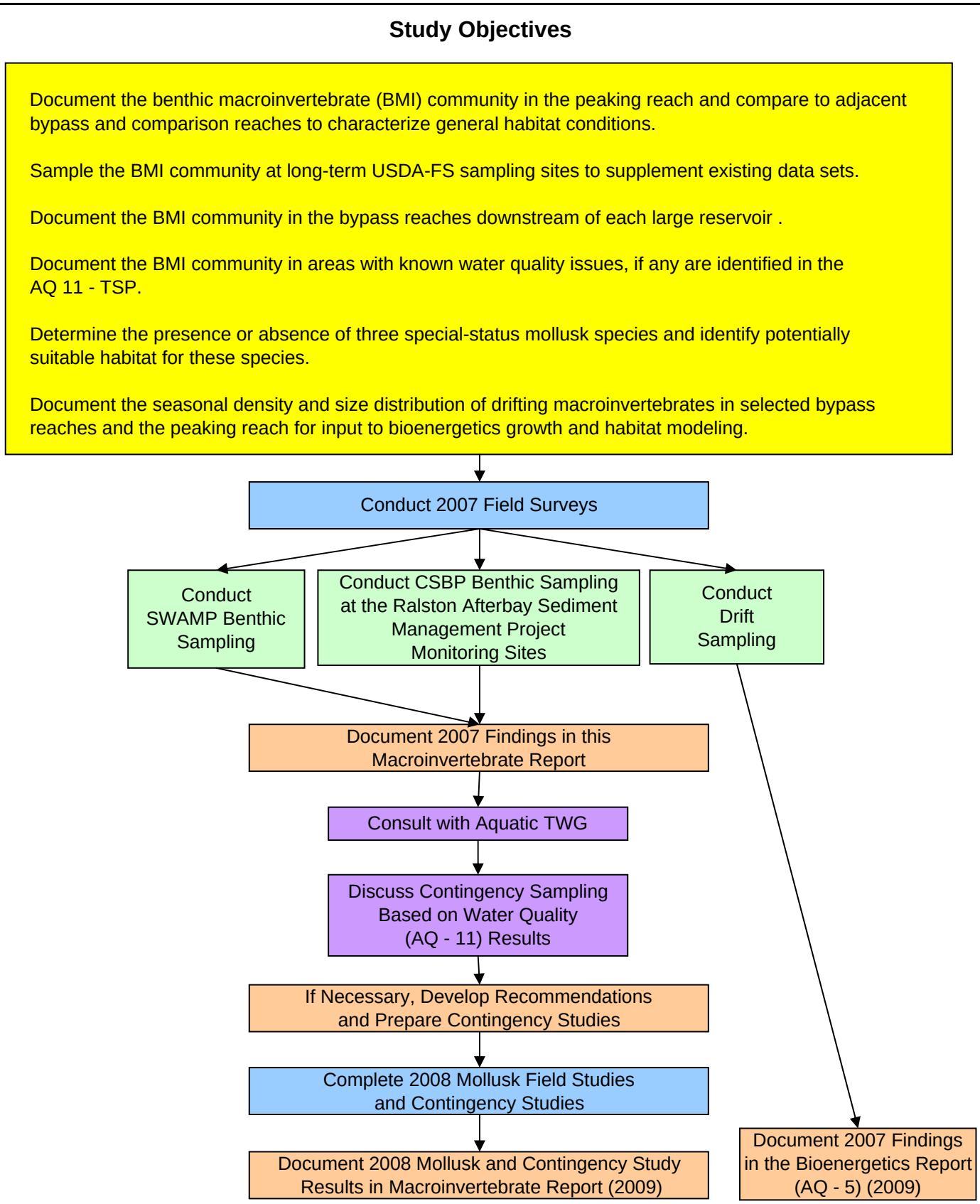


Figure AQ 3-2. Comparison of SWAMP Targeted Riffle Composite (TRC) Sample IBI Scores Versus Elevation and Average August Temperature (°F).

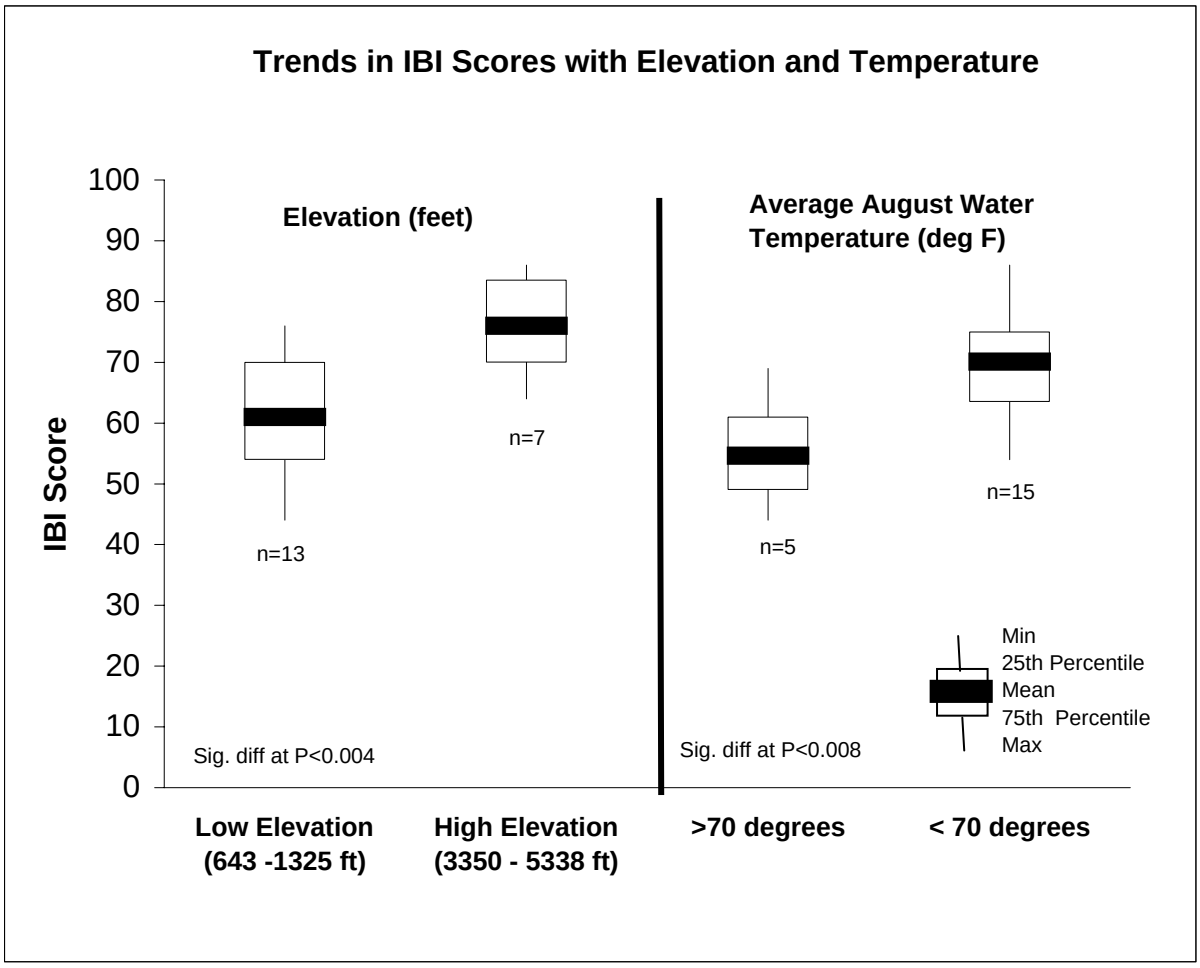
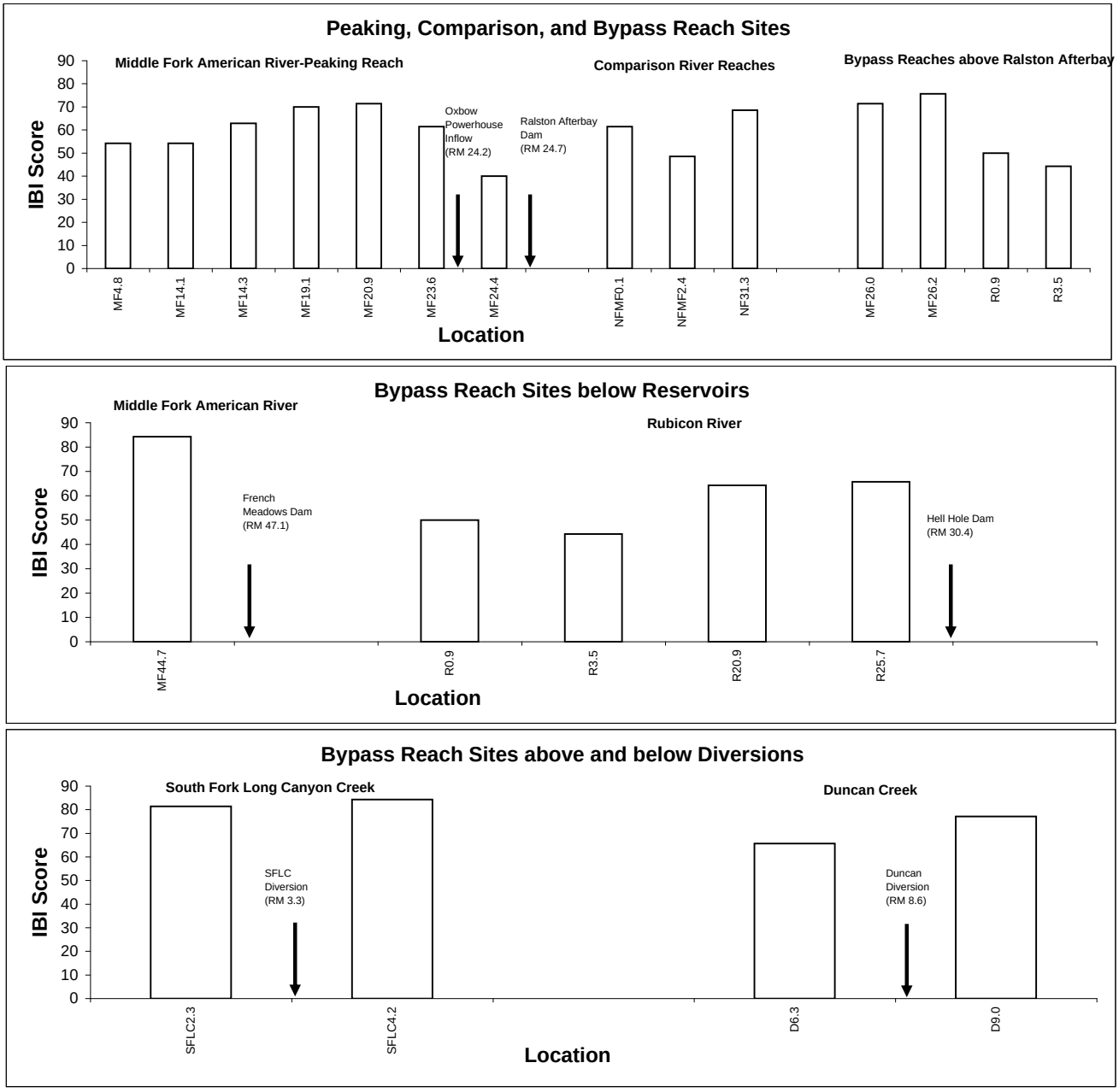
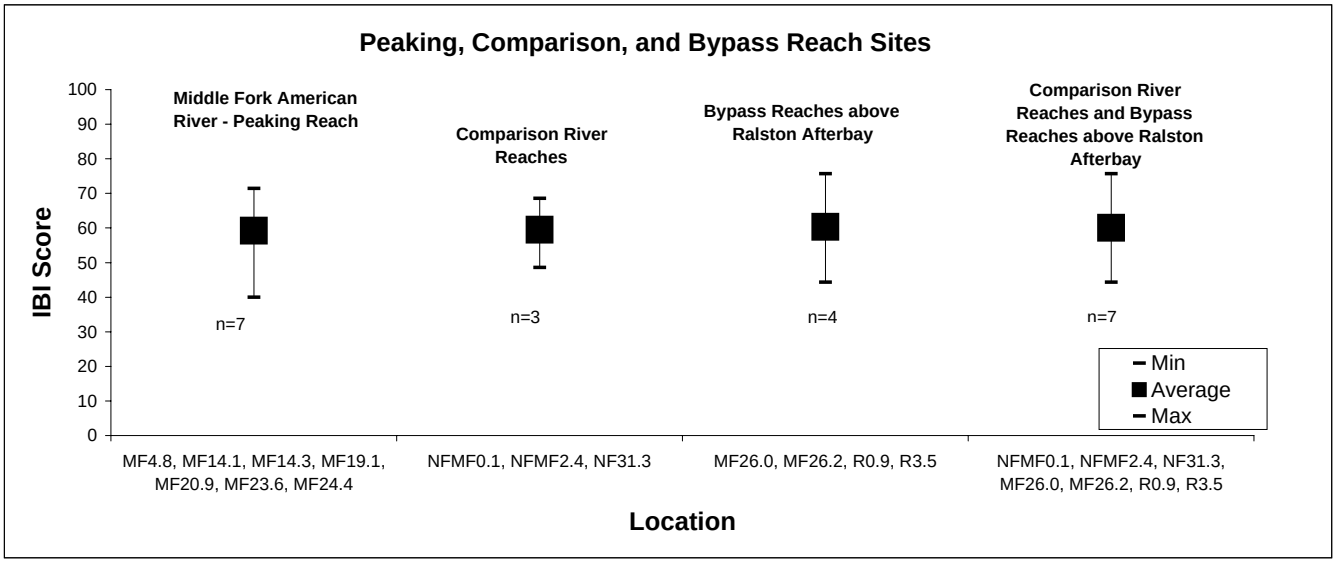


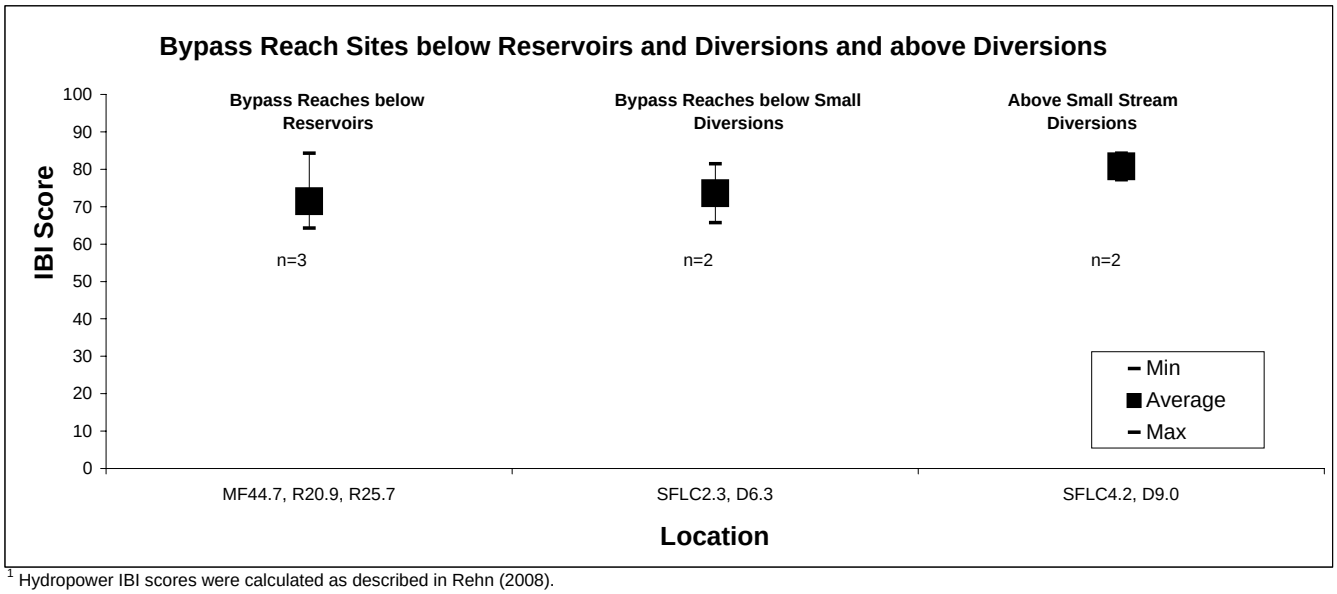
Figure AQ 3-3. Hydropower IBI Scores for 2007 PCWA SWAMP Targeted Riffle Composite (TRC) Sampling Sites and California Stream Bioassessment Procedure (CSBP) Ralston Sediment Management Project (RASMP) Reaches in the Peaking, Comparison, and Bypass Reaches, Bypass Reaches below Reservoirs, and above and below Diversions[1].



[1] Hydropower IBI scores were calculated as described in Rehn (2008).

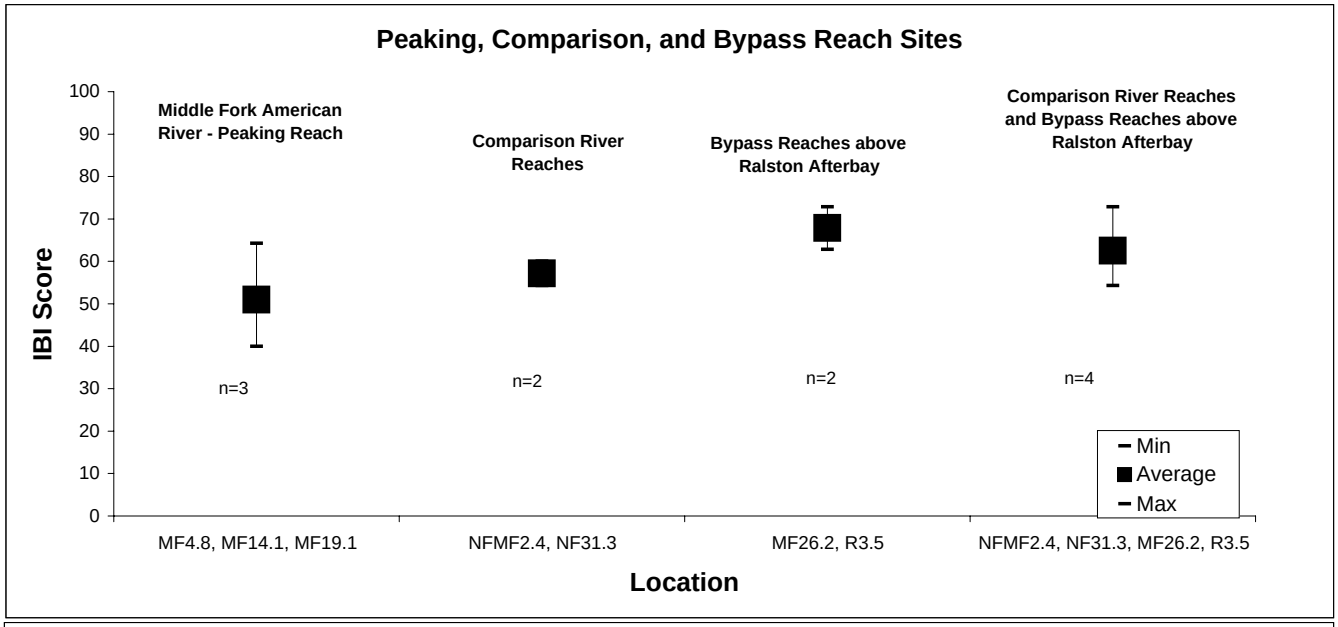
Figure AQ 3-4a. Average, Minimum, and Maximum Hydropower IBI Scores for the 2007 SWAMP Targeted Riffle Composite (TRC) and California Stream Bioassessment Procedure (CSBP) Sampling Sites[1].





[1] Hydropower IBI scores were calculated as described in Rehn (2008).

Figure AQ 3-4b. Average, Minimum, and Maximum Hydropower IBI Scores for the 2007 SWAMP Reachwide Benthos (RWB) Sampling Sites[1].



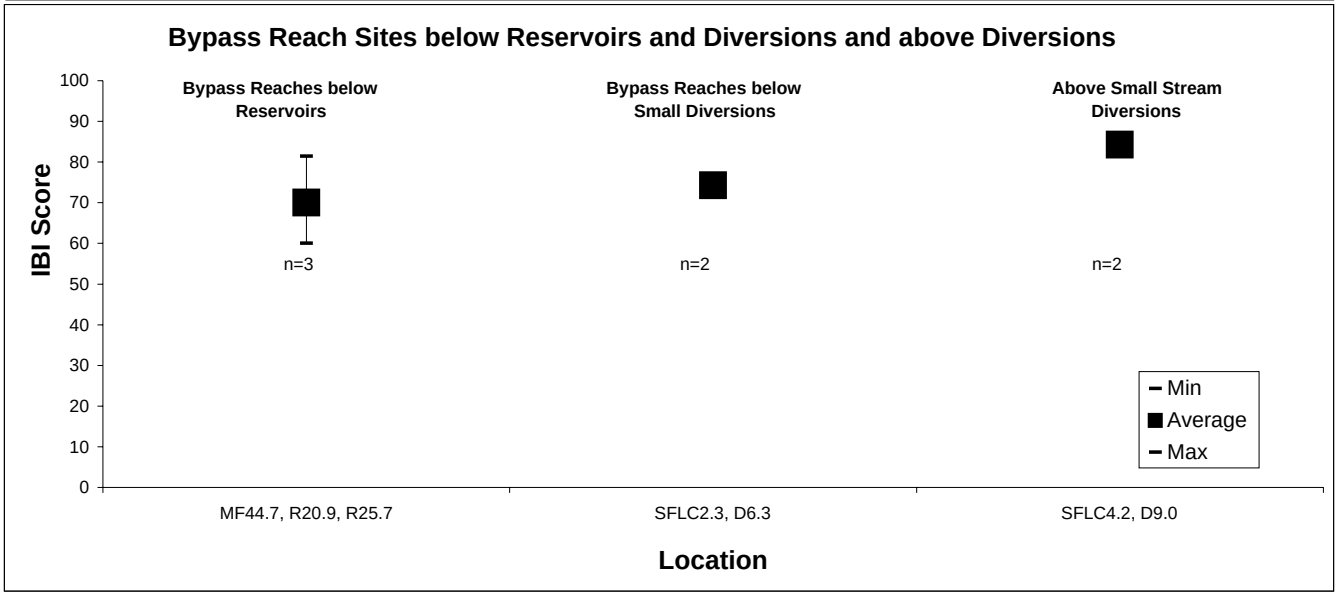
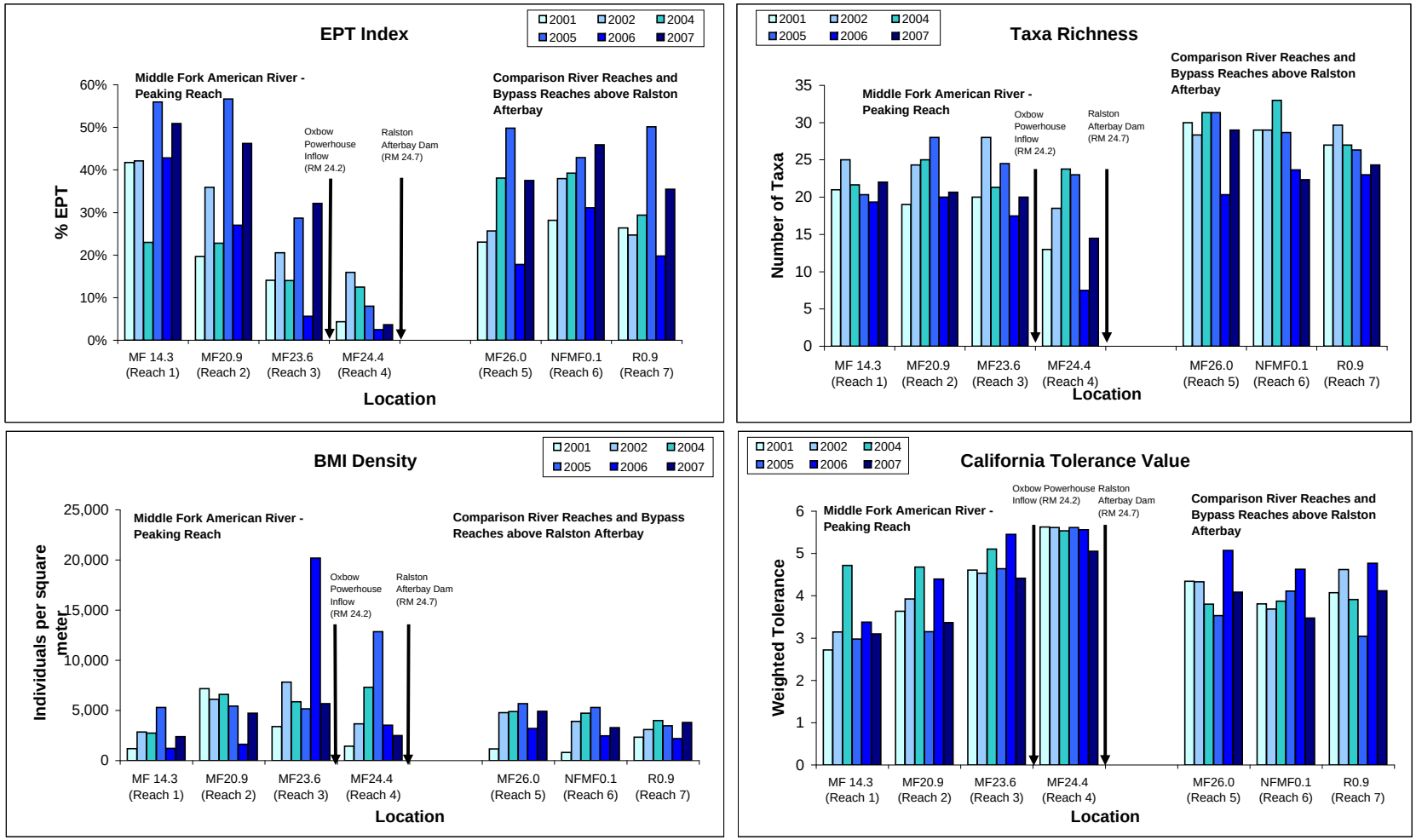
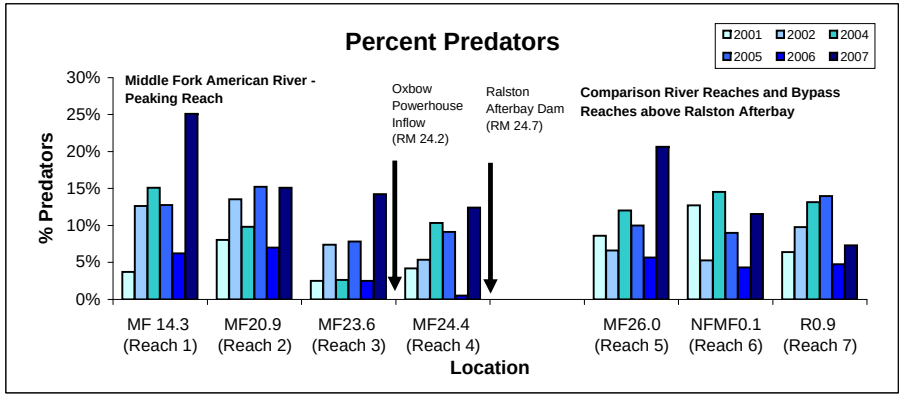


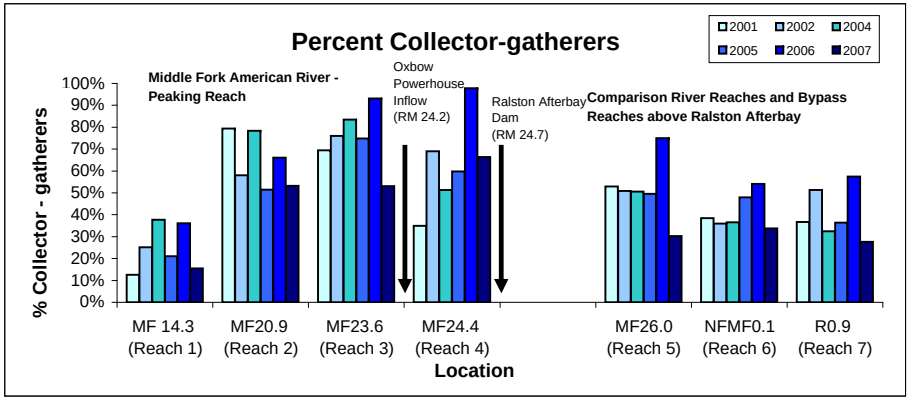
Figure AQ 3-5. Summary Graphs of Macroinvertebrate Metrics from the Ralston Afterbay Sediment Management Project (RASMP) Monitoring Sites, October 2001, 2002, 2004, 2005, 2006, and 2007[1].

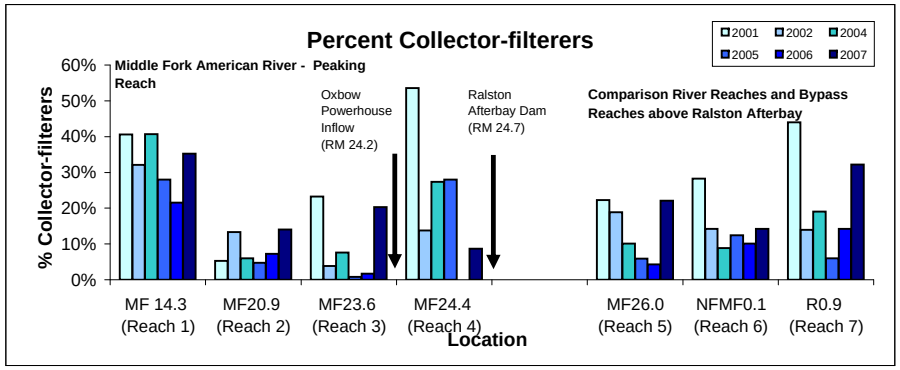


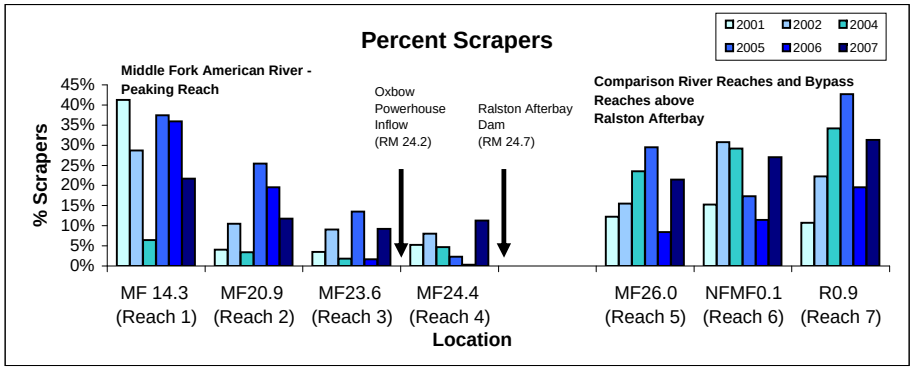
[1] Data prior to 2007 were collected for the Ralston Afterbay Sediment Management Project (PCWA 2007b).

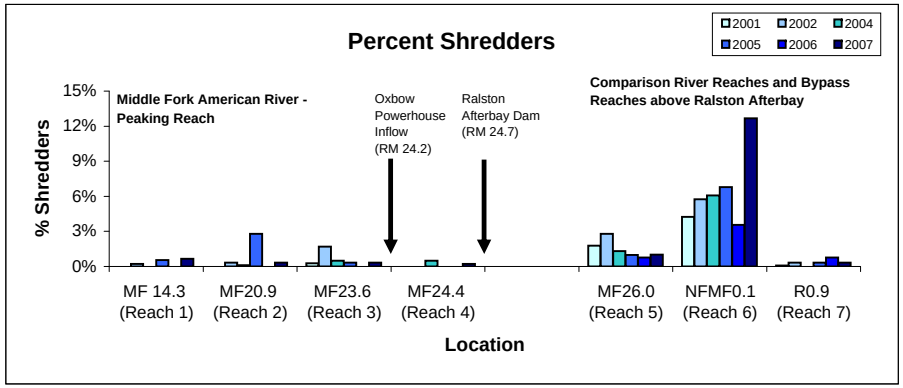
Figure AQ 3-6. Relative Abundance of Functional Feeding Groups in Each Ralston Afterbay Sediment Management Project (RASMP) Monitoring Site Reach in October 2001, 2002, 2004, 2005, 2006, and 2007[1].

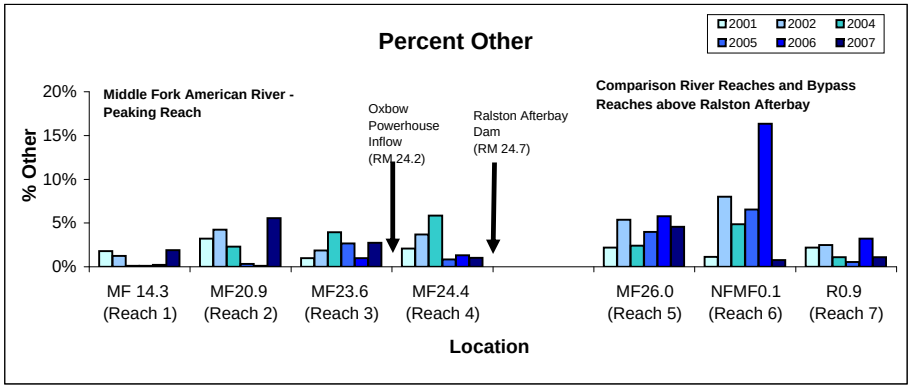






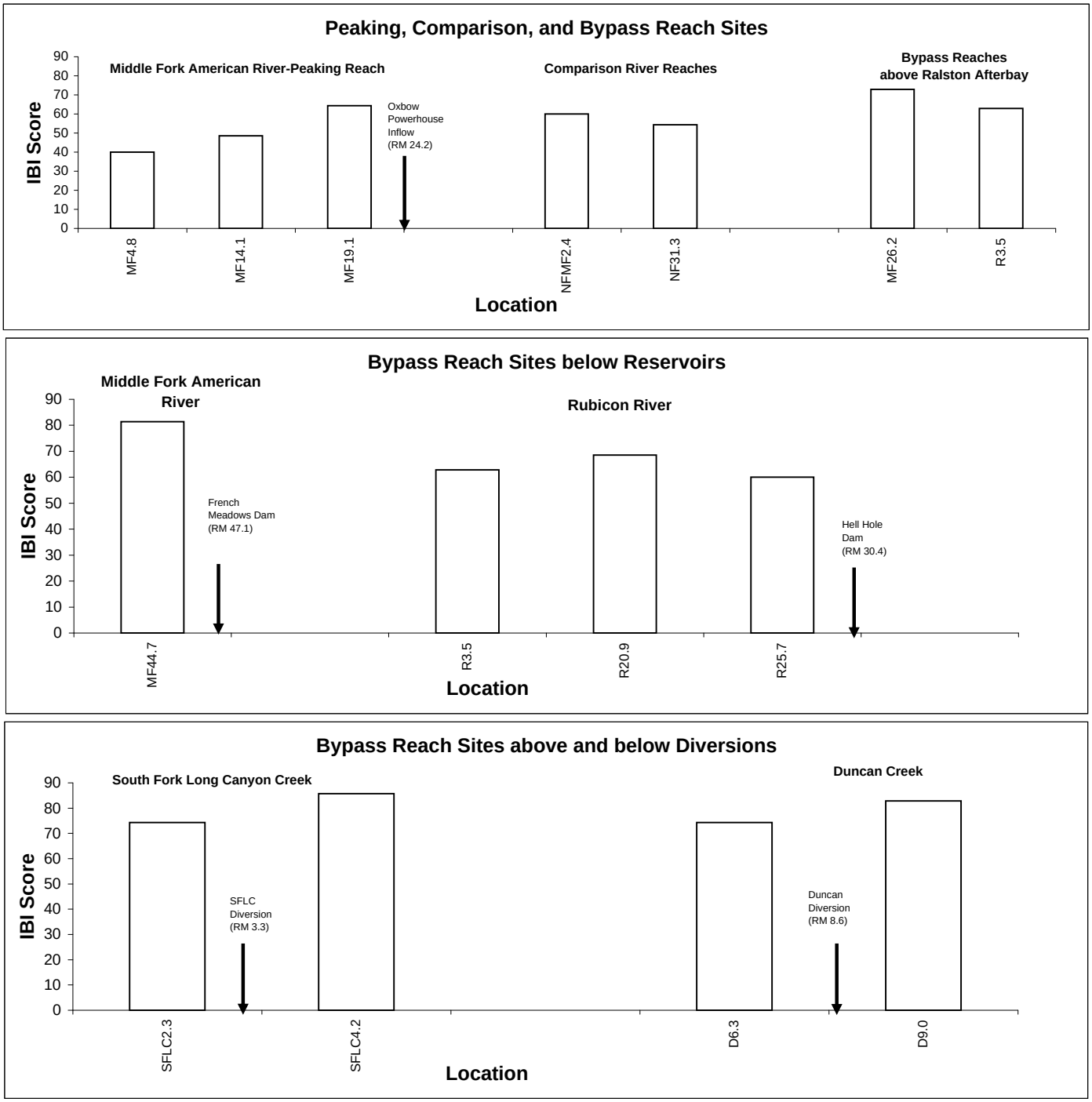






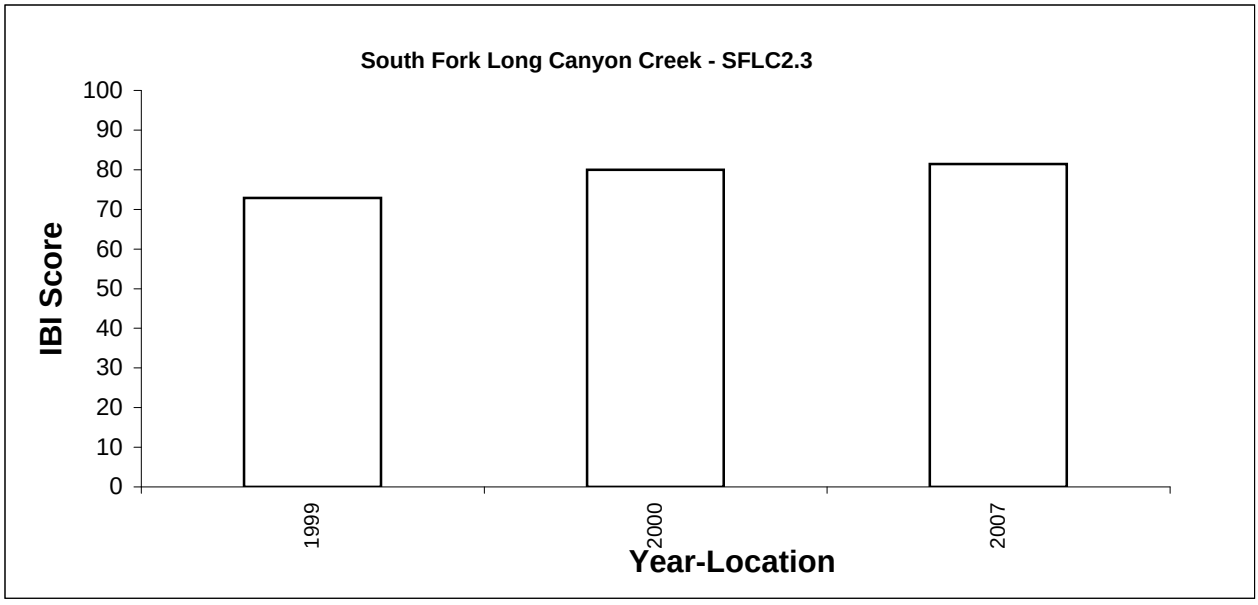
[1]Data prior to 2007 were collected for the Ralston Afterbay Sediment Management Project (PCWA 2007b).

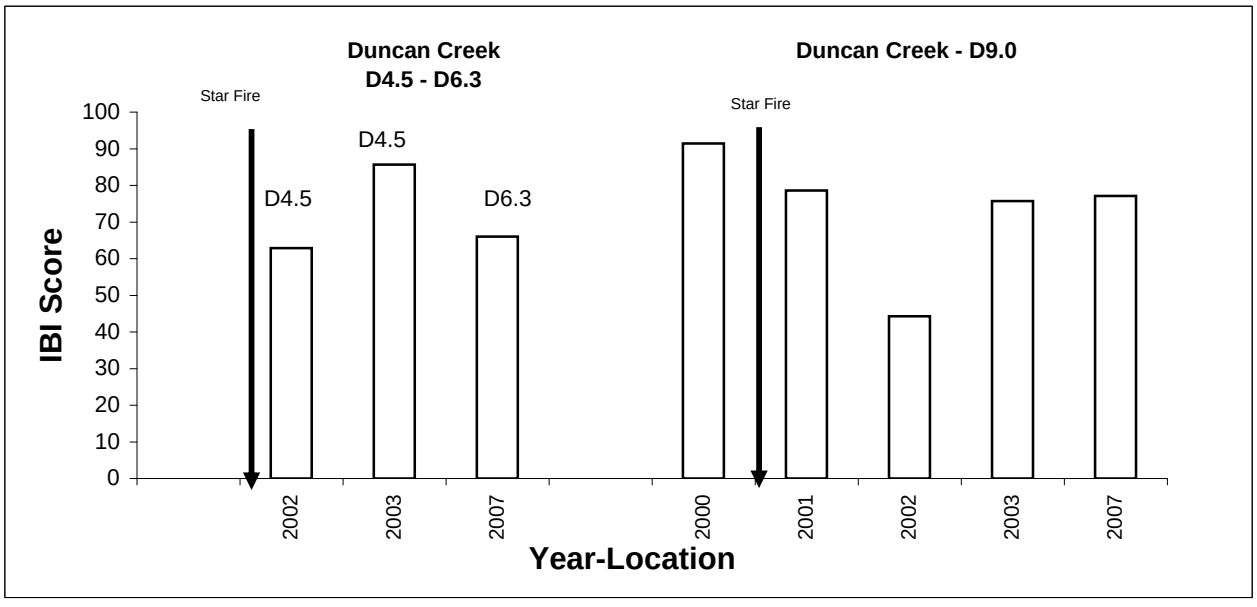
Figure AQ 3-7. Hydropower IBI Scores for 2007 SWAMP Reachwide Benthos (RWB) Sampling Sites in the Peaking, Comparison, and Bypass Reaches, Bypass Reaches below Reservoirs, and above and below Diversions[1].



[1] Hydropower IBI scores were calculated as described in Rehn (2008).

Figure AQ 3-8. Temporal Hydropower IBI Score Trends at the USDA-Forest Service 2007 SWAMP Targeted Riffle Composite (TRC) and California Stream Bioassessment Procedure (CSBP) Macroinvertebrate Monitoring Sites on South Fork Long Canyon Creek[1,3,4] and Duncan Creek[2,3,4].





[1]Eldorado National Forest macroinvertebrate monitoring site.

[2]Tahoe National Forest macroinvertebrate monitoring site.

[3]2007 data were collected by PCWA. Data from previous years were collected by the Forest Service. All samples were analyzed at the USU Bug Lab.

[4]Hydropower IBI scores were calculated as described in Rehn (2008).

MAPS

APPENDIX A

BLM/USU National Aquatic Monitoring Center, Department of Aquatic, Watershed, and Earth Resources (AWER),

Utah State University, Logan Utah (Bug Lab): Sample Processing and Quality Control /Quality Assurance

Sample Processing and Quality Control /Quality Assurance

The general procedures we follow for processing samples are similar to those described by the USGS NAWQA program (Cuffney et al 1993 and Moulton et al 2000). Our procedures were also described in Vinson and Hawkins (1996).

The following is a step-by-step description of how we typically process quantitative benthic macroinvertebrate samples:

1) Pour the preservative from the sample through an appropriate sized 500 micron sieve  into the laboratory waste container. 

2) If the sample contains a lot of sand and gravel you will need to separate the organic matter from these inorganic particles. To do this, pour the entire sample from the sieve into a bucket.  Partially fill the bucket with water. Swirl the bucket so that the organisms and organic matter become suspended in the water column and the heavier sand and gravel fall to the bottom. Carefully decant the water and floating organisms back through a 500 micron sieve.  Continue to add water to the bucket and swirl and decant until no organic matter remains in the bucket. When finished, closely examine the remaining material in the bucket and pick out any caddis flies, snails, clams, or other organisms that remain. Add these organisms to those on your sieve.

3) Keep the sample in the sieve and rinse the sample under the faucet to wash additional fine particles and silt into the sink.

4) Place the sieve in an enamel pan or bucket that is partially filled with water and "float" the sample so that it becomes level within the sieve.  Once leveled, carefully remove the sieve from the enamel pan. Place an appropriately sized separator bar (see photo of sieves with separators above) into the sieve to split the material on in the sieve in half. Make sure it appears that there is an equal amount of sample material in each half.

5) Flip a coin to determine which half of the sample is to be processed; heads = right or top, tails = left or bottom.  Keep the portion of the sample to be processed in the sieve.  Place the other half into a cup using a spoon and/or rinse the material into the cup using an alcohol filled squeeze bottle.  Cover the cup with ParaFilm  and write the portion or split of the sample on the lid, e.g., 50%.

If you judge that you will start with less than 50% of the sample, place the sieve back in the enamel pan and re-float the material to level it. Re-flip the coin and divide this portion in half again. Place the material you are not going to immediately sort through in a different cup, cover with ParaFilm, and label with the split percentage, e.g., 25%.  Repeat this process until it appears that approximately 600 organisms remain in one-half of the sieve. *It is best to start with small splits to assess how many bugs you will find (3.125%, 6.25%)*. The goal is to sort at least 600 organisms from the sample. Once you start a split you must finish it in its entirety. If you start to sort through a split and realize that this split will contain considerably more than 600 organisms, e.g., 1000 or more critters; stop and pour all the material, including the bugs you have already removed from the sample back into a sieve and split it down to a more appropriate percentage.

6) The material to be sorted is placed little-by-little into a petri dish and all organisms within the petri dish are removed under a dissecting microscope at 7x magnification.  The material under the microscope is illuminated by a fiber optic light source.  Petri dishes are divided into sections by lines drawn on the bottom of the dish with a permanent marker. The lines subdivide the

dish so that you can systematically move across the dish.  Move along these "guides" removing all organisms that you encounter. 

7) As you remove the organisms count them using a clicker  and drop them into vials separated by the major taxonomic orders, i.e., Diptera, Coleoptera, Ephemeroptera, Plecoptera, Trichoptera, other insects, and non-insects.  You need to remove all of the organism from the debris, but not all organisms will be counted. Remove, but do not count the following in your 600 minimum count (follow this link for a more in-depth description of NO COUNT organisms):

1. damaged and immature organisms
2. molt skins (exuviae)
3. adult insects [excluding water-dwelling adults such as beetles (Coleoptera) and true bugs (Hemiptera)]
4. eggs
5. empty snail shells
6. brooding juveniles
7. zooplankton
8. Collembola
9. pupae
10. worms

Additional portions of the sample (splits) are sorted until at least 600 organisms are found. Once you start a split, remove all the organisms within it. It is fine if you exceed 700 organisms, but beware of exceeding 1000.

8) When you have removed a minimum of 600 bugs, perform a "Big/Rare" search. This search is called a "Big/Rare" search because we tend to find larger individuals, but the goal is to collect rarer taxa that may not have been present in the split samples. Spread the entire un-sorted portion of the sample into an appropriately sized white enamel pan. Place this pan under the lighted magnifier lamp. Systematically search the pan and remove any organisms that you did not

find in your split samples. Perform this search for 10 minutes. If you are in doubt that a critter is new, it is much better to pick up duplicates than to miss a bug. Put these bugs into a separate vial labeled "B/R" for "Big/Rare". 

9) Print a sheet of labels off our website (http://www1.usu.edu/buglab/process/vials.pdf) onto waterproof paper. The label will contain the following information:

Sample #, Sample Set/Customer name Site name/Station I.D., Date collected County, State Sorter, Date sorted, Total split percent, Total # bugs sorted I.D.er, Date I.D.ed # of each Chironominae, Orthocladinae, Tanypodinae counted	*#3, Wasatch-Cache National Forest* *Wood Camp- Logan River, 12/12/03* *Cache County, UT* *BB, 12/23/03, 25%, 616 bugs* *MT, 01/05/04* *5 C, 12 O, 20 T*

Use waterproof paper and either a waterproof pen or pencil.  Put the label into one of the vials. If you do not know the county, search for it at *http://www.topozone.com/*.

10) Place a smaller label with the sample number (#3, from the example above) in each vial and label the lids of the vials with this same number using a dry erase marker. Label the "Big /Rare" vial "B/R". Put a rubber band around the vials  and put them on the appropriate shelf. 

11) The remaining portions of the sample, the debris that has been sorted, and any unsorted portions of the sample should be returned to the original sample jar and covered with preservative (70% ethanol). Place an "X" on the jar lid to indicate that the sample has been sorted and place it on the  appropriate shelf. 

12) Record your sample sort time, the sample sort dates, and your initials on the sample tracking data sheet in the folder. Download this form.

EQUIPMENT

preservative (70% ethanol) 500 & 250 micron meter sieves (of various diameters) waste container bucket enamel pans (of various sizes) separator bars (that fit each diameter of the sieves) coin plastic spoon and cups alcohol (ethanol) filled squeeze bottle distilled water filled squeeze bottle Parafilm dry erase marker	petri dish (with permanent marker drawn lines) dissecting microscope (7-20x magnification) fiber optic light source clicker/counter tweezers/forceps (both flat and pointed tipped) vial holder (vial sized holes drilled into a wooden block) scintillation vials desk lamp waterproof label paper waterproof pen or sharp tipped pencil rubber bands data recording sheet

All the organisms removed during the sorting process are then identified by qualified taxonomists. We try to identify organisms to a consistent taxonomic level. Small (early instar) and poorly preserved specimens may be identified to a higher level than specified. Insects are normally identified to genus, some to species, and others to family. Non-insects are identified to the lowest taxonomic level feasible without slide-mounting. If you want your samples processed differently than described above, call us at (435) 797-3945.

BUGLAB QUALITY CONTROL/QUALITY ASSURANCE

The processing of aquatic invertebrate samples involves a number of distinct operations where errors to the data may occur. In our laboratory these distinct operations include the following:

I. Sample sorting - The separation and removal of aquatic invertebrates from the entire sample.
II. Invertebrate identification - The identification of each individual invertebrate to the recommended or lowest practical taxonomic level.
III. Data processing - this includes filling out the taxonomic lists, i.e., the bench sheets, by taxonomists, the transcribing of codes to each bench sheet, the entry of the data into a computer data base, the matching of samples to sampling locations, and any subsequent analysis or transformations of the data.

Described below are the ways in which we attempt to reduce these potential errors and control for differences in taxonomic consistency among laboratory personnel.

I. Sample sorting

Sorting aquatic invertebrate samples involves removing aquatic macroinvertebrates from the organic and inorganic material within each sample. Error can occur if the sample is not split correctly and if all the organisms are not removed from a sample split. To reduce error associated with subsampling procedures we use a relatively easy subsampling method, record all information associated with each sample, and review this information on a weekly basis. The information recorded for each sample includes who sorted each sample, the date the sample was sorted, the time required to sort the sample, the number of invertebrates removed from the sample, and the percent of the sample that was sorted. Any abnormalities are assessed and corrected.

To ensure that all organisms are removed from sample splits, all sorting is done using a binocular microscope at 7x magnification. We intensively train all new employees and check all of their samples for the first month. Spot checks are then done on individual employees if there appears to be any consistent abnormalities in their samples. Abnormalities typically include distinct differences in sample characteristics between one technician and other technicians working on the same set of samples. These differences include differences in the percent of the sample sorted, the time required to sort a sample, or the number of invertebrates removed during the sample splitting or the big-rare search.

Individuals invertebrates left on a sieve from a previous sample can also be a source of error. We try to prevent this from happening by carefully washing the sieves after a sample is split, by inspecting each sieve prior to putting a new sample into it, drying the sieves following their use, and by noticing if any invertebrates in a sample appear to look "dried out" with respect to other invertebrates in that sample. These desiccated invertebrates may have been leftover from a previous sample, i.e., they were not removed from the sieve during a previous subsampling event and were inadvertently added to a different sample. These invertebrates are removed from the current sample and discarded as there is no way of determining which sample they were supposed to belong to.

II. Verification of taxonomic identifications

The BugLab attempts to reduce the number of misidentifications and improve the consistency in taxonomic resolution among taxonomists through a number of conscientious efforts. These efforts include:

1. Conducting in-house workshops and participating in outside taxonomic seminars. Periodically, typically 3-4 times a year, we visit with other regional taxonomists , e.g., Dr. George Edmunds, Dr. Dick Baumann, Dr. Jane Brim-Box, and Dr. Riley Nelson, to share specimens and discuss relevant taxonomic issues. We also

bring questionable taxa to the Taxonomy Fair held at annual meetings of the North American Benthological Society. BugLab taxonomists also attend regional taxonomic seminars as offered by the Northwest Bioassessment Work Group.

2. Insisting on constant and consistent communication among all taxonomists and dealing with any questionable taxa on the spot. Questionable specimens are immediately shared with all other taxonomists and compared to voucher specimens from our laboratory and the Utah State University insect collection. If consensus cannot be reached among our taxonomists, the specimens are shown to Dr. Wilford Hanson or Dr. Charles Hawkins, both eminent professional entomologists at Utah State University. If consensus is still not reached, the taxonomic resolution is backed off (e.g., genus to family) and the specimen is set aside to be shown to an outside expert.

3. Each bench sheet is reviewed by the taxonomist a few days to a week after they finished that sample and prior to the data being entered into the computer. This procedure is done to re-evaluate each sample in light of information the taxonomists may have gained by identifying other samples from that set, while the information from a particular sample is still fresh in their mind. Problems identified during this procedure typically include incomplete bench sheets (e.g., counts or life stage not written in) and taxonomic resolution inconsistencies among samples. For example, the taxa identified in other samples from the same area and collected at different times of the year may allow for higher taxonomic resolution of other samples from the same sample set. Any questionable or incomplete information is corrected at this time.

4. After a set of samples has been completed the lab's QA/QC officer reviews each bench sheet for completeness and any abnormalities. This is a further attempt to improve the consistency among samples.

5. After the data has been entered into the computer all taxonomists review a composite taxa list for each set of samples. Three taxonomists and the lab director currently review a list of all taxa found in each sample set. They review this list for:
   a. taxonomic consistency, e.g., all monotypic taxa identified to species, and,
   b. rare taxa and any unusual taxa for the habitats sampled or geographical location sampled.

   These taxa are then reidentified. This procedure has improved the consistency of identifications and helped in reducing misidentifications and data entry errors.

6. We maintain a large reference collection. Our voucher collection contains over 2000 specimens. The identification of most of these specimens has been verified by outside professional taxonomists. All new taxonomists are required to identify each of these specimens. The identification of any new taxon for our laboratory is currently verified by outside taxonomists and compared to known distribution records.

III. Data processing and sample verification

Data processing involves entering the data from the bench sheets and the sample information data sheets into a dBASE IV program. Bench sheet information includes the unique code for each invertebrate taxon, the life stage, the split count, the count from the big-rare search, and any notes. Once entered, the computer program then displays the taxonomic name for each code, the life stage, enumerations, and taxonomic notes. These data are then verified or corrected before the data are uploaded to the main data base. Once all the data from a set of samples have been entered into the computer a composite taxa list and the counts for each taxon is printed and reviewed for accuracy and consistency as described above.

Sample verification is the process of making sure that the taxonomic lists produced for each sample get assigned to the correct sampling location. When working with large numbers of samples and individual projects that may exceed 500 samples that were collected over a several month period by several crews, this issue becomes more complex than one might imagine. Our procedure for dealing with this issue is to assign each sample a sequential identification code. These codes are unique for each sample and sample jar and correspond to a list of samples, sampling dates, and locations. This number is retained throughout the life of the sample and is stored in hand-written and electronic formats.

IV. Summary

Our professional laboratory staff members have 5-11 years experience tracking, processing, and identifying aquatic macroinvertebrate samples. Our data entry person has been at the job for 5 years. In spite of all of this collective experience, not a week goes by that we do not seem to learn something new or think about new ways we can improve the quality or consistency in the way we process aquatic invertebrate samples. QA/QC is a dynamic process and constructive comments are always welcome.

We recently completed a comprehensive QA/QC evaluation of all of our field and laboratory procedures. The good news was that we found little bias or variation in several measures of accuracy and precision among different field crews, sample sorters, taxonomists, and the same taxonomist identifying the same sample several times over a several month period. We hope to have a complete write-up of this evaluation available on our web site within a few months. At that time, we will also submit this work for peer-review and publication.

APPENDIX B

SWAMP Stream Habitat Characterizations

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Introduction

SWAMP stream habitat characteristics and site photographs for benthic macroinvertebrate (BMI) study sites on the peaking, bypass, and comparison reaches are summarized below. For each study site, site location information is also provided. The study sites in the Middle Fork American River peaking reach are described first. The study sites on the bypass reaches, including the Middle Fork American River, Rubicon River, South Fork Long Canyon Creek, and Duncan Creek, are then described. Last, the comparison stream study sites upstream of the diversions on the South Fork Long Canyon Creek and Duncan Creek, the North Fork of the Middle Fork American River, and North Fork American River are described.

Middle Fork American River Downstream of Ralston Afterbay

BMI MF4.8 (Peaking Reach)

Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4309963	673705	643	19.9	250	11	19	2

[1] NAD 93, location of most downstream transect.

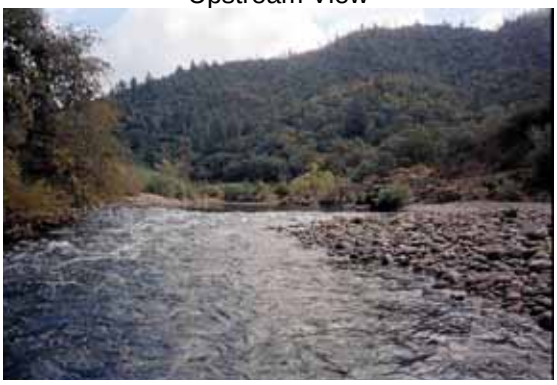
SWAMP Stream Habitat Characterization Photographs

Downstream View



Transect A

Upstream View



Transect A



Transect F



Transect F



Transect K



Transect K

Middle Fork American River Downstream of Ralston Afterbay
BMI MF4.8 (Peaking Reach)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics

Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
250	21.2	0.7	1.0%	161 (USGS 11433300)

Water Quality

Temperature ^{o}C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
15.6	7.1	--[1]	8.7	60	0.03

Habitat Quality

Epifaunal Substrate/Cover[2]	**Sediment Deposition**[3]	**Channel Alteration**[4]	**Canopy Cover**
14	15	14	0.0%

Substrate Types

Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
0.0%	6.7%	2.2%	16.7%	46.7%	13.3%	7.8%	6.7%	0.0%	0.0%	0.0%	0.0%	0.0%

Habitat Percentages

Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
0.0%	4.0%	29.0%	16.0%	0.0%	51.0%	0.0%

Notable Field Conditions

Rainfall	**Fire**	**Landcover**
Minimal	None	Forest

[1] Data not available.

[2] Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[3] Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[4] Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

Middle Fork American River Downstream of Ralston Afterbay

BMI MF14.1 (Peaking Reach)

Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4314029	685576	797	10.6	250	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs

Downstream View



Transect A



Transect F



Transect K

Upstream View

Photograph Not Available

Transect A



Transect F



Transect K

Middle Fork American River Downstream of Ralston Afterbay
BMI MF14.1 (Peaking Reach)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics

Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
250	26.1	0.6	0.6%	217 (USGS 11433300)

Water Quality

Temperature °C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
14.0	7.6	--[1]	9.5	63	0.03

Habitat Quality

Epifaunal Substrate/Cover[2]	**Sediment Deposition**[3]	**Channel Alteration**[4]	**Canopy Cover**
12	11	15	0.0%

Substrate Types

Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
0.0%	26.9%	1.0%	13.5%	34.6%	9.6%	1.0%	11.5%	1.0%	0.0%	0.0%	0.0%	1.0%

Habitat Percentages

Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
0.0%	13.0%	9.0%	65.0%	0.0%	13.0%	0.0%

Notable Field Conditions

Rainfall	**Fire**	**Landcover**
Minimal	None	Forest

[1] Data not available.

[2] Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[3] Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[4] Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

Middle Fork American River Downstream of Ralston Afterbay

BMI MF19.1 (Peaking Reach)

Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4319006	689366	888	5.6	250	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs

Downstream View



Transect A



Transect F



Transect K

Upstream View



Transect A



Transect F



Transect K

Middle Fork American River Downstream of Ralston Afterbay

BMI MF19.1 (Peaking Reach)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics

Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
250	22.8	0.5	1.1%	188 (USGS 11433300)

Water Quality

Temperature °C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
14.3	--[1]	10.7	9.6	62	0.03

Habitat Quality

Epifaunal Substrate/Cover[2]	**Sediment Deposition**[3]	**Channel Alteration**[4]	**Canopy Cover**
12	14	16	0.0%

Substrate Types

Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
0.0%	12.4%	1.0%	26.7%	38.1%	15.2%	0.0%	6.7%	0.0%	0.0%	0.0%	0.0%	0.0%

Habitat Percentages

Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
0.0%	0.0%	26.0%	48.0%	0.0%	26.0%	0.0%

Notable Field Conditions

Rainfall	**Fire**	**Landcover**
Minimal	None	Forest

Human Influence

At 6 of 14 transects there was evidence of mining and an unpaved road less than 50 meters away. Additionally there were three other transects within 50 meters of the road.

[1] Data not available.

[2] Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[3] Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[4] Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

Middle Fork American River from Middle Fork Interbay to Ralston Afterbay

BMI MF26.2 (Bypass Reach)

Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4320138	696339	1188	9.4	250	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs[2]

Representative Habitat Photographs



Representative Habitat Photographs











[2] Representative habitat photographs of the SWAMP study sites were taken for other 2007 PCWA studies that were also conducted at the study site.

Middle Fork American River from Middle Fork Interbay to Ralston Afterbay
BMI MF26.2 (Bypass Reach)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics

Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
250	14.9	0.4	2.0%	17 (USGS 11427760)

Water Quality

Temperature °C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
14.0	--[1]	--[1]	--[1]	--[1]	--[1]

Habitat Quality

Epifaunal Substrate/Cover[2]	**Sediment Deposition**[3]	**Channel Alteration**[4]	**Canopy Cover**
17	18	17	0.0%

Substrate Types

Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
2.9%	3.8%	17.3%	27.9%	26.9%	9.6%	9.6%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%

Habitat Percentages

Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
2.0%	0.0%	20.0%	60.0%	0.0%	18.0%	0.0%

Notable Field Conditions

Rainfall	**Fire**	**Landcover**
Minimal	<1 year	Forest

[1] Data not available.

[2] Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[3] Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[4] Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

Middle Fork American River Upstream of Middle Fork Interbay

BMI MF44.7 (Bypass Reach)

Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4330122	716712	4505	2.5	150	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs

Downstream View



Transect A



Transect F



Transect K

Upstream View



Transect A



Transect F



Transect K

Middle Fork American River Upstream of Middle Fork Interbay
BMI MF44.7 (Bypass Reach)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics

Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
150	9.0	0.3	4.1%	9.3 (USGS 11427500)

Water Quality

Temperature ^{o}C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
13.2	7.5	16	11.3	30	0

Habitat Quality

Epifaunal Substrate/Cover[1]	**Sediment Deposition**[2]	**Channel Alteration**[3]	**Canopy Cover**
19	19	20	0.0%

Substrate Types

Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
21.9%	1.0%	15.2%	13.3%	31.4%	8.6%	2.9%	2.9%	1.9%	0.0%	1.0%	0.0%	0.0%

Habitat Percentages

Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
12.0%	0.0%	12.0%	35.0%	0.0%	41.0%	0.0%

Notable Field Conditions

Rainfall	**Fire**	**Landcover**
None	None	Forest

[1]Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[2]Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[3]Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

Rubicon River

BMI R3.5 (Bypass Reach)

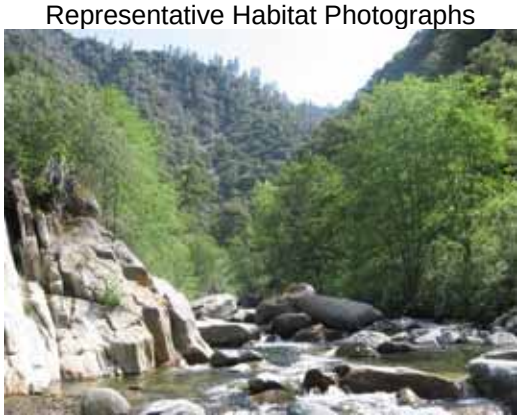
Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4317545	699586	1325	27.0	250	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs[2]

Representative Habitat Photographs



Representative Habitat Photographs











[2] Representative habitat photographs of the SWAMP study sites were taken for other 2007 PCWA studies that were also conducted at the study site.

Rubicon River
BMI R3.5 (Bypass Reach)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics				
Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
250	17.4	0.6	1.9%	61 (PF-3)

Water Quality					
Temperature ^{o}C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
11.0	7.2	0.9	9.6	49	0.02

Habitat Quality			
Epifaunal Substrate/Cover[1]	**Sediment Deposition**[2]	**Channel Alteration**[3]	**Canopy Cover**
15	18	19	0.0%

Substrate Types												
Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
13.9%	0.0%	4.0%	20.8%	45.5%	9.9%	1.0%	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Habitat Percentages						
Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
0.0%	0.0%	34.0%	40.0%	7.0%	19.0%	0.0%

Notable Field Conditions		
Rainfall	**Fire**	**Landcover**
Minimal	None	Forest

[1]Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[2]Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[3]Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

Rubicon River

BMI R20.9 (Bypass Reach)

Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4315352	718057	3350	9.6	250	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs

Downstream View



Transect A



Transect F



Transect K

Upstream View



Transect A



Transect F



Transect K

Rubicon River
BMI R20.9 (Bypass Reach)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics

Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
250	13.8	0.7	1.9%	38 (PF-6)

Water Quality

Temperature ^{o}C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
12.5	8.2	0	10.4	47	0.02

Habitat Quality

Epifaunal Substrate/Cover[1]	**Sediment Deposition**[2]	**Channel Alteration**[3]	**Canopy Cover**
17	18	19	0.0%

Substrate Types

Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
15.2%	0.0%	16.2%	16.2%	28.6%	8.6%	12.4%	1.9%	1.0%	0.0%	0.0%	0.0%	0.0%

Habitat Percentages

Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
9.0%	0.0%	16.0%	34.0%	0.0%	41.0%	0.0%

Notable Field Conditions

Rainfall	**Fire**	**Landcover**
None	None	Forest

[1]Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[2]Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[3]Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

Rubicon River

BMI R25.7 (Bypass Reach)

Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4320070	720865	3927	4.8	250	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs

Downstream View



Transect A

Upstream View



Transect A



Transect G



Transect G



Transect K



Transect K

Rubicon River
BMI R25.7 (Bypass Reach)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics

Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
250	13.4	0.3	0.9%	20.3 (Calculated)

Water Quality

Temperature °C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
11.5	--[1]	--[1]	--[1]	24	--[1]

Habitat Quality

Epifaunal Substrate/Cover[2]	**Sediment Deposition**[3]	**Channel Alteration**[4]	**Canopy Cover**
18	17	19	0.0%

Substrate Types

Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
0.0%	0.0%	8.6%	30.5%	41.9%	10.5%	2.9%	3.8%	1.9%	0.0%	0.0%	0.0%	0.0%

Habitat Percentages

Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
0.0%	0.0%	34.0%	47.0%	0.0%	19.0%	0.0%

Notable Field Conditions

Rainfall	**Fire**	**Landcover**
Minimal	None	Forest

[1] Data not available.

[2] Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[3] Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[4] Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

South Fork Long Canyon Creek

BMI SFLC2.3 (Bypass Reach)

Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4324189	717924	4514	1.0	150	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs

Downstream View



Transect A



Transect F



Transect K

Upstream View



Transect A



Transect F



Transect K

South Fork Long Canyon Creek
BMI SFLC2.3 (Bypass Reach)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics

Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
150	4.8	0.1	1.9%	0.1 (Calculated)

Water Quality

Temperature ^{o}C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
15.6	7.0	2.1	9.7	40	0.02

Habitat Quality

Epifaunal Substrate/Cover[1]	**Sediment Deposition**[2]	**Channel Alteration**[3]	**Canopy Cover**
--[4]	--[4]	--[4]	53.3%

Substrate Types

Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
1.9%	1.9%	4.8%	11.4%	41.9%	28.6%	2.9%	3.8%	1.9%	0.0%	1.0%	0.0%	0.0%

Habitat Percentages

Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
0.0%	0.0%	35.0%	29.0%	0.0%	36.0%	0.0%

Notable Field Conditions

Rainfall	**Fire**	**Landcover**
None	None	Forest

Human Influence

At 10 of 14 transects there have been logging operations less than 50 meters away.

[1] Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[2] Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[3] Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

[4] Data not available.

South Fork Long Canyon Creek

BMI SFLC4.2 (Comparison Reach above South Fork Long Canyon Diversion)

Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4326841	720563	4820	No Upstream Diversion	150	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs

Downstream View



Transect A



Transect F



Transect K

Upstream View



Transect A



Transect F



Transect K

South Fork Long Canyon Creek

BMI SFLC4.2 (Comparison Reach above South Fork Long Canyon Diversion)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics

Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
150	6.6	0.1	3.6%	0.1 (Calculated)

Water Quality

Temperature ^{o}C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
12.7	6.9	34.8[1]	9.0	50	0.03

Habitat Quality

Epifaunal Substrate/Cover[2]	**Sediment Deposition**[3]	**Channel Alteration**[4]	**Canopy Cover**
17	19	19	--[5]

Substrate Types

Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
0.0%	0.0%	4.8%	18.3%	45.2%	21.2%	7.7%	1.0%	1.9%	0.0%	0.0%	0.0%	0.0%

Habitat Percentages

Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
0.0%	0.0%	44.0%	12.0%	0.0%	44.0%	0.0%

Notable Field Conditions

Rainfall	**Fire**	**Landcover**
None	None	Forest

[1] Equipment Malfunction

[2] Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[3] Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[4] Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

[5] Data not available.

Duncan Creek

BMI D6.3 (Bypass Reach)

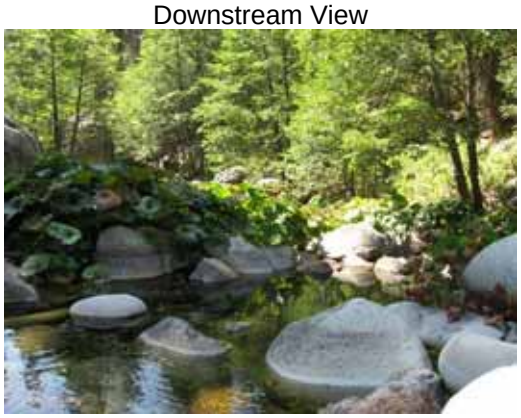
Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4332118	715494	4787	2.3	150	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs

Downstream View



Transect A



Transect F



Transect K

Upstream View



Transect A



Transect F



Transect K

Duncan Creek
BMI D6.3 (Bypass Reach)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics

Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
150	8.1	0.2	3.5%	0.6 (Calculated)

Water Quality

Temperature ^{o}C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
17.5	7.3	1.3	8.7	50	0.03

Habitat Quality

Epifaunal Substrate/Cover[1]	**Sediment Deposition**[2]	**Channel Alteration**[3]	**Canopy Cover**
18	19	20	--[4]

Substrate Types

Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
5.7%	1.9%	10.5%	28.6%	29.5%	18.1%	2.9%	0.0%	1.9%	0.0%	1.0%	0.0%	0.0%

Habitat Percentages

Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
4.0%	3.0%	26.0%	16.0%	0.0%	50.0%	1.0%

Notable Field Conditions

Rainfall	**Fire**	**Landcover**
None	None	Forest

[1]Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[2]Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[3]Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

[4]Data not available.

Duncan Creek

BMI D9.0 (Comparison Reach above Duncan Diversion)

Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4335217	718193	5338	No Upstream Diversion	150	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs

Downstream View



Transect A



Transect F



Transect K

Upstream View



Transect A



Transect F



Transect K

Duncan Creek

BMI D9.0 (Comparison Reach above Duncan Diversion)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics				
Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
150	6.0	0.2	3.1%	0.4 (Calculated)

Water Quality					
Temperature ^{o}C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
16.7	7.4	2.4	8.4	67	0.03

Habitat Quality			
Epifaunal Substrate/Cover[1]	**Sediment Deposition**[2]	**Channel Alteration**[3]	**Canopy Cover**
16	17	20	16.8%

Substrate Types												
Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
22.9%	8.6%	9.5%	13.3%	23.8%	9.5%	12.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Habitat Percentages						
Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
4.0%	1.0%	17.0%	20.0%	0.0%	58.0%	0.0%

Notable Field Conditions		
Rainfall	**Fire**	**Landcover**
None	None	Forest

[1]Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[2]Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[3]Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

North Fork of the Middle Fork American River

BMI NFMF2.3 (Comparison Reach)

Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4321782	697275	1263	No Upstream Diversion	250	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs[2]

Representative Habitat Photographs



Representative Habitat Photographs











[2] Representative habitat photographs of the SWAMP study sites were taken for other 2007 PCWA studies that were also conducted at the study site.

North Fork of the Middle Fork American River
BMI NFMF2.3 (Comparison Reach)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics

Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
250	15.2	0.6	2.5%	--[1] (PF-1)

Water Quality

Temperature °C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
12.0	7.7	0.4	9.2	76	0.04

Habitat Quality

Epifaunal Substrate/Cover[2]	**Sediment Deposition**[3]	**Channel Alteration**[4]	**Canopy Cover**
18	15	15	0.0%

Substrate Types

Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
2.9%	7.6%	15.2%	27.6%	20.0%	13.3%	8.6%	3.8%	0.0%	0.0%	1.0%	0.0%	0.0%

Habitat Percentages

Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
2.0%	0.0%	20.0%	62.0%	0.0%	16.0%	0.0%

Notable Field Conditions

Rainfall	**Fire**	**Landcover**
None	None	Forest

Human Influence

Mining operations are common in this area, evidence of mining was apparent at 9 of 14 transects.

[1] Data not available.

[2] Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[3] Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[4] Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

North Fork American River

BMI NF31.3 (Comparison Reach)

Site Location Information

GPS (UTM)[1]		Elevation (ft)	Distance from Closest Upstream Diversion (miles)	Site Length (m)	Number of Transects	Number of Samplings	Number of Samples
Northing	Easting						
4319167	678607	781	No Upstream Diversion	250	11	19	2

[1] NAD 93, location of most downstream transect.

SWAMP Stream Habitat Characterization Photographs

Downstream View



Transect A



Transect F



Transect K

Upstream View



Transect A



Transect F



Transect K

North Fork American River
BMI NF31.3 (Comparison Reach)

Summary of SWAMP Habitat Data

Physical Habitat Characteristics

Reach Length m.	**Average Channel Width** m.	**Average Depth** m.	**Slope**	**Discharge** cfs. (Source)
250	19.8	0.6	1.1%	45 (USGS 11427000)

Water Quality

Temperature ^{o}C	**pH**	**Turbidity** ntu.	**Dissolved Oxygen** mg/L	**Specific Conductivity** µS/cm	**Salinity** mg/L
15.8	8.4	3	9.6	140	0.07

Habitat Quality

Epifaunal Substrate/Cover[1]	**Sediment Deposition**[2]	**Channel Alteration**[3]	**Canopy Cover**
18	19	20	1.5%

Substrate Types

Bedrock, Smooth	Bedrock, Rough	Boulder, Large	Boulder, Small	Cobble	Gravel, Coarse	Gravel, Fine	Sand	Fines	Hardpan (Consolidated Fines)	Wood	Concrete/ Asphalt	Other
0.0%	5.7%	2.9%	15.2%	53.3%	18.1%	0.0%	4.8%	0.0%	0.0%	0.0%	0.0%	0.0%

Habitat Percentages

Cascade	**Rapid**	**Riffle**	**Run**	**Glide**	**Pool**	**Dry**
0.0%	8.0%	24.0%	68.0%	0.0%	0.0%	0.0%

Notable Field Conditions

Rainfall	**Fire**	**Landcover**
Minimal	None	Forest

[1]Epifaunal Substrate/Cover Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the favorability of a site for epifaunal colonization and the level of fish cover.

[2]Sediment Deposition Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious sediment deposition in a site.

[3]Channel Alteration Score = A score from 0 to 20, 0 being of poor quality and 20 being of optimal quality, ranking the level of deleterious channel alteration in a site.

APPENDIX C

SWAMP Datasheets

Directory of SWAMP Datasheets.

Study Site	File Name
Middle Fork American River Downstream of Ralston Afterbay	
BMI MF4.8 (Peaking Reach)	SWAMP MF4.8
BMI MF14.1 (Peaking Reach)	SWAMP MF14.1
BMI MF19.1 (Peaking Reach	SWAMP MF19.1
Middle Fork American River from Middle Fork Interbay to Ralston Afterbay	
BMI MF26.2 (Bypass Reach)	SWAMP MF26.2
Middle Fork American River Upstream of Middle Fork Interbay	
BMI MF44.7 (Bypass Reach)	SWAMP MF44.7
Rubicon River	
BMI R3.5 (Bypass Reach)	SWAMP R3.5
BMI R20.9 (Bypass Reach)	SWAMP R20.9
BMI R25.7 (Bypass Reach)	SWAMP R25.7
South Fork Long Canyon Creek	
BMI SFLC2.3 (Bypass Reach)	SWAMP SFLC2.3
BMI SFLC4.2 (Comparison Reach above SFLC Diversion)	SWAMP SFLC4.2
Duncan Creek	
BMI D6.3 (Bypass Reach)	SWAMP D6.3
BMI D9.0 (Comparison Reach above Duncan Diversion)	SWAMP D9.0
North Fork of the Middle Fork American River	
BMI NFMF2.3 (Comparison Reach)	SWAMP NFMF2.3
North Fork American River	
BMI NF31.3 (Comparison Reach)	SWAMP NF31.3

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA	Date: 10-10-2007	Time: 10:20
Stream Name: Middle Fork American River	Site Name/ Description: MFAR @ Mammoth Bar	
Site Code: MF4.8	Crew Members: PG, TDG	
Latitude: °N 38.921400	datum: ~~NAD83~~	
Longitude: °W 120.996280	other:	

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	15.6	pH	7.14	Alkalinity (mg/L)	—	Turbidity (ntu, *optional*)	—
Dissolved O_2 (mg/L)	8.7	Specific Cond. (µS)	60	Salinity (mg/L)	0.03	Dissolved Silica (*optional*)	—

REACH LENGTH
(see reach length guidelines at top of form)

Actual Length (m)	250
Explanation:	

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

Transect Width:

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1				11			
2	Gage Discharge			12			
3		0		13			
4	Gage 11433300			14			
5				15			
6	Discharge 161 cfs			16			
7		0		17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO		minimal	X	>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO	X	< 1 year		< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest	X	Rangeland	
	Urban/ Industrial		Suburb/Town		Other	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: MF-4.8 Date: 10/10/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm ☐ % ☒	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		1%	25	210°						
I		3%	25	220°						
H		1%	25	220°						
G		1%	25	220°						
F		0%	25	250°						
E		0%	25	250°						
D		0%	25	260°						
C		0%	25	270°						
B		1%	25	280°						
A		3%	25	250°						
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive: embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

Site Code: MF4.8	Site Name: MFAR @ Mammoth Bar	Date: 10/12/2007
Wetted Width (m): 15m	Bankfull Width (m): 55m	Bankfull Height (cm): 137

Transect A

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P A	
Left Center	375	52	CB	P A	50
Center	750	58	CB	P A	40
Right Center	1125	19.5	SB	P A	
Right Bank	1400	0	SA	P A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

	eroded	vulnerable	stable
Left Bank		vulnerable	
Right Bank		vulnerable	

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y N	0	B	C	P
Buildings	P	C	B	0	Y N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y N	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y N	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y N	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings - <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m): 11.2

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	40
Riffle	20
Run	40
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	6	GC	P A	
Left Center	280	40	CB	P A	30
Center	560	52	CB	P A	40
Right Center	840	205	CB	P A	40
Right Bank	1120	0	GC	P A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) ☑ 25A

Upstream (**optional**) ☐ 24A

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF4.8	Site Name: MFAR @ Mammoth Bar	Date: 10/10/2007
Wetted Width (m): 20.8	Bankfull Width (m): 52.5	Bankfull Height (cm): 106.5

Transect B

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P A	
Left Center	520	9	CB	P A	30
Center	1040	45.5	CB	P A	50
Right Center	1560	18.5	CB	P A	10
Right Bank	2080	3	CB	P A	60

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	0 B C P
Buildings	P C B 0	Y N	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y N	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y N	0 B C P
Landfill/ Trash	P C B 0	Y N	0 B C P
Park/ Lawn	P C B 0		0 B C P
Row Crops	P C B 0		0 B C P
Pasture/ Range	P C B 0		0 B C P
Logging Operations	P C B 0		0 B C P
Mining Activity	P C B 0	Y N	0 B C P
Vegetation Management	P C B 0		0 B C P
Bridges/ Abutments	P C B 0	Y N	0 B C P
Orchards/ Vineyards	P C B 0		0 B C P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 26.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	40
Run	
Glide	
Pool	60
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	6	0	SA	P A	
Left Center	650	55	GC	P A	
Center	1300	67	CB	P A	
Right Center	1950	58	CB	P A	
Right Bank	2600	3	GF	P A	

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF418	Site Name: NFAR @ Memorial Bar	Date: 10/10/2007
Wetted Width (m): 29.8	Bankfull Width (m): 51	Bankfull Height (cm): 116

Transect C

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	(P) A	
Left Center	745	113	CB	P (A)	30
Center	1490	125	CB	(P) A	30
Right Center	2235	106.5	SB	(P) A	
Right Bank	2980	0	GC	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 (2) 3 4
Herbs/ grasses	(0) 1 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	(0) 1 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 30.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	100
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	P (A)	
Left Center	750	Too Deep		P A	
Center	1500	Too Deep		P A	
Right Center	2250	137	GF	P (A)	
Right Bank	3000	0	GF	P (A)	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF4.8	Site Name: MFAR @ Mammoth Bar	Date: 10/10/2002
Wetted Width (m): 27.6	Bankfull Width (m): 35	Bankfull Height (cm): 186

Transect D

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	(P) A	
Left Center	Too Deep			P A	
Center				P A	
Right Center				P A	
Right Bank	2760	0	RR	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 1 (2) 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 27.5

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	100
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GL	P (A)	
Left Center	687.5	Too Deep		P A	
Center	1375	Too Deep		P A	
Right Center	2062.5	30.5	XB	P (A)	
Right Bank	2750	0	SA	P (A)	

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF4.8	Site Name: MFAR Mammoth Bar	Date: 10/10/2002
Wetted Width (m): 29.0	Bankfull Width (m): 32.0	Bankfull Height (cm): 167.5

Transect E

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P (A)	
Left Center	725	Too	Deep	P A	
Center	1450	—	—	P A	
Right Center	2175	137.	RR	P (A)	
Right Bank	2900	0	RR	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 21.5

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	100
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	580	Too	Deep	P A	
Center	1075	Too	Deep	P A	
Right Center	1595	167.5	BR	P (A)	
Right Bank	2150	0	RR	P (A)	

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF4.8	Site Name: MFAR @ Mammoth Bar	Date: 10/10/2007
Wetted Width (m): 16.8	Bankfull Width (m): 36.5	Bankfull Height (cm): 167.5

Transect F

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	420	Too Deep		P A	
Center	840			P A	
Right Center	1260			P A	
Right Bank	1650	0	RR	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 23.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	100
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	525	104.5	CB	P (A)	40
Center	1150	Too Deep		P A	
Right Center	1725	122	CB	P (A)	60
Right Bank	2300	0	RR	P (A)	

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) ☑
23 A

Upstream (**required**) ☑
22 A

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF 4.8	Site Name: MFAR @ Mammoth Bar	Date: 10/10/2007
Wetted Width (m): 20.5	Bankfull Width (m): 32.5	Bankfull Height (cm): 172

Transect G

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	(P) A	
Left Center	512.5	64	CB	P (A)	20
Center	1025	134	SB	P (A)	
Right Center	1537.5	80	CB	P (A)	40
Right Bank	2050	0	CB	P (A)	10

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 16.5

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	90
Glide	
Pool	10
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	20
Left Center	410.5	79	CB	P (A)	40
Center	820.5	79	CB	P (A)	40
Right Center	1237.5	67	CB	P (A)	50
Right Bank	1650	0	CB	P (A)	10

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF4.8	Site Name: MFAR @ Mammoth Bar	Date: 10/10/2007
Wetted Width (m): 19.0	Bankfull Width (m): 24.0	Bankfull Height (cm): 186

Transect H

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	475	45.5	CB	P (A)	20
Center	950	67	SB	P (A)	
Right Center	1425	55.5	CB	P (A)	30
Right Bank	1900	0	CB	P (A)	0

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0)	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	(0)	1	2	3	4
Boulders	0	(1)	2	3	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	(0)	1	2	3	4
Undercut Banks	(0)	1	2	3	4
Overhang. Vegetation	(0)	1	2	3	4
Live Tree Roots	(0)	1	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17) count covered dots

Center Left	(1)
Center Upstream	(0)
Center Downstream	(0)
Center Right	(5)
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 15.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	70
Run	30
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	40
Left Center	375	45.5	CB	P (A)	70
Center	750	64	SB	P (A)	
Right Center	1125	42.5	CB	P (A)	60
Right Bank	1500	0	CB	P A	20

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF4.8	Site Name: MFAR @ Mammoth Bar	Date: 10/10/2007
Wetted Width (m): 14.9	Bankfull Width (m): 23.0	Bankfull Height (cm): 168

Transect I

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P (A)	0
Left Center	372.5	36.5	SB	P (A)	
Center	745.0	64	SB	P (A)	
Right Center	1117.5	33.5	CB	P (A)	20
Right Bank	1490	6	SB	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m): 17.3

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	100
Run	
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	0
Left Center	431.5	42.5	CB	P (A)	60
Center	865	52	SB	P (A)	
Right Center	1297.5	36.5	SB	P (A)	
Right Bank	1730	0	CB	P (A)	10

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF4.8	Site Name: MFAR @ Mammoth Bar	Date: 10/10/2007
Wetted Width (m): 19.3	Bankfull Width (m): 41.0	Bankfull Height (cm): 94.5

Transect J

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	0
Left Center	482.5	24.5	CB	P (A)	20
Center	965	33.5	GC	P (A)	
Right Center	1447.5	45.5	SB	P (A)	
Right Bank	1930	0	CB	P (A)	30

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 3 (4)

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0)	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	(0)	1	2	3	4
Boulders	0	(1)	2	3	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	(0)	1	2	3	4
Undercut Banks	(0)	1	2	3	4
Overhang. Vegetation	(0)	1	2	3	4
Live Tree Roots	(0)	1	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m): 20.1

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	60
Run	
Glide	
Pool	40
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	70
Left Center	482.5	45.5	SB	P (A)	
Center	965	45.5	GC	P (A)	
Right Center	1447.5	58	CB	P (A)	80
Right Bank	1930	0	CB	P (A)	30

*Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page (**direct measurements are preferred**)*

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF4.8	Site Name: MFAR @ Mammoth Bar	Date: 10/10/2007
Wetted Width (m): 24.4	Bankfull Width (m): 45.0	Bankfull Height (cm): 94.5

Transect K

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P (A)	
Left Center	610	58	SA	(P) A	
Center	1220	79.5	CB	P (A)	30
Right Center	1830	73	GC	P A	
Right Bank	2440	0	CB	(P) A	60

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B (0)	Y (N)	(0) B C P
Buildings	P C B (0)	Y (N)	(0) B C P
Pavement/ Cleared Lot	P C B (0)		(0) B C P
Road/ Railroad	P C B (0)	Y (N)	(0) B C P
Pipes (Inlet/ Outlet)	P C B (0)	Y (N)	(0) B C P
Landfill/ Trash	P C B (0)	Y (N)	(0) B C P
Park/ Lawn	P C B (0)		(0) B C P
Row Crops	P C B (0)		(0) B C P
Pasture/ Range	P C B (0)		(0) B C P
Logging Operations	P C B (0)		(0) B C P
Mining Activity	P C B (0)	Y (N)	(0) B C P
Vegetation Management	P C B (0)		(0) B C P
Bridges/ Abutments	P C B (0)	Y (N)	(0) B C P
Orchards/ Vineyards	P C B (0)		(0) B C P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	(0) 1 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	(0) 1 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center - Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Upstream (**required**) ☑ 21A

Downstream (**optional**) ☑ 20A

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

Site Code: MF 4.8	Date: 10/10/2007	FULL FORM

Site Map:

Field Notes/ Comments:

Pool in middle of Reach was too deep to survey. No xs data collected in deep section. Multi-Habitat kick sample was collected @ xs on margin of stream, Approximately 10% from left bank.

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

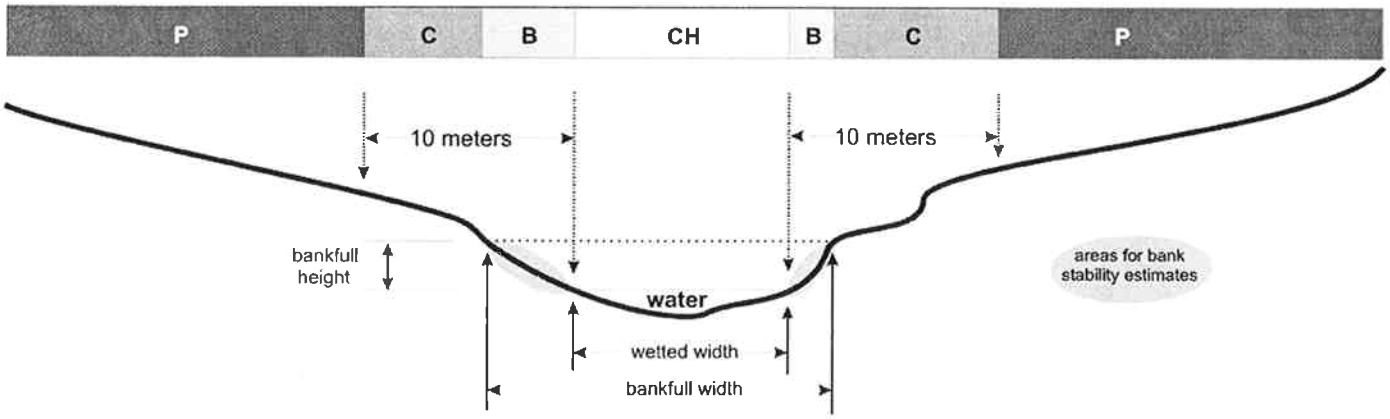


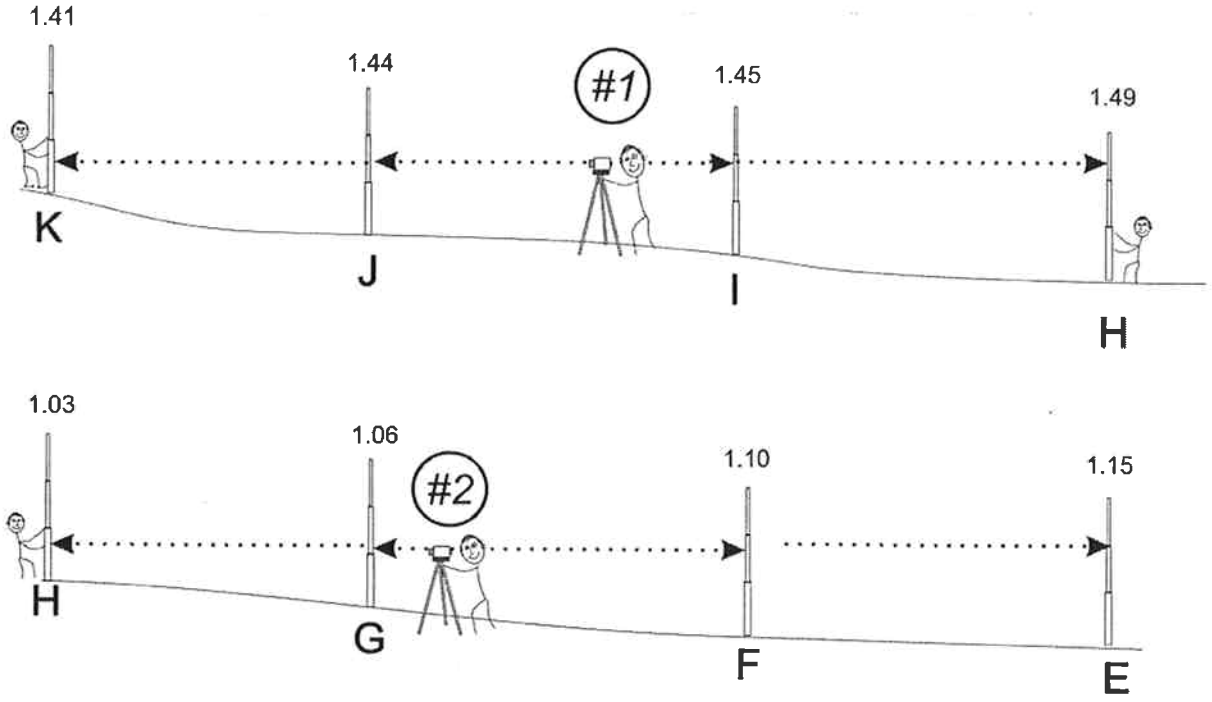
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA	Date: 10-16-2007	Time:
Stream Name: Middle Fork American River	Site Name/ Description: MFAR @ otter creek	
Site Code: MF 14.1	Crew Members: CH, CUD, TDG	
Latitude: °N 38.955585	datum: NAD83 / other:	
Longitude: °W 120.859330		

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	14.0	pH	7.62	Alkalinity (mg/L)	—	Turbidity (ntu, *optional*)	—
Dissolved O_2 (mg/L)	9.51	Specific Cond. (µS)	63	Salinity (mg/L)	0.03	Dissolved Silica (*optional*)	—

REACH LENGTH
(see reach length guidelines at top of form)

Actual Length (m)	250

Explanation:

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

Transect Width:

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1				11			
2	Gage Discharge			12			
3				13			
4	Gage 11433300			14			
5				15			
6	Discharge 217cfs			16			
7				17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO		minimal	X	>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO	X	< 1 year		< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest	X	Rangeland	
	Urban/ Industrial		Suburb/Town		Other	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: MF 14.1 Date: 10/16/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL [ ] CLINOMETER [X] HANDLEVEL [ ]

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm [ ] % [X]	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm [ ] % [ ]	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		0%	25	240°						
I		2%	25	250°						
H		2%	25	220°						
G		0.5%	25	210°						
F		1%	25	200°						
E		0%	25	200°						
D		0%	25	195°						
C		0.5%	25	190°						
B		0%	25	185°						
A		0%	25	175°						
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive: embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF14.1	Site Name: MFAR @ otter creek	Date: 10/16/2007
Wetted Width (m): 27.0	Bankfull Width (m): 34.0	Bankfull Height (cm): 46.5

Transect A

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	(P) A	
Left Center	675	80	SA	P (A)	
Center	1350		CB	P (A)	0
Right Center	2025	109.5	XB	P (A)	
Right Bank	2700	0	RR	(P) A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y	(N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)			(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y	(N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y	(N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)			(0)	B	C	P
Row Crops	P	C	B	(0)			(0)	B	C	P
Pasture/ Range	P	C	B	(0)			(0)	B	C	P
Logging Operations	P	C	B	(0)			(0)	B	C	P
Mining Activity	P	C	B	(0)	Y	(N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)			(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y	(N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)			(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 2 (3) 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	(0) 1 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m): 22.2

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	10
Glide	
Pool	90
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	555	58	CB	(P) A	20
Center	1110	–	SB	P (A)	
Right Center	1665	–	SB	P (A)	
Right Bank	2220	0	RR	(P) A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Downstream (**required**) ☒

00 A

Upstream (**optional**) ☐

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF 14.1	Site Name: MFAR @ Otter Creek	Date: 10/16/2007
Wetted Width (m): 22.6	Bankfull Width (m): 33.0	Bankfull Height (cm): 45.5

Transect B

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	35
Left Center	565	44	CB	P (A)	65
Center	1130	146	SB	P (A)	
Right Center	1695	–	CB	P (A)	5
Right Bank	2260	0	RR	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

	eroded	vulnerable	stable
Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings .<0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	(0) 1 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 27.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	60
Glide	
Pool	40
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	40
Left Center	690	275	CB	P (A)	45
Center	1380	143	SB	P (A)	
Right Center	2070	–	–	P (A)	
Right Bank	2760	0	RR	(P) A	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF14.1	Site Name: MFAR @ Otter Creek	Date: 10/16/2007
Wetted Width (m): 28.2	Bankfull Width (m): 32.5	Bankfull Height (cm): 61

Transect C

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	30
Left Center	705	33.5	SB	P (A)	
Center	1410	27.5	RR	P (A)	
Right Center	2115	39.5	RR	P (A)	
Right Bank	2800	0	SA	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y (N)	0	B	C	P
Buildings	P	C	B	0	Y (N)	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y (N)	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y (N)	0	B	C	P
Landfill/ Trash	P	C	B	0	Y (N)	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y (N)	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y (N)	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	(0) 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 (3) 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17)

count covered dots

Center – Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 27.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	70
Left Center	740	6	CB	P (A)	10
Center	1480	76	RR	P (A)	
Right Center	2220	35	RR	P A	
Right Bank	2760	0	RR	P (A)	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF14.1	Site Name: MFAR @ Otter Creek	Date: 10/16/2007
Wetted Width (m): 25.6	Bankfull Width (m): 33.0	Bankfull Height (cm): 45.5

Transect D

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	640	6	CB	P (A)	5
Center	1280	64	CB	P (A)	10
Right Center	1920	97.5	RR	P (A)	
Right Bank	2560	0	OT*	(P) A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

*Grass, Rootwad

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 (1) 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 21.0

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	P (A)	
Left Center	545	58	CB	P (A)	0
Center	1050	73	RD	P (A)	
Right Center	1575	103.5	RR	P (A)	
Right Bank	2100	0	FN	(P) A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF 14.1	Site Name: MFAR @ Otter Creek	Date: 10/6/2007
Wetted Width (m): 19.4	Bankfull Width (m): 33.0	Bankfull Height (cm): 45.5

Transect E

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P (A)	
Left Center	485	55	CB	P (A)	5
Center	970	73	SB	P (A)	
Right Center	1455	116	RR	P (A)	
Right Bank	1940	0	RR	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 2 (3) 4	0 1 2 (3) 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 21.2

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	6	SA	(P) A	
Left Center	530	39.5	RR	P (A)	
Center	1060	104.5	RR	P (A)	
Right Center	1590	95	SB	P (A)	
Right Bank	2120	0	RR	P (A)	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF14.1	Site Name: MFAR @ other creek	Date: 10/16/2007
Wetted Width (m): 23.2	Bankfull Width (m): 31.5	Bankfull Height (cm): 61

Transect F

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P A	
Left Center	580	15	SB	P A	
Center	1160	67	SB	P A	
Right Center	1740	47.5	SB	P A	
Right Bank	2300	0	ER	P A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y	N	0	B	C	P
Buildings	P	C	B	0	Y	N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0			0	B	C	P
Road/ Railroad	P	C	B	0	Y	N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y	N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y	N	0	B	C	P
Park/ Lawn	P	C	B	0			0	B	C	P
Row Crops	P	C	B	0			0	B	C	P
Pasture/ Range	P	C	B	0			0	B	C	P
Logging Operations	P	C	B	0			0	B	C	P
Mining Activity	P	C	B	0	Y	N	0	B	C	P
Vegetation Management	P	C	B	0			0	B	C	P
Bridges/ Abutments	P	C	B	0	Y	N	0	B	C	P
Orchards/ Vineyards	P	C	B	0			0	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 23.0

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	30
Riffle	
Run	70
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P A	
Left Center	575	39.5	GC	P A	
Center	1150	45.5	CB	P A	15
Right Center	1725	79	RR	P A	
Right Bank	2300	0	RR	P A	

*Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)***

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) ☒
1A

Upstream (**required**) ☒
0A

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF14.1	Site Name: MFAR @ otter creek	Date: 10/16/2007
Wetted Width (m): 24.8	Bankfull Width (m): 31.0	Bankfull Height (cm): 45.5

Transect G

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	620	45.5	CB	P (A)	55
Center	1240	55	RR	P (A)	
Right Center	1860	70	RR	P (A)	
Right Bank	2480	0	RR	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 2 (3) 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 24.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	10
Riffle	
Run	90
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	35
Left Center	620	38	CB	P (A)	20
Center	1240	52	GC	P (A)	
Right Center	1860	73	RR	P (A)	
Right Bank	2480	0	RR	P (A)	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code:	Site Name:	Date:
MF14.1	MFAR @ Otter Creek	10/16/2007

Wetted Width (m):	Bankfull Width (m):	Bankfull Height (cm):
21.6	32.0	45.5

Transect H

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	10
Left Center	540	30.5	CB	P (A)	10
Center	1080	70	RR	P (A)	
Right Center	1620	76	CB	P (A)	30
Right Bank	2160	0	SA	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B (0)	Y (N)	(0) B C P
Buildings	P C B (0)	Y (N)	(0) B C P
Pavement/ Cleared Lot	P C B (0)		(0) B C P
Road/ Railroad	P C B (0)	Y (N)	(0) B C P
Pipes (Inlet/ Outlet)	P C B (0)	Y (N)	(0) B C P
Landfill/ Trash	P C B (0)	Y (N)	(0) B C P
Park/ Lawn	P C B (0)		(0) B C P
Row Crops	P C B (0)		(0) B C P
Pasture/ Range	P C B (0)		(0) B C P
Logging Operations	P C B (0)		(0) B C P
Mining Activity	P C B (0)	Y (N)	(0) B C P
Vegetation Management	P C B (0)		(0) B C P
Bridges/ Abutments	P C B (0)	Y (N)	(0) B C P
Orchards/ Vineyards	P C B (0)		(0) B C P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 35.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	30
Riffle	30
Run	60
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SC	(P) A	
Left Center	630	3	CB	P (A)	15
Center	1270	45.5	CB	P (A)	30
Right Center	1905	76	CB	P (A)	30
Right Bank	2540	0	CB	(P) A	10

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF14.1	Site Name: MFAR @ Otter Creek	Date: 10/16/2007
Wetted Width (m): 25.4	Bankfull Width (m): 33.5	Bankfull Height (cm): 45.5

Transect 1

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	(P) A	
Left Center	635	9	CB	P (A)	10
Center	1270	15	CB	P (A)	20
Right Center	1905	42.5	CB	P (A)	30
Right Bank	2540	0	SB	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 2 (3) 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m): 29.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	60
Riffle	40
Run	
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	0
Left Center	705	27.5	CB	P (A)	40
Center	1450	15	CB	P (A)	30
Right Center	2175	15	SB	P (A)	
Right Bank	2900	0	SB	(P) A	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MFP4.1	Site Name: MFAR @ otter creek	Date: 10/16/2007
Wetted Width (m): 35.4	Bankfull Width (m): 28.0	Bankfull Height (cm): 30.5

Transect J

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P A	
Left Center	985	30.5	GC	P A	
Center	1770	30.5	CB	P A	20
Right Center	2655	15	GC	P A	
Right Bank	3540	0	CB	P A	10

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y N	0	B	C	P
Buildings	P	C	B	0	Y N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y N	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y N	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y N	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m): 38.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	10
Riffle	30
Run	60
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	P A	
Left Center	970	30.5	CB	P A	20
Center	1940	42.5	GC	P A	
Right Center	2910	24.5	GC	P A	
Right Bank	3880	0	SA	P A	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF14.1	Site Name: MFAR @ Otter Creek	Date: 10/16/2007
Wetted Width (m): 34.0	Bankfull Width (m): 45.0	Bankfull Height (cm): 30.5

Transect K

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	850	46.5	SB	P (A)	
Center	1700	34.5	CB	P (A)	60
Right Center	2550	15	CB	P (A)	10
Right Bank	3400	0	RR	(P) A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 (3) 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 (1) 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS
(check box if taken and record photo code)

Upstream (**required**) ☒
3A

Downstream (**optional**) ☒
2A

Site Code:	Date: __ __ / __ __ / __ __ __ __	**FULL FORM**

Site Map:

Field Notes/ Comments:

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

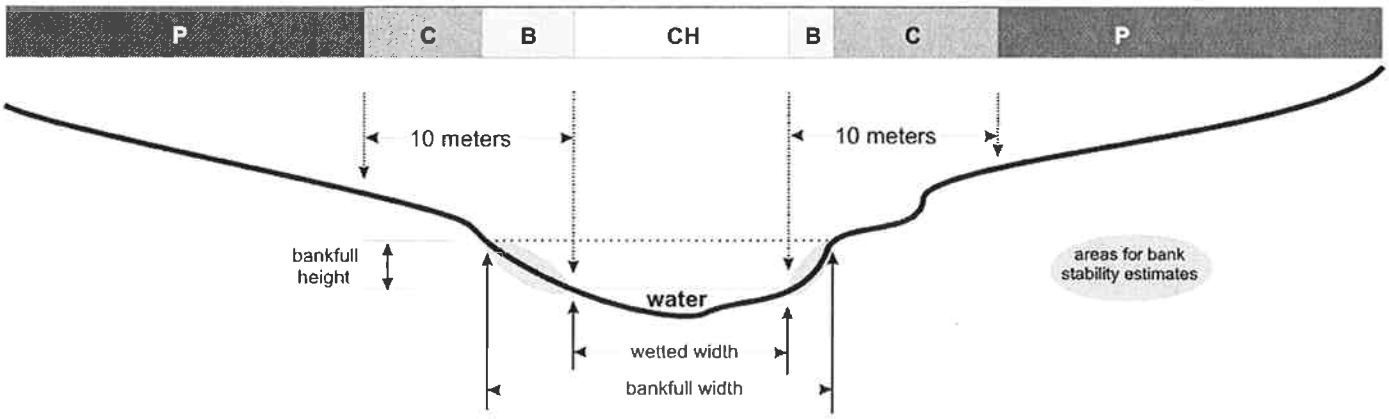


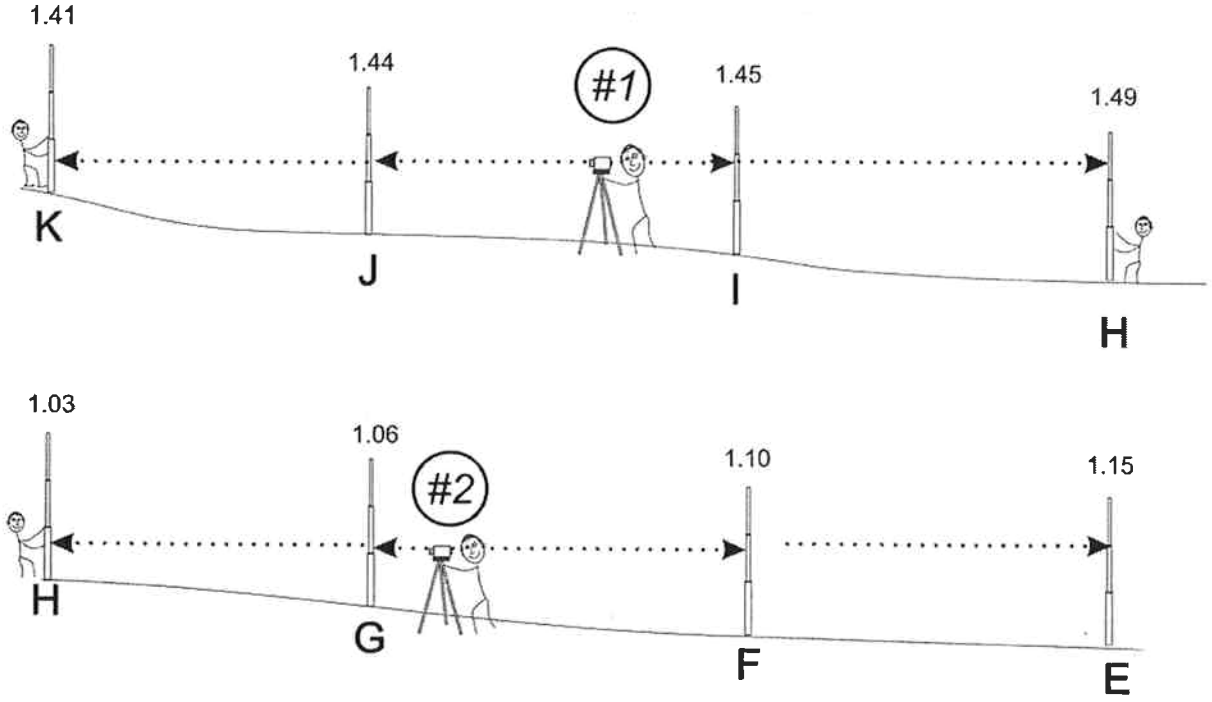
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA	Date: 10-15-2007	Time: 14:30
Stream Name: Middle Fork American River	Site Name/ Description: MFAR @ Cache Rock	
Site Code: MF 19.1	Crew Members: TDG, CB, CH, CUD	
Latitude: °N 38.999591	datum: NAD83	
Longitude: °W 120.813242	other:	

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	14.33	pH	—	Alkalinity (mg/L)	—	Turbidity (ntu, *optional*)	10.7
Dissolved O_2 (mg/L)	9.63	Specific Cond. (µS)	62	Salinity (mg/L)	0.03	Dissolved Silica (*optional*)	—

REACH LENGTH

(see reach length guidelines at top of form)

Actual Length (m)	250

Explanation:

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

Transect Width:

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1				11			
2	Gage Discharge			12			
3				13			
4	Gage	11433300		14			
5				15			
6	Discharge 189cfs			16			
7				17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO		minimal	X	>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO		< 1 year	X	< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest	X	Rangeland	
	Urban/ Industrial		Suburb/Town		Other	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form FULL VERSION *Revision Date: July 10, 2007*

Site Code: MF19.1 Date: 10/5/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm ☐ % ☒	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		1.5%	25	230°						
I		2.5%	25	240°						
H		1%	25	240°						
G		1%	25	170°						
F		0%	25	225°						
E		1%	25	220°						
D		0%	25	220°						
C		3.5%	25	220°						
B		0%	25	190°						
A		0.5%	25	210°						
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive; embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

Site Code: MF19.1	Site Name: MFAR @ Cache Park	Date: 10/15/2007
Wetted Width (m): 20.0	Bankfull Width (m): 30.0	Bankfull Height (cm): 61

Transect A

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P A	
Left Center	500	58	SA	P A	
Center	1000	40.5	RR	P A	
Right Center	1500	91.5	RR	P A	
Right Bank	2000	0	RR	P A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	(P)	C	B	0	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	(C)	B	0	(Y) N	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m): 19.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	100
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	(P) A	
Left Center	490	73	CB	P (A)	15
Center	980	134	SB	P (A)	
Right Center	1470	140	SA	P (A)	
Right Bank	1960	0	RR	(P) A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) ☒ 7A

Upstream (**optional**) ☒ 9A

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF14.1	Site Name: MFAR @ Cache Rock	Date: 10/15/2007
Wetted Width (m): 19.6	Bankfull Width (m): 25.0	Bankfull Height (cm): 76

Transect B

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	(P) A	
Left Center	490	73	CB	(P) A	95
Center	980	161.5	CB	P (A)	60
Right Center	1470	146.5	RR	P (A)	
Right Bank	1960	0	RR	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	(P)	C	B	0	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	(C)	B	0	(Y) N	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	(0) 1 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	6
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 18.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	100
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	(P) A	
Left Center	460	91.5	SA	P (A)	
Center	920	158.5	GC	(P) A	
Right Center	1380	167.5	SB	P A	
Right Bank	1840	0	RR	P (A)	

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF19.1	Site Name: MFAR @ Cedar Rock	Date: 10/15/2007
Wetted Width (m): 19.6	Bankfull Width (m): 28.0	Bankfull Height (cm): 76

Transect C

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	(P) A	
Left Center	490	14.5	CB	P (A)	10
Center	980	—	SB	P A	
Right Center	1470	24.5	SB	P (A)	
Right Bank	1960	5.8	RR	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	(P)	C	B	0	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	(B)	0	(Y) N	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 (3) 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 29.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	40
Run	40
Glide	
Pool	20
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	55
Left Center	735	33.5	CB	P (A)	15
Center	1470	20	CB	P (A)	10
Right Center	2205	24.5	GC	P (A)	
Right Bank	2940	0	CB	P (A)	15

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF19.1	Site Name: MFAR Cadre Rock	Date: 10/15/2007
Wetted Width (m): 23.8	Bankfull Width (m): 31.5	Bankfull Height (cm): 45.5

Transect D

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	595	36.5	CB	P (A)	15
Center	1190	38	SB	P (A)	
Right Center	1785	396	CB	P (A)	10
Right Bank	2380	0	GC	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

	eroded	vulnerable	stable
Left Bank	eroded	~~vulnerable~~	stable
Right Bank	eroded	vulnerable	~~stable~~

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B (0)	Y (N)	(0) B C P
Buildings	P C B (0)	Y (N)	(0) B C P
Pavement/ Cleared Lot	P C B (0)		(0) B C P
Road/ Railroad	P C B (0)	Y (N)	(0) B C P
Pipes (Inlet/ Outlet)	P C B (0)	Y (N)	(0) B C P
Landfill/ Trash	P C B (0)	Y (N)	(0) B C P
Park/ Lawn	P C B (0)		(0) B C P
Row Crops	P C B (0)		(0) B C P
Pasture/ Range	P C B (0)		(0) B C P
Logging Operations	P C B (0)		(0) B C P
Mining Activity	P C B (0)	Y (N)	(0) B C P
Vegetation Management	P C B (0)		(0) B C P
Bridges/ Abutments	P C B (0)	Y (N)	(0) B C P
Orchards/ Vineyards	P C B (0)		(0) B C P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17)

count covered dots

Center Left	(0)
Center Upstream	(0)
Center Downstream	(0)
Center Right	(0)
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 23.2

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	(P) A	
Left Center	580	47	SB	P (A)	
Center	1160	49	CB	P (A)	20
Right Center	1740	41	CB	P (A)	75
Right Bank	2320	0	SB	P (A)	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF 19.1	Site Name: MFAR @ cache Rock	Date: 10/15/2007
Wetted Width (m): 23.0	Bankfull Width (m): 36.0	Bankfull Height (cm): 76

Transect E

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	575	81	CB	P (A)	40
Center	1150	87	CB	P (A)	80
Right Center	1725	113	CB	P (A)	80
Right Bank	2300	0	BC	(P) A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	(P)	C	B	0	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	10
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 20.6

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	60
Glide	
Pool	40
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	(P) A	
Left Center	515	97.5	CB	P (A)	35
Center	1030	88.4	SB	P (A)	
Right Center	1545	119	CB	P (A)	20
Right Bank	2060	0	RR	(P) A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

Site Code: MF-19.1	Site Name: MFAR @ Cache Rock	Date: 10/15/2007
Wetted Width (m): 21.2	Bankfull Width (m): 25.0	Bankfull Height (cm): 45.5

Transect F

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	530	61	CB	P (A)	5
Center	1060	91.5	GC	P (A)	
Right Center	1590	12	CB	P (A)	5
Right Bank	2120	30.5	RR	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	(P)	C	B	0	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 (3) 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17)

count covered dots

Center Left	(0)
Center Upstream	(0)
Center Downstream	(0)
Center Right	(0)
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 25.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	30
Run	70
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	(P) A	
Left Center	645	65.5	CB	P (A)	30
Center	1290	35	CB	P (A)	60
Right Center	1935	21.5	SB	P (A)	
Right Bank	2580	0	CB	(P) A	5

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Downstream (**required**) ☐ 10 A

Upstream (**required**) ☐ 11 A

SWAMP Stream Habitat Characterization Form — *FULL VERSION* — *Revision Date: July 10, 2007*

Site Code: MF 19.1	Site Name: MFAR @ Cadiz Park	Date: 10/15/2007
Wetted Width (m): 23.6	Bankfull Width (m): 32.0	Bankfull Height (cm): 45.5

Transect G

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	25
Left Center	590	47	SB	P (A)	
Center	1180	17	SB	P (A)	
Right Center	1770	29.5	CB	P (A)	20
Right Bank	2360	0	RR	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	(P)	C	B	0	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 (3) 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 26.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	30
Run	70
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	(P) A	
Left Center	650	0	SB	P (A)	
Center	1300	23	GC	P (A)	
Right Center	1950	11	CB	P (A)	55
Right Bank	2600	0	GC	(P) A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: MF19.1	Site Name: MFAR @ cache Park	Date: 10/15/2007
Wetted Width (m): 23.8	Bankfull Width (m): 37.0	Bankfull Height (cm): 61

Transect H

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	595	26	SB	P (A)	
Center	1190	0	CB	P (A)	55
Right Center	1785	91.5	CB	P (A)	0
Right Bank	2380	0	BR	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	(P)	C	B	0	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	(C)	B	0	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 (3) 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 28.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	10
Run	90
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P (A)	
Left Center	720	0	CB	P (A)	10
Center	1440	0	GC	(P) A	
Right Center	2160	36.5	SB	P (A)	
Right Bank	2880	0	CB	(P) A	15

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF19.1	Site Name: MFAR@ Cache Rock	Date: 10/15/2007
Wetted Width (m): 26.0	Bankfull Width (m): 40.0	Bankfull Height (cm): 76

Transect 1

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	25
Left Center	650	4.5	CB	P (A)	45
Center	1300	0	SB	P (A)	
Right Center	1950	26	SB	P (A)	
Right Bank	2600	0	CB	P (A)	40

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	(P)	C	B	0	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	(C)	B	0	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 2 (3) 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	(0) 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	1
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m): 23.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	100
Run	
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	30
Left Center	590	3	SB	P (A)	
Center	1180	0	CB	P (A)	15
Right Center	1770	16.5	XB	P (A)	
Right Bank	2360	0	CB	P (A)	40

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF 19.1	Site Name: MFAR @ Cache Rock	Date: 10/15/2007
Wetted Width (m): 21.8	Bankfull Width (m): 70.0	Bankfull Height (cm): 91.5

Transect J

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	50
Left Center	545	6	SB	P (A)	
Center	1090	33.5	CB	P (A)	30
Right Center	1635	42.5	SB	P (A)	
Right Bank	2180	0	GC	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	(P)	C	B	0	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	(C)	B	0	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	(0) 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m): 22.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	50
Run	50
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	70
Left Center	550	12	CB	P (A)	5
Center	1100	26	SB	P (A)	
Right Center	1650	49	CB	P (A)	20
Right Bank	2200	0	CB	(P) A	45

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF19.1	Site Name: MFAR @ cache Rock	Date: 10/15/2007
Wetted Width (m): 19.4	Bankfull Width (m): 78.0	Bankfull Height (cm): 61

Transect K

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	20
Left Center	485	12	SB	P (A)	
Center	970	61	SB	P (A)	
Right Center	1455	45.5	CB	P (A)	0
Right Bank	1940	0	GC	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	(P)	C	B	0	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	(C)	B	0	Y (N)	0	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 2 (3) 4
Herbs/ grasses	0 (1) 2 3 4	(0) 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	(0) 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Upstream (**required**) ☒ 13 A

Downstream (**optional**) ☐ 12 A

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: MF19.1	Date: 10/15/2007	**FULL FORM**

Site Map:

Field Notes/ Comments:

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

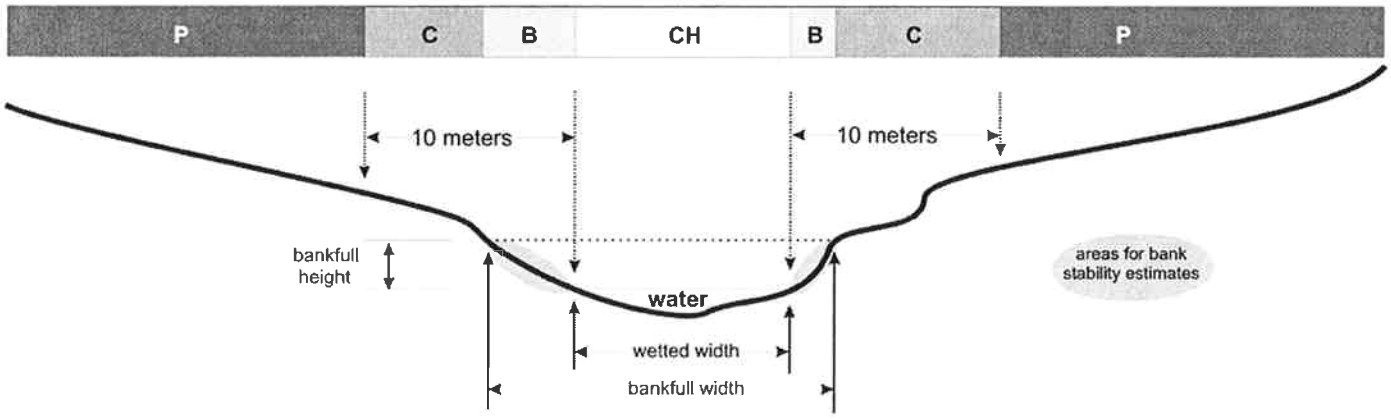


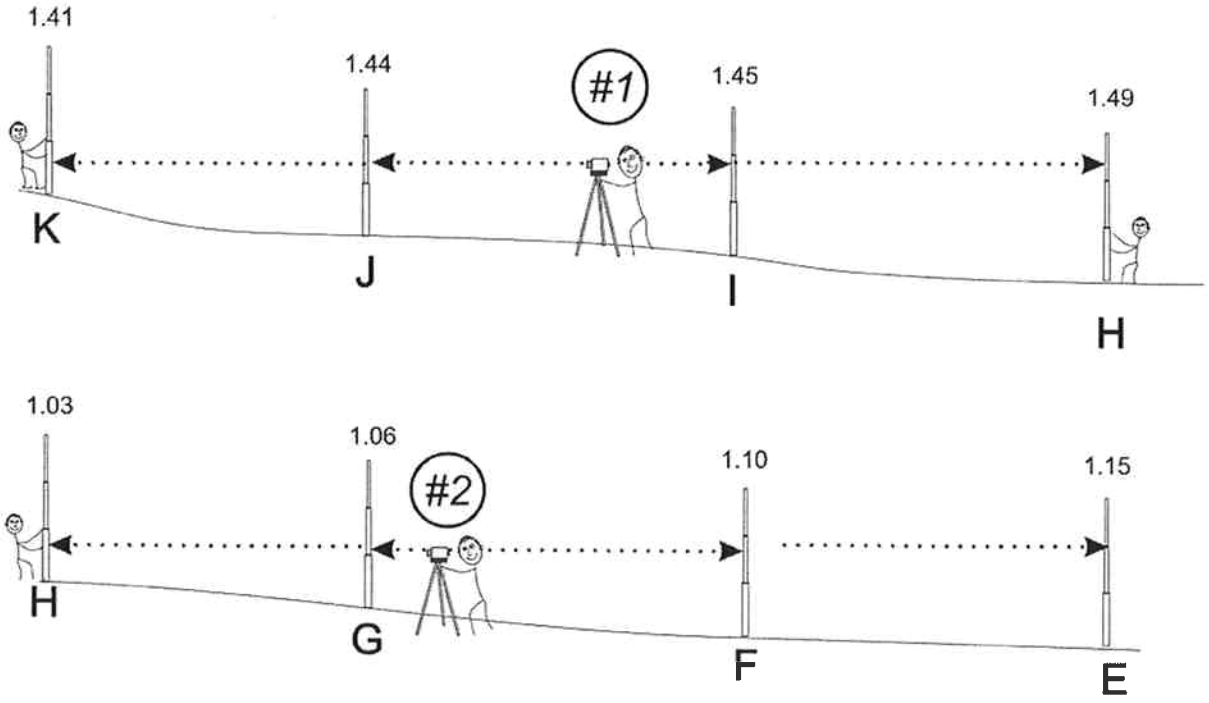
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width > 10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA	Date: 10-02-2007	Time:
Stream Name: Middle Fork American River	Site Name/ Description: MFAR above Ralston	
Site Code: MF26.2	Crew Members: CUD, BF, PG	
Latitude: °N 39.008248	datum: NAD83 / other:	
Longitude: °W 120.732451		

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	14	pH	—	Alkalinity (mg/L)	—	Turbidity (ntu, *optional*)	—
Dissolved O_2 (mg/L)	—	Specific Cond. (µS)	—	Salinity (mg/L)	—	Dissolved Silica (*optional*)	—

REACH LENGTH

(see reach length guidelines at top of form)

Actual Length (m)	250

Explanation:

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

Transect Width:

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1				11			
2	Gage Discharge			12			
3				13			
4	Gage 11427760			14			
5				15			
6	Discharge 17 CFS			16			
7				17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO		minimal	X	>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO		< 1 year	X	< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest	X	Rangeland	
	Urban/ Industrial		Suburb/Town		Other	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: MF762 Date: 10/02/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm ☐ % ☒	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		6%	25	260°						
I		5%	25	280°						
H		0%	25	270°						
G		2%	25	280°						
F		1%	25	264°						
E		1%	25	261°						
D		2%	25	260°						
C		1%	25	255°						
B		1%	25	260°						
A		1%	25	260°						
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive; embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF26.2	Site Name: MFAR above Pulsten	Date: 10/02/2007
Wetted Width (m): 21.5	Bankfull Width (m): 31.0	Bankfull Height (cm): 61

Transect A

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	(P) A	
Left Center	537.5	0	XB	P (A)	
Center	1075	6	CB	(P) A	20
Right Center	1612.5	56.5	GC	P (A)	
Right Bank	2150	0	XB	(P) A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m): 20.0

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	(P) A	
Left Center	500	6	CB	(P) A	70
Center	1000	32	CB	P (A)	35
Right Center	1500	18.5	XB	P (A)	
Right Bank	2000	0	XB	(P) A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Downstream **(required)** ☒
camera 6288 10_05_07
356 JPG

Upstream **(optional)** ☐

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF26.2	Site Name: MFAR above Ralston	Date: 10/02/2007
Wetted Width (m): 14.8	Bankfull Width (m): 41.9	Bankfull Height (cm): 61

Transect B

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P A	85
Left Center	370	30.5	CB	P A	15
Center	740	50.5	SB	P A	
Right Center	1110	33.5	SB	P A	
Right Bank	1480	3	FN	P A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip rap/ Dams	P	C	B	0	Y	N	0	B	C	P
Buildings	P	C	B	0	Y	N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0			0	B	C	P
Road/ Railroad	P	C	B	0	Y	N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y	N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y	N	0	B	C	P
Park/ Lawn	P	C	B	0			0	B	C	P
Row Crops	P	C	B	0			0	B	C	P
Pasture/ Range	P	C	B	0			0	B	C	P
Logging Operations	P	C	B	0			0	B	C	P
Mining Activity	P	C	B	0	Y	N	0	B	C	P
Vegetation Management	P	C	B	0			0	B	C	P
Bridges/ Abutments	P	C	B	0	Y	N	0	B	C	P
Orchards/ Vineyards	P	C	B	0			0	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 11.2

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	10
Run	90
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	XB	P A	
Left Center	280	15	SB	P A	
Center	560	15	CB	P A	90
Right Center	840	36.5	CB	P A	40
Right Bank	1120	0	SR	P A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: MF26.2	Site Name: MEAR above Ralston	Date: 10/2/2007
Wetted Width (m): 12.4	Bankfull Width (m): 44.0	Bankfull Height (cm): 45.5

Transect C

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	(P) A	
Left Center	310	30.5	CB	P (A)	85
Center	620	39.5	CB	P (A)	45
Right Center	930	45.5	GF	P (A)	
Right Bank	1240	0	GC	(P) A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*

Center Left	(0)
Center Upstream	(0)
Center Downstream	(0)
Center Right	(0)
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 15.4

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	80
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	(P) A	
Left Center	385	12	XB	(P) A	
Center	770	27.5	GF	P (A)	
Right Center	1155	45.5	CB	P (A)	90
Right Bank	1540	3	GF	(P) A	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: MF26,2	Site Name: MFAR above Ralston	Date: 10/02/2007
Wetted Width (m): 9,6	Bankfull Width (m): 38,0	Bankfull Height (cm): 61

Transect D

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	15
Left Center	240	30,5	SB	P (A)	
Center	480	26	CB	P (A)	0
Right Center	720	12	CB	P (A)	10
Right Bank	960	0	CB	(P) A	5

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 2 (3) 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 (1) 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0)	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	0	1	(2)	3	4
Boulders	0	1	(2)	3	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	0	(1)	2	3	4
Undercut Banks	(0)	1	2	3	4
Overhang. Vegetation	0	(1)	2	3	4
Live Tree Roots	(0)	1	2	3	4
Artificial Structures	(0)	1	2	3	4

DENSIOMETER READINGS (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 14,4

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	40
Run	60
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	360	27,5	CB	P (A)	0
Center	720	3	SB	P (A)	
Right Center	1080	30,5	GC	P (A)	
Right Bank	1440	33,5	CB	(P) A	50

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF26.2	Site Name: MFAR above Ralston	Date: 10/02/2007
Wetted Width (m): 13.8	Bankfull Width (m): 28.0	Bankfull Height (cm): 61

Transect E

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	(P) A	
Left Center	345	39.5	SB	P (A)	
Center	690	39.5	CB	(P) A	10
Right Center	1035	41	SB	(P) A	
Right Bank	1380	12	SB	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	(eroded)	vulnerable	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	6
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 10.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	80
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	(P) A	
Left Center	265	24.5	XB	P (A)	
Center	530	24.5	XB	P (A)	
Right Center	795	42.5	SB	P (A)	
Right Bank	1060	13.5	GF	P (A)	

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: MF26.2	Site Name: MFAR above Ralston	Date: 10/02/2007
Wetted Width (m): 11.2	Bankfull Width (m): 41.0	Bankfull Height (cm): 76

Transect F

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	XB	P A	
Left Center	280	3	CB	P A	15
Center	560	44	CB	P A	55
Right Center	840	38	SB	P A	
Right Bank	1120	0	GC	P A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel **Channel (record Yes or No)**

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 2 (3) 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 (1) 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*

Center Left	0
Center Upstream	1
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 9.1

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	3	SB	P (A)	
Left Center	227.5	24.5	GC	P (A)	
Center	455	30.5	CB	P (A)	5
Right Center	682.5	45.5	SB	P (A)	
Right Bank	910	6	CB	P (A)	30

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

TAKE PHOTOGRAPHS *(check box if taken and record photo code)*

Downstream **(required)** camera 6288 10_03_07 ☒
545.JPG

Upstream **(required)** camera 6288 10_03_07 ☒
355.JPG

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF26.2	Site Name: MFAR above Ralston	Date: 10/04/2007
Wetted Width (m): 6.8	Bankfull Width (m): 38.0	Bankfull Height (cm): 76

Transect G

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	30.5	CB	P (A)	15
Left Center	170	30.5	CB	P (A)	0
Center	340	52	SB	P (A)	
Right Center	510	39.5	GF	P (A)	
Right Bank	680	15	GF	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy>75% 2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (3) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Filamentous Algae	0	(0)	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	0	(1)	2	3	4
Boulders	0	1	(2)	3	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	(0)	1	2	3	4
Undercut Banks	(0)	1	2	3	4
Overhang. Vegetation	0	(1)	2	3	4
Live Tree Roots	(0)	1	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 18.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	30
Run	60
Glide	
Pool	10
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	53.5	CB	P (A)	0
Left Center	470	7.5	SB	P (A)	
Center	940	33.5	GF	P (A)	
Right Center	1410	6	SB	P (A)	
Right Bank	1880	0	GC	(P) A	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: MF2.6.2	Site Name: MFAR above Ralston	Date: 10/02/2007
Wetted Width (m): 15.6	Bankfull Width (m): 35.0	Bankfull Height (cm): 61

Transect H

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	P A	
Left Center	340	61	CB	P A	0
Center	780	0	RS	P A	
Right Center	1170	15	XB	P A	
Right Bank	1560	0	XB	P A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y N	0	B	C	P
Buildings	P	C	B	0	Y N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y N	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y N	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y N	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 16.8

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	30
Glide	
Pool	70
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SS	P A	
Left Center	420	87	SS	P A	
Center	840	67	SS	P A	
Right Center	1260	44	CB	P A	65
Right Bank	1680	0	CB	P A	40

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — *FULL VERSION* — *Revision Date: July 10, 2007*

Site Code: MF26.2	Site Name: MFAR above Ralston	Date: 10/02/2007
Wetted Width (m): 14.4	Bankfull Width (m): 30.0	Bankfull Height (cm): 106.5

Transect I

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	P (A)	
Left Center	360	146.5	GF	P (A)	
Center	720	195	SB	P (A)	
Right Center	1080	113	SB	P (A)	
Right Bank	1440	0	SB	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	(0) 1 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0)	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	(0)	1	2	3	4
Boulders	0	(1)	2	3	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	(0)	1	2	3	4
Undercut Banks	0	(1)	2	3	4
Overhang. Vegetation	0	(1)	2	3	4
Live Tree Roots	0	(1)	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17)
count covered dots

Center Left	(0)
Center Upstream	(0)
Center Downstream	(0)
Center Right	(0)
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m): 13.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	100
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	P (A)	
Left Center	325	152.5	–	P (A)	
Center	650	152.5	XB	P (A)	
Right Center	975	140	XB	P (A)	
Right Bank	1300	6	XB	(P) A	

w. ***Note:*** *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF262	Site Name: MFAR above Ralston	Date: 10/2/2007
Wetted Width (m): 15.8	Bankfull Width (m): 36.0	Bankfull Height (cm): 91.5

Transect J

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	P (A)	
Left Center	395	0	XB	P (A)	
Center	790	3	XB	(P) A	
Right Center	1185	0	XB	P (A)	
Right Bank	1580	0	GC	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0)	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	0	1	(2)	3	4
Boulders	0	1	2	(3)	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	0	(1)	2	3	4
Undercut Banks	0	(1)	2	3	4
Overhang. Vegetation	0	1	(2)	3	4
Live Tree Roots	0	(1)	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m): 21.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	20
Rapid	
Riffle	80
Run	
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	BS	(P) A	
Left Center	540	13.5	GC	P (A)	
Center	1080	6	SB	(P) A	
Right Center	1620	55	SB	P (A)	
Right Bank	2160	0	SB	P (A)	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF26.2	Site Name: MFR above Ralston	Date: 10/02/2007
Wetted Width (m): 25.6	Bankfull Width (m): 45.0	Bankfull Height (cm): 76

Transect K

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	
Left Center	640	33.5	GC	P (A)	
Center	1280	33.5	GC	P (A)	
Right Center	1920	33.5	CB	P (A)	40
Right Bank	2560	0	XB	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy>75%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 2 (3) 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Upstream (**required**) ☑

Camera 6288 10-03-07
5440PQ

Downstream (**optional**) ☐

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

Site Code: MF26.2	Date: 10/02/2007	FULL FORM

Site Map:

Field Notes/ Comments:

Ralston Fire in area September 2006 but not < 50m from channel

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

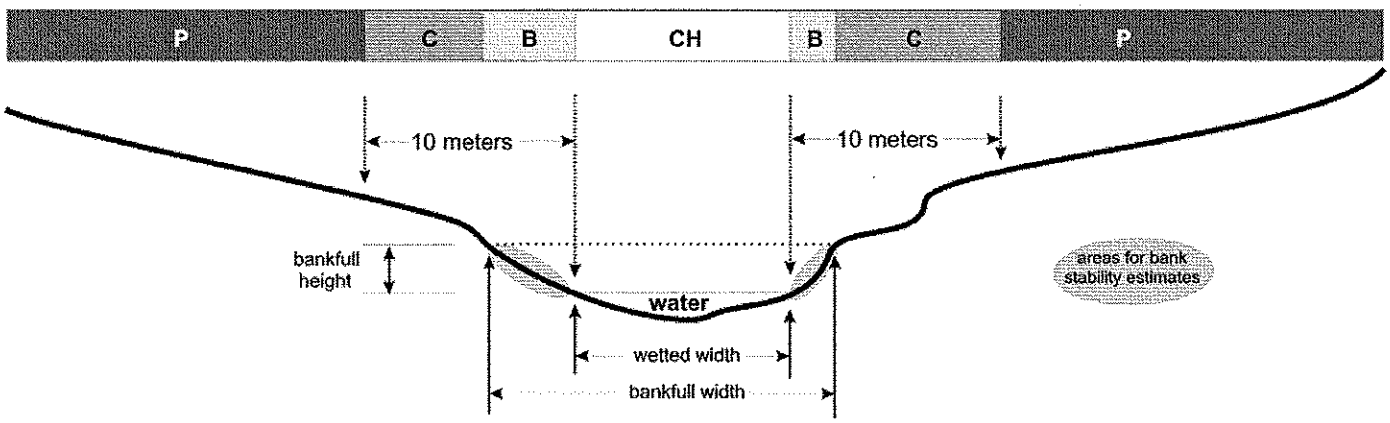


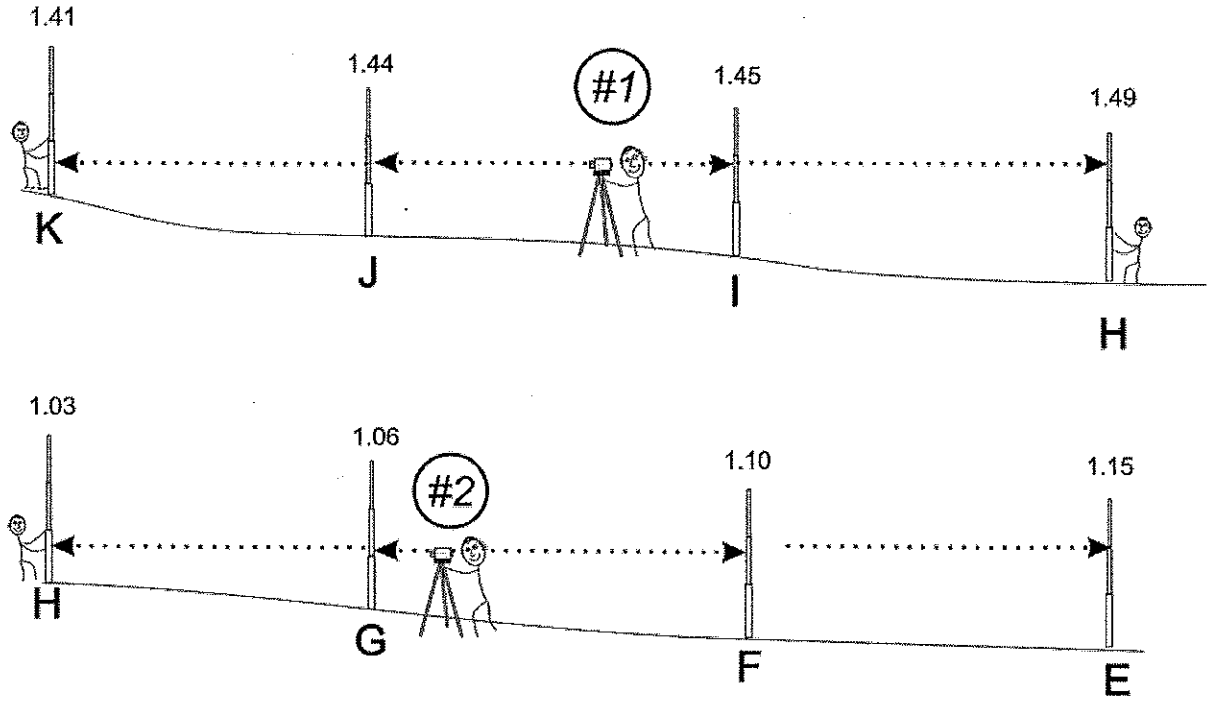
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA	Date: 09-12-2007	Time: 15:50
Stream Name: Middle Fork American River	Site Name/ Description: MFAR below French Meadows	
Site Code: MF44.7	Crew Members: PG, CUD, TDG, RK	
Latitude: °N 39.093321	datum: NAD83	
Longitude: °W 120.494184	other:	

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	13.2	pH	7.5	Alkalinity (mg/L)	—	Turbidity (ntu, *optional*)	16
Dissolved O_2 (mg/L)	11.25	Specific Cond. (µS)	30	Salinity (mg/L)	0	Dissolved Silica (*optional*)	—

REACH LENGTH

(see reach length guidelines at top of form)

Actual Length (m)	150

Explanation:

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

Transect Width:

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1				11			
2	Gage Discharge			12			
3				13			
4	Gage 11427500			14			
5				15			
6	Discharge 9.3 cfs			16			
7				17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO	X	minimal		>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO	X	< 1 year		< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest	X	Rangeland	
	Urban/ Industrial		Suburb/Town		Other	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

Site Code: MF447 Date: 9/12/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm☐ %☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm☐ %☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		5%	15	230°						
I		1%	15	210°						
H		6%	15	200°						
G		6%	15	210°						
F		0%	15	190°						
E		6%	15	190°						
D		2%	15	190°						
C		7%	15	180°						
B		5%	15	180°						
A		3%	15	180°						
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive: embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF44.7	Site Name: MFAR below French Meadows	Date: 09/12/2007
Wetted Width (m): 13.0	Bankfull Width (m): 15.0	Bankfull Height (cm): 76

Transect A

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	65
Left Center	325	20.5	CB	P (A)	60
Center	650	24.5	GC	P (A)	
Right Center	975	30.5	GC	P (A)	
Right Bank	1300	6	FN	(P) A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m): 10.0

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	100
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	
Left Center	250	0	RS	P (A)	
Center	500	49	RS	(P) A	
Right Center	750	70	CB	P (A)	30
Right Bank	1000	9	RS	(P) A	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) Camera 6282 10-10-07 ☑
078

Upstream (**optional**) Camera 6282 10-10-07 ☑
077

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF44.7	Site Name: MFAR below Franck Meadows	Date: 09/12/2007
Wetted Width (m): 8.0	Bankfull Width (m): 10.0	Bankfull Height (cm): 91.5

Transect B

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	(P) A	
Left Center	200	0	RS	(P) A	
Center	400	27.5	GC	P (A)	
Right Center	600	24.5	RS	P (A)	
Right Bank	800	0	RS	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 12.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	50
Rapid	
Riffle	50
Run	
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	55
Left Center	310	24.5	CB	P (A)	40
Center	620	12	GC	(P) A	
Right Center	930	3	SB	P (A)	
Right Bank	1240	0	SB	P (A)	

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF 44.7	Site Name: MFAR below Franklin Meadows	Date: 09/12/2007
Wetted Width (m): 12.0	Bankfull Width (m): 17.0	Bankfull Height (cm): 75

Transect C

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	9	CB	P (A)	20
Left Center	300	33.5	CB	P (A)	60
Center	600	0	XB	P (A)	
Right Center	900	13	XB	P (A)	
Right Bank	1200	0	SB	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	~~stable~~
Right Bank	eroded	~~vulnerable~~	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
					Channel (record Yes or No)				
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 12.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	10
Rapid	
Riffle	
Run	
Glide	
Pool	90
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	9	CB	(P) A	85
Left Center	315	76	CB	P (A)	20
Center	630	0	XB	(P) A	
Right Center	945	0	SB	P (A)	
Right Bank	1260	0	CB	(P) A	30

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF44.7	Site Name: MFAR below French Meadows	Date: 9/12/2007
Wetted Width (m): 11.4	Bankfull Width (m): 25.0	Bankfull Height (cm): 76

Transect D

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	XB	P (A)	
Left Center	285	30.5	GC	(P) A	
Center	570	61	GF	(P) A	
Right Center	855	46	CB	P (A)	50
Right Bank	1140	0	RS	(P) A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 (1) 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 1 (2) 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 7.4

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	10
Glide	
Pool	90
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	5
Left Center	185	21.5	CB	(P) A	10
Center	370	30.5	CB	P (A)	60
Right Center	555	9	XB	P (A)	
Right Bank	740	0	XB	(P) A	

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF44.7	Site Name: MFAR below French Meadows	Date: 09/12/2007
Wetted Width (m): 7.3	Bankfull Width (m): 17.5	Bankfull Height (cm): 91.5

Transect E

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	6	SB	P (A)	
Left Center	183	24.5	CB	P (A)	30
Center	365	55	SB	P (A)	
Right Center	548	39.5	CB	P (A)	
Right Bank	730	0	RS	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 5.2

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	10
Rapid	
Riffle	10
Run	40
Glide	
Pool	40
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	6	CB	(P) A	55
Left Center	130	24.5	XB	P (A)	
Center	260	39.5	SB	P (A)	
Right Center	390	27.5	CB	P (A)	60
Right Bank	520	0	CB	(P) A	40

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or as one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF44.7	Site Name: MFAR below Finnie Landing	Date: 09/12/2007
Wetted Width (m): 6.8	Bankfull Width (m): 17.0	Bankfull Height (cm): 91.5

Transect F

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	30.5	GF	P (A)	
Left Center	170	61	GC	(P) A	
Center	340	76	CB	P (A)	50
Right Center	510	9	RS	(P) A	
Right Bank	680	0	RS	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 8.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	50
Glide	
Pool	50
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	220	55	GC	P (A)	
Center	440	70	CB	P (A)	30
Right Center	660	39.5	CB	P (A)	20
Right Bank	880	0	RR	P (A)	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) ☑ Camera 6282 10-10-07 080

Upstream (**required**) ☑ Camera 6282 10-10-07 079

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF44.7	Site Name: MFAR below French Meadows	Date: 09/12/2007
Wetted Width (m): 4.0	Bankfull Width (m): 12.0	Bankfull Height (cm): 76

Transect G

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	BS	P A	
Left Center	100	39.5	BS	P A	
Center	200	30.5	BS	P A	
Right Center	300	0	BS	P A	
Right Bank	400	3	BS	P A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y N	0	B	C	P
Buildings	P	C	B	0	Y N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y N	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y N	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y N	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 7.9

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	20
Rapid	
Riffle	
Run	40
Glide	
Pool	40
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	XB	P A	
Left Center	197	18.5	GC	P A	
Center	395	0	CB	P A	60
Right Center	592	12	CB	P A	40
Right Bank	790	15	CB	P A	50

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF44.7	Site Name: MFAR below Franch Meadows	Date: 09/12/2007
Wetted Width (m): 10.4	Bankfull Width (m): 14.5	Bankfull Height (cm): 91.5

Transect H

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P A	0
Left Center	260	0	XB	P A	
Center	520	0	CB	P A	10
Right Center	780	82.5	XB	P A	
Right Bank	1040	58	CB	P A	50

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y	N	0	B	C	P
Buildings	P	C	B	0	Y	N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0			0	B	C	P
Road/ Railroad	P	C	B	0	Y	N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y	N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y	N	0	B	C	P
Park/ Lawn	P	C	B	0			0	B	C	P
Row Crops	P	C	B	0			0	B	C	P
Pasture/ Range	P	C	B	0			0	B	C	P
Logging Operations	P	C	B	0			0	B	C	P
Mining Activity	P	C	B	0	Y	N	0	B	C	P
Vegetation Management	P	C	B	0			0	B	C	P
Bridges/ Abutments	P	C	B	0	Y	N	0	B	C	P
Orchards/ Vineyards	P	C	B	0			0	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 10.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	30
Rapid	
Riffle	
Run	70
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	9	SB	P A	
Left Center	270	33.5	CB	P A	70
Center	540	9	SB	P A	
Right Center	810	0	RS	P A	
Right Bank	1080	21.5	RS	P A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF44.7	Site Name: MFAR below French Meadows	Date: 09/12/2007
Wetted Width (m): 14.4	Bankfull Width (m): 25.0	Bankfull Height (cm): 91.5

Transect I

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	9	SA	P (A)	
Left Center	360	18.5	CB	P (A)	50
Center	720	30.5	SB	P (A)	
Right Center	1080	0	XB	P (A)	
Right Bank	1440	12	XB	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 1 (2) 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m): 5.7

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	(P) A	
Left Center	142.5	6	SB	P (A)	
Center	285	3	XB	P (A)	
Right Center	357.5	42.5	CB	P (A)	40
Right Bank	570	15	XB	(P) A	

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF44.7	Site Name: MFAR bdow French Meadows	Date: 09/12/2007
Wetted Width (m): 5.5	Bankfull Width (m): 25.0	Bankfull Height (cm): 76

Transect J

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	145	24.5	CB	P (A)	60
Center	290	42.5	RS	P (A)	
Right Center	435	39.5	SB	P (A)	
Right Bank	590	15	FN	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

	eroded	vulnerable	stable
Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy>75% 2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (0) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m): 7.5

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	60
Run	40
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	3	GC	(P) A	
Left Center	137.5	12	CB	P (A)	70
Center	375	0	x8	P (A)	
Right Center	512.5	0	WD	P (A)	
Right Bank	750	18.5	RS	(P) A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: MF44.7	Site Name: MFAE below French Meadows	Date: 09/12/2007
Wetted Width (m): 8.1	Bankfull Width (m): 24.0	Bankfull Height (cm): 106.5

Transect K

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	45
Left Center	202.5	0	RS	P (A)	
Center	405	33.5	RS	P (A)	
Right Center	607.5	18.5	SB	(P) A	
Right Bank	810	0	XB	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 (3) 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Upstream (**required**) ☑
Camera 6282 10-10-07
081

Downstream (**optional**) ☑
Camera 6282 10-10-07
082

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: MF44.7	Date: 09/12/2007	**FULL FORM**

Site Map:

Field Notes/ Comments:

Area heavily affected by Star Fire ~10 years ago

Some signs of salvage logging

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

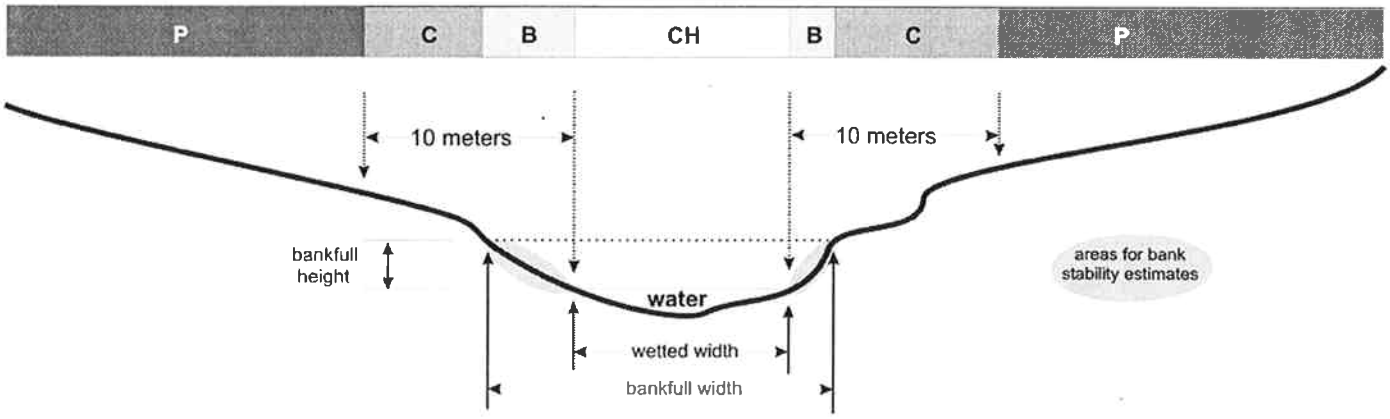


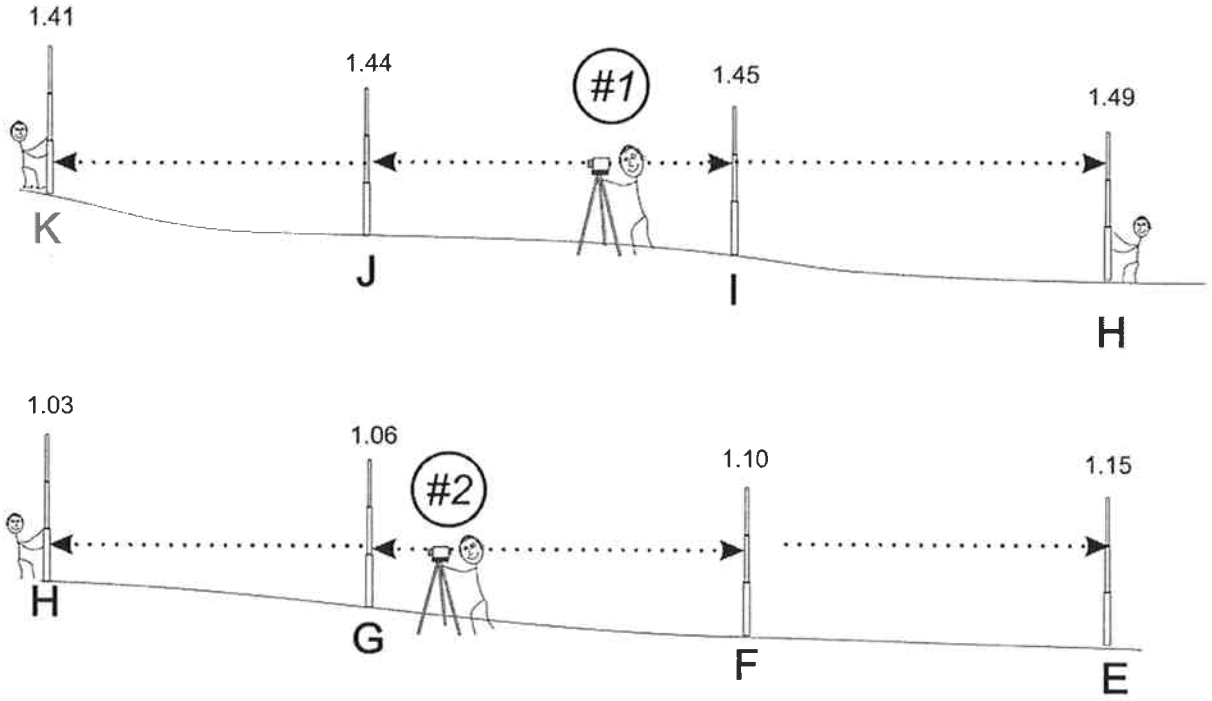
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA	Date: 09-29-07	Time: 11:05
Stream Name: Rubicon River	Site Name/ Description: Rubicon @ Long Canyon	
Site Code: R3.5	Crew Members: PG, JT	
Latitude: °N 38.984165	datum: ~~NAD83~~ *other:*	
Longitude: °W 120.695737		

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	11.0	pH	7.2	Alkalinity (mg/L)	—	Turbidity (ntu; *optional*)	0.9
Dissolved O_2 (mg/L)	9.6	Specific Cond. (µS)	49	Salinity (mg/L)	0.02	Dissolved Silica (*optional*)	—

REACH LENGTH

(see reach length guidelines at top of form)

Actual Length (m)	250

Explanation:

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible ☐ (explain in field notes section)

VELOCITY AREA METHOD (preferred)

Transect Width:

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1				11			
2	Gage Discharge			12			
3				13			
4				14			
5	Gage PE=3			15			
6				16			
7	Discharge 61cfs			17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO ☐	~~minimal~~ ☐	>10% flow increase ☐
Evidence of fires in reach or immediately upstream (<500 m)	~~NO~~ ☐	< 1 year ☐	< 5 years ☐
Dominant landuse/ landcover in area surrounding reach	Agriculture ☐	~~Forest~~ ☐	Rangeland ☐
	Urban/ Industrial ☐	Suburb/Town ☐	Other ☐

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: R3.5 Date: 09/24/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		2%	25	260°						
I		1%	25	260°						
H		2%	25	250°						
G		4%	25	260°						
F		2%	25	250°						
E		1%	25	250°						
D		1%	25	250°						
C		2%	25	250°						
B		1%	25	240°						
A		1%	25	240°						
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive; embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form — *FULL VERSION* — *Revision Date: July 10, 2007*

Site Code: R3.5	Site Name: Robicon @ Longcanyon	Date: 09/24/2007
Wetted Width (m): 21.2	Bankfull Width (m): 36.0	Bankfull Height (cm): 61

Transect A

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	15
Left Center	530	23	SB	P (A)	—
Center	1060	40	CB	P (A)	50
Right Center	1590	39.5	CB	P (A)	0
Right Bank	2120	0	CB	(P) A	5

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 2 3 (4)
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m): 20.2

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	80
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	50
Left Center	505	50.5	GC	(P) A	
Center	1010	45.5	SB	P (A)	
Right Center	1515	67	XB	(P) A	
Right Bank	2020	0	GC	P (A)	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Downstream **(required)** ☐ IMG_0656.JPG

Upstream **(optional)** ☐ IMG_0657.JPG

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: R3.S	Site Name: Rubicon @ Long Canyon	Date: 07/24/2007
Wetted Width (m): 20.4	Bankfull Width (m): 24.0	Bankfull Height (cm): 45.5

Transect B

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	—
Left Center	510	70	RS	(P) A	—
Center	1020	70	RS	P (A)	—
Right Center	1530	33.5	CB	P (A)	10
Right Bank	2040	0	CB	(P) A	5

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y	N	(0)	B	C	P
Buildings	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)			(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y	(N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y	(N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)			(0)	B	C	P
Row Crops	P	C	B	(0)			(0)	B	C	P
Pasture/ Range	P	C	B	(0)			(0)	B	C	P
Logging Operations	P	C	B	(0)			(0)	B	C	P
Mining Activity	P	C	B	(0)	Y	(N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)			(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y	(N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)			(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 18.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	40
Run	60
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	—
Left Center	450	42.5	SB	P (A)	—
Center	900	58	SB	P (A)	—
Right Center	1350	21.5	SB	P (A)	—
Right Bank	1800	0	SB	P (A)	—

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: R3.5	Site Name: Robicon @ Longcanyon	Date: 09/24/2007
Wetted Width (m): 18.0	Bankfull Width (m): 25.0	Bankfull Height (cm): 70

Transect C

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P (A)	--
Left Center	450	3	XB	P (A)	--
Center	900	27.5	CB	P (A)	10
Right Center	1350	55	CB	P (A)	20
Right Bank	1800	0	CB	P (A)	20

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y N	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y N	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*

Center Left	(0)
Center Upstream	(0)
Center Downstream	(0)
Center Right	(0)
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 19.5

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	30
Run	70
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	(P) A	
Left Center	460	0	XB	P (A)	
Center	910	106.5	GC	P (A)	
Right Center	1370	92.5	CB	P (A)	40
Right Bank	1830	0	SB	P (A)	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R3.5	Site Name: Rubicon @ Long Canyon	Date: 09/24/2007
Wetted Width (m): 16.0	Bankfull Width (m): 17.0	Bankfull Height (cm): 61

Transect D

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	
Left Center	400	61	RS	(P) A	
Center	800	85.5	CB	P (A)	20
Right Center	1200	88.5	SA	P (A)	
Right Bank	1600	0	SB	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy>75%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 2 3 (4)
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 14.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	
Left Center	370	45.5	SB	P (A)	
Center	740	45.5	SB	P (A)	
Right Center	1110	27.5	SB	P (A)	
Right Bank	1480	0	SB	P (A)	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R3,S	Site Name: Robicon @ long canyon	Date: 09/24/2007
Wetted Width (m): 18,8	Bankfull Width (m): 20,1	Bankfull Height (cm): 49

Transect E

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	(P) A	
Left Center	470	64	GC	(P) A	
Center	940	97,5	XB	P (A)	
Right Center	1410	45,5	CB	P (A)	70
Right Bank	1880	0	CB	(P) A	40

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3. 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 2 3 (4)
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (0) 2 3 4
Overhang. Vegetation	0 (0) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 18,0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	100
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	(P) A	
Left Center	400	213,5	-	P (A)	
Center	800	213,5	-	P (A)	
Right Center	1200	103,5	SB	P (A)	
Right Bank	1600	0	CB	(P) A	10

Inter transect too deep for substrate measurement — most likely small boulders.

*Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page (**direct measurements are preferred**)*

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: R3.5	Site Name: Robicon@Long Canyon	Date: 09/24/2007
Wetted Width (m): 12.0	Bankfull Width (m): 13.3 V	Bankfull Height (cm): 55

Transect F

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	
Left Center	300	274+	—	P A	
Center	600	274+	—	P A	
Right Center	900	64	SB	P (A)	
Right Bank	1200	0	SB	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	(0) 1 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0)	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	(0)	1	2	3	4
Boulders	0	1	2	3	(4)
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	(0)	1	2	3	4
Undercut Banks	0	(1)	2	3	4
Overhang. Vegetation	0	(1)	2	3	4
Live Tree Roots	(0)	1	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 9.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	30
Run	40
Glide	
Pool	30
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	
Left Center	225	55	CB	P (A)	40
Center	450	55	CB	P (A)	30
Right Center	675	30.5	CB	P (A)	10
Right Bank	900	0	CB	P (A)	20

Note: *Substrate sizes can be recorded either as direct measuros of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Downstream **(required)** ☐ IMG_0659.JPG

Upstream **(required)** ☐ IMG_0660.JPG

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: R3S	Site Name: Rubicon @ Longcanyon	Date: 09/24/2007
Wetted Width (m): 13.0	Bankfull Width (m): 15.1	Bankfull Height (cm): 52

Transect G

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	325	82.5	CB	P (A)	50
Center	650	45.5	CB	P (A)	50
Right Center	975	15	CB	P (A)	0
Right Bank	13.00	0	CB	P (A)	40

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	(0) 1 2 3 4
Herbs/ grasses	0 1 (2) 3 4	(0) 1 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	(0) 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0	(1)	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	(0)	1	2	3	4
Boulders	0	1	2	(3)	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	(0)	1	2	3	4
Undercut Banks	0	(1)	2	3	4
Overhang. Vegetation	0	(1)	2	3	4
Live Tree Roots	(0)	1	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 9.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	50
Run	20
Glide	
Pool	30
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	245	61	CB	P (A)	0
Center	490	24.5	GF	P (A)	
Right Center	735	9	CB	P (A)	75
Right Bank	980	0	CB	(P) A	30

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — *FULL VERSION* — *Revision Date: July 10, 2007*

Site Code: R3.5 | Site Name: Robicon @ Lawrence Canyon | Date: 09/24/2007

Wetted Width (m): 18.2 | Bankfull Width (m): 21.1 | Bankfull Height (cm): 42.5

Transect H

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	
Left Center	455	3	GC	P (A)	
Center	910	9	CB	P (A)	10
Right Center	1365	18.5	CB	P (A)	50
Right Bank	1820	0	CB	(P) A	20

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel **Channel (record Yes or No)**

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	6
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 20.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	70
Run	
Glide	30
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P A	
Left Center	520	15	CB	P A	30
Center	1040	9	CB	P A	5
Right Center	1560	24.5	CB	P A	25
Right Bank	2080	0	CB	P A	20

Note**: Substrate sizes can be recorded either as diameter measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R3S	Site Name: Rubicon @ Long Canyon	Date: 09/24/2007
Wetted Width (m): 24.4	Bankfull Width (m): 26.0	Bankfull Height (cm): 42.5

Transect 1

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	
Left Center	610	30.5	CB	P (A)	
Center	1220	24.5	GC	P (A)	
Right Center	1830	52	CB	P (A)	
Right Bank	2440	0	SA	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 2 (3) 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0)	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	(0)	1	2	3	4
Boulders	0	(1)	2	3	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	0	(1)	2	3	4
Undercut Banks	0	(1)	2	3	4
Overhang Vegetation	0	1	(2)	3	4
Live Tree Roots	0	(1)	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m): 20.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	30
Run	
Glide	40
Pool	30
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	(P) A	
Left Center	510	0	SB	P (A)	
Center	1020	27.5	CB	P (A)	50
Right Center	1530	79.5	CB	P (A)	30
Right Bank	2040	0	RS	P (A)	

Note: Substrate sizes can be recorded either a direct measures of the median axis of each particle or one of size class categories listed on the supplemental page ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: R3,5 | Site Name: Robicon @ Long Canyon | Date: 09/24/2007

Wetted Width (m): 18,8 | Bankfull Width (m): 19,5 | Bankfull Height (cm): 67

Transect J

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	470	24,5	CB	P (A)	15
Center	940	33,5	CB	P (A)	10
Right Center	1310	82,5	CB	P (A)	0
Right Bank	1880	0	RS	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 (2) 3 4
Herbs/ grasses	(0) 1 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	(0) 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m):

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	70
Run	30
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	470	49	CB	P (A)	30
Center	940	6	SB	P (A)	
Right Center	1310	6	CB	P (A)	10
Right Bank	1880	0	CB	P (A)	10

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: R3.5	Site Name: Rubicon @ long canyon	Date: 09/29/2007
Wetted Width (m): 19.8	Bankfull Width (m): 21.1	Bankfull Height (cm): 49

Transect K

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P A	
Left Center	490	74.5	CB	P A	50
Center	990	27.5	SB	P A	
Right Center	1490	15	CB	P A	15
Right Bank	1980	0	SB	P A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 2 (3) 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 (1) 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Upstream (**required**) ☐

IMG_0661.JPG

Downstream (**optional**) ☐

IMG_0662.JPG

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: R3.5	Date: 09124/2007	**FULL FORM**

Site Map:

Field Notes/ Comments:

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

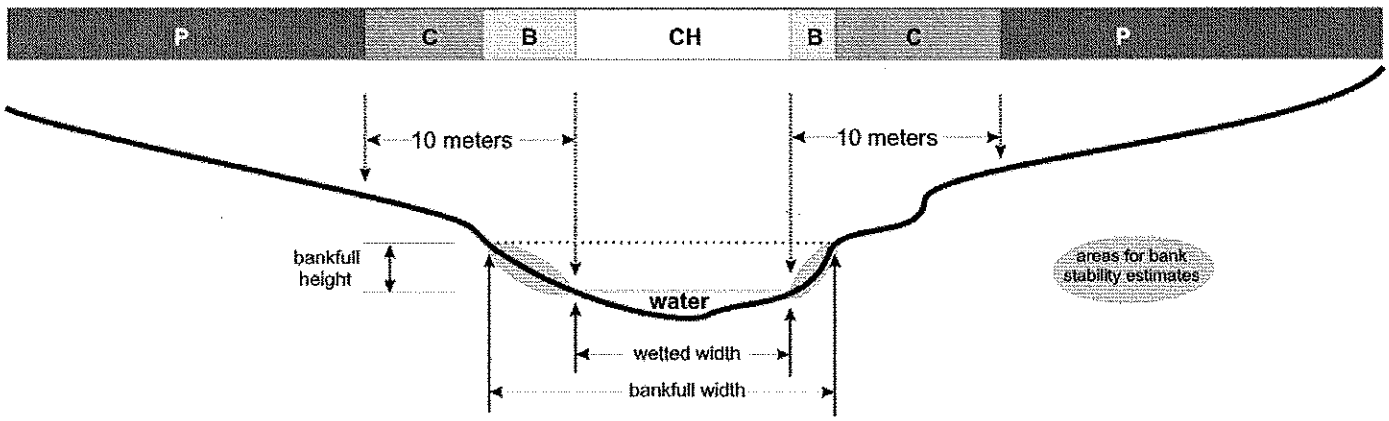


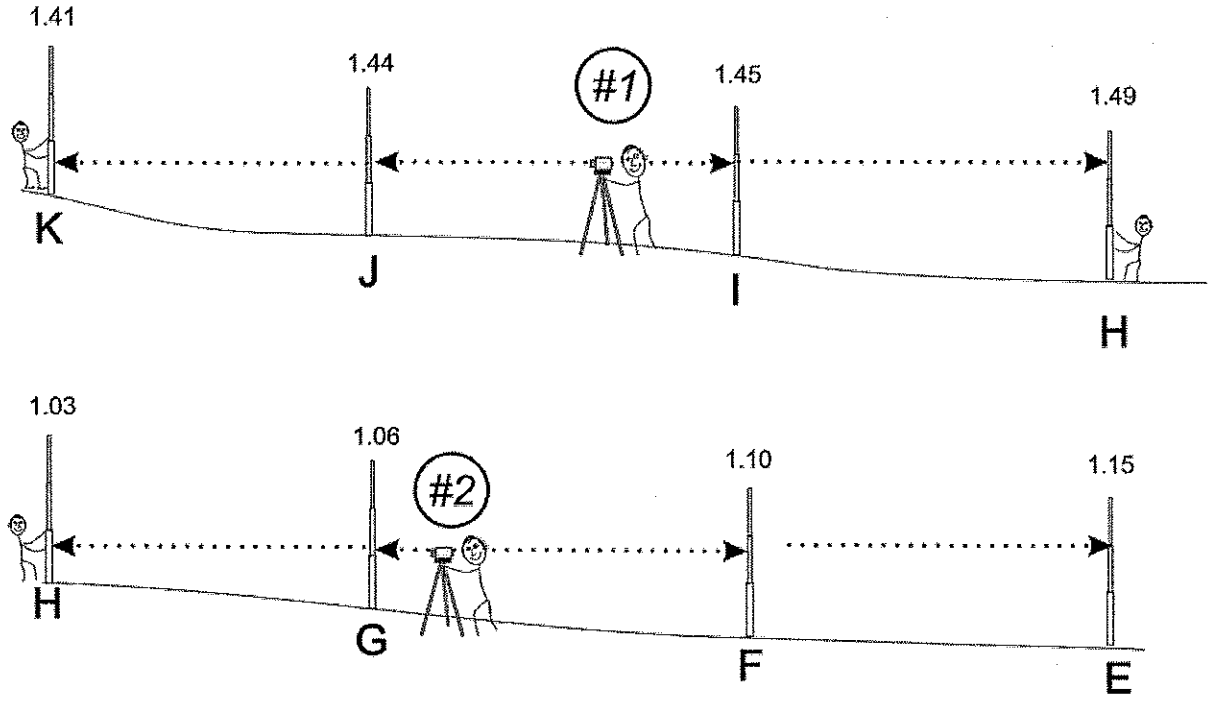
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA	Date: 09-25-2007	Time: 1245
Stream Name: Rubicon River	Site Name/ Description: Rubicon at Ellicott Bridge	
Site Code: R20.9	Crew Members: P.G., T.D	
Latitude: °N 38.960018	datum: NAD83 / other:	X
Longitude: °W 120.483568		X

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	12.5	pH	8.2	Alkalinity (mg/L)	—	Turbidity (ntu, *optional*)	—
Dissolved O_2 (mg/L)	10.4	Specific Cond. (µS)	47	Salinity (mg/L)	0.02	Dissolved Silica (*optional*)	—

REACH LENGTH
(see reach length guidelines at top of form)

Actual Length (m)	250
Explanation:	

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

Transect Width:

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1				11			
2	Gage Discharge			12			
3				13			
4	Gage PF-6			14			
5				15			
6	Discharge ≥ 30 cfs			16			
7				17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO	X	minimal		>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO	X	< 1 year		< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest	X	Rangeland	
	Urban/ Industrial		Suburb/Town		Other	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: R20.9 Date: 09/25/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm ☐ % ☒	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		6	25	300	100					
I		2	25	280	100					
H		2	25	280	100					
G		0	25	270	100					
F		0	25	270	100					
E		1	25	260	100					
D		1	25	260	100					
C		3	25	240	100					
B		2	25	240	100					
A		2	25	240	100					
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive: embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R20,4	Site Name: Rubicon at Ellicott	Date: 09/25/2007
Wetted Width (m): 17.2	Bankfull Width (m): 21.5	Bankfull Height (cm): 55

Transect A

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	(P) A	—
Left Center	430	36.5	XB	P (A)	—
Center	860	46.7	CB	P (A)	20
Right Center	1290	0	GC	P (A)	—
Right Bank	1720	0	CB	P (A)	—

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 (1) 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 3 (4)
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m): 14.6

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	80
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P A	—
Left Center	365	36.5	CB	P A	40
Center	730	12	XB	P A	—
Right Center	1095	55	CB	P A	60
Right Bank	1460	15	GF	P A	—

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) ☒
Camera 6288
10-05-07 665

Upstream (**optional**) ☒
Camera 6288
10-05-07 666

SWAMP Stream Habitat Characterization Form FULL VERSION *Revision Date: July 10, 2007*

Site Code: R20,9	Site Name: Rubicon at Ellicott	Date: 09/26/2007
Wetted Width (m): 12.14	Bankfull Width (m): 19.5	Bankfull Height (cm): 64

Transect B

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	—
Left Center	310	24.5	SB	P (A)	—
Center	620	46.5	SB	P (A)	—
Right Center	930	42.5	CB	P (A)	40
Right Bank	1240	0	SB	P (A)	—

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	(0) 1 2 3 4	(0) 1 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 2 3 (4)
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 14.8

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	10
Run	90
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	70
Left Center	370	0	RS	P (A)	—
Center	740	27.5	RS	P (A)	—
Right Center	1110	18.5	RS	P (A)	—
Right Bank	1480	0	RS	P (A)	—

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R20.9	Site Name: Rubicon at Ellicott	Date: 09/26/2007
Wetted Width (m): 15.5	Bankfull Width (m): 18.3	Bankfull Height (cm): 82

Transect C

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	P (A)	—
Left Center	387.5	5	GC	P (A)	—
Center	775	0	XB	P (A)	—
Right Center	1162.5	73	RS	P (A)	—
Right Bank	1550	0	CB	P A	50

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 14.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	50
Run	50
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	—
Left Center	360	6	CB	P (A)	10
Center	720	52	RS	P (A)	—
Right Center	1180	335	SB	P (A)	—
Right Bank	1440	0	CB	P (A)	30

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: R20.9	Site Name: Rubicon at Ellicott	Date: 09/26/2007
Wetted Width (m): 18.1	Bankfull Width (m): 20.5	Bankfull Height (cm): 76

Transect D

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	—
Left Center	475	64	CB	(P) A	50
Center	950	36.5	CB	P (A)	30
Right Center	1425	24.5	SB	P (A)	—
Right Bank	1510	0	SA	P (A)	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y N	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y N	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	0	Y (N)	0	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	6
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 16.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	—
Run	70
Glide	—
Pool	30
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P (A)	—
Left Center	410	73	XB	P (A)	—
Center	820	64	XB	P (A)	—
Right Center	1230	61	CB	P (A)	20
Right Bank	1640	0	CB	P (A)	30

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R20,9	Site Name: Rubicon at Ellicott	Date: 09/26/2007
Wetted Width (m): 13.6	Bankfull Width (m): 18.6	Bankfull Height (cm): 61

Transect E

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	–
Left Center	340	15	XB	P (A)	–
Center	680	36.5	XB	P (A)	–
Right Center	1020	0	CB	P (A)	20
Right Bank	1360	0	CB	P A	20

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	(0) 1 2 3 4	(0) 1 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 (3) 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 2 3 (4)
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 12.5

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	–
Rapid	–
Riffle	–
Run	50
Glide	–
Pool	50
Dry	–

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	30
Left Center	312	6	XB	P (A)	–
Center	625	55	GF	P (A)	–
Right Center	937	18	GC	P (A)	–
Right Bank	1250	0	SB	(P) A	–

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code:	Site Name:	Date:
R20,9	Rubicon at Ellicott	09/26/2007

Wetted Width (m):	Bankfull Width (m):	Bankfull Height (cm):	**Transect F**
22.0	23.0	67	

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	(P) A	—
Left Center	550	30.5	CB	P (A)	40
Center	1100	94.5	CB	P (A)	20
Right Center	1650	94.5	CB	P (A)	40
Right Bank	2200	0	GC	(P) A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 17.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	—
Run	—
Glide	—
Pool	100
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	P (A)	—
Left Center	440	116	CB	(P) A	30
Center	880	67	XB	P (A)	—
Right Center	1320	40	CB	P (A)	40
Right Bank	1760	119	FN	P (A)	—

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) ☒
Camera 6288 10-03-07
661

Upstream (**required**) ☒
Camera 6288 10-03-07
662

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R20,9	Site Name: Rubicon at Ellicott	Date: 09/26/2007
Wetted Width (m): 15,0	Bankfull Width (m): 15,5	Bankfull Height (cm): 76

Transect G

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	—
Left Center	375	122	CB	P (A)	60
Center	750	146,5	SB	P (A)	—
Right Center	1125	140	GC	P (A)	—
Right Bank	1500	0	RS	P (A)	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	(0) 1 2 3 4
Herbs/ grasses	(0) 1 2 3 4	(0) 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 2 3 (4)

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	(0)
Center Upstream	(0)
Center Downstream	(0)
Center Right	(0)
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 12,5

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	—
Run	—
Glide	—
Pool	100
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	XB	P (A)	—
Left Center	313	91	GF	P (A)	—
Center	625	143	GF	P (A)	—
Right Center	938	295,5	CB	(P) A	20
Right Bank	1250	274,5	CB	(P) A	20

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R20.9	Site Name: Rubicon at Ellicott	Date: 09/26/2007
Wetted Width (m): 9.8	Bankfull Width (m): 13.0	Bankfull Height (cm): 55

Transect H

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	P (A)	—
Left Center	245	46	BS	P (A)	—
Center	490	174	CB	P (A)	40
Right Center	735	186	XB	P (A)	—
Right Bank	980	0	CB	P (A)	30

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 (1) 2 3 4
Herbs/ grasses	(0) 1 2 3 4	(0) 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 10.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	50
Run	—
Glide	—
Pool	50
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P A	10
Left Center	260	39.5	CB	P (A)	30
Center	520	42.5	GC	P (A)	—
Right Center	780	15	SB	P (A)	—
Right Bank	1040	3	SB	P (A)	—

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R20,9	Site Name: Rubicon at Ellicott	Date: 09/26/2007
Wetted Width (m): 17.8	Bankfull Width (m): 19.0	Bankfull Height (cm): 42.5

Transect I

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	—
Left Center	445	134	GF	P (A)	—
Center	890	143	GF	(P) A	—
Right Center	1335	140	GF	P (A)	—
Right Bank	1780	0	GF	(P) A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y	(N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)			(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y	(N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y	(N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)			(0)	B	C	P
Row Crops	P	C	B	(0)			(0)	B	C	P
Pasture/ Range	P	C	B	(0)			(0)	B	C	P
Logging Operations	P	C	B	(0)			(0)	B	C	P
Mining Activity	P	C	B	(0)	Y	(N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)			(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y	(N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)			(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m): 14.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	20
Run	—
Glide	—
Pool	80
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P A	10
Left Center	365	15.5	CB	P A	20
Center	730	20.1	RS	P A	—
Right Center	1095	33.5	SB	P A	—
Right Bank	1460	3	GF	P A	—

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R20.9	Site Name: Rubicon at Ellicott	Date: 09/26/2007
Wetted Width (m): 6.0	Bankfull Width (m): 10.5	Bankfull Height (cm): 55

Transect J

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	XB	P (A)	—
Left Center	150	0	XB	P (A)	—
Center	300	15	XB	P (A)	—
Right Center	450	12	RS	P (A)	—
Right Bank	600	0	RS	P (A)	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	(0) 1 2 3 4
Herbs/ grasses	(0) 1 2 3 4	(0) 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 2 3 (4)

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	(0) 1 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m): 4.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	90
Rapid	—
Riffle	10
Run	—
Glide	—
Pool	—
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	—
Left Center	110	88.5	RS	P (A)	—
Center	220	58	XB	P (A)	—
Right Center	330	0	XB	P (A)	—
Right Bank	440	9	GC	P (A)	—

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R20.9	Site Name: Rubicon at Ellicott	Date: 09/25/2007
Wetted Width (m): 10.4	Bankfull Width (m): 13.7	Bankfull Height (cm): 42

Transect K

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	–
Left Center	260	15	SB	P (A)	–
Center	520	0	SB	P (A)	–
Right Center	780	0	XB	P (A)	–
Right Bank	1040	0	CB	P (A)	30

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	(0) 1 2 3 4
Herbs/ grasses	(0) 1 2 3 4	(0) 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 2 3 (4)

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 2 3 (4)
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Upstream (**required**) ☑
Camera 6288
10-03-07 663

Downstream (**optional**) ☐
Camera 6288
10-03-07 664

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code:	Date: 09 12 5 2007	**FULL FORM**

Site Map:

Field Notes/ Comments:

Large bedrock pool in reach. RW samples taken on Transects but closer to bank, center too deep.

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

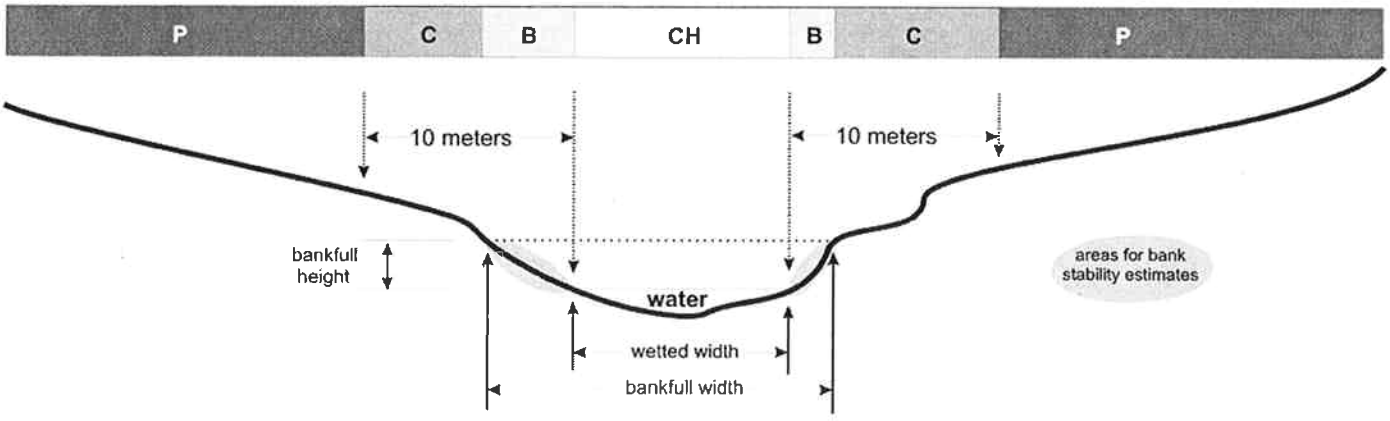


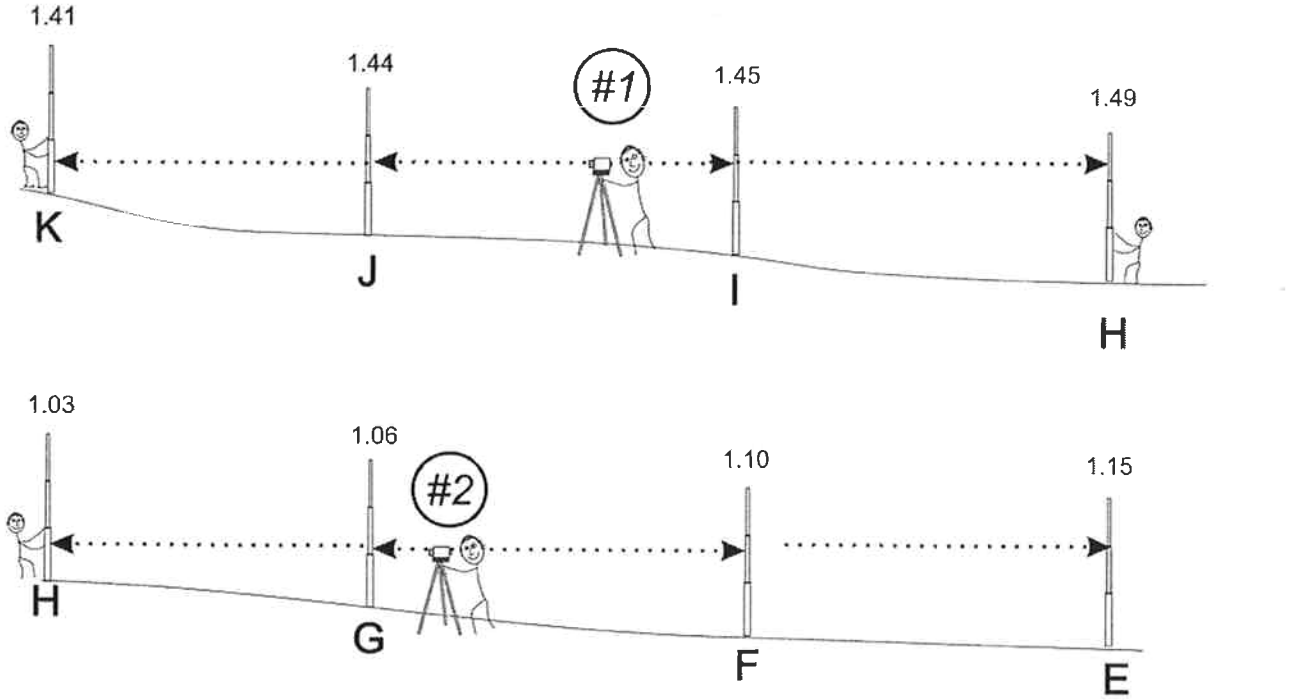
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA	Date: 09-24-2007	Time:
Stream Name: Rubicon River	Site Name/ Description: Rubicon River below Hell Hole	
Site Code: R25.7	Crew Members: CUD, TDG, DJ, BF, CB	
Latitude: °N 39.001785	datum: NAD83 / other:	
Longitude: °W 120.449466		

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	11.5	pH	—	Alkalinity (mg/L)	—	Turbidity (ntu, *optional*)	—
Dissolved O_2 (mg/L)	—	Specific Cond. (µS)	—	Salinity (mg/L)	—	Dissolved Silica (*optional*)	—

REACH LENGTH
(see reach length guidelines at top of form)

Actual Length (m)	250 m
Explanation:	

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

Transect Width: 10.5 m

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1	50	24.5	0.02	11			
2	150	55	0.12	12			
3	250	58	0.37	13			
4	350	64	0.38	14			
5	450	53.5	0.06	15			
6	550	42.5	0.04	16			
7	650	39.5	0.02	17			
8	750	36.5	0.01	18			
9	850	30.5	0.03	19			
10	950	6	0.0	20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO		minimal	X	>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO	X	< 1 year		< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest	X	Rangeland	
	Urban/ Industrial		Suburb/Town		Other	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: R2-5.7 Date: 09/24/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm☐ %☒	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm☐ %☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		0%	25	140°						
I		2%	25	176°						
H		1%	25	192°						
G		0%	25	190°						
F		0%	25	190°						
E		0.5%	25	197°						
D		1%	25	184°						
C		1.5%	25	158°						
B		1.5%	25	156°						
A		2%	25	155°						
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive: embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R2S.7	Site Name: Rubicon River below Hull Hole	Date: 09/24/2002
Wetted Width (m): 29.3	Bankfull Width (m): 32.5	Bankfull Height (cm): 45.5

Transect A

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	24.5	SB	(P) A	
Left Center	733	21.5	GC	(P) A	
Center	1465	15	SB	P (A)	
Right Center	2197	0	XB	(P) A	
Right Bank	2930	0	XB	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m): 18.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	100
Run	
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	465	21.5	XB	(P) A	
Center	930	29	XB	P (A)	
Right Center	1395	0	XB	P (A)	
Right Bank	1860	0	XB	(P) A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) Camera 6288 10-05-02 ☑
660

Upstream (**optional**) Camera 6288 10-05-02 ☑
659

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R2S.7	Site Name: Pabiron River bdwalk/Hdc	Date: 09/24/2007
Wetted Width (m): 17.7	Bankfull Width (m): 25.0	Bankfull Height (cm): 76

Transect B

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P A	
Left Center	443	21.5	CB	P A	10
Center	885	29	SB	P A	
Right Center	1327	0	GC	P A	
Right Bank	1770	0	XB	P A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	0	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	0	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	0	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	0	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 2 (3) 4	0 1 (2) 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	(0) 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 19.0

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	80
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P (A)	
Left Center	350	0	SB	P (A)	
Center	700	42.5	XB	P (A)	
Right Center	1050	42.5	CB	P (A)	70
Right Bank	1400	0	CB	(P) A	20

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R25.7	Site Name: Robicon River below Hall Hole	Date: 09/24/2007
Wetted Width (m): 13.0	Bankfull Width (m): 30.0	Bankfull Height (cm): 122

Transect C

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	325	61	CB	P (A)	50
Center	650	0	XB	(P) A	
Right Center	975	0	CB	(P) A	20
Right Bank	1300	0	SB	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 16.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	10
Run	70
Glide	
Pool	20
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	(P) A	
Left Center	405	30.5	SB	P (A)	
Center	930	15	SB	P (A)	
Right Center	1245	30.5	CB	P (A)	40
Right Bank	1660	0	SB	(P) A	

Note. *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R25.7	Site Name: Robicon River below Hell Hole	Date: 09/24/2007
Wetted Width (m): 14.7	Bankfull Width (m): 21.5	Bankfull Height (cm): 91.5

Transect D

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	367	61	CB	P (A)	30
Center	735	49	GC	P (A)	
Right Center	1102	33.5	GC	(P) A	
Right Bank	1470	0	SB	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 1 (2) 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 7.5

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	80
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	70
Left Center	188	70	CB	(P) A	70
Center	375	30.5	SB	P (A)	
Right Center	563	30.5	SB	P (A)	
Right Bank	750	0	CB	(P) A	90

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R2S.7	Site Name: Rubicon River below Hwy 50	Date: 09/24/2007
Wetted Width (m): 8.7	Bankfull Width (m): 14.0	Bankfull Height (cm): 61

Transect E

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P A	40
Left Center	217	24.5	SB	P A	
Center	435	9	SB	P A	
Right Center	642	30.5	CB	P A	50
Right Bank	870	0	CB	P A	0

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y	N	0	B	C	P
Buildings	P	C	B	0	Y	N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0			0	B	C	P
Road/ Railroad	P	C	B	0	Y	N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y	N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y	N	0	B	C	P
Park/ Lawn	P	C	B	0			0	B	C	P
Row Crops	P	C	B	0			0	B	C	P
Pasture/ Range	P	C	B	0			0	B	C	P
Logging Operations	P	C	B	0			0	B	C	P
Mining Activity	P	C	B	0	Y	N	0	B	C	P
Vegetation Management	P	C	B	0			0	B	C	P
Bridges/ Abutments	P	C	B	0	Y	N	0	B	C	P
Orchards/ Vineyards	P	C	B	0			0	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 11.4

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	6	0	SB	P A	
Left Center	285	24.5	GC	P A	
Center	570	36.5	SB	P A	
Right Center	855	33.5	CB	P A	0
Right Bank	1140	0	CB	P A	70

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R25.7	Site Name: Ribicon River below Hell Hole	Date: 09/24/2007
Wetted Width (m): 10.2	Bankfull Width (m): 18.5	Bankfull Height (cm): 76

Transect F

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P A	90
Left Center	255	30.5	GP	P A	
Center	510	33.5	CB	P A	0
Right Center	765	15	CB	P A	0
Right Bank	1020	0	SB	P A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y N	0	B	C	P
Buildings	P	C	B	0	Y N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y N	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y N	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y N	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 9.2

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	30
Glide	
Pool	70
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	FN	P A	
Left Center	230	61	CB	P A	40
Center	460	61	SB	P A	
Right Center	690	18.5	SB	P A	
Right Bank	920	0	CB	P A	40

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) ☐ next Transect →

Upstream (**required**) → ☐ next Transect

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R257	Site Name: Rubicon River below Hell Hole	Date: 09/24/2007
Wetted Width (m): 9.1	Bankfull Width (m): 17.0	Bankfull Height (cm): 91.5

Transect G

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	227	58	CB	P (A)	80
Center	455	49	SB	P (A)	
Right Center	683	58	CB	P (A)	20
Right Bank	910	0	CB	P (A)	10

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 9.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	100
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	79.5	GC	P (A)	
Left Center	210	76	CB	P (A)	50
Center	420	76	CB	(P) A	0
Right Center	630	45.5	SB	(P) A	
Right Bank	840	0	CB	(P) A	90

Photos | Down
Camera 6288 10-03-07
655

UP
Camera 6288 10-03-07
656

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R25,7	Site Name: Robinson River Indian Hill Hole	Date: 09/24/2007
Wetted Width (m): 7.7	Bankfull Width (m): 12.0	Bankfull Height (cm): 106.5

Transect H

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	FN	P (A)	
Left Center	193	73	SA	P (A)	
Center	385	109.5	CB	P (A)	0
Right Center	577	58	CB	(P) A	0
Right Bank	770	0	SB	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 1 (2) 3 4
Undercut Banks	0 1 (2) 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 1 (2) 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 5.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	80
Run	20
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	(P) A	
Left Center	140	9	SB	P (A)	
Center	280	33.5	CB	P (A)	0
Right Center	420	18.5	CB	P (A)	40
Right Bank	560	0	SB	(P) A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code:	Site Name:	Date:
R2S.7	Rubicon River below Hell Hole	04/24/2007

Wetted Width (m):	Bankfull Width (m):	Bankfull Height (cm):	**Transect 1**
7.4	12.5	61	

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	40
Left Center	185	27.5	CB	P (A)	0
Center	370	33.5	GC	P (A)	
Right Center	555	6	CB	P (A)	70
Right Bank	740	0	CB	(P) A	0

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 2 (3) 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m): 5.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	30
Run	70
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	45
Left Center	125	24.5	GC	P (A)	
Center	250	55	CB	P (A)	10
Right Center	375	6	CB	P (A)	0
Right Bank	500	0	CB	(P) A	30

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R25.7	Site Name: Rubicon River below Wall Hole	Date: 04/24/2007
Wetted Width (m): 21.8	Bankfull Width (m): 37.0	Bankfull Height (cm): 46.5

Transect J

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P (A)	
Left Center	545	0	CB	P (A)	0
Center	1090	9	SB	P (A)	
Right Center	1635	12	CB	P (A)	0
Right Bank	2180	0	CB	P (A)	50

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	(eroded)	vulnerable	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m): 25.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	80
Run	
Glide	20
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	
Left Center	625	34.5	GC	P (A)	
Center	1250	21.5	GF	P (A)	
Right Center	1875	0	SB	(P) A	
Right Bank	2500	0	SB	(P) A	

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size-class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: R2-5.7	Site Name: Rubicon R. 2 below Hull Hole	Date: 09/24/2007
Wetted Width (m): 20.0	Bankfull Width (m):	Bankfull Height (cm):

Transect K

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	20
Left Center	500	24.5	CB	(P) A	0
Center	1000	3	SB	(P) A	
Right Center	1500	33.5	GF	(P) A	
Right Bank	2000	0	CB	(P) A	0

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	~~vulnerable~~	stable
Right Bank	eroded	~~vulnerable~~	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y (N)	0	B	C	P
Buildings	P	C	B	0	Y (N)	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y (N)	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y (N)	0	B	C	P
Landfill/ Trash	P	C	B	0	Y (N)	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y (N)	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y (N)	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 (3) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	(0) 1 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Upstream (**required**) Camera 6288 10-03-07 ☑
658

Downstream (**optional**) Camera 6288 10-03-07 ☑
657

Site Code: R25.7	Date: 09124/2007	**FULL FORM**

Site Map:

Field Notes/ Comments:

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

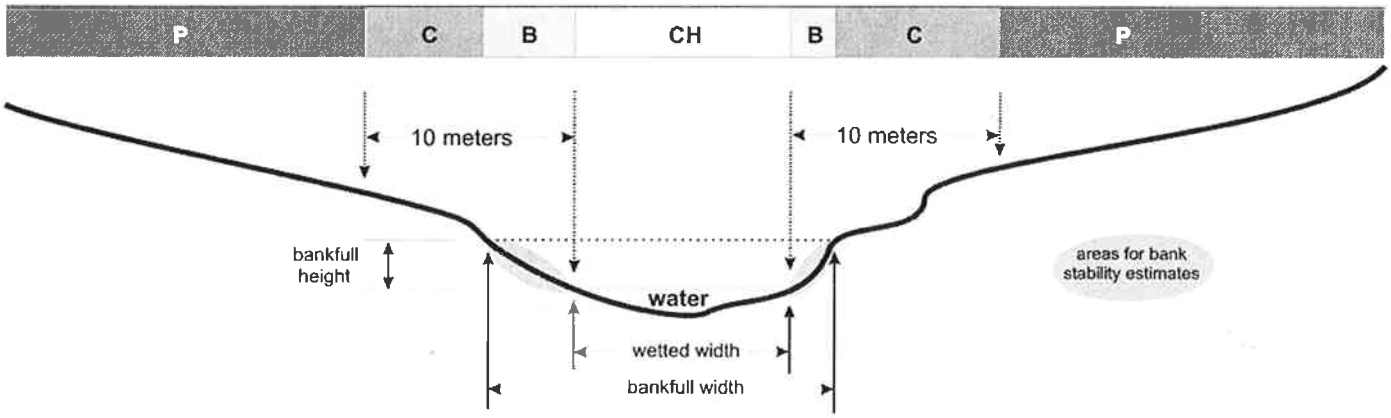


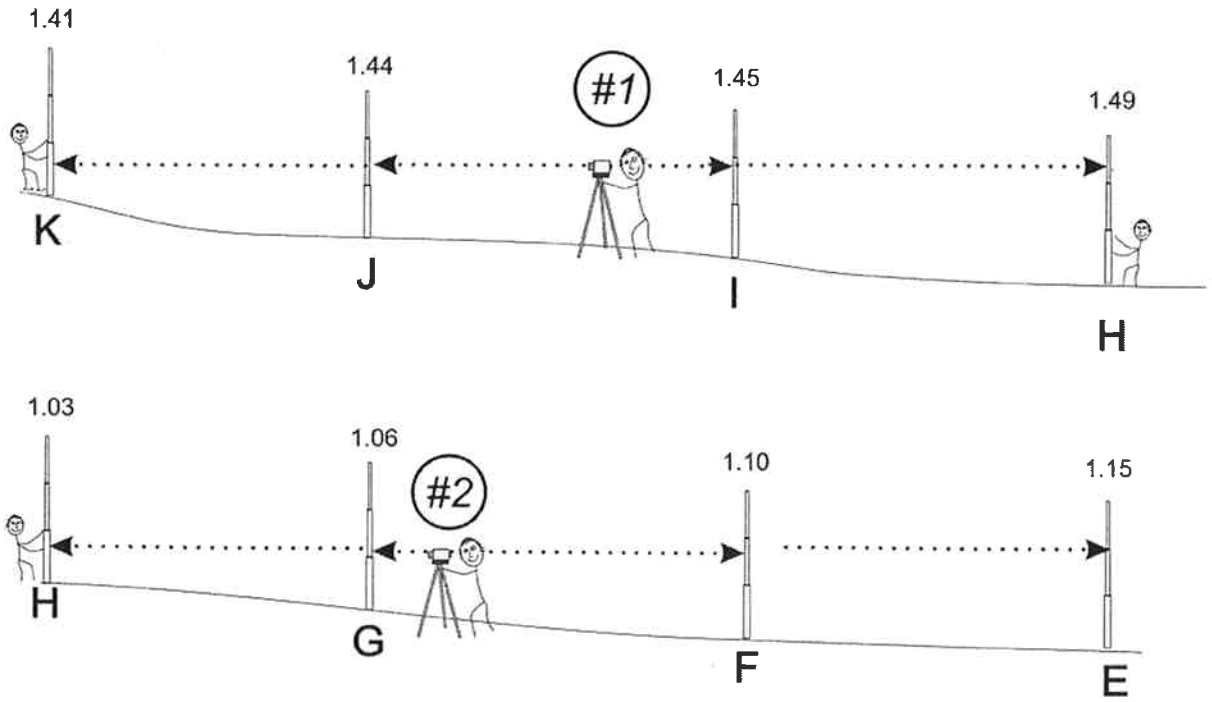
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA	Date: 09/13/2007	Time: 11:15
Stream Name: South Fork Long Canyon Creek	Site Name/ Description: SFLC below diversion	
Site Code: SFLC 2.3	Crew Members:	
Latitude: °N 39.039608	datum: NAD83	
Longitude: °W 120.482082	other:	

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	15.6	pH	7.01	Alkalinity (mg/L)	—	Turbidity (ntu, *optional*)	2.1
Dissolved O_2 (mg/L)	9.67	Specific Cond. (µS)	40	Salinity (mg/L)	0.02	Dissolved Silica (*optional*)	—

REACH LENGTH

(see reach length guidelines at top of form)

Actual Length (m)	150

Explanation:

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

Transect Width: 1.1m

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1	20	6	0	11			
2	40	9	0.03	12			
3	60	9	0.09	13			
4	80	9	0.03	14			
5	100	9	0.12	15			
6	110	0	0	16			
7				17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO	X	minimal		>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO	X	< 1 year		< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest	X	Rangeland	
	Urban/ Industrial		Suburb/Town		Other	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: SFLC2.3 Date: 09/13/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm ☐ % ☒	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		4	15	250	100					
I		1	15	250	100					
H		1	15	250	100					
G		2	15	250	100					
F		5	15	250	100					
E		1	15	250	100					
D		2	15	250	100					
C		1	15	250	100					
B		1	15	250	100					
A		1	15	250	100					
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive; embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC2.3	Site Name: SFL below diversion	Date: 09/13/2007
Wetted Width (m): 7.4	Bankfull Width (m): 12	Bankfull Height (cm): 91.5

Transect A

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P A	10
Left Center	185	10.5	GC	(P) A	—
Center	370	3	CB	P (A)	15
Right Center	550	0	SB	P (A)	—
Right Bank	740	0	GC	(P) A	—

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 (3) 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 2 (3) 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	1
Center Downstream	1
Center Right	3
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m):

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	30
Run	70
Glide	—
Pool	—
Dry	—

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	6	GC	(P) A	—
Left Center	155	9	GC	(P) A	—
Center	310	0	CB	(P) A	65
Right Center	465	4.5	CB	(P) A	45
Right Bank	620	3	FN	(P) A	—

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) Canon 6282 10-10-07 040 ☑

Upstream (**optional**) Canon 6282 10-10-07 039 ☑

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

Site Code: SFLC2.3	Site Name: SFLC below diversion	Date: 09/13/2007
Wetted Width (m): 5.5	Bankfull Width (m): 13.0	Bankfull Height (cm): 61

Transect B

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	20
Left Center	137	0	GC	(P) A	—
Center	275	6	GC	(P) A	—
Right Center	412	6	GF	(P) A	—
Right Bank	550	0	GC	(P) A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	(P)	C	B	0		0	B	C	(P)
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 (4)
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17)

count covered dots

Center Left	5
Center Upstream	8
Center Downstream	4
Center Right	5
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 3.3

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	10
Run	80
Glide	—
Pool	10
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	(P) A	—
Left Center	83	0	CB	(P) A	0
Center	165	9	GC	(P) A	—
Right Center	248	4.5	CB	(P) A	65
Right Bank	330	0	FN	(P) A	—

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC23	Site Name: SFLC below diversion	Date: 09/13/2007
Wetted Width (m): 4.0	Bankfull Width (m): 10.5	Bankfull Height (cm): —

Transect C

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	3	GC	P (A)	—
Left Center	100	12	GC	(P) A	—
Center	200	13.5	CB	(P) A	40
Right Center	300	13.5	CB	(P) A	60
Right Bank	400	0	GC	(P) A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	(eroded)	vulnerable	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		0	B	C	(P)
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 (4)
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	17
Center Upstream	17
Center Downstream	16
Center Right	3
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 3.1

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	30
Run	40
Glide	—
Pool	30
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	60
Left Center	78	3	SB	P (A)	—
Center	155	7.5	CB	(P) A	10
Right Center	233	0	CB	(P) A	60
Right Bank	310	0	GC	(P) A	—

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC2.3	Site Name: SFLC below diversion	Date: 09/13/2007
Wetted Width (m): 4.5	Bankfull Width (m): 11	Bankfull Height (cm): 61

Transect D

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	30
Left Center	113	3	CB	(P) A	55
Center	225	0	CB	(P) A	30
Right Center	338	0	SB	(P) A	—
Right Bank	450	0	CB	(P) A	85

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	(eroded)	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 (3) 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 (3) 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 1 (2) 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	5
Center Upstream	12
Center Downstream	11
Center Right	12
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 5.0

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	20
Run	60
Glide	—
Pool	20
Dry	—

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	45
Left Center	125	0	CB	(P) A	65
Center	250	0	SB	(P) A	—
Right Center	375	3	CB	(P) A	40
Right Bank	500	4.5	CB	(P) A	60

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC2.3	Site Name: SFLC below diversion	Date: 09/13/2007
Wetted Width (m): 5.1	Bankfull Width (m): 9.1	Bankfull Height (cm): 61

Transect E

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	50
Left Center	138	9	CB	(P) A	15
Center	275	9	GC	(P) A	—
Right Center	413	15	GC	(P) A	—
Right Bank	510	6	GC	(P) A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	(P)	C	B	0		0	B	C	(P)
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 (4)
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	5
Center Upstream	5
Center Downstream	7
Center Right	10
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 2.5

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	10
Run	—
Glide	—
Pool	90
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	(P) A	—
Left Center	63	18.5	RR	(P) A	—
Center	125	0	SB	(P) A	—
Right Center	188	12	CB	(P) A	5
Right Bank	250	0	GC	(P) A	—

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC2.3	Site Name: SFLC below diversion	Date: 09/13/2007
Wetted Width (m): 2.0	Bankfull Width (m): 9.0	Bankfull Height (cm): 132

Transect F

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	(P) A	—
Left Center	50	0	SB	(P) A	—
Center	100	6	SB	P (A)	—
Right Center	100	0	XB	(P) A	—
Right Bank	200	0	XB	(P) A	—

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	0	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		0	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	0	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	0	B	C	P
Park/ Lawn	P	C	B	(0)		0	B	C	P
Row Crops	P	C	B	(0)		0	B	C	P
Pasture/ Range	P	C	B	(0)		0	B	C	P
Logging Operations	P	C	B	(0)		0	B	C	(P)
Mining Activity	P	C	B	(0)	Y N	0	B	C	P
Vegetation Management	P	C	B	(0)		0	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	0	B	C	P
Orchards/ Vineyards	P	C	B	(0)		0	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 2 (3) 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 (3) 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	0 1 (2) 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*

Center Left	8
Center Upstream	7
Center Downstream	11
Center Right	12
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 3.6

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	90
Run	10
Glide	—
Pool	—
Dry	—

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	—
Left Center	90	0	RS	P (A)	—
Center	180	17	GC	(P) A	—
Right Center	270	7.5	CB	(P) A	65
Right Bank	360	6	GC	(P) A	—

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) ☑
Camera 6282 10-10-07
092

Upstream (**required**) ☑
Camera 6282 10-10-07
091

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC 2.3	Site Name: SFLC below diversion	Date: 09/13/2007
Wetted Width (m): 4.0	Bankfull Width (m): 13.5	Bankfull Height (cm): 61

Transect G

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	XB	(P) A	—
Left Center	100	0	GC	(P) A	—
Center	200	0	CB	(P) A	55
Right Center	300	0	CB	P (A)	45
Right Bank	400	0	GC	(P) A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y	(N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)			(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y	(N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y	(N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)			(0)	B	C	P
Row Crops	P	C	B	(0)			(0)	B	C	P
Pasture/ Range	P	C	B	(0)			(0)	B	C	P
Logging Operations	(P)	C	B	0			0	B	C	(P)
Mining Activity	P	C	B	(0)	Y	(N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)			(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y	(N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)			(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 (3) 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	12
Center Upstream	12
Center Downstream	15
Center Right	17
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 3.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	90
Run	10
Glide	—
Pool	—
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	40
Left Center	75	3	CB	(P) A	10
Center	150	12	GF	(P) A	—
Right Center	225	0	SB	P (A)	—
Right Bank	300	0	GC	(P) A	—

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC2.3	Site Name: SF LC below diversion	Date: 09/13/2007
Wetted Width (m): 7.0	Bankfull Width (m): 17.5	Bankfull Height (cm): 91.5

Transect H

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	40
Left Center	175	3	CB	(P) A	90
Center	350	0	SB	(P) A	—
Right Center	525	12	CB	(P) A	85
Right Bank	700	9	CB	(P) A	85

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	(eroded)	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	(P)	C	B	0		0	B	C	(P)
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 (3) 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	11
Center Upstream	11
Center Downstream	16
Center Right	5
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 5.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	—
Run	—
Glide	—
Pool	100
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	30
Left Center	135	27.5	GC	(P) A	—
Center	270	45.5	GC	P (A)	—
Right Center	405	39.5	SA	(P) A	—
Right Bank	540	0	SA	(P) A	—

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC2.3	Site Name: SFLC below diversion	Date: 07/13/2007
Wetted Width (m): 7.2	Bankfull Width (m): 7.2	Bankfull Height (cm): 70

Transect 1

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	3	SA	(P) A	—
Left Center	180	18.5	GC	(P) A	—
Center	360	55	CB	(P) A	65
Right Center	540	49	GC	(P) A	—
Right Bank	720	9	GF	(P) A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	(eroded)	vulnerable	stable
Right Bank	(eroded)	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y	N	(0)	B	C	P
Buildings	P	C	B	(0)	Y	N	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)			(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y	N	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y	N	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y	N	(0)	B	C	P
Park/ Lawn	P	C	B	(0)			(0)	B	C	P
Row Crops	P	C	B	(0)			(0)	B	C	P
Pasture/ Range	P	C	B	(0)			(0)	B	C	P
Logging Operations	(P)	C	B	0			0	B	C	(P)
Mining Activity	P	C	B	(0)	Y	N	(0)	B	C	P
Vegetation Management	P	C	B	(0)			(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y	N	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)			(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 (3) 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 1 (2) 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 (2) 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	9
Center Upstream	11
Center Downstream	11
Center Right	12
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m): 4.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	10
Run	20
Glide	—
Pool	70
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	60
Left Center	110	0	SB	P (A)	—
Center	220	13.5	CB	(P) A	40
Right Center	330	6	SB	(P) A	—
Right Bank	440	0	GC	P (A)	—

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC 2.3	Site Name: SFLC below diversion	Date: 09/13/2007
Wetted Width (m): 3.2	Bankfull Width (m): 13	Bankfull Height (cm): 48.3

Transect J

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	40
Left Center	80	0	CB	(P) A	80
Center	160	0	WD	(P) A	—
Right Center	240	0	XB	(P) A	—
Right Bank	320	9	XB	(P) A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	(eroded)	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	(P)	C	B	0		0	B	C	(P)
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 (3) 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 1 2 (3) 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	8
Center Upstream	7
Center Downstream	11
Center Right	12
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m): 1.5

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	60
Run	—
Glide	—
Pool	40
Dry	—

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	15
Left Center	38	9	SB	(P) A	—
Center	75	9	GC	P (A)	—
Right Center	112	0	CB	(P) A	15
Right Bank	150	0	GC	(P) A	—

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

Site Code: SFLC23	Site Name: SFLC below division	Date: 09/13/2007
Wetted Width (m): 9.6	Bankfull Width (m): 15	Bankfull Height (cm): —

Transect K

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	(P) A	—
Left Center	240	30.5	GC	(P) A	—
Center	480	0	CB	(P) A	90
Right Center	720	0	CB	(P) A	0
Right Bank	960	0	CB	(P) A	60

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y	(N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)			(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y	(N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y	(N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)			(0)	B	C	P
Row Crops	P	C	B	(0)			(0)	B	C	P
Pasture/ Range	(P)	C	B	0			0	B	C	(P)
Logging Operations	P	C	B	(0)			(0)	B	C	P
Mining Activity	P	C	B	(0)	Y	(N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)			(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y	(N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)			(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 2 (3) 4
Herbs/ grasses	0 1 (2) 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 (1) 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 (3) 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	8
Center Upstream	5
Center Downstream	5
Center Right	11
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Upstream (**required**) Camera 6282 10-10-07 094 ☐

Downstream (**optional**) Camera 6282 10-10-07 093 ☑

Site Code:	Date: 09/13/2007	FULL FORM

Site Map:

Field Notes/ Comments:

Signs of heavy cattle grazing

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

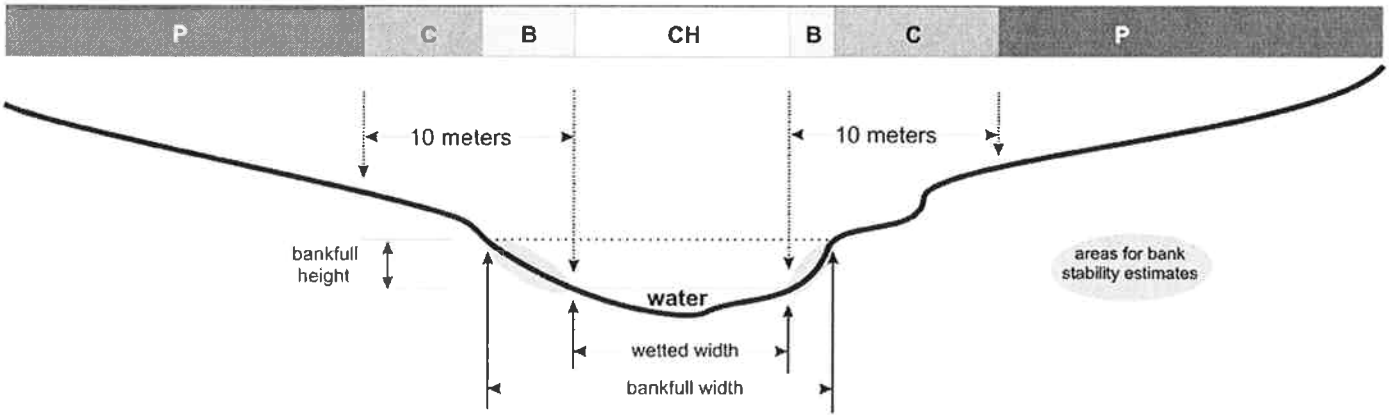


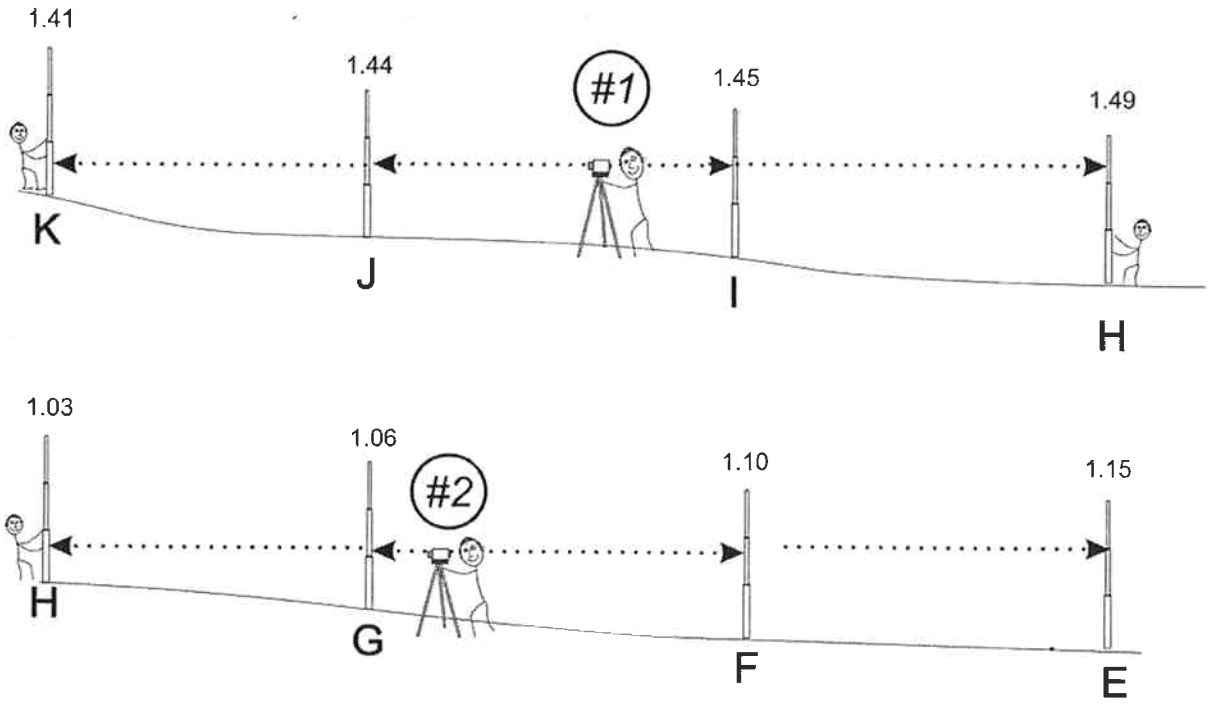
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA		Date: 09-13-2007	Time: 3:40
Stream Name: South Fork Long Canyon Creek		Site Name/ Description: SFLC above diversion	
Site Code: SFLC 4.2		Crew Members: PG, TDG, CUD, RK	
Latitude: °N 39.062820	datum: NAD83		
Longitude: °W 120.450760	other:		

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	12.7	pH	6.9	Alkalinity (mg/L)	—	Turbidity (ntu, *optional*)	—
Dissolved O_2 (mg/L)	9	Specific Cond. (µS)	50	Salinity (mg/L)	0.03	Dissolved Silica (*optional*)	—

REACH LENGTH

(see reach length guidelines at top of form)

Actual Length (m)	150 m

Explanation:

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

Transect Width: 1.0

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1	20	15	0.02	11			
2	40	9	0.05	12			
3	60	6	0.08	13			
4	80	6	0.10	14			
5				15			
6				16			
7				17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO	X	minimal		>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO	X	< 1 year		< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest	X	Rangeland	
	Urban/ Industrial		Suburb/Town		Other	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: SFLC42 Date: 09/13/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm ☐ % ☒	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		4%	15	210°						
I		2%	15	220°						
H		4%	15	240°						
G		3%	15	230°						
F		8%	15	200°						
E		3%	15	190°						
D		5%	15	180°						
C		2%	15	180°						
B		2%	15	180°						
A		3%	15	200°						
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive: embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC4.2	Site Name: SFLC above Diversion	Date: 09/13/2007
Wetted Width (m): 3.5	Bankfull Width (m): 18	Bankfull Height (cm): 76

Transect A

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	(P) A	
Left Center	87	9	CB	P (A)	10
Center	175	15	CB	(P) A	65
Right Center	262	7.5	GC	(P) A	
Right Bank	350	0	CB	(P) A	20

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y	N	(0)	B	C	P
Buildings	P	C	B	(0)	Y	N	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)			(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y	N	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y	N	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y	N	(0)	B	C	P
Park/ Lawn	P	C	B	(0)			(0)	B	C	P
Row Crops	P	C	B	(0)			(0)	B	C	P
Pasture/ Range	P	C	B	(0)			(0)	B	C	P
Logging Operations	P	C	B	(0)			(0)	B	C	P
Mining Activity	P	C	B	0	Y	N	(0)	B	C	P
Vegetation Management	P	C	B	0			(0)	B	C	P
Bridges/ Abutments	P	C	B	0	Y	N	0	B	C	P
Orchards/ Vineyards	P	C	B	0			0	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (0) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 (3) 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	19
Center Upstream	12
Center Downstream	7
Center Right	11
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m): 2.3

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	10
Run	30
Glide	
Pool	60
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	57	15	CB	P A	75
Center	115	0	CB	(P) A	50
Right Center	172	0	SB	(P) A	
Right Bank	230	0	GC	(P) A	

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) ☑
Camera 10-10-07
6182 083

Upstream (**optional**) ☑
Camera 10-10-07
6282 084

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

Site Code: SFLC 4.2	Site Name: SFLC above Diversion	Date: 09/13/2007
Wetted Width (m): 5.3	Bankfull Width (m): 14	Bankfull Height (cm): 45.5

Transect B

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	(P) A	
Left Center	133	12	SB	P (A)	
Center	265	24.5	CB	(P) A	20
Right Center	398	9	GC	(P) A	
Right Bank	530	0	CB	(P) A	40

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y	(N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)			(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y	(N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y	(N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)			(0)	B	C	P
Row Crops	P	C	B	(0)			(0)	B	C	P
Pasture/ Range	P	C	B	(0)			(0)	B	C	P
Logging Operations	P	C	B	(0)			(0)	B	C	P
Mining Activity	P	C	B	(0)	Y	N	(0)	B	C	P
Vegetation Management	P	C	B	(0)			(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y	N	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)			(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	(0) 1 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 (3) 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 1 (2) 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	22
Center Upstream	10
Center Downstream	10
Center Right	13
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 5.1

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	
Glide	
Pool	80
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	XB	P A	
Left Center	128	0	CB	(P) A	85
Center	255	6	CB	(P) A	15
Right Center	383	0	GF	(P) A	
Right Bank	510	0	CB	(P) A	55

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC 4.2	Site Name: SFLC above Diversion	Date: 09/13/2007
Wetted Width (m): 3.0	Bankfull Width (m): 12	Bankfull Height (cm): 91.5

Transect C

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	(P) A	
Left Center	75	21.5	GC	P (A)	
Center	150	27.4	CB	(P) A	15
Right Center	225	0	XB	(P) A	
Right Bank	300	0	XB	(P) A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	0 1 (2) 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 1 (2) 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	22
Center Upstream	8
Center Downstream	13
Center Right	8
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 2.2

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	50
Run	
Glide	
Pool	50
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	55	0	CB	(P) A	60
Center	110	4.5	GC	(P) A	
Right Center	165	12	GC	(P) A	
Right Bank	220	12	GC	(P) A	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC 4.2	Site Name: SFLC above Diversion	Date: 07/31/2007
Wetted Width (m): 4.4	Bankfull Width (m): 12.0	Bankfull Height (cm): 12

Transect D

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	FN	(P) A	
Left Center	110	12	GC	(P) A	
Center	220	6	CB	(P) A	45
Right Center	330	0	SB	(P) A	
Right Bank	440	4.5	CB	(P) A	90

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 3 (4)

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	13
Center Upstream	8
Center Downstream	0
Center Right	24
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 3.2

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	100
Run	
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	3	GF	P A	
Left Center	30	3	CB	(P) A	45
Center	160	9	CB	(P) A	75
Right Center	240	12	CB	(P) A	65
Right Bank	320	0	GC	(P) A	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC 4.2	Site Name: SFLC above Diversion	Date: 09/13/2007
Wetted Width (m): 5.8	Bankfull Width (m): 13.0	Bankfull Height (cm): 123

Transect E

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	FN	P A	
Left Center	145	0	SB	P A	
Center	290	0	CB	P A	10
Right Center	435	0	XB	P A	
Right Bank	580	4.5	CB	P A	60

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y N	0	B	C	P
Buildings	P	C	B	0	Y N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y N	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y N	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y N	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	12
Center Upstream	11
Center Downstream	7
Center Right	11
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 1.1

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	60
Glide	
Pool	20
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	—	—	P A	
Left Center	28	0	CB	P A	20
Center	55	0	GC	P A	
Right Center	83	0	CB	P A	70
Right Bank	110	0	CB	P A	5

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC 4.2	Site Name: SFLC above Diversion	Date: 09/13/2007
Wetted Width (m): 6.4	Bankfull Width (m): 10.5	Bankfull Height (cm): 91.5

Transect F

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	3	GC	P A	
Left Center	160	9	GC	P A	
Center	320	1.5	CB	P A	15
Right Center	480	3	GC	P A	
Right Bank	640	0	CB	P A	20

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y N	10	B	C	P
Buildings	P	C	B	0	Y N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y N	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y N	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y N	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 2 (3) 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 3 (4)

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 (3) 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 1 (2) 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	14
Center Upstream	10
Center Downstream	7
Center Right	16
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 5.9

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	60
Run	30
Glide	
Pool	10
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	20
Left Center	148	0	CB	P (A)	15
Center	295	9	CB	(P) A	50
Right Center	443	4.5	GC	(P) A	
Right Bank	590	0	CB	(P) A	60

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) ☑
Camera 6282 10-10-07
085

Upstream (**required**) ☑
Camera 6282 10-10-07
086

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC 4.2	Site Name: SFLC above Diversion	Date: 09/13/2007
Wetted Width (m): 11.3	Bankfull Width (m): 12.3	Bankfull Height (cm): 61

Transect G

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	40
Left Center	283	0	CB	(P) A	70
Center	565	3	GC	(P) A	
Right Center	848	0	CB	(P) A	80
Right Bank	1130	0	SB	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 2 3 (4)	0 1 2 (3) 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 (4)
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 1 (2) 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	21
Center Upstream	8
Center Downstream	11
Center Right	14
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 5.7

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	60
Run	
Glide	
Pool	40
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	50
Left Center	143	0	CB	(P) A	40
Center	285	9	GF	(P) A	
Right Center	428	9	GC	(P) A	
Right Bank	570	0	CB	(P) A	40

Note. *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC4.2	Site Name: SFLC above Diversion	Date: 09/13/2007
Wetted Width (m): 4.0	Bankfull Width (m): 11.5	Bankfull Height (cm): 91.5

Transect H

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	3	GF	P A	
Left Center	100	21.5	SB	P A	
Center	200	18.5	SB	P A	
Right Center	300	21.5	CB	P A	35
Right Bank	400	0	SA	P A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y N	0	B	C	P
Buildings	P	C	B	0	Y N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y N	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y N	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y N	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	17
Center Upstream	3
Center Downstream	16
Center Right	8
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 2.8

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	40
Run	
Glide	
Pool	60
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	XB	P A	
Left Center	70	18.5	SB	P A	
Center	140	36.5	CB	P A	90
Right Center	210	15	CB	P A	55
Right Bank	280	0	GF	P A	

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC 4.2	Site Name: SFLC above Diversion	Date: 09/13/2007
Wetted Width (m): 3.2	Bankfull Width (m): 10	Bankfull Height (cm): 76

Transect I

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	0
Left Center	80	3	CB	(P) A	0
Center	160	0	SB	P (A)	
Right Center	240	0	CB	(P) A	55
Right Bank	320	0	CB	(P) A	10

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 (3) 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 1 (2) 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	17
Center Upstream	5
Center Downstream	11
Center Right	3
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ — Wetted Width (m): 5.0

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	
Glide	
Pool	80
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	15	GF	P (A)	
Left Center	125	36.5	GF	P (A)	
Center	250	79.5	GC	P (A)	
Right Center	375	33.5	CB	(P) A	45
Right Bank	500	0	SB	(P) A	

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC 4.2	Site Name: SFLC above Division	Date: 09/13/2007
Wetted Width (m): 3.0	Bankfull Width (m): 7.5	Bankfull Height (cm): 41.7

Transect J

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P A	
Left Center	75	15	CB	P A	65
Center	150	0	GC	P A	
Right Center	225	12	GC	P A	
Right Bank	300	0	CB	P A	50

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 2 (3) 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 2 (3) 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 (3) 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 2 (3) 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	8
Center Upstream	6
Center Downstream	5
Center Right	7
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m): 1.5

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	60
Run	
Glide	
Pool	40
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P A	
Left Center	37	0	CB	P A	75
Center	75	0	SB	P A	
Right Center	113	0	SB	P A	
Right Bank	150	0	SB	P A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: SFLC4.2	Site Name: SFLC above Diversion	Date: 09/13/2007
Wetted Width (m): 4.8	Bankfull Width (m): 9.0	Bankfull Height (cm): 106.5

Transect K

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	40
Left Center	120	0	SB	(P) A	
Center	240	0	CB	(P) A	10
Right Center	360	3	SB	P (A)	
Right Bank	480	9	GC	(P) A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 (3) 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 (3) 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 2 (3) 4
Live Tree Roots	0 1 (2) 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	3
Center Upstream	6
Center Downstream	10
Center Right	6
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Upstream (**required**) Camera 6284 10-10-07 ☒
087

Downstream (**optional**) Camera 6282 10-10-07 ☒
088

Site Code: SFLC 4.2	Date: 09/13/2007	FULL FORM

Site Map:

Field Notes/ Comments:

No Dansiometer

Signs of some cattle grazing

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

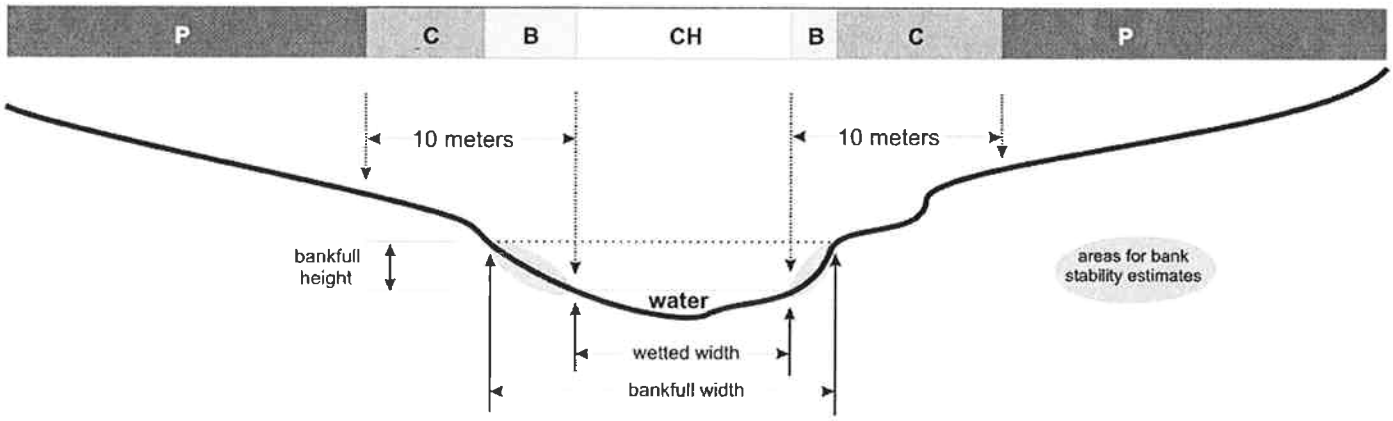


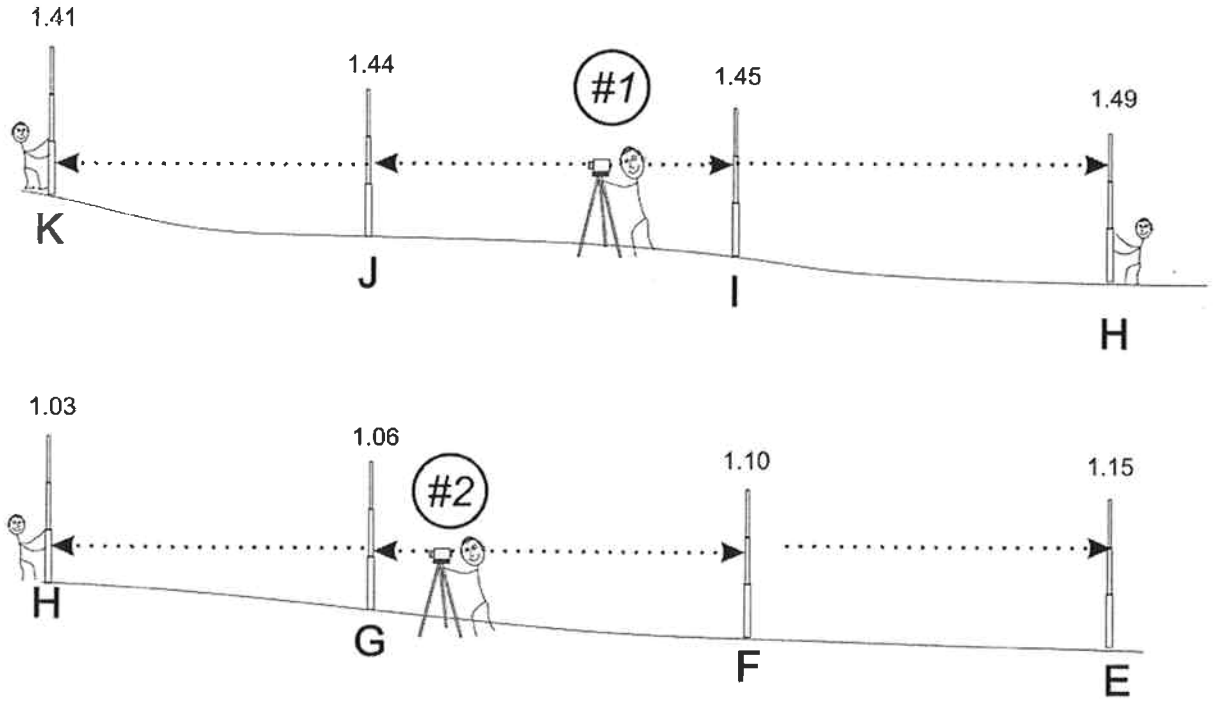
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA	Date: 09-11-2007	Time: 13:15	
Stream Name: Duncan Creek	Site Name/ Description: DC below Diversion		
Site Code: D6.3	Crew Members: PG, CUD, TDG, RK		
Latitude: °N 39.111592	datum: NAD83		
Longitude: °W 120.507622	other:		

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	17.5	pH	7.27	Alkalinity (mg/L)	—	Turbidity (ntu, *optional*)	1.3
Dissolved O_2 (mg/L)	8.68	Specific Cond. (µS)	50	Salinity (mg/L)	0.03	Dissolved Silica (*optional*)	—

REACH LENGTH
(see reach length guidelines at top of form)

Actual Length (m)	150
Explanation:	

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

Transect Width: 0.76 m

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1	15	27.5	0.25	11			
2	30.5	30.5	0.15	12			
3	45	21.5	0.07	13			
4	61	9	0.06	14			
5	76	6	0.08	15			
6				16			
7				17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO	X	minimal		>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO	X	< 1 year		< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest	X	Rangeland	
	Urban/ Industrial		Suburb/Town		Other	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: D6.3 Date: 09/11/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm ☐ % ☒	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K.										
J		0%	15		100					
I		3	15		100					
H		7	15		100					
G		8	15		100					
F		1	15		100					
E		3	15		100					
D		4	15		100					
C		4	15		100					
B		4	15		100					
A		1	15		100					
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive: embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D6.3	Site Name: Duncan Creek below Diversion	Date: 09/11/2007
Wetted Width (m): 4.4	Bankfull Width (m): 13.3	Bankfull Height (cm): 91.5

Transect A

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	P A	—
Left Center	110	24.5	SB	P A	—
Center	220	58	CB	P A	10%
Right Center	330	42.5	GF	P A	—
Right Bank	440	0	SC	P A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 (1) 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	12
Center Upstream	3
Center Downstream	5
Center Right	7
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m): 0.7

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	90
Glide	
Pool	10
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P A	—
Left Center	17	3	RS	P A	—
Center	34	15	RS	P A	—
Right Center	511	3	CB	P A	0
Right Bank	70	0	XB	P A	—

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) Camera 6282 10-10-07 ☑
066

Upstream (**optional**) Camera 6282 10-10-07 ☑
065

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D6.3	Site Name: DC below diversion	Date: 09/11/2007
Wetted Width (m): 4.8	Bankfull Width (m): 14.3	Bankfull Height (cm): 116

Transect B

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	P (A)	—
Left Center	120	3	RR	P (A)	—
Center	240	15	GC	P (A)	—
Right Center	360	3	RS	P (A)	—
Right Bank	480	0	CB	P (A)	100%

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	(0) 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	9
Center Upstream	6
Center Downstream	5
Center Right	12
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 380

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	30
Riffle	50
Run	
Glide	
Pool	20
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	80%
Left Center	95	12	SB	(P) A	—
Center	190	12	CB	P (A)	5%
Right Center	285	9	CB	P A	20%
Right Bank	380	0	SB	P (A)	—

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code:	Site Name:	Date:
D613	DC below diversion	09/11/2007

Wetted Width (m):	Bankfull Width (m):	Bankfull Height (cm):	**Transect C**
5.0	18.0	137	

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	—
Left Center	125	21.5	CB	P (A)	30
Center	250	0	SB	P (A)	—
Right Center	375	0	SB	P (A)	—
Right Bank	500	0	GC	(P) A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 (4)	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	8
Center Upstream	5
Center Downstream	7
Center Right	13
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 6.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	—
Rapid	—
Riffle	60
Run	—
Glide	—
Pool	30
Dry	10

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	—
Left Center	160	6	GC	P (A)	—
Center	320	6	GC	P (A)	—
Right Center	480	17	GC	P (A)	—
Right Bank	660	0	GF	(P) A	—

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code:	Site Name:	Date:
D6.3	DC below diversion	09/11/2007

Wetted Width (m):	Bankfull Width (m):	Bankfull Height (cm):	**Transect D**
8.2	19.0	152.5	

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	XB	P (A)	—
Left Center	205	7.5	SB	(P) A	—
Center	410	9	CB	P (A)	20%
Right Center	615	0	SB	(P) A	—
Right Bank	820	0	SB	(P) A	—

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 1 2 (3) 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 (4)	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	(0) 1 2 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	0 (1) 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	7
Center Upstream	4
Center Downstream	6
Center Right	14
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 8.0

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	40
Run	50
Glide	
Pool	10
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	(P) A	—
Left Center	200	0	GC	P (A)	—
Center	400	0	SB	P (A)	—
Right Center	600	3	SB	P (A)	—
Right Bank	800	0	CB	(P) A	5

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D 6.3	Site Name: DC below diversion	Date: 09/11/2007
Wetted Width (m): 4.4	Bankfull Width (m): 20.0	Bankfull Height (cm): 123

Transect E

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	40
Left Center	110	33.5	CB	(P) A	40
Center	220	30.5	CB	P (A)	40
Right Center	330	7.5	SB	P (A)	—
Right Bank	440	0	CB	(P) A	5

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	(eroded)	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	(0) 1 2 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 (3) 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center -- Left	11
Center Upstream	1
Center Downstream	4
Center Right	11
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 5.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	10
Rapid	
Riffle	60
Run	
Glide	
Pool	30
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	—
Left Center	125	18.5	CB	(P) A	50
Center	250	9	GC	P (A)	—
Right Center	375	18.5	SB	P (A)	—
Right Bank	500	0	CB	P (A)	0

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code:	Site Name:	Date:
D63	DC below diversion	09/11/2007

Wetted Width (m):	Bankfull Width (m):	Bankfull Height (cm):	**Transect F**
6.0	25.0	91.5	

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	0
Left Center	150	0	SB	P (A)	—
Center	300	12	CB	P (A)	25
Right Center	450	0	XB	P (A)	—
Right Bank	600	0	SB	(P) A	—

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	0 (1) 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 (4)
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	10
Center Upstream	3
Center Downstream	2
Center Right	9
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 7.6

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	10
Run	20
Glide	
Pool	70
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	45
Left Center	190	2.3	CB	P (A)	0
Center	380	6	GC	P (A)	—
Right Center	570	0	SB	P (A)	—
Right Bank	760	0	GC	(P) A	—

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) Camera 6282 10-10-07 ☑
068

Upstream (**required**) Camera 6282 10-10-07 ☑
067

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D63	Site Name: DC below diversion	Date: 09/11/2007
Wetted Width (m): 12.0	Bankfull Width (m): 35.0	Bankfull Height (cm): 19

Transect G

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	–
Left Center	300	0	XB	P (A)	–
Center	600	0	XB	P (A)	–
Right Center	900	36.5	XB	P (A)	–
Right Bank	1200	0	CB	(P) A	70

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	(0) 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	0 (1) 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 1 (2) 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	7
Center Upstream	1
Center Downstream	1
Center Right	10
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 13.2

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	20
Rapid	
Riffle	20
Run	
Glide	
Pool	60
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	85
Left Center	330	10.5	SB	P (A)	–
Center	660	0	SB	P (A)	–
Right Center	990	0	SB	P (A)	–
Right Bank	1320	0	XB	(P) A	–

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D6.3	Site Name: DC, below diversion	Date: 09/11/2007
Wetted Width (m): 12.0	Bankfull Width (m): 27.0	Bankfull Height (cm): 137

Transect H

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	(P) A	—
Left Center	300	18.5	SB	P (A)	—
Center	600	6	GC	P (A)	—
Right Center	900	0	SB	(P) A	—
Right Bank	1200	0	CB	P (A)	0

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	(eroded)	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 (3) 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	(0) 1 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	0 (1) 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	11
Center Upstream	3
Center Downstream	2
Center Right	11
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 17.8

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	10
Rapid	
Riffle	10
Run	
Glide	
Pool	80
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	(P) A	—
Left Center	445	73	SB	P (A)	—
Center	890	56.5	CB	P (A)	0
Right Center	1335	27.5	CB	P (A)	0
Right Bank	1780	0	XB	P (A)	—

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D6.3	Site Name: DC below diversion	Date: 09/11/2007
Wetted Width (m): 8.0	Bankfull Width (m): 24.0	Bankfull Height (cm): 104.5

Transect I

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	—
Left Center	200	41.5	SB	P (A)	—
Center	400	21.5	GC	(P) A	—
Right Center	600	0	FN	P (A)	—
Right Bank	800	0	CB	(P) A	55

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y N	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 2 (3) 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	(0) 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 2 (3) 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	9
Center Upstream	4
Center Downstream	3
Center Right	10
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m):

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	10
Run	
Glide	
Pool	90
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	15
Left Center	280	33.5	SB	P (A)	—
Center	560	36.5	CB	(P) A	0
Right Center	840	32	CB	P (A)	0
Right Bank	1120	0	WD	(P) A	—

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D6.3	Site Name: DC below diversion	Date: 09/11/2007
Wetted Width (m): 10.9	Bankfull Width (m): 18.0	Bankfull Height (cm): 106.5

Transect J

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	35
Left Center	273	30.5	SB	P (A)	—
Center	545	3	SB	(P) A	—
Right Center	818	3	GC	(P) A	—
Right Bank	1090	3	FN	(P) A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	(0) 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	13
Center Upstream	3
Center Downstream	1
Center Right	10
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m):

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	100
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	55
Left Center	230	3	SB	P (A)	—
Center	460	30.5	GC	P (A)	—
Right Center	690	0	XB	P (A)	—
Right Bank	920	0	GC	(P) A	—

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D63	Site Name: DC below diversion	Date: 09/11/2007
Wetted Width (m): 10.6	Bankfull Width (m): 14.5	Bankfull Height (cm): 61

Transect K

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	12	GC	(P) A	—
Left Center	265	30.5	XB	P (A)	—
Center	530	30.5	GC	(P) A	—
Right Center	795	0	XB	P (A)	—
Right Bank	1060	0	GB	(P) A	75

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	(0) 1 2 3 4	(0) 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	10
Center Upstream	6
Center Downstream	6
Center Right	13
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Upstream (**required**) ☑
Camera 6282 10-10-07
069

Downstream (**optional**) ☑
Camera 6282 10-10-07
070

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code:	Date: 09 / 11 / 2007	**FULL FORM**

Site Map:

Field Notes/ Comments:

No Compass

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

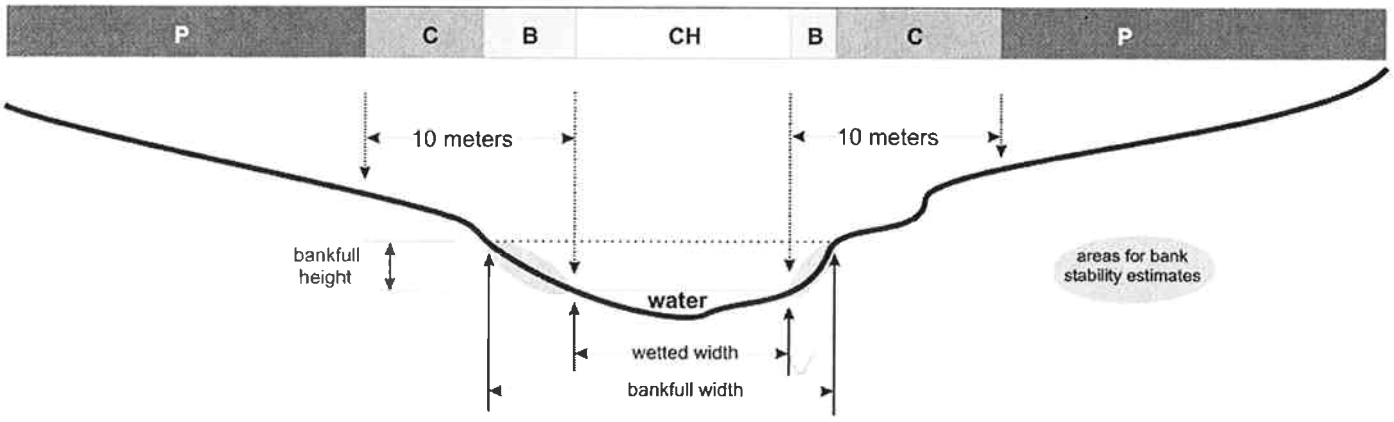


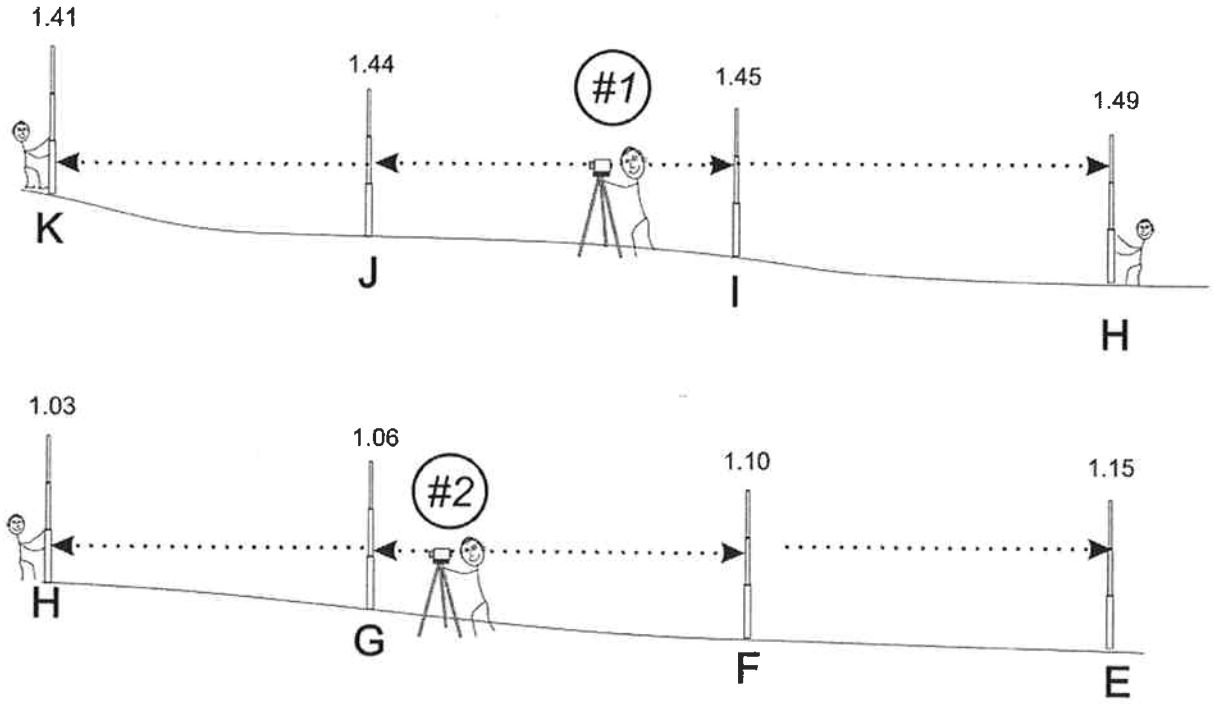
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: D10 Date: 09/12/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm☐ %☒	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm☐ %☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		6	15	170						
I		0	15	180						
H		1	15	180						
G		3	15	170						
F		5	15	180						
E		4	15	180						
D		2	15	200						
C		6	15	210						
B		4	15	210						
A		0	15	210						
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive: embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: D9.0	Site Name: DC above Diversion	Date: 09/12/2007
Wetted Width (m): 4.4	Bankfull Width (m): 13.0	Bankfull Height (cm): 91.5

Transect A

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0.0	CB	(P) A	55
Left Center	110	15	CB	(P) A	65
Center	220	0.0	SB	P (A)	—
Right Center	330	0.0	SB	P (A)	—
Right Bank	440	0.0	XB	P (A)	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	(eroded)	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
					Channel (record Yes or No)				
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	17
Center Upstream	6
Center Downstream	3
Center Right	16
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m):

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	10
Glide	
Pool	90
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	30
Left Center	150	21.5	CB	P (A)	30
Center	320	36.5	XB	(P) A	
Right Center	480	36.5	GF	(P) A	
Right Bank	630	0	CB	(P) A	0

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) Camera 6282 10-10-07 ☑
072

Upstream (**optional**) Camera 6282 10-10-07 ☑
071

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form **FULL VERSION** *Revision Date: July 10, 2007*

Site Code: D9.0	Site Name: DC above Division	Date: 09/12/2007
Wetted Width (m): 7.3	Bankfull Width (m): 10.0	Bankfull Height (cm): —

Transect B

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0.0	0	RS	P (A)	—
Left Center	180	15	XB	P (A)	—
Center	370	48.5	SB	(P) A	—
Right Center	550	34.5	GF	(P) A	—
Right Bank	730	0	RS	(P) A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	3
Center Upstream	2
Center Downstream	5
Center Right	3
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 3.7

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	10
Rapid	
Riffle	
Run	
Glide	
Pool	90
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	4	RS	P (A)	—
Left Center	90	0	RS	(P) A	—
Center	185	0	RS	P (A)	—
Right Center	270	15	RS	P (A)	—
Right Bank	370	0	RS	(P) A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D9.0	Site Name: DC above Diversion	Date: 09 / 12 / 2007
Wetted Width (m): 4.4	Bankfull Width (m): 9.0	Bankfull Height (cm): 61

Transect C

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	40
Left Center	110	0	XB	(P) A	—
Center	220	42.5	GF	(P) A	—
Right Center	330	42.5	RS	P (A)	—
Right Bank	440	0	RS	P (A)	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	6
Center Upstream	1
Center Downstream	6
Center Right	10
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 7.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	20
Rapid	
Riffle	20
Run	
Glide	
Pool	60
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0.0	0	RS	(P) A	—
Left Center	175	0	XB	P (A)	—
Center	350	6	SB	(P) A	—
Right Center	525	0	SB	P (A)	—
Right Bank	700	0	XB	P (A)	—

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D9.0	Site Name: DC above Diversion	Date: 09/12/2007
Wetted Width (m): 2.8	Bankfull Width (m): 13.5	Bankfull Height (cm): 76

Transect D

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	6	GF	(P) A	—
Left Center	70	9	RS	P (A)	—
Center	140	21	RS	P (A)	—
Right Center	210	0	XB	P (A)	—
Right Bank	280	0	CB	P (A)	0%

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 (3) 4	0 1 2 (3) 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	(0) 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) *count covered dots*

Center Left	5
Center Upstream	1
Center Downstream	1
Center Right	8
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 1.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	10
Riffle	
Run	70
Glide	
Pool	20
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	3	RS	(P) A	—
Left Center	45	21.5	RS	P (A)	—
Center	90	30.5	GC	P (A)	—
Right Center	135	18	GF	(P) A	—
Right Bank	180	0	CB	P (A)	30

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D9.0	Site Name: DC above Diversion	Date: 09/12/2007
Wetted Width (m): 4.3	Bankfull Width (m): 12.0	Bankfull Height (cm): 91.5

Transect E

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	12	CB	(P) A	35
Left Center	108	6	SB	P (A)	–
Center	215	12	GF	(P) A	–
Right Center	327	0	XB	P (A)	–
Right Bank	430	0	SB	P (A)	–

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 2 (3) 4
Herbs/ grasses	0 1 (2) 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 (1) 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*

Center Left	1
Center Upstream	5
Center Downstream	0
Center Right	1
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 9.2

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	10
Glide	
Pool	70
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	6	RS	P (A)	–
Left Center	230	15	CB	P (A)	80
Center	460	40.5	CB	P (A)	70
Right Center	690	12	SB	P (A)	–
Right Bank	920	3	RS	(P) A	–

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — *FULL VERSION* — *Revision Date: July 10, 2007*

Site Code: D9.0	Site Name: DC above Diversion	Date: 09/12/2007
Wetted Width (m): 4.4	Bankfull Width (m): 12.5	Bankfull Height (cm): 67

Transect F

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	—
Left Center	110	0	SB	P (A)	—
Center	220	6	CB	P (A)	70
Right Center	330	1.5	CB	P (A)	10
Right Bank	440	0	XB	P (A)	—

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 10.8

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	80
Run	
Glide	
Pool	20
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	60
Left Center	270	3	CB	(P) A	10
Center	540	0	GC	P (A)	—
Right Center	810	15	GC	(P) A	—
Right Bank	1080	0	RS	P (A)	—

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Downstream (**required**) Camera 6282 10-10-07 ☑
074

Upstream (**required**) Camera 6282 10-10-07 ☑
073

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D9.0	Site Name: DC above Diversion	Date: 09/12/2007
Wetted Width (m): 8.5	Bankfull Width (m): 14.0	Bankfull Height (cm): 45.5

Transect G

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	6	GC	P A	—
Left Center	213	0	SB	P A	—
Center	425	0	CB	P A	60
Right Center	630	3	CB	P A	10
Right Bank	850	12	GF	P A	—

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 1 (2) 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	6
Center Downstream	1
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 8.9

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	30
Run	50
Glide	
Pool	20
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	(P) A	—
Left Center	223	12	CB	P (A)	70
Center	445	21	GC	(P) A	—
Right Center	668	0	GC	(P) A	—
Right Bank	890	0	SB	P (A)	—

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code:	Site Name:	Date:
D90	DC above Diversion	09/12/2007

Wetted Width (m):	Bankfull Width (m):	Bankfull Height (cm):
9.6	15.0	98

Transect H

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	40
Left Center	240	6	SB	P (A)	—
Center	480	0	GF	(P) A	—
Right Center	720	6	CB	P (A)	30
Right Bank	960	3	CB	(P) A	50

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	(0) 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	3
Center Downstream	1
Center Right	2
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 4.1

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	10
Glide	
Pool	70
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	(P) A	—
Left Center	103	24.5	RS	(P) A	—
Center	205	1.5	CB	(P) A	65
Right Center	307	6	CB	P (A)	80
Right Bank	410	3	CB	P (A)	60

Note:** Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: D9.0	Site Name: DC above Diversion	Date: 09/12/2007
Wetted Width (m): 8.3	Bankfull Width (m): 10.0	Bankfull Height (cm): 61

Transect I

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	30.5	BR	(P) A	—
Left Center	208	34.5	CB	P (A)	0
Center	415	3	RS	P (A)	—
Right Center	622	1.5	GF	(P) A	—
Right Bank	830	0	GC	(P) A	—

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel **Channel (record Yes or No)**

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 2 (3) 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*

Center Left	2
Center Upstream	2
Center Downstream	0
Center Right	4
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m): 3.5

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	50
Glide	
Pool	50
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	9	RS	P (A)	—
Left Center	87.5	34.5	RS	(P) A	—
Center	175	30.5	GC	P (A)	—
Right Center	263	15	GF	P (A)	—
Right Bank	350	0	GC	(P) A	—

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code:	Site Name:	Date:
D9.0	DC above Diversion	09/12/2007

Wetted Width (m):	Bankfull Width (m):	Bankfull Height (cm):
8.4	10.5	91.5

Transect J

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	P (A)	—
Left Center	210	33.5	XB	P (A)	—
Center	420	27.4	GF	P (A)	—
Right Center	630	12	GF	(P) A	—
Right Bank	840	0	RR	(P) A	—

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B (0)	Y (N)	(0) B C P
Buildings	P C B (0)	Y (N)	(0) B C P
Pavement/ Cleared Lot	P C B (0)		(0) B C P
Road/ Railroad	P C B (0)	Y (N)	(0) B C P
Pipes (Inlet/ Outlet)	P C B (0)	Y (N)	(0) B C P
Landfill/ Trash	P C B (0)	Y (N)	(0) B C P
Park/ Lawn	P C B (0)		(0) B C P
Row Crops	P C B (0)		(0) B C P
Pasture/ Range	P C B (0)		(0) B C P
Logging Operations	P C B (0)		(0) B C P
Mining Activity	P C B (0)	Y (N)	(0) B C P
Vegetation Management	P C B (0)		(0) B C P
Bridges/ Abutments	P C B (0)	Y (N)	(0) B C P
Orchards/ Vineyards	P C B (0)		(0) B C P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	3
Center Downstream	1
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m): 5.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	10
Rapid	
Riffle	
Run	
Glide	
Pool	90
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	—
Left Center	140	49.5	RS	P (A)	—
Center	280	55	GC	P (A)	—
Right Center	420	100.5	SB	P (A)	—
Right Bank	560	9	RS	P (A)	—

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

Site Code:	Site Name:	Date:
D90	DC above Diversion	09/12/2007

Wetted Width (m):	Bankfull Width (m):	Bankfull Height (cm):	**Transect K**
3.2	10.5	76	

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	P (A)	
Left Center	80	13.5	RR	P (A)	
Center	160	6	RR	P (A)	
Right Center	240	0	RR	P (A)	
Right Bank	320	0	RR	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	2
Center Downstream	1
Center Right	2
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Upstream (**required**) Canon 6282 10-10-07 ☑
075

Downstream (**optional**) Canon 6282 10-10-07 ☑
067

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

Site Code: D9,0	Date: 09/12/2007	FULL FORM

Site Map:

Field Notes/ Comments:

Area burned by star fire ~10 years ago..

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

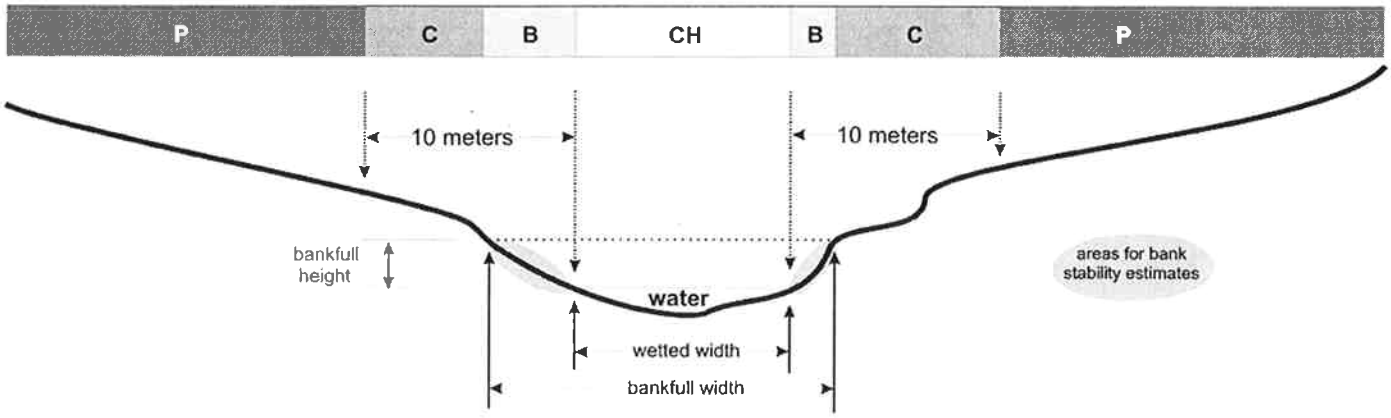


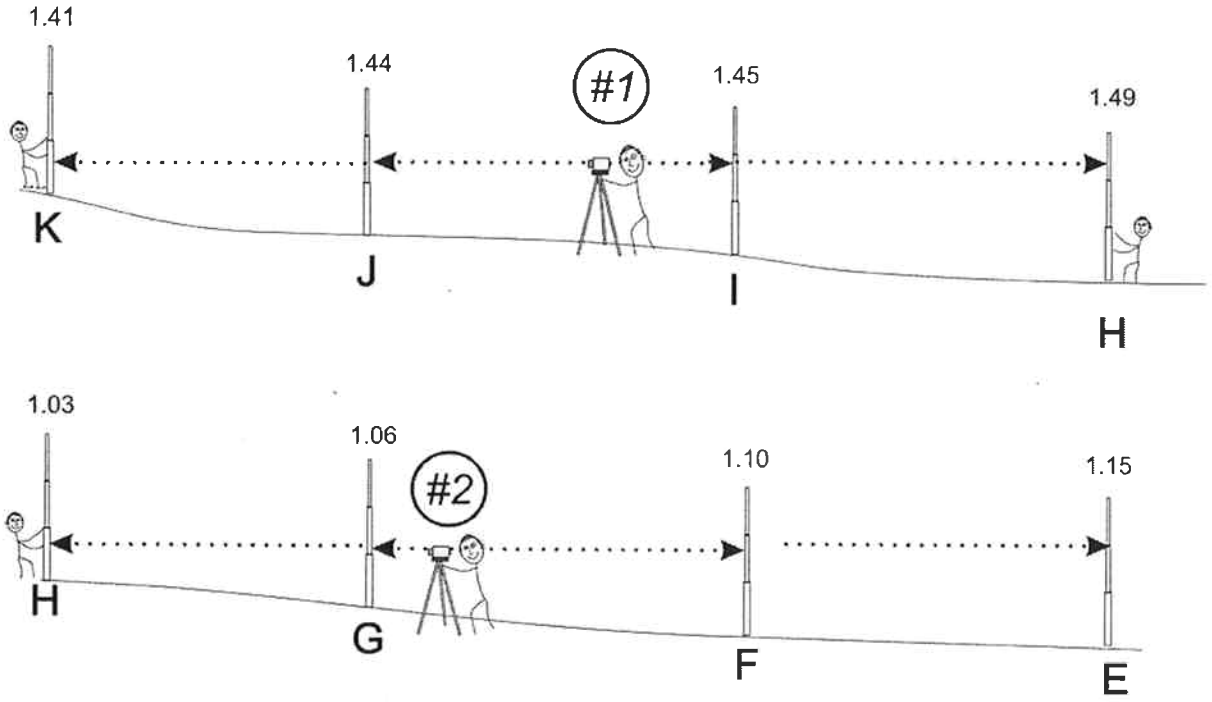
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



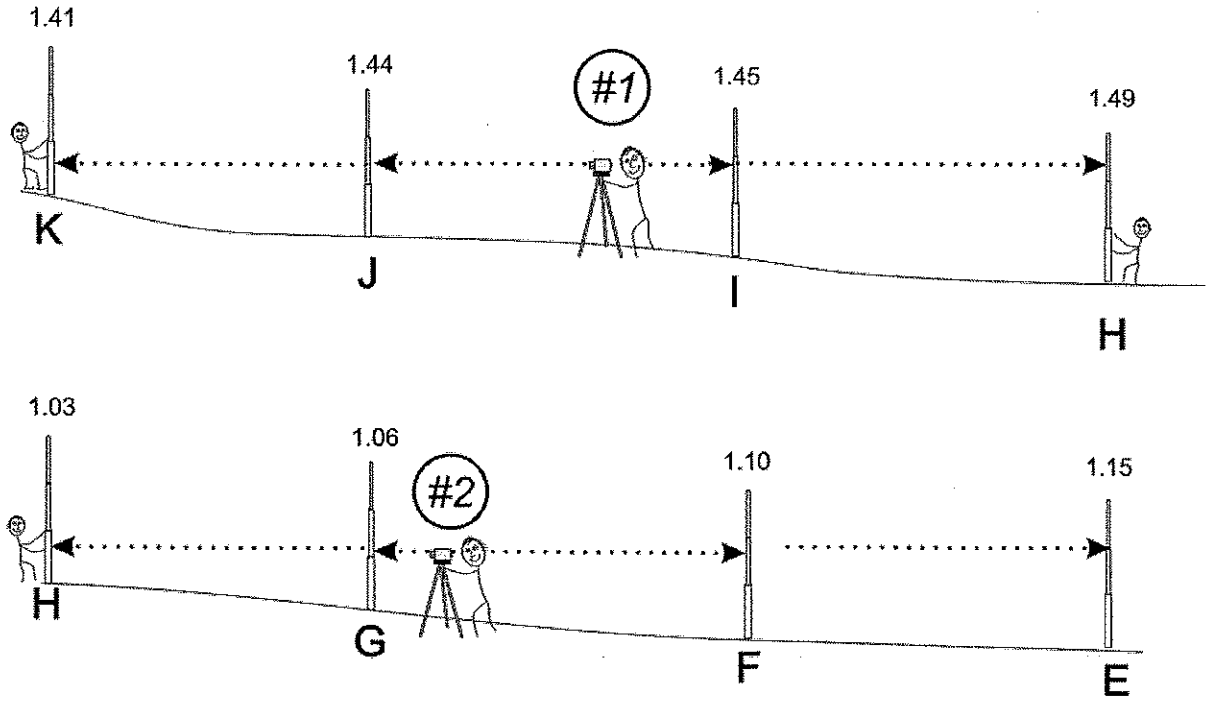
1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						



1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: July 10, 2007

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA	Date: 10-3-2007	Time: 13:00
Stream Name: North Fork of the Middle Fork American River	Site Name/ Description: NFMFAR@ Circle Bridge	
Site Code: NFMF 2.3	Crew Members: PG, CW, BF	
Latitude: °N 39.022840	datum: NAD83	
Longitude: °W 120.721174	other:	

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	12.0	pH	7.65	Alkalinity (mg/L)	—	Turbidity (ntu, *optional*)	0.4
Dissolved O_2 (mg/L)	9.2	Specific Cond. (µS)	76	Salinity (mg/L)	0.04	Dissolved Silica (*optional*)	—

REACH LENGTH

(see reach length guidelines at top of form)

Actual Length (m): 250 m

Explanation:

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

Transect Width:

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1				11			
2	Gage Discharge			12			
3				13			
4	Gage	PF-1		14			
5				15			
6	Discharge (unavailable)			16			
7				17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO	X	minimal		>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO	X	< 1 year		< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest	X	Rangeland	
	Urban/ Industrial		Suburb/Town		Other	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: NFMF2.3 Date: 10/03/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		2%	25	10°						
I		1%	25	0°						
H		1%	25	320°						
G		1%	25	350°						
F		2%	25	20°						
E		2%	25	20°						
D		1%	25	20°						
C		8%	25	50°						
B		7%	25	130°						
A		0%	25	100°						
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50-80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive; embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NFMF2.3	Site Name: NFMFAR@Circle Bridge	Date: 10/03/2007
Wetted Width (m): 19.2	Bankfull Width (m): 32.0	Bankfull Height (cm): 96.5

Transect A

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	
Left Center	480	18.5	XB	P (A)	
Center	960	143.5	SB	P (A)	
Right Center	1490	33.5	CB	P A	40
Right Bank	1920	0	XB	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	(Y) N	0	B	(C)	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (1) 2 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0)	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	(0)	1	2	3	4
Boulders	0	1	(2)	3	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	(0)	1	2	3	4
Undercut Banks	(0)	1	2	3	4
Overhang Vegetation	0	(1)	2	3	4
Live Tree Roots	(0)	1	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m): 14.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	100
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RS	P (A)	
Left Center	366	125	GC	P (A)	
Center	730	158.5	CB	P (A)	5
Right Center	1095	81	SB	P (A)	
Right Bank	1460	0	GC	P (A)	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Downstream (**required**) ☐
camera 628 10_03_07
359 JPG.

Upstream (**optional**) ☐
camera 628 10_03_07
360 JPG.

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: NFMF2.3	Site Name: NFMFAR@circle Bridge	Date: 10/05/2007
Wetted Width (m): 16.4	Bankfull Width (m): 39.0	Bankfull Height (cm): 122

Transect B

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	(P) A	
Left Center	410	82.5	GC	P (A)	
Center	820	145	RS	P (A)	
Right Center	1230	105	CB	P (A)	0
Right Bank	1690	0	CB	P (A)	75

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel		Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y	(N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)			(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y	(N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y	(N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y	(N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)			(0)	B	C	P
Row Crops	P	C	B	(0)			(0)	B	C	P
Pasture/ Range	P	C	B	(0)			(0)	B	C	P
Logging Operations	P	C	B	(0)			(0)	B	C	P
Mining Activity	P	C	B	(0)	(Y)	N	0	B	(C)	P
Vegetation Management	P	C	B	(0)			(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y	(N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)			(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (3) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0	1	(2)	3	4
Aquatic Macrophytes/ Emergent Vegetation	(0)	1	2	3	4
Boulders	0	1	(2)	3	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	(0)	1	2	3	4
Undercut Banks	0	(1)	2	3	4
Overhang. Vegetation	(0)	1	2	3	4
Live Tree Roots	(0)	1	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 9.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	20
Rapid	
Riffle	20
Run	
Glide	
Pool	60
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	(P) A	
Left Center	245	61	RR	P (A)	
Center	490	142	XB	P (A)	
Right Center	735	73	SB	P (A)	
Right Bank	980	0	CB	P (A)	5

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — *FULL VERSION* — *Revision Date: July 10, 2007*

Site Code: NFMF 2.3	Site Name: NFMFAR @ cindy Bridge	Date: 10/03/2007
Wetted Width (m): 15.8	Bankfull Width (m): 37.0	Bankfull Height (cm): 61

Transect C

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	P A	
Left Center	395	0	CB	P A	0
Center	790	3	CB	P A	0
Right Center	1185	0	SB	P A	
Right Bank	1580	3	GF	P A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y N	0	B	C	P
Buildings	P	C	B	0	Y N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y N	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y N	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y N	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	0	1	2	3	4
Boulders	0	1	2	3	4
Woody Debris >0.3 m	0	1	2	3	4
Woody Debris <0.3 m	0	1	2	3	4
Undercut Banks	0	1	2	3	4
Overhang. Vegetation	0	1	2	3	4
Live Tree Roots	0	1	2	3	4
Artificial Structures	0	1	2	3	4

Densiometer Readings (0-17) *count covered dots*

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 26.5

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	80
Run	20
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	P A	
Left Center	662.5	12	SB	P A	
Center	1325	0	SB	P A	
Right Center	1987.5	7.5	SB	P A	
Right Bank	2650	0	SB	P A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: NFMF2.3	Site Name: NFMFAR @ Circle Bridge	Date: 10/03/2007
Wetted Width (m): 24.4	Bankfull Width (m): 43.0	Bankfull Height (cm): 76

Transect D

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	610	0	SB	P (A)	
Center	1220	10.5	SB	P (A)	
Right Center	1830	39.5	GC	P (A)	
Right Bank	2440	0	GC	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 1 2 3 (4)
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 2 (3) 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	6
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 21.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	50
Run	50
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	XB	(P) A	
Left Center	525	56.5	CB	P (A)	70
Center	1050	3	XB	(P) A	
Right Center	1575	21.5	SB	P (A)	
Right Bank	2100	0	XB	P (A)	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: NFMF2.3	Site Name: NFMFAR @ Cider Bridge	Date: 10/03/2007
Wetted Width (m): 15.0	Bankfull Width (m):	Bankfull Height (cm): 91.5

Transect E

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	6	XB	P (A)	
Left Center	375	0	RR	P (A)	
Center	750	35	SB	P (A)	
Right Center	1125	15	CB	P (A)	20
Right Bank	1500	0	CB	P (A)	35

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	(eroded)	vulnerable	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	(Y) N	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 3 (4)
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17)

count covered dots

Center Left	(0)
Center Upstream	(0)
Center Downstream	(0)
Center Right	(0)
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 13.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	80
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	WD	(P) A	
Left Center	335	70	BC	P (A)	
Center	670	30.5	XB	P (A)	
Right Center	1005	21.5	CB	P (A)	0
Right Bank	1340	0	XB	(P) A	

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NFMF 2.3	Site Name: NFMFAR@ Circle Bridge	Date: 10/03/2007
Wetted Width (m): 14.2	Bankfull Width (m): 36.0	Bankfull Height (cm): 76

Transect F

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	(P) A	
Left Center	355	61	XB	P (A)	
Center	710	20	XB	P (A)	
Right Center	1065	21.5	CB	P (A)	5
Right Bank	1420	0	GC	(P) A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	(Y) N	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 (3) 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0	1	(2)	3	4
Aquatic Macrophytes/ Emergent Vegetation	0	(1)	2	3	4
Boulders	0	1	2	(3)	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	(0)	1	2	3	4
Undercut Banks	(0)	1	2	3	4
Overhang Vegetation	0	1	(2)	3	4
Live Tree Roots	(0)	1	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 13.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	10
Run	90
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	(P) A	
Left Center	340	11.5	GF	P (A)	
Center	680	61	CB	P (A)	55
Right Center	1020	6	GC	P (A)	
Right Bank	1360	0	CB	(P) A	5

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page* ***(direct measurements are preferred)***

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Downstream **(required)** ☐
Camera 6288 10_03_07
366.JPG

Upstream **(required)** ☐
Camera 6288 10_03_07
365.JPG

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: 10FMF2.3 | Site Name: NFMFAR @ Cinder Bridge | Date: 10/31/2007

Wetted Width (m): 14.6 | Bankfull Width (m): 24.0 | Bankfull Height (cm): 91.5

Transect G

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	(P) A	
Left Center	365	77.5	XB	P (A)	
Center	730	64	CB	P (A)	
Right Center	1095	4.5	SB	(P) A	
Right Bank	1460	0	XB	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	(Y) N	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy>75% 2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	0 (1) 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 10.6

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	10
Run	90
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	(P) A	
Left Center	265	27.5	GC	(P) A	
Center	530	65.5	GC	P (A)	
Right Center	795	0	SB	(P) A	
Right Bank	1060	0	CB	(P) A	10

Note**: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page **(direct measurements are preferred)

SWAMP Stream Habitat Characterization Form — *FULL VERSION* — *Revision Date: July 10, 2007*

Site Code: NFMF2.3	Site Name: NFMFAR @ Wide Bridge	Date: 10/03/2007
Wetted Width (m): 11.8	Bankfull Width (m): 23.5	Bankfull Height (cm): 167.5

Transect H

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	P (A)	
Left Center	295	0	SB	P (A)	
Center	590	41	CB	P (A)	
Right Center	885	9	XB	P (A)	
Right Bank	1180	0	GF	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	(eroded)	vulnerable	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	(Y) N	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 (3) 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 (2) 3 4
Herbs/ grasses	(0) 1 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0)	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	(0)	1	2	3	4
Boulders	0	1	2	(3)	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	(0)	1	2	3	4
Undercut Banks	(0)	1	2	3	4
Overhang. Vegetation	(0)	1	2	3	4
Live Tree Roots	(0)	1	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17) *count covered dots*

Center - Left	(0)
Center Upstream	(0)
Center Downstream	(0)
Center Right	(0)
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 18.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	RR	P (A)	
Left Center	450	49	GF	P (A)	
Center	900	58	GC	P (A)	
Right Center	1350	12	SB	P (A)	
Right Bank	1800	0	SA	P (A)	

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NFMF2.3	Site Name: NFMFAR @ Uncle Bridge	Date: 10/31/2007
Wetted Width (m): 14.8	Bankfull Width (m): 23.5	Bankfull Height (cm): 183

Transect I

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P A	
Left Center	370	12	XB	P A	
Center	740	58	GC	P A	
Right Center	1110	39.5	SB	P A	
Right Bank	1480	0	GC	P A	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y N	0	B	C	P
Buildings	P	C	B	0	Y N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y N	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y N	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y N	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m): 17.2

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P A	
Left Center	430	23	GF	P A	
Center	860	36.5	GF	P A	
Right Center	1290	15	XB	P A	
Right Bank	1700	0	CB	P A	25

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NFMF2.3	Site Name: NFMFAR @ Cuddy Bridge	Date: 10/03/2007
Wetted Width (m): 10.0	Bankfull Width (m): 22.0	Bankfull Height (cm): 198

Transect J

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GF	P (A)	
Left Center	260	50.5	SB	P (A)	
Center	520	62.5	SB	P (A)	
Right Center	750	70	CB	P (A)	80
Right Bank	1040	0	SB	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	(B)	0	(Y) N	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy>75% 2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 (1) 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 2 (3) 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m): 10.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	10
Run	90
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	41	GF	P (A)	
Left Center	260	36.5	SB	P (A)	
Center	520	35	SB	P (A)	
Right Center	780	64	CB	P (A)	60
Right Bank	1040	0	CB	P (A)	65

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: NFMF 2.3	Site Name: NFMFAR @ circle Bridge	Date: 10/03/2007
Wetted Width (m): 8.2	Bankfull Width (m): 27.5	Bankfull Height (cm): 167.5

Transect K

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SB	P (A)	
Left Center	205	39.5	SB	P (A)	
Center	410	55	SB	P (A)	
Right Center	615	29	SB	P (A)	
Right Bank	820	0	GC	P (A)	

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	(Y) N	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 (2) 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 1 (2) 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 (2) 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 3 (4)
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17)

count covered dots

Center Left	(0)
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Upstream (**required**) camera 6288 10_03_07 ☐
369.JPG

Downstream (**optional**) camera 6288 10_03_07 ☐
370.JPG

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: NFMF 2.3	Date: 10/03/2007	**FULL FORM**

Site Map:

Field Notes/ Comments:

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

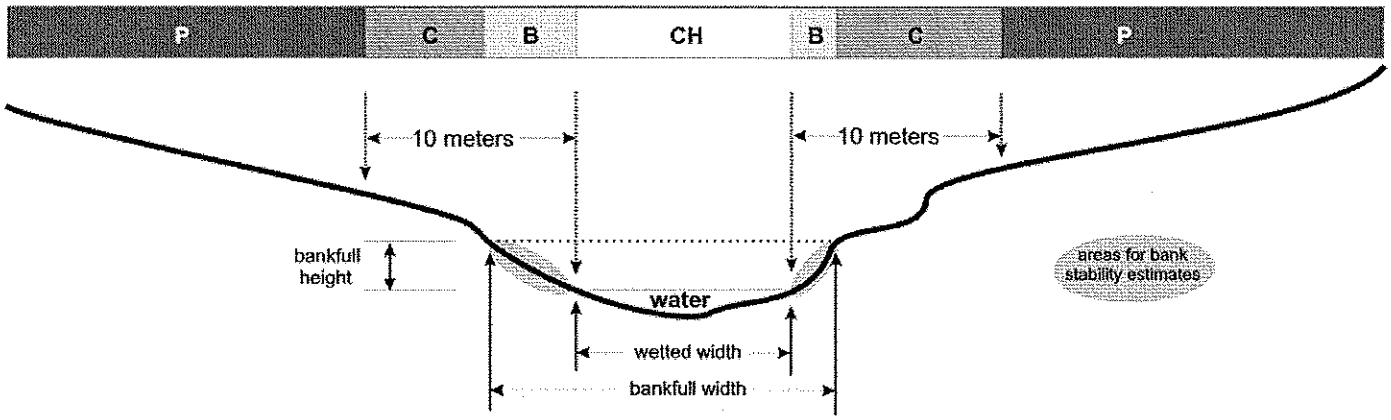


Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name: PCWA		Date: 10-10-2007	Time: 14:35
Stream Name: North fork American River		Site Name/ Description: Ponderosa Bridge	
Site Code: NF31.3		Crew Members: PG, TD, BF	
Latitude: °N 39.003303		datum: NAD83	
Longitude: °W 120.937365		other:	

AMBIENT WATER QUALITY MEASUREMENTS

all meters calibrated? Yes ☐ No ☐

Temp (°C)	15.76	pH	8.36	Alkalinity (mg/L)	—	Turbidity (ntu, *optional*)	3.0
Dissolved O_2 (mg/L)	9.62	Specific Cond. (µS)	140	Salinity (mg/L)	0.07	Dissolved Silica (*optional*)	—

REACH LENGTH

(see reach length guidelines at top of form)

Actual Length (m)	250 m
Explanation:	

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

Transect Width:

	Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (m/sec)
1				11			
2	Gage Discharge			12			
3				13			
4	Gage	11427000		14			
5				15			
6	Discharge 45 cfs			16			
7				17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO ☐	(minimal) ☐	>10% flow increase ☐
Evidence of fires in reach or immediately upstream (<500 m)	(NO) ☐	< 1 year ☐	< 5 years ☐
Dominant landuse/ landcover in area surrounding reach	Agriculture ☐	(Forest) ☐	Rangeland ☐
	Urban/ Industrial ☐	Suburb/Town ☐	Other ☐

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in mm)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: July 10, 2007*

Site Code: NF31,3 Date: 10/10/2007

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL ☐
CLINOMETER ☒
HANDLEVEL ☐

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm ☐ % ☒	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J		1.0%	25m	250°						
I		3.0%	25m	255°						
H		3.0%	25m	250°						
G		1.0%	25m	250°						
F		1.0%	25m	245°						
E		0%	25m	215°						
D		0%	25m	220°						
C		0%	25m	190°						
B		1%	25m	170°						
A		1%	25m	170°						
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive: embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NF31,3	Site Name: Ponderosa Bridge	Date: 10/10/2007
Wetted Width (m): 24.7	Bankfull Width (m): 31.0	Bankfull Height (cm): 61

Transect A

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	103.5	SB	P (A)	–
Left Center	617.5	97.5	CB	P (A)	30
Center	1235	30.5	CB	P A	40
Right Center	1842.5	27.5	GC	P (A)	–
Right Bank	2470	0	CB	(P) A	20

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
					Channel (record Yes or No)				
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 (1) 2 3 4	0 1 2 (3) 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 1 (2) 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: AB

Wetted Width (m): 19.4

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	85.5	SB	P (A)	–
Left Center	485	58	CB	P (A)	0
Center	970	42.5	CB	P (A)	0
Right Center	1455	39.5	CB	P (A)	20
Right Bank	1940	0	GC	(P) A	–

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

TAKE PHOTOGRAPHS (check box if taken and record photo code)

Downstream (**required**) ☒ 19A

Upstream (**optional**) ☒ 18A

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NF31.3	Site Name: Ponderosa Bridge	Date: 10/10/2007
Wetted Width (m): 20.0	Bankfull Width (m): 37	Bankfull Height (cm): 97.5

Transect B

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	24.5	SB	P (A)	—
Left Center	500	79.5	CB	P (A)	50
Center	1000	61	CB	P (A)	0
Right Center	1500	33.5	GC	P (A)	—
Right Bank	2000	0	CB	P (A)	0

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	(stable)
Right Bank	eroded	vulnerable	(stable)

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 (1) 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 (3) 4	0 1 2 3 (4)

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 1 2 (3) 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: BC

Wetted Width (m): 21.0

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	BR	P (A)	—
Left Center	525	76	XB	P (A)	—
Center	1050	58	GC	P (A)	—
Right Center	1575	52	CB	P (A)	0
Right Bank	2100	0	CB	P (A)	0

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NF31.3	Site Name: Ponderosa Bridge	Date: 10/10/2007
Wetted Width (m): 18.6	Bankfull Width (m): 31	Bankfull Height (cm): 94.5

Transect C

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	6	RR	P A	—
Left Center	462.5	64	XB	P A	—
Center	930	91.5	CB	P A	20
Right Center	1395	55	GC	P A	—
Right Bank	1860	0	GC	P A	—

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	~~vulnerable~~	stable
Right Bank	eroded	vulnerable	~~stable~~

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	0	Y (N)	0	B	C	P
Buildings	P	C	B	0	Y (N)	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y (N)	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y (N)	0	B	C	P
Landfill/ Trash	P	C	B	0	Y (N)	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y (N)	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y (N)	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	(0) 1 2 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 2 3 (4)

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: CD

Wetted Width (m): 18.5

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	6	SA	P A	—
Left Center	462.5	15	XB	P A	—
Center	925	73	GC	P A	—
Right Center	1387.5	42.5	CB	P A	20
Right Bank	1850	0	GC	P A	—

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NF31.3	Site Name: Ponderosa Bridge	Date: 10/10/2007
Wetted Width (m): 20.0	Bankfull Width (m): 34.0	Bankfull Height (cm): 113

Transect D

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	3	RR	P (A)	–
Left Center	500	100.5	LB	P (A)	40
Center	1000	58	GC	P (A)	–
Right Center	1500	20.5	CB	P (A)	20
Right Bank	2000	0	GC	P (A)	–

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
					Channel (record Yes or No)				
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	(0) 1 2 3 4
Herbs/ grasses	(0) 1 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 2 3 (4)

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: DE

Wetted Width (m): 17.0

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	100
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	9	RR	P (A)	–
Left Center	425	125	GC	P (A)	–
Center	850	113	CB	P (A)	20
Right Center	1275	49	CR	P (A)	30
Right Bank	1700	0	SR	P (A)	–

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NF31.3	Site Name: Ponderosa Bridge	Date: 10/10/2007
Wetted Width (m): 15.5	Bankfull Width (m): 27.0	Bankfull Height (cm): 106.5

Transect E

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	12	RR	P (A)	—
Left Center	397.5	131	SA	P (A)	—
Center	775	73	CB	P (A)	70
Right Center	1162.5	73	CB	P (A)	50
Right Bank	1550	0	GC	(P) A	—

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	vulnerable	(stable)

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 (0) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 (1) 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 (0) 2 3 4
Herbs/ grasses	(0) 1 2 3 4	0 (0) 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 2 3 (4)

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	0 1 (2) 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	0 (1) 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17) count covered dots

Center Left	0 --
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: EF

Wetted Width (m): 13.2

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	80
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	6	RR	P (A)	—
Left Center	330	137	SA	P (A)	—
Center	660	79.5	CB	P (A)	80
Right Center	990	39.5	CB	P (A)	70
Right Bank	1320	0	CB	P (A)	20

Note. *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NF31.3	Site Name: Ponderosa Bridge	Date: 10/10/2007
Wetted Width (m): 20.2	Bankfull Width (m): 35.0	Bankfull Height (cm): 116

Transect F

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P A	—
Left Center	512.5	9	GC	P A	—
Center	1025	42.5	CB	P A	60
Right Center	1537.5	45.5	SB	P A	—
Right Bank	2050	0	CB	P A	0

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
					Channel (record Yes or No)				
Walls/ Rip-rap/ Dams	P	C	B	0	Y N	0	B	C	P
Buildings	P	C	B	0	Y N	0	B	C	P
Pavement/ Cleared Lot	P	C	B	0		0	B	C	P
Road/ Railroad	P	C	B	0	Y N	0	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	0	Y N	0	B	C	P
Landfill/ Trash	P	C	B	0	Y N	0	B	C	P
Park/ Lawn	P	C	B	0		0	B	C	P
Row Crops	P	C	B	0		0	B	C	P
Pasture/ Range	P	C	B	0		0	B	C	P
Logging Operations	P	C	B	0		0	B	C	P
Mining Activity	P	C	B	0	Y N	0	B	C	P
Vegetation Management	P	C	B	0		0	B	C	P
Bridges/ Abutments	P	C	B	0	Y N	0	B	C	P
Orchards/ Vineyards	P	C	B	0		0	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: FG

Wetted Width (m): 15.7

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	30
Run	80
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P A	0
Left Center	392.5	21.5	GC	P A	—
Center	785	52	CB	P A	40
Right Center	1177.5	49	SB	P A	—
Right Bank	1570	0	CB	P A	10

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

TAKE PHOTOGRAPHS

(check box if taken and record photo code)

Downstream (**required**) ☒ 17A

Upstream (**required**) ☐ 16A

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code:	Site Name:	Date:
NF31.3	Ponderosa Bridge	10/10/2007

Wetted Width (m):	Bankfull Width (m):	Bankfull Height (cm):	**Transect G**
16.0	27.0	116	

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	—
Left Center	400	30.5	GC	P (A)	—
Center	800	52	SB	P (A)	—
Right Center	1200	70	CB	P (A)	40
Right Bank	1600	0	CB	P (A)	0

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy>75% 2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 (1) 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 (1) 2 3 4	0 1 (2) 3 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Filamentous Algae	(0)	1	2	3	4
Aquatic Macrophytes/ Emergent Vegetation	(0)	1	2	3	4
Boulders	(0)	1	2	3	4
Woody Debris >0.3 m	(0)	1	2	3	4
Woody Debris <0.3 m	(0)	1	2	3	4
Undercut Banks	(0)	1	2	3	4
Overhang. Vegetation	(0)	1	2	3	4
Live Tree Roots	(0)	1	2	3	4
Artificial Structures	(0)	1	2	3	4

Densiometer Readings (0-17) count covered dots

Center Left	(0)
Center Upstream	(0)
Center Downstream	(0)
Center Right	(0)
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: GH

Wetted Width (m): 12.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	30
Run	70
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	GC	P (A)	—
Left Center	320	42.5	SB	P (A)	—
Center	640	70	SB	P (A)	—
Right Center	960	61	CB	P (A)	80
Right Bank	1280	0	CB	(P) A	0

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NF3L3	Site Name: Ponderosa Bridge	Date: 10/10/2007
Wetted Width (m): 11.4	Bankfull Width (m): 19.5	Bankfull Height (cm): 125

Transect H

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	10
Left Center	265	55	SB	P (A)	—
Center	570	52	SB	P (A)	—
Right Center	925	44	CB	P (A)	10
Right Bank	1140	0	CB	P (A)	0

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy>75% 2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 (2) 3 4
Herbs/ grasses	(0) 1 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	(0) 1 2 3 4
Boulders	(0) 1 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: HI

Wetted Width (m): 7.8

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	50
Riffle	
Run	50
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	0
Left Center	195	45.5	CB	P (A)	40
Center	390	42.5	SB	P (A)	—
Right Center	585	9	SB	P (A)	—
Right Bank	780	0	CB	P (A)	0

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NF31,3	Site Name: Ponderosa Bridge	Date: 10/10/2007
Wetted Width (m): 28.0	Bankfull Width (m): 34.0	Bankfull Height (cm): 33.5

Transect 1

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	10
Left Center	700	33.5	CB	P (A)	30
Center	1400	45.5	SB	P (A)	—
Right Center	2100	52	SB	P (A)	—
Right Bank	2800	0	CB	P (A)	0

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B (0)	Y (N)	(0) B C P
Buildings	P C B (0)	Y (N)	(0) B C P
Pavement/ Cleared Lot	P C B (0)		(0) B C P
Road/ Railroad	P C B (0)	Y (N)	(0) B C P
Pipes (Inlet/ Outlet)	P C B (0)	Y (N)	(0) B C P
Landfill/ Trash	P C B (0)	Y (N)	(0) B C P
Park/ Lawn	P C B (0)		(0) B C P
Row Crops	P C B (0)		(0) B C P
Pasture/ Range	P C B (0)		(0) B C P
Logging Operations	P C B (0)		(0) B C P
Mining Activity	P C B (0)	Y (N)	(0) B C P
Vegetation Management	P C B (0)		(0) B C P
Bridges/ Abutments	P C B (0)	Y (N)	(0) B C P
Orchards/ Vineyards	P C B (0)		(0) B C P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy>75% 2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 (3) 3 4
Herbs/ grasses	(0) 1 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 (2) 3 4

Instream Habitat Complexity

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Filamentous Algae	0 (1) 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	(0) 1 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	(0) 1 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 1 (2) 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	4
Center Upstream	3
Center Downstream	4
Center Right	1
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: IJ

Wetted Width (m): 26.5

Flow Habitats (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	30
Riffle	70
Run	
Glide	
Pool	
Dry	

Inter-Transect Substrates (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P (A)	0
Left Center	612.5	33.5	CB	(P) A	20
Center	1325	21.5	GC	P (A)	—
Right Center	1937.5	39.5	CB	P (A)	10
Right Bank	2650	0	CB	P (A)	0

Willows through middle of channel

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NF31.3	Site Name: Ponderosa Bridge	Date: 10/10/2007
Wetted Width (m): 30.5	Bankfull Width (m): 55.0	Bankfull Height (cm): 64

Transect J

TRANSECT SUBSTRATES

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	P A	
Left Center	762.5	33.5	CB	P A	
Center	1525	12	SB	P A	
Right Center	2288.5	27.5	CB	P A	
Right Bank	3050	0	CB	P A	

BANK STABILITY (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel
P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

RIPARIAN VEGETATION (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	0 (1) 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	(0) 1 2 3 4	0 1 (2) 3 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	(0) 1 2 3 4	0 1 (2) 3 4
Herbs/ grasses	(0) 1 2 3 4	0 1 (2) 3 4
Barren, bare soil/ duff	0 1 2 3 (4)	0 1 (2) 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 (2) 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	0 (1) 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

DENSIOMETER READINGS (0-17)

count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

Inter-transect: JK

Wetted Width (m): 31.0

FLOW HABITATS (% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	100
Run	
Glide	
Pool	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	CB	(P) A	15
Left Center	775	7.5	CB	P (A)	40
Center	1550	79.5	CB	P (A)	20
Right Center	2325	30.5	CB	P (A)	10
Right Bank	3100	0	CB	(P) A	0

Logs in center of channel

Note: *Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of size class categories listed on the supplemental page* ***(direct measurements are preferred)***

SWAMP Stream Habitat Characterization Form — FULL VERSION — Revision Date: July 10, 2007

Site Code: NF31.3	Site Name: Ponderosa Bridge	Date: 10/10/2007
Wetted Width (m): 28.5	Bankfull Width (m): 70.0	Bankfull Height (cm): 61

Transect K

Transect Substrates

Position	Dist from LB (cm)	Depth (cm)	mm/ size class	CPOM	Cobble Embeddedness (%)
Left Bank	0	0	SA	P (A)	—
Left Center	712.5	12	CB	P (A)	20
Center	1425	50.5	CB	P (A)	70
Right Center	2137.5	30.5	GC	P (A)	—
Right Bank	2850	0	CB	(P) A	10

Bank Stability (score zone 5m up and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	(vulnerable)	stable
Right Bank	eroded	(vulnerable)	stable

Human Influence (circle only the closest to wetted channel)

0 = Not Present B = On Bank C = Between Bank and 10 m from Channel P = >10 m + <50 m from Channel Channel (record Yes or No)

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	P	C	B	(0)	Y (N)	(0)	B	C	P
Buildings	P	C	B	(0)	Y (N)	(0)	B	C	P
Pavement/ Cleared Lot	P	C	B	(0)		(0)	B	C	P
Road/ Railroad	P	C	B	(0)	Y (N)	(0)	B	C	P
Pipes (Inlet/ Outlet)	P	C	B	(0)	Y (N)	(0)	B	C	P
Landfill/ Trash	P	C	B	(0)	Y (N)	(0)	B	C	P
Park/ Lawn	P	C	B	(0)		(0)	B	C	P
Row Crops	P	C	B	(0)		(0)	B	C	P
Pasture/ Range	P	C	B	(0)		(0)	B	C	P
Logging Operations	P	C	B	(0)		(0)	B	C	P
Mining Activity	P	C	B	(0)	Y (N)	(0)	B	C	P
Vegetation Management	P	C	B	(0)		(0)	B	C	P
Bridges/ Abutments	P	C	B	(0)	Y (N)	(0)	B	C	P
Orchards/ Vineyards	P	C	B	(0)		(0)	B	C	P

Riparian Vegetation (facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) circle one

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	(0) 1 2 3 4	(0) 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 (2) 3 4	0 1 2 (3) 4
Ground Cover (<0.5 m high)		
Woody shrubs and saplings <0.5 m	0 1 (2) 3 4	0 1 2 (3) 4
Herbs/ grasses	0 (1) 2 3 4	0 (1) 2 3 4
Barren, bare soil/ duff	0 1 (2) 3 4	0 (1) 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	(0) 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 (1) 2 3 4
Boulders	0 (1) 2 3 4
Woody Debris >0.3 m	(0) 1 2 3 4
Woody Debris <0.3 m	0 (1) 2 3 4
Undercut Banks	(0) 1 2 3 4
Overhang. Vegetation	(0) 1 2 3 4
Live Tree Roots	(0) 1 2 3 4
Artificial Structures	(0) 1 2 3 4

Densiometer Readings (0-17) count covered dots

Center Left	0
Center Upstream	0
Center Downstream	0
Center Right	0
Left Bank (optional)	
Right Bank (optional)	

No Inter-transect Measures

TAKE PHOTOGRAPHS
(check box if taken and record photo code)

Upstream (**required**) ☒
14A

Downstream (**optional**) ☒
15A

Site Code: NF31.3	Date: 1/01/2007	**FULL FORM**

Site Map:

Field Notes/ Comments:

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY

Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)

Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (≥1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

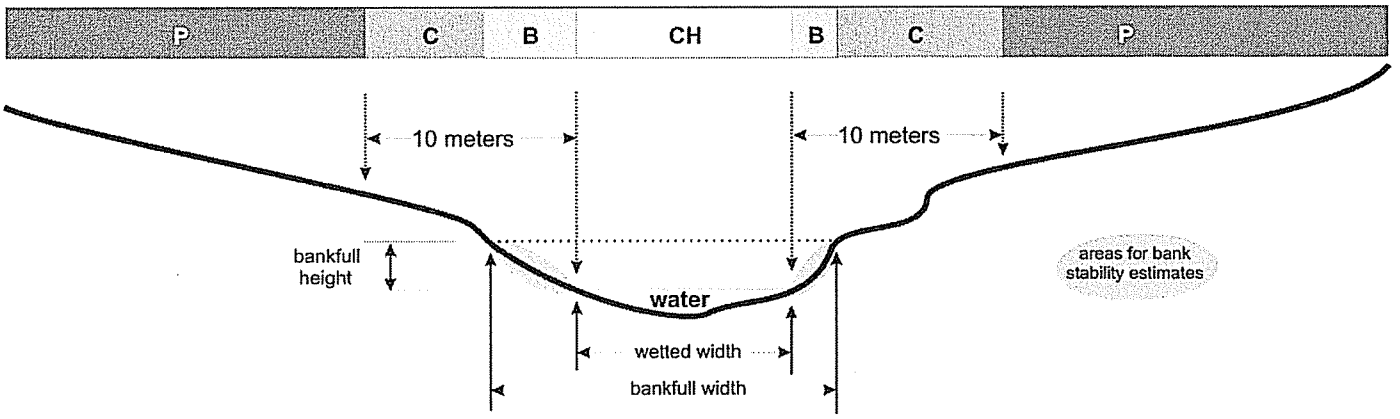


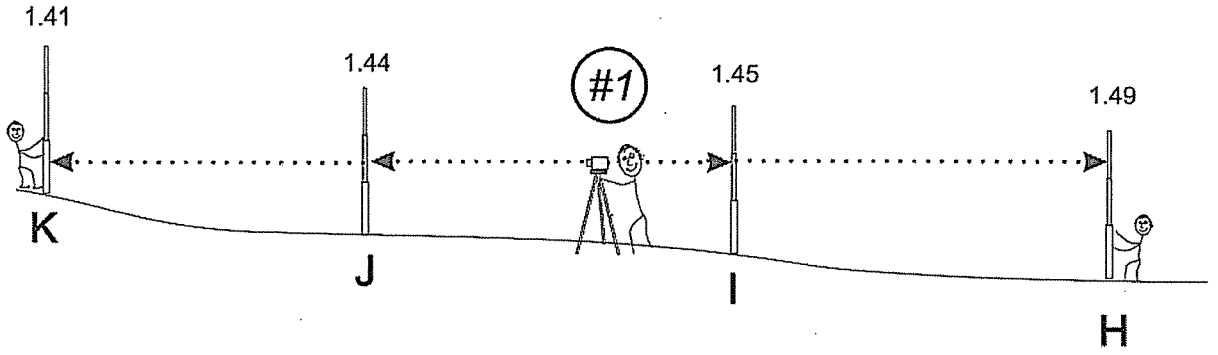
Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

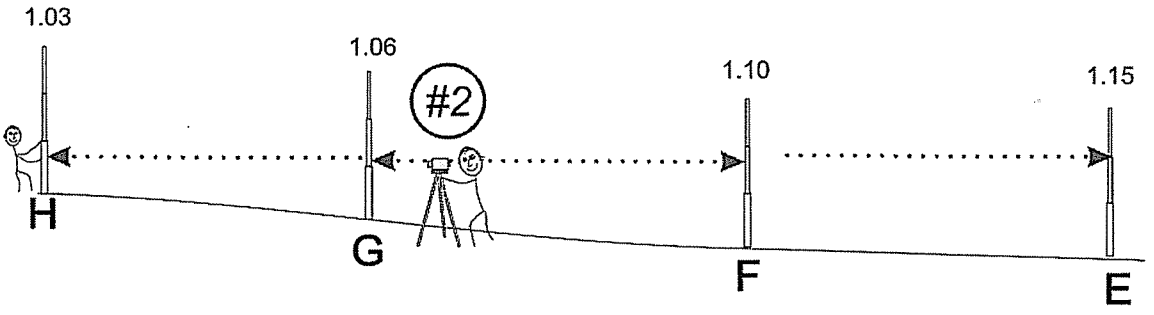
- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM — EXAMPLE

AUTOLEVEL	X
CLINOMETER	
HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment if supplemental segments are used)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ▩ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	1.41											
J	1.44		3	15	140	100						
I	1.45		1	15	145	100						
H	1.49	1.03	4	15	150	100						
G		1.06	3	15	143	100						
F		1.10	4	15	187	100						
E		1.15	5	15	195	100						





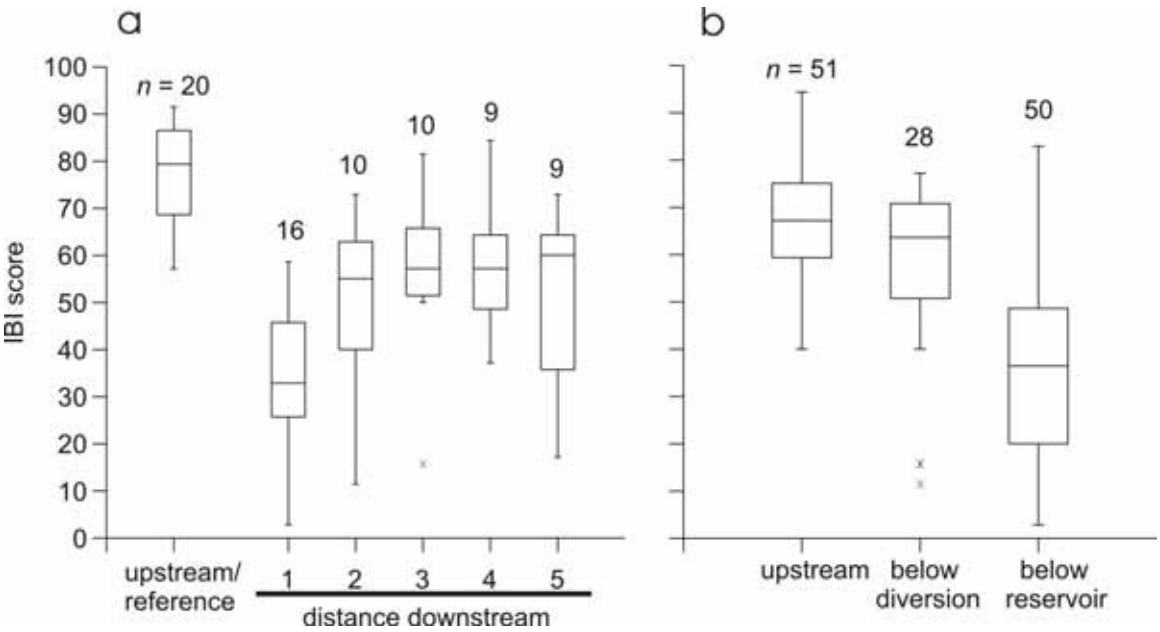
1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: sites will vary in the number of separate level positions needed to survey the reach

APPENDIX D

Hydropower IBI Scores from Rehn (2008).

Figure D-1. Hydropower IBI Scores from Rehn (2008): (a) Sampling Sites Above and Below Reservoirs Used for IBI Development and (b) Sites Sampled in Other Unpublished Studies Used for IBI Validation[1,2].



[1]Samples sizes are shown above the boxes. In (a), the first sites downstream were as close to the dam as possible, with the next sites spaced 500 meters apart. The boxes indicate median values and interquartile ranges, whiskers indicate 95th percentiles, and outliers are indicated by an 'x'.

[2]Figure 2 in Rehn (2008).