Sonoma County Phase I MS4 2018 Bioassessment Monitoring Study



Prepared For:

Sonoma County Phase I MS4 Stormwater Co-Permittees:
Cotati, Sebastopol, Rohnert Park, Windsor and Sonoma County

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EXECUTIVE SUMMARY

As required by North Coast Regional Water Quality Control Board Order R1-2015-0030, the Co-Permittees of County of Sonoma, City of Cotati, City of Rohnert Park, Town of Windsor, and City of Sebastopol are required to perform a bioassessment study to assess the physical, chemical, and biological health of creek reaches within the Laguna de Santa Rosa Watershed. Reaches were identified at Mark West Creek site (County of Sonoma), Laguna de Santa Rosa at Gravestein Way (City of Cotati), Hinebaugh Creek site (City of Rohnert Park), East Windsor Creek site (Town of Windsor), and Calder Creek site (City of Sebastopol). Habitat assessments and sample collection for routine water quality analyses, benthic macroinvertebrates (BMI), and algae were performed on each creek reach in Spring 2018.

Biological and physical habitat assessment sampling followed the Surface Water Ambient Monitoring Program (SWAMP) standard operating procedure (SOP) for wadeable streams (Ode et al., 2016). At each site, the creek was delineated into 11 transects. A full complement of habitat measures was collected at each transect, as well as for the entire stream reach. BMIs and algae were collected from all 11 transects established along the stream/creek reach for each site. BMIs and algae were identified following SWAMP procedures (Woodard et al., 2012; Stancheva et al., 2015).

The habitat measures for the five sites varied as follows:

- Mark West Creek near Cresta Road (aka: Mark West Creek site)
    - sub-optimal score for epifaunal substrate;
    - sub-optimal score for sediment deposition;
    - optimal score for channel alteration;
    - high benthic habitat diversity based on benthic particle size;
    - flowing water;
    - good canopy coverage;
    - a variety of riparian vegetation (mostly woody shrubs); and
    - instream habitat comprised mostly of sparse amounts of filamentous algae and aquatic macrophytes, sparse amounts of live tree roots, and moderate amounts of overhanging vegetation.

- Laguna de Santa Rosa at Gravenstein Way (aka: Laguna de Santa Rosa site)
    - sub-optimal score for epifaunal substrate;
    - sub-optimal score for sediment deposition;
    - marginal score for channel alteration;
    - low benthic habitat diversity based on benthic particle size;
    - minimal flowing water;
    - low canopy coverage;
    - a variety of riparian vegetation (mostly herbs and grasses); and

- an instream habitat comprised mostly of heavy amounts of filamentous algae and sparse amounts of aquatic macrophyte, sparse amounts of live roots, and sparse amounts of overhanging vegetation.

- Hinebaugh Creek at State Farm Drive (aka. Hinebaugh Creek site)
  - marginal score for epifaunal substrate;
  - optimal score for sediment deposition;
  - sub-optimal score for channel alteration;
  - moderate benthic habitat diversity based on benthic particle size;
  - flowing water;
  - moderate canopy coverage;
  - a variety of riparian vegetation (mostly herbs and grasses); and

  an instream habitat comprised mostly of sparse amounts of filamentous algae and aquatic macrophytes, sparse amounts of live roots, and sparse amounts of overhanging vegetation.

- East Windsor Creek behind the Senior Center (aka. East Windsor Creek site)
  - sub-optimal score for epifaunal substrate;
  - marginal score for sediment deposition;
  - sub-optimal score for channel alteration;
  - high benthic habitat diversity based on benthic particle size;
  - no flowing water;
  - dense canopy coverage;
  - a variety of riparian vegetation; and
  - an instream habitat comprised mostly of sparse amounts of filamentous algae and aquatic macrophytes, sparse amounts of live roots and sparse overhanging vegetation.

- Calder Creek at Joe Rodata Trail (aka. Calder Creek site)
  - marginal score for epifaunal substrate;
  - sub-optimal score for sediment deposition;
  - sub-optimal score for channel alteration;
  - low benthic habitat diversity based on benthic particle size;
  - minimal flowing water;
  - dense canopy coverage;
  - a variety of riparian vegetation (mostly woody shrubs); and
  - an instream habitat comprised mostly of sparse amounts of filamentous algae and aquatic macrophytes, sparse amounts of live roots and sparse amounts of overhanging vegetation.

For the benthic macroinvertebrate community, there was high variability in species richness measures among the five sites (i.e., 14-74 species at each site), with the Mark West Creek site showing the most diverse biological community. Percent dominant taxa followed a similar pattern to overall biological diversity; as species richness increased, a decreasing percentage of dominant taxa were observed. The East Windsor Creek site and Calder Creek site both had a moderately rich biological community with the presence of EPT taxa indicating relatively healthy streams but some presence of human disturbances. The Laguna de Santa Rosa site had the lowest taxonomic richness among all sites. Due to the lack of mayflies, caddisflies, stoneflies (EPT taxa) and high quantities of pollutant tolerant organisms, the composition measures were low and tolerance values were high for all sites except for the Mark West Creek site.

In regard to the trophic assemblages, all five sites had a relatively high percentages of collectors, with the Hinebaugh Creek site comprised almost entirely of collectors. The Calder Creek site had a moderately diverse trophic assemblage, with the highest percentage of filterers among all sites and comprising half of the entire reach's trophic composition. The East Windsor Creek site also had a moderately diverse trophic assemblage, with a high percentage of collectors and a relatively high percentage of filterers. The Laguna de Santa Rosa site also had a high percentage of collectors and the highest percentage of scrapers for all sites. The Mark West Creek site had the most diverse trophic assemblage, supported by having the highest species richness of all streams. Overall organism abundance ranged from 181 organisms/ft^2 at the Laguna de Santa Rosa site to 1330 organisms/ft^2 at the Calder Creek site.

For algal indices of biological integrity (IBIs), the East Windsor Creek site had the highest scores for three of the five IBIs calculated, while the Hinebaugh Creek site had the highest scores in the remaining two IBIs. The Mark West Creek site had the lowest scores for three of the five IBIs, while the Laguna de Santa Rosa had the lowest IBI scores for the remaining two IBIs. However, it is important to note that these IBIs were developed for southern California streams and state-wide algal IBIs have yet to be adopted. Therefore, the algal IBIs should be used for informational purposes only and not used to characterize impacts at each site.

1. INTRODUCTION

The North Coast Regional Water Quality Control Board requires multiple permittees that have municipal separate storm sewer systems under NPDES No. CA0025054 to comply with the requirements in Order R1-2015-0030. The associated Monitoring and Reporting Program indicates that a bioassessment study is to be performed to assess the physical, chemical, and biological health of creek reaches within the Laguna de Santa Rosa Watershed. Bioassessment monitoring is required once during the permit term within the jurisdictional boundary of the following Co-Permittees: County of Sonoma, City of Cotati, City of Rohnert Park, Town of Windsor, and City of Sebastopol.

Pacific EcoRisk was selected through a competitive bidding process to perform all aspects of the bioassessment study, including: the submittal of a sampling standard operating procedure (SOP), the preparation of a sampling plan, the preparation of study site maps, the collection of the BMI, algae, and collection of water quality samples, the related habitat assessment, the coordination of sample disposition to the sub-contract laboratories, the submittal of electronic SWAMP-compliant data, and the preparation of a study report of the data. Required laboratory analyses for some routine water quality analyses were performed by Pacific EcoRisk and Monterey Bay Analytical, while benthic macroinvertebrate (BMI) and algae analyses were performed by EcoAnalysts. Note that as there are not yet state-wide adopted indices for algal bioassessment studies, and the available indices were developed for southern California streams, the algal indices provided in this report are intended for informational purposes only at this time.

2. METHODS

2.1 Description of Study Area and Site Selection

One stream reach per Co-Permittee was identified by each agency and Pacific EcoRisk completed a pre-sampling site scoping evaluation. The reaches were approved by Pacific EcoRisk and each Co-Permittee and identified in a study-specific SOP/work plan. Creek reaches were selected that were wadeable, had safe access, and had a high likelihood of having water during the dry weather sampling period of Spring 2018. The following sites were selected:

1. Mark West Creek near Cresta Road (County of Sonoma), aka Mark West Creek site;
2. Laguna de Santa Rosa at Gravenstein Way (City of Cotati), aka Laguna de Santa Rosa site;
3. Hinebaugh Creek at State Farm Drive (City of Rohnert Park), aka Hinebaugh Creek site;
4. East Windsor Creek behind the Senior Center (Town of Windsor), aka East Windsor Creek site; and
5. Calder Creek at Joe Rodata Trail (City of Sebastopol), aka Calder Creek site.

All reaches monitored spanned 150 meters, per SWAMP protocol for streams less than 10 m wide, with the exception of Calder Creek site which was reduced to 100 meters in order to eliminate a downstream pedestrian bridge and upstream culverts. Mark West Creek site was the only reach with limited site access due to private property rights. Site attributes for the sampling reaches are presented in Table 1, and a vicinity map and photos are presented in Figures 1-6. Individual site maps with the transect delineations are included in Appendix A.

Table 1. Site Attributes for the 2018 Sonoma County Phase I MS4 BMI Monitoring Program Sampling Sites.

	Site:	Mark West Creek site	East Windsor Creek site	Calder Creek site	Laguna de Santa Rosa site	Hinebaugh Creek site
	Site Code	MWCNCR	EWCBSC	CCAJRT	LDSRAGW	HBCASFD
Site Characteristics	GPS Coordinates	N 38.54756º W 122.70495º	N 38.55132º W 122.80925º	N 38.40044º W 122.81982º	N 38.33455º W 122.70883º	N 38.35058º W 122.70531º
	Habitat	Dense riparian corridor, sparse in-stream vegetation, complex particle size distribution	Moderate riparian corridor; sparse in-stream vegetation; complex particle size distribution	Dense riparian corridor; sparse in-stream vegetation; soft/fine substrate habitat	Moderate riparian corridor; sparse in-stream vegetation; soft/fine substrate habitat	Moderate riparian corridor, sparse in-stream vegetation, fine /gravel substrate habitat
	Upstream Land Uses	Sparsely populated forest area	Urban development	Urban development/ stream enclosed by culvert	Urban development	Golf course & urban development
	Storm Drain Input	No	No	No	Yes	Yes
	Construction Activities	No	No	No	No	No
Safety Hazards	Traffic	No	No	No	No	No
	Wading	No	No	No	No	No
	Bank Stability	No	No	No	No	Steep bank access
	Possible Wildlife	Rattlesnakes, mosquitoes and ticks	Rattlesnakes, mosquitoes and ticks	Rattlesnakes, mosquitoes and ticks	Rattlesnakes, mosquitoes and ticks	Rattlesnakes, mosquitoes and ticks
Access	Vehicular	No	No	Yes	No	No
	Foot	Yes	Yes	Yes	Yes	Yes
	Parking	Through access gate on Cresta Road	Senior Center parking lot	Near Rodata trail entrance where stream exposes from culvert	Next to overpass on Gravenstein Way	Police department parking lot southeast of transect K



Figure 1. Vicinity Map of the Sonoma County Bioassessment sites within the Laguna de Santa Rosa Watershed.



Figure 2. Mark West Creek site



Figure 3. East Windsor Creek site



Figure 4. Calder Creek site



Figure 5. Laguna de Santa Rosa site



Figure 6. Hinebaugh Creek site

2.2 Bioassessment Sampling

All field sampling was performed June 5-7, 2018 during the Spring Index Period and following Surface Water Ambient Monitoring Program (SWAMP) methods (Ode et al., 2016). Appropriately-trained scientists performed the bioassessment sampling for the Sonoma County Phase I MS4 study. This monitoring includes collection of general water quality analyses, BMIs and algae, and an assessment of physical habitat characteristics.

2.2.1 Water Quality Sampling

Basic water quality parameters [e.g., temperature, pH, dissolved oxygen (D.O.), and specific conductance] were measured at the downstream end of each reach using a Hydrolab model 4a datasonde. Water samples were collected at each site as sub-surface grabs directly to the sample bottles provided by the laboratories. Samples were sent to Pacific EcoRisk for alkalinity analyses and to Monterey Bay Analytical Services for nutrient analyses.

2.2.2 Benthic Macroinvertebrate (BMI) and Algae Sampling

Benthic macroinvertebrates and algae samples were collected following a multi-habitat protocol known as reachwide benthos (RWB). Full habitat measurements are made at 11 primary equally-spaced, cross-stream transects, identified as transects A-K, along each reach, with substrate measurements made in between each transect (i.e., identified as 10 inter-transects). The benefit

of the RWB method is that the even distribution of the transects results in sampling areas that may fall into a variety of erosional or depositional habitats. Each reach was photo documented using a digital camera at the following locations: transect A facing upstream, transect F facing upstream, transect F facing downstream, and transect K facing downstream. Dominant land use, evidence of rainfall, and evidence of fire is noted on the field sheets.

Starting at the most downstream transect, BMI samples were collected either from the left, center, or right end (i.e., 25%, 50%, and 75% of the wetted width, respectively) of the transect using a standard D-net with 500 µm mesh. Organisms were dislodged from the benthic substrate to a depth of 4-6 inches from within a one-ft^2 area of the benthic habitat (*e.g.,* riffle, pool/glide, snag, vegetated banks, or submerged macrophytes) immediately upstream of the net for 30 seconds. This process was repeated at each transect working upstream until one composite sample of 11 transects was collected. For each sample, the material retained in the net was immediately sieved through a 500-µm stainless steel sieve, and then transferred into an appropriately labeled 500-mL plastic wide mouth jar(s) containing 95% ethanol to preserve any organisms. The preserved samples were transported, under chain of custody, to the PER laboratory where they were stored at room temperature until being shipped to EcoAnalysts Inc. for organism identification.

Concurrent quantitative benthic algae samples were collected alongside BMI samples approximately 0.25 meters upstream from the location of the BMI samples. Algae samples followed the same pattern from left, center, or right end (i.e., 25%, 50%, and 75% of the wetted width, respectively) of the transect using two separate algae delimiters with a 4 cm diameter hole (12.6 cm^2 area). The delimiter used was dependent upon the type of substrate encountered at each transect. A rubber delimiter was used for cobble, large gravel, and wood substrates. These larger substrate pieces were removed from the stream and the delimiter was placed on the portion of substrate most exposed to sun. Using a small stuff bristled brush the substrate was scrubbed within the 4 cm diameter hole and rinsed with site water into a large dish tub. A PVC delimiter was used for collecting samples from substrate made of particulate matter (silt/sand/fine gravel). This delimiter was penetrated 1 cm into the sediment and retrieved with a flat masonry trowel, keeping the collected sediment contained within the area of the delimiter. All material retained within the delimiter was deposited into the composite tub. This process was repeated at each transect working upstream until one composite sample of 11 transects was collected. For each sample the material retained in the composite tub was thoroughly massaged to suspend any microalgae coating materials (leaves, sticks rocks etc.) within the sample. The final volume of supernatant for each sample was measured. Four types of quantitative laboratory samples were prepared from this composite sample; two for taxonomic identification of diatoms and soft-bodied algae, and two for biomass (i.e., chlorophyll a and Ash Free Dry Mass). Taxonomic identification samples aliquoted 40 mL for diatom samples and 45 mL for soft bodied algae into a 50 mL centrifuge tube. Samples were then preserved and stored on wet ice. Diatoms were preserved immediately in the field using formalin to a final concentration of 1%, soft bodied algae samples were fixed upon returning to Pacific EcoRisk laboratory using glutaraldehyde to a

final concentration of 2%. Glutaraldehyde fixation was completed within 96 hours of sample collection time. Up to 25 mL of the composite sample was filtered through 47 mm glass-fiber filters to obtain biomass samples and were immediately stored on dry ice. Ash Free Dry Mass samples were collected on pre combusted glass-fiber filters. Volume filtered for each sample was recorded. Both taxonomic ID samples and biomass samples were wrapped with aluminum foil to eliminate any further light exposure. Macroalgae was included if encountered when sampling for benthic algae, requiring additional processing steps per SWAMP protocols.

A qualitative algae sample was collected throughout the duration of the sampling period. Any algae encountered within the reach was collected in a whirl pack bag, and 100 mL of the qualitative sample was added. All five algae samples were transported, under chain of custody, to the PER laboratory where they were stored in the dark at appropriate temperatures until being shipped to EcoAnalysts Inc. for final analysis.

2.2.3 Physical Habitat Assessment

A physical habitat assessment was performed for each reach and was done concurrently with the collection of BMIs and algae. The following qualitative habitat characteristics were recorded for the entire reach: epifaunal substrate/cover, sediment deposition, and channel alteration. Each metric is given a maximum score of 20, with the greater the value representing a better habitat for BMI; the combined habitat metric score for any site can be no greater than 60. There are four categories of stream condition for these qualitative habitat characteristics: optimal (60 to 46), sub-optimal (45 to 31), marginal (30 to 16), and poor (15 to 0).

Quantitative and semi-quantitative measurements of physical habitat included a characterization of particle size distribution, identification of the presence/absence of coarse particulate organic matter (CPOM), percent canopy cover, and % gradient and sinuosity. Visual estimates of human influence, instream habitat complexity, and riparian vegetation are also recorded for each transect. Inter-transect measures included flow habitats, particle size distribution, and presence/absence of CPOM. Stream discharge was measured at one transect for each reach. A copy of the SWAMP field data sheets for each stream reach is provided in Appendix B.

A GARMIN GPS map 76 was used to record GPS coordinates for each sampling site. Reach and transect length were measured using a tape measure. Depth was measured using a staff gauge. Canopy was measured immediately above the sampling locations using a spherical densiometer. Flow rate was measured at each sampling station using a HACH digital velocity meter.

2.3 Water Quality Analyses

Alkalinity samples were analyzed by Pacific EcoRisk using Hach digital titrator. Nutrient analyses were performed by Monterey Bay Analytical Services as follows: Total Nitrogen via calculation, Total Kjeldahl Nitrogen via EPA 351.2, Total Phosphorus via EPA 365.1, and Nitrate + Nitrite as N via EPA 300.0.

2.4 BMI Identification Procedures

Benthic macroinvertebrate (BMI) analyses followed methods described in Woodard et al., (2012). The methods are described in detail below.

2.4.1 Sample Sorting

EcoAnalysts (a taxonomy laboratory located in Moscow, Idaho) sorted all samples. Following the removal of alcohol, each sample was placed into a 500 µm mesh sieve and rinsed using de-ionized water. Large debris (*e.g.,* twigs, rocks, etc.) were removed from the sample after carefully examining each item for the presence of BMIs. The remaining material was then evenly spread across a gridded (2" x 2" grids) tray. Following the random selection of a grid (using a random number generator), the materials from within the selected grid were transferred into a petri dish. Using a dissecting microscope, BMIs were removed from the dish during a systematic sorting of the sample. The BMIs were counted, and then placed into 50 mL vials containing 70% ethanol/glycerin. This process was repeated, grid-by-grid, until a total of 600 BMIs were collected. Once 600 BMIs were collected, the remaining materials in the last grid being sorted were placed into an additional 50-mL vial labeled with the appropriate sample code and the phrase "partially sorted". The remaining materials from <u>all</u> of the previously sorted grids were collected into a 500-mL plastic wide mouth jar containing 70% ethanol/glycerin, and labeled with the sample code and identified as "sorted"; as a QC measure, sorted materials from 20% of the samples were re-sorted a second time by a different scientist, with the target of finding no more than 30 un-collected BMIs (5% of the overall number removed for identification). The remaining unsorted materials in the gridded tray were placed back into the original 500-mL plastic wide mouth jar containing 70% ethanol/glycerin and the original sample label. This process was repeated for all of the samples collected.

2.4.2 Taxonomic Identification

EcoAnalysts provided all taxonomic identification services. A Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) Level 2 taxonomic effort was used for this study, whereby most organisms were taxonomically identified to the lowest possible taxon, with Chironomidae generally being identified to genus. This was achieved by removing the BMIs from the 50-mL vials, transferring them to a Petri dish, and identifying each organism using standard taxonomic keys. A 10-mL vial with 70% ethanol/glycerin, and a specimen label containing the sample identification number and family name was prepared for each taxonomic group, with each identified organism transferred into the appropriate vial. Once an organism was

identified, and before proceeding to another specimen, the Petri dish was searched for additional organisms of the same family, which were added to the vial for that family. A push-button counter was used to maintain an accurate count of the various organisms; the data from the push-button counter was then transferred to a taxonomic worksheet. This process was continued until all organisms were identified. The resulting collection of vials from each site comprise the voucher collection for that site and should be maintained for 5 years for any possible future use by Sonoma County Co-Permittees.

2.5 Algae Identification Procedures

Algae analyses followed methods described in Stancheva *et* al., (2015). Sample processing and preparation of identification varies between the three separate algae samples; Soft Bodied Algae qualitative, Soft Bodied Algae quantitative, and Diatom quantitative sample. The qualitative sample is used to identify as many macro algal taxa present in the stream as possible, identified to the lowest possible taxonomic level (typically species). This is accomplished by identifying enough unfixed material representing different life stages to determine vegetative features, reproduction of mode, and characteristics of completely developed reproductive structures of each species. Qualitative samples are poured into a glass dish and examined under dissecting microscope to identify key life stages and reproductive structures used to separate algae by genus. Quantitative Soft bodied algae samples are used to provide accurate taxa lists down to a species level and biovolume estimate for each algae taxon at a given site. Soft bodied algae samples contain algae of varying different sizes, requiring the separate analyses of macroalgal and microalgal fractions. Macroalgae particles are removed from composite volume and placed into centrifuge tube for a final estimated volume of removed macroalgae. Each macroalgal genus is placed on separate microscope slide for final identification and enumeration. Following removal of the macroalgae fraction, the remaining volume of sample is used for the microalgae fraction. Removal of glutaraldehyde is completed before microscopic examination. One mL of five times concentrated microalgae sample is transferred to a 15 mL centrifuge tube. A subsample of 0.05 mL is examined under a compound microscope for final taxonomic ID and enumeration. Quantitative diatom samples are used to identify 600 valves of diatoms to the lowest taxonomic level, usually species, and to determine an abundance of diatom taxa. Diatom frustules must be cleaned with nitric acid or hydrogen peroxide to remove all organic content of diatom. Diatom samples are then placed on microscope slide for final identification and enumeration. Unused, cleaned diatom material is preserved with ethanol to 50% final concentration and archived.

2.6 Data Analysis/Management

2.6.1 Data Analysis

The data from the identification of the 600 BMIs for each sample were used to generate biological metrics that allow for an assessment of the biological condition of the reach at each sampling location. The biological metrics are categorized into four categories: richness

measures, composition measures, tolerance/intolerance measures, and functional feeding groups. The ecological structure of the BMI assemblage (*i.e.,* groups of benthic organisms) may be described using numerous biological metrics, are:

Richness Measures

- Taxa Richness
- Ephemeroptera Taxa
- Plecoptera Taxa
- Trichoptera Taxa
- EPT Taxa

Composition Measures

- EPT Index
- Sensitive EPT Index
- Percent Hydropsychidae
- Percent Baetidae

Tolerance/Intolerance Measures

- Tolerance Value
- Percent Intolerant Organisms
- Percent Tolerant Organisms
- Percent Dominant Taxa

Trophic Measures

- Percent Collectors
- Percent Filterers
- Percent Scrapers
- Percent Predators
- Percent Shredders

These biological metrics define a characteristic of the BMI organisms that may change in some predictable way with increased human disturbance (Table 2).

Measures of richness reflect the diversity of the aquatic organisms, where increasing diversity correlates with increasing health of the aquatic community; decreasing richness correlates with increasing disturbance. The richness measures used in this study were: taxa richness (the total number of individual taxa) and EPT taxa [number of families in the Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly) insect orders].

Measures of composition reflect the relative contribution of the population of individual taxa to the total fauna and are based on the ecological patterns and environmental requirements of certain organism groups, such as those taxa considered to be environmentally sensitive, or alternatively, those considered to be a nuisance species. The composition measures used in this study include: EPT index (percent composition of mayfly, stonefly, and caddisfly larvae), sensitive EPT index (percent composition of EPTs with a tolerance value of 0 through 3), percent Hydropsychidae (percent of caddisflies in the more tolerant family Hydropsychidae), and percent Baetidae (a composition measure for a tolerant family of mayflies).

Tolerance/intolerance measures are metrics that reflect the relative sensitivity of the community to aquatic disturbances. Although the taxa used are usually 'pollutant tolerant' or 'intolerant', they are not specific to the type of stressor. For example, these metric values typically also co-vary with increasing fine particulate organic matter and sedimentation. The tolerance/intolerance measures used in this study include: tolerance value [values between 0 and 10 weighted for abundance of individuals that are pollutant tolerant (higher values) and intolerant (lower values)], percent intolerant organisms (percent of organisms that are considered highly intolerant to impairment as indicated by tolerance values of 0, 1, or 2), percent tolerant organisms (percent of organisms that are considered highly tolerant to impairment as indicated by tolerance values of 8, 9, or 10), and percent dominant taxa (percent composition of the single most abundant taxa).

Table 2. Trends in Biological Metrics Associated with Disturbance.

Biological Metrics	Response to Disturbance
Richness Measures	
Taxa Richness	Decrease
EPT Taxa	Decrease
Composition Measures	
EPT Index	Decrease
Sensitive EPT Index	Decrease
Percent Hydropsychidae	Increase
Percent Baetidae	Increase
Tolerance/Intolerance Measures	
Tolerance Value	Increase
Percent Intolerant Organisms	Decrease
Percent Tolerant Organisms	Increase
Percent Dominant Taxa	Increase
Trophic Measures	
Percent Collectors (CG)	Increase
Percent Filterers (FC)	Increase
Percent Scrapers (SC)	Variable
Percent Predators (P)	Variable
Percent Shredders (SH)	Decrease

Table Notes: EPT= Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly)

Trophic measures are metrics that provide information on the balance of feeding strategies in the aquatic assemblage. An imbalance of the functional feeding groups reflects unstable food dynamics and indicates stressed conditions. The trophic measures included in this study were:

- percent collectors (percent of BMIs that collect and gather fine particulate matter),
- percent filterers (percent of BMIs that filter fine particulate matter),
- percent scrapers (percent of BMIs that graze upon periphyton),

- percent predators (percent of BMIs that feed on other organisms), and
- percent shredders (percent of BMIs that shred coarse particulate organic matter).

Abundance is one additional metric that provides information on the total number of organisms in a given sampling area. Abundance is calculated dividing the total number of organisms in the sub-sample grids sorted by the number of grids used for the sub-sampling and multiplied by the number of possible sampling grids (15 for this study). The abundance data represents the total number of organisms in an 11 square foot composite (*i.e.,* 11 transect samples, each with an area of 1 square feet).

The California Stream Condition Index (CSCI) is a more generalized metric quantifying human activity and alterations to a given stream based on biological and environmental data. This metric is calculated by averaging two separate indices, the observed-to-expected index (O/E) and a multi-metric index (MMI). The O/E assesses the taxonomic completeness by comparing the observed taxa to the expected taxa of a given site based on statistical modeling of relationships between taxonomic composition and environmental gradient conditions. The MMI index combines several different BMI characteristics such as percent predators, number of tolerant species, richness, composition, etc. into a single biological condition based on the responsiveness to human disturbance. As both of these indices decrease (values ranging from 0 to 1), the more likely the stream has undergone some type of historical human alterations. CSCI scores range from 0 to 1. Scores greater than 1 are indicative of high taxonomic richness and more complex ecological functions than what was predicated for the site-specific habitat conditions. Standardized CSCI scores allow for statewide stream assessments under three thresholds established based on the 30^{th}, 10^{th}, and 1^{st} of CSCI scores at reference sites. Four categories of biological condition are used to evaluate overall stream conditions: ≥ .92 a stream is likely intact condition; from 0.91 and 0.80 a stream has possibly altered conditions; from 0.79 to 0.63 a stream has likely altered conditions; and ≤0.62 a stream is very likely altered.

Algae communities can be used as indicators for water quality, providing the base for the trophic food web and quick responses to chemical and physical disturbances. Taxonomic ID and biomass samples were analyzed to provide count (diatom and soft algae), biovolume (soft algae) and "presence" (diatom and soft algae) data of local algae communities. Eleven metrics for diatoms, 11 metrics for soft bodied algae, and 5 IBIs (D18, S2, H20, H21, and H23) were calculated following protocols developed from Southern California streams. Diatom and soft bodied algae fall into five metrics:

- Tolerance/Sensitivity [association with specific water-quality constituents like nutrients; tolerance to low dissolved oxygen; tolerance to high-ionic-strength/saline waters]
- Autoecological Guild [nitrogen fixers; saprobic/heterotrophic taxa]
- Morphological Guild [sedimentation indicators; motility]
- Taxonomic Groups [Chlorophyta, Rhodophyta, Zygnemataceae, heterocystous cyanobacteria]
- Relationship to Reference sites

After each metric was scored, values were summed and then converted to a 100-point scale by multiplying the sum by the number of metrics [e.g., sum x (100/50) if five metrics included in the IBI]. SWAMP has not updated the algae attribute list for new Final IDs since May 2013 so some metrics and IBIs could be deficient due to a lack of attribute classification rather than environmental effects. Soft bodies algae help to indicate anthropogenic disturbances in a stream. As anthropogenic disturbances increase (TP, TH, DOC, CU) proportion of ZHR species decrease and proportion of CRUS species increase. These metrics were quantified for each site so as to characterize the parameter ranges across the Laguna de Santa Rosa Watershed.

The algal IBIs are calculated based on a combination of metrics. For example, the H20 IBI is comprised of eight metrics that are based on diatoms, soft algae, and/or relative species number. However, as the algal IBIs were developed for southern California streams, the algal indices provided in this report are intended for informational purposes only at this time. The data are available for a future assessment should state-wide IBIs be developed.

2.6.2 Data Entry

All bioassessment data will be provided electronically in an Excel format and entered into the statewide SWAMP Bioassessment online database.

3. RESULTS

3.1 Physical Habitat Assessment

Habitat condition recorded during the qualitative physical habitat assessment of the study sites are presented in Table 3-5.

Table 3. SWAMP Qualitative Physical Habitat Characteristics for Sonoma County Sites.

Physical Habitat Parameters	Mark West Creek Site	East Windsor Creek Site	Calder Creek Site	Laguna de Santa Rosa Site	Hinebaugh Creek Site
Epifaunal Substrate/ Cover	15	11	8	14	8
Sediment Deposition	14	10	13	14	16
Channel Alteration	18	13	12	10	12
Total Habitat Score	**47**	**34**	**33**	**38**	**36**

The Mark West Creek site was characterized as having a:

- sub-optimal score for epifaunal substrate, with 30-50% of the reach classified with stable habitat;
- sub-optimal score for sediment deposition with 20-50% of the streambed affected by sediment deposition;
- optimal score for channel alteration with no evidence of historical channelization or dredging and a normal stream pattern;
- complex benthic habitat, largely comprised of coarse gravel;
- high percentage of canopy coverage and a variety of riparian vegetation (mostly woody shrubs); and
- instream habitat comprised mostly of sparse filamentous algae and aquatic macrophytes, sparse amounts of live tree roots, and moderate amounts of overhanging vegetation.

The East Windsor Creek site was characterized as having a:

- sub-optimal score for epifaunal substrate, with 30-50% of the reach classified with stable habitat;
- marginal score for sediment deposition with 50-80% of the streambed affected by sediment deposition;
- sub-optimal score for channel alteration with evidence of historical (>20 yrs) channelization present;
- complex benthic habitat, largely comprised of coarse gravel;
- high percentage canopy coverage and a variety of riparian vegetation; and
- instream habitat comprised mostly of sparse filamentous algae and aquatic macrophytes, sparse amounts of live roots and very little overhanging vegetation.

The Calder Creek site was characterized as having a:

- marginal score for epifaunal substrate, with 10-30% of the reach classified with stable habitat;
- sub-optimal score for sediment deposition with 20-50% of the streambed affected by sediment deposition;
- sub-optimal score for channel alteration with evidence of historical (>20 yrs) channelization present;
- benthic habitat comprised of mostly fines;
- high percentage canopy coverage and a variety of riparian vegetation (mostly woody shrubs); and
- in stream habitat comprised mostly of sparse filamentous algae and aquatic macrophytes, sparse amounts of live roots and sparse amounts of overhanging vegetation.

The Laguna de Santa Rosa site was characterized as having a:

- sub-optimal score for epifaunal substrate, with 30-50% of the reach classified with stable habitat;
- sub-optimal score for sediment deposition with 20-50% of the streambed affected by sediment deposition;
- marginal score for channel alteration with extensive shoring structure and 40-80% of the stream reach disrupted by channelization;
- benthic habitat comprised of mostly fines;
- low percentage of canopy cover and a variety of riparian vegetation (mostly herbs and grasses); and
- in stream habitat comprised mostly of large filamentous algae and sparse amounts of aquatic macrophyte, sparse amounts of live roots, and sparse amounts of overhanging vegetation.

The Hinebaugh Creek site was characterized as having a:

- marginal score for epifaunal substrate, with 10-30% of the reach classified with stable habitat;
- optimal score for sediment deposition with >20% of the streambed affected by sediment deposition;
- sub-optimal score for channel alteration with evidence of historical (>20 yrs) channelization present;
- benthic habitat comprised mostly of fines and sand;
- moderate percentage of canopy coverage and a variety of riparian vegetation (mostly woody shrubs); and
- instream habitat comprised mostly of sparse filamentous algae and aquatic macrophytes, sparse amounts of live roots, and sparse amounts of overhanging vegetation.

Table 4. SWAMP Particle Size Assessment for Sonoma County Sites.

Benthic Particle Size Composition	Mark West Creek Site	East Windsor Creek Site	Calder Creek Site	Laguna de Santa Rosa Site	Hinebaugh Creek Site
Primary Transects					
% Bedrock (smooth)	2	0	0	0	0
% Bedrock (rough)	0	0	0	0	0
% Large Boulder (1000 - 4000 mm)	0	0	0	0	0
% Small Boulder (250 – 1000 mm)	0	7	0	0	2
% Cobble (64 – 250 mm)	18	9	0	0	4
% Coarse Gravel (16 – 64 mm)	38	42	0	5	13
% Fine Gravel (2 – 16 mm)	14	16	4	4	14
% Sand (0.06 – 2 mm)	15	4	5	9	22
% Fines (silt, clay, muck, not gritty)	13	20	80	82	43
% Hardpan (firm substrate)	0	0	0	0	0
% Wood	0	2	11	0	2
% Concrete/asphalt	0	0	0	0	0
% Other	0	0	0	0	0
Inter Transects					
% Bedrock (smooth)	2	0	0	0	0
% Bedrock (rough)	0	0	0	0	0
% Large Boulder (1000 - 4000 mm)	0	0	0	0	0
% Small Boulder (250 – 1000 mm)	0	12	0	0	0
% Cobble (64 – 250 mm)	16	20	0	0	8
% Coarse Gravel (16 – 64 mm)	44	24	2	6	18
% Fine Gravel (2 – 16 mm)	10	14	4	12	20
% Sand (0.06 – 2 mm)	10	8	4	10	12
% Fines (silt, clay, muck, not gritty)	18	16	76	70	42
% Hardpan (firm substrate)	0	0	0	0	0
% Wood	0	6	14	0	0
% Concrete/asphalt	0	0	0	2	0
% Other	0	0	0	0	0

Table 5. SWAMP Physical Habitat Characteristics for Sanoma County Sites.					
Physical Habitat Parameters	Mark West Creek Site	East Windsor Creek Site	Calder Creek Site	Laguna de Santa Rosa Site	Hinebaugh Creek Site
Reach Length (m)[1]	150	150	100	150	150
Wetted Width (m)[1]	6.3	4.1	2.5	8.5	8.1
Bankfull Height (m)[1]	1.3	1.9	0.9	0.5	0.9
Discharge (m^3/s)	0.03	0.00	0.01	0.01	0.03
Reach Slope (%)[1]	0.57	0.59	0.49	0.01	0.01
% of particles with CPOM[1]	32.7	54.5	83.6	20.0	29.1
% Canopy[1]	78.2	97	92.1	18.6	45.2
Riparian Vegetation[1,2]					
Trees & saplings >5 m	1.6	1.8	1.8	1.1	1.6
All vegetation 0.5 m to 5	2.6	1.4	2.9	2.1	1.8
Woody shrubs <0.5 m	3.1	1.5	3.3	2.2	2.1
Herbs/grasses	1.5	2.4	1.5	3.3	3.5
Barren soil	1.3	2.0	1.2	0.4	0.4
Instream Habitat Complexity[1,2]					
Filamentous algae	0.8	0.9	0.1	3.7	1.0
Aquatic macrophytes and	1.0	0.7	0.8	1.2	1.2
Boulders	0.9	0.9	0.0	0.0	0.9
Woody debris >0.3 m	1.0	1.0	1.0	0.9	1.0
Woody debris <0.3 m	0.7	0.8	0.9	0.0	0.4
Undercut banks	0.8	0.4	0.3	0.0	0.5
Overhang vegetation	1.6	0.8	1.0	1.1	1.2
Live Tree Roots	1.0	1.0	1.0	1.0	1.0
Artificial structure	0.0	0.0	0.1	0.0	0.0
Human Influences	Pasture & Ranges	Urban Development	Urban Development	Urban Development	Urban Development & Golf Course

1 – As averaged for the reach based on 11 sampling transects.
2 – Average of right and left bank: 0=absent (0%), 1=sparse (<10%), 2= moderate (10-40%), 3= heavy (40-75%), an 4 = very heavy (>75%).

3.1.1 Water Quality Parameters

Water quality results for Sonoma County Phase I MS4 are presented in Table 6. Relatively low dissolved oxygen concentrations were recorded for East Windsor Creek site and Laguna de Santa Rosa sites. Both of these sites had minimal to no discharge, consisting of continuous stagnate pools. Calder Creek site was the only site with a detectable Nitrate + Nitrite concentration, and all sites had no detectable Total Kjeldahl Nitrogen. Total Phosphorus concentrations were low amongst all sites. Laboratory reports for nutrient analyses are provided in Appendix C.

Table 6. Water Quality Characteristics for Sonoma County Sites.

Water Quality Parameters	Mark West Creek Site	East Windsor Creek Site	Calder Creek Site	Laguna de Santa Rosa Site	Hinebaugh Creek Site
Temperature (ºC)	17.12	15.62	15.25	17.14	19.61
pH	7.16	6.63	7.44	7.30	7.85
Dissolved Oxygen (mg/L)	7.31	1.91	8.62	3.27	9.74
Specific Conductance (µS)	308	348	231	653	493
Alkalinity (mg/L)	135	127	55	277	241
Nutrients					
Total Nitrogen (mg/L)	ND	ND	2.1	ND	ND
Total Kjeldahl Nitrogen (mg/L)	ND	ND	ND	ND	ND
Total Phosphorus (mg/L)	0.06	0.04	0.13	0.34	0.12
Nitrate and Nitrite as N (mg/L)	ND	ND	2.1	ND	ND

3.2 BMI Biological Metrics

The BMI laboratory data are provided in Appendix D. The biological metrics for the Sonoma County Phase I MS4 BMIs study are presented in Table 7.

Richness Measures

Richness measures varied widely between all five sites and was highest at the Mark West Creek site, indicating a healthy stream, and a diverse biological community with minimal anthropogenic disturbances. The East Windsor Creek site and Calder Creek sites showed little difference in richness measures, with moderately diverse benthic communities and the presence of EPT taxa indicating relatively healthy streams with some presence of human disturbances. The Laguna de Santa Rosa and Hinebaugh Creek sites both exhibited a lowest taxonomic richness scores and minimal presence of EPT taxa, indicating that they had the highest level of human disturbance; higher levels of human disturbance has a negative impact on the biological community (i.e., see Table 2).

Composition Measures

The EPT index ranged from 0-0.57, with the highest proportion of EPT taxa and greatest sensitive EPT index at the Mark West Creek site. The East Windsor Creek site had a relatively low EPT Index and low sensitive EPT Index. The Calder Creek site, and Laguna de Santa Rosa sites all had similar EPT index values low sensitive EPT indices, indicating similar overall stream quality characteristics and indications of disturbance. There was a complete absence of EPT taxa at the Hinebaugh Creek site. As noted in Table 2, the EPT Index decreases with increasing disturbance, suggesting that this site has experienced the highest level of historical disturbances.

Table 7. Biological Metrics for BMIs Collected from Sonoma County Sites.

Biological Metrics	Mark West Creek Site	East Windsor Creek Site	Calder Creek Site	Laguna de Santa Rosa Site	Hinebaugh Creek Site
Richness Measures					
Taxa Richness	74	47	36	18	14
EPT Taxa	28	2	3	1	0
Composition Measures					
EPT Index	50.2	5.9	0.82	0.67	0.0
Sensitive EPT Index	39.6	9.3	0.2	0.0	0.0
% Hydropsychidae	0.5	0.0	0.0	0.0	0.0
% Baetidae	10.7	0.2	0.7	0.7	0.0
Tolerance/Intolerance Measures					
Tolerance Value	4.3	7.5	6.5	7.8	8.1
% Intolerant Organisms	30.0	2.1	1.1	0.0	0.0
% Tolerant Organisms	0.6	15.3	0.9	26.1	9.8
% Dominant Taxa	14.3	31.3	40.7	66.4	77.9
Trophic Measures					
% Collectors (CG)	47.2	64.2	33.4	75.4	94.4
% Filterers (FC)	9.3	17.0	50.5	8.7	4.4
% Scrapers (SC)	9.7	6.1	4.8	13.1	0.0
% Predators (P)	10.0	5.9	1.2	2.5	1.0
% Shredders (SH)	22.5	6.1	9.8	0.2	0.2
% Other (e.g.,	1.3	0.7	0.3	0.1	0.0
Abundance Measures					
Abundance (per square foot)	532	190	1330	181	534

Table Notes: BMIs= benthic macroinvertebrates; EPT = Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies)

Tolerance/Intolerance Measures

The tolerance value, percent dominant taxa, and percentage of tolerant organisms were the lowest at the Mark West Creek site, indicating that this site had the lowest level of disturbance. The tolerance/intolerance measures varied among the other four sites, with the Hinebaugh Creek site with the highest tolerance and percent dominant taxa values, again suggesting a high level of human disturbance at this site.

Trophic Measures

The diversity of the benthic organism composition at the Mark West Creek site is consistent with lower human disturbance. The benthic organism composition at the East Windsor Creek site and Calder Creek site were comprised mostly of collectors and filterers, which is consistent with increased human disturbance. The benthic organism composition at the Laguna de Santa Rosa

and Hinebaugh Creek sites were comprised almost entirely of collectors, which is also consistent with increased human disturbance.

Abundance

The abundance of organisms ranged widely between all five sites. Low organism abundance is generally associated with increased human disturbance. The Laguna de Santa Rosa and East Windsor Creek sites had the lowest abundance values, with just under 200 organisms per square foot. The Mark West Creek and Hinebaugh Creek sites had very similar abundance values, rating moderately abundant in comparison to other streams evaluated in the study. The Calder Creek site had the highest abundance value, with over double the number of organisms per square foot of any other site.

Stream Condition Indices

The stream condition indices are provided in Table 8. Mark West Creek site scored greater than 1 under all stream indices, indicating a high taxonomic richness and likely intact stream conditions with minimal anthropogenic disturbances. The four remaining sites scored ≤0.62 across all stream indices, indicating that the streams are very likely altered and have undergone historical human disturbances.

Table 8. Stream Condition Indices of Sonoma County sites.

Stream Condition Index	Mark West Creek Site	East Windsor Creek Site	Calder Creek Site	Laguna de Santa Rosa Site	Hinebaugh Creek Site
BMI Count	610	611	610	601	612
MMI	1.1	0.3	0.2	0.1	0.1
O/E	1.1	0.4	0.5	0.3	0.3
CSCI	1.1	0.4	0.3	0.2	0.2
Status	Likely Intact	Very Likely Altered	Very Likely Altered	Very Likely Altered	Very Likely Altered

Table Notes: BMI = Benthic Macroinvertebrate; MMI= Multi-metric Index; O/E= Observed/Expected; and CSCI= California Stream Condition Index.

3.3 Algal Biological Metrics and Indices

The algae laboratory data for the Sonoma County Phase I MS4 BMIs study are presented in Appendix E.

Biomass Results

The biomass results are provided in Table 9. Of the five algae samples analyzed, 329 diatom and soft algae taxa were identified to match the SWAMP Master Taxa List except for one (*Navicula indifferens*), which was backed off to *Navicula* in the calculations. The Laguna de Santa Rosa site had the highest overall AFDM of all five sites, with over double the mass of any other site, whereas the Mark West Creek site had the lowest overall biomass. The East Windsor Creek, Calder Creek, and Hinebaugh Creek sites had similar AFDM values. The Calder Creek site had

the lowest chlorophyll a and pheophytin concentration of all sites, and these metrics were relatively similar for the Mark West Creek and East Windsor Creek sites. The Hinebaugh Creek and Laguna de Santa Rosa sites had the highest overall chlorophyll a and pheophytin concentrations. The Laguna de Santa Rosa and Hinebaugh Creek sites were the only two sites where macroalgae was encountered during quantitative algae collection. Collectively, these results suggest relatively high algal biomass values at the Laguna de Santa Rosa and Hinebaugh Creek sites.

Table 9. Biomass Results for Sonoma County Sites.

Stream Condition Index	Mark West Creek Site	East Windsor Creek Site	Calder Creek Site	Laguna de Santa Rosa Site	Hinebaugh Creek Site
Chlorophyll a (mg/m^2)	27.1	37.3	15.6	124.3	162.9
Pheophytin (mg/m^2)	33.9	31.8	14.9	92.8	111.3
AFDM (g/m^2)	8.7	51.4	41.7	119.0	54.0

Algal IBI Scores

Algal Index of Biological Integrity (IBI) scores are presented in Table 10 and the related algal metrics are presented in Appendix F. The East Windsor Creek site had the highest scores for three of the five IBIs calculated (D18, H20, H21). The Hinebaugh Creek site had the highest scores in the remaining two IBIs (S2 and H23), including the highest overall IBI score (S2= 83). The Mark West Creek site had the lowest scores for three of the five IBIs (S2, H20, H23), while the Laguna de Santa Rosa site had the lowest IBI scores for the remaining two IBIs (D18 and H21). As the state-wide algal metrics and indices have yet to be adopted and given that the algal indices were developed for southern California streams, the algal indices should be used for informational purposes only and not used to characterize impacts at each site.

Table 10. Algae IBI Scores for Sonoma County.

Stream Condition Index	Mark West Creek Site	East Windsor Creek Site	Calder Creek Site	Laguna de Santa Rosa Site	Hinebaugh Creek Site
D18 IBI (Diatom)	34	68	42	30	40
S2 IBI (Soft algae)	12	-	57	67	83
H20 IBI (Hybrid)	20	68	44	44	50
H21 IBI (Hybrid)	30	63	41	26	57
H23 IBI (Hybrid)	30	39	44	44	62

Table Notes: IBI= Index of Biological Integrity; D18 = IBI based on diatoms; S2 = IBI based on soft bodied algae; H20= Hybrid IBI based on diatoms and soft bodied algae (species level identification of soft bodied algae and excluding biovolume data); H21= Hybrid IBI based on diatoms and soft bodied algae (genus level or above identification of soft bodied algae and requires biovolume data); and H23= Hybrid IBI based on diatoms and soft bodied algae (requiring full soft algae laboratory protocol).

4. DATA QUALITY CONTROL

4.1 Benthic Macroinvertebrate QC

Of the five samples sorted for BMI identification, each sample was re-sorted. No more than 2.4% of the organisms were missed during sorting, which meets the program quality control objective.

5. SUMMARY AND CONCLUSIONS

5.1 Habitat Assessment

The habitat measures for the five sites varied as follows:

- Mark West Creek site
    - sub-optimal score for epifaunal substrate;
    - sub-optimal score for sediment deposition;
    - optimal score for channel alteration;
    - high benthic habitat diversity based on benthic particle size;
    - flowing water;
    - good canopy coverage;
    - a variety of riparian vegetation (mostly woody shrubs); and
    - instream habitat comprised mostly of sparse amounts of filamentous algae and aquatic macrophytes, sparse amounts of live tree roots, and moderate amounts of overhanging vegetation.

- East Windsor Creek site
    - sub-optimal score for epifaunal substrate;
    - marginal score for sediment deposition;
    - sub-optimal score for channel alteration;
    - high benthic habitat diversity based on benthic particle size;
    - no flowing water;
    - dense canopy coverage;
    - a variety of riparian vegetation; and
    - an instream habitat comprised mostly of sparse amounts of filamentous algae and aquatic macrophytes, sparse amounts of live roots and sparse overhanging vegetation.

- Calder Creek site
    - marginal score for epifaunal substrate;
    - sub-optimal score for sediment deposition;
    - sub-optimal score for channel alteration;

- low benthic habitat diversity based on benthic particle size;
- minimal flowing water;
- dense canopy coverage;
- a variety of riparian vegetation (mostly woody shrubs); and
- an instream habitat comprised mostly of sparse amounts of filamentous algae and aquatic macrophytes, sparse amounts of live roots and sparse amounts of overhanging vegetation.

- Laguna de Santa Rosa site
  - sub-optimal score for epifaunal substrate;
  - sub-optimal score for sediment deposition;
  - marginal score for channel alteration;
  - low benthic habitat diversity based on benthic particle size;
  - minimal flowing water;
  - low canopy coverage;
  - a variety of riparian vegetation (mostly herbs and grasses); and
  - an instream habitat comprised mostly of heavy amounts of filamentous algae and sparse amounts of aquatic macrophyte, sparse amounts of live roots, and sparse amounts of overhanging vegetation.

- Hinebaugh Creek site
  - marginal score for epifaunal substrate;
  - optimal score for sediment deposition;
  - sub-optimal score for channel alteration;
  - moderate benthic habitat diversity based on benthic particle size;
  - flowing water;
  - moderate canopy coverage;
  - a variety of riparian vegetation (mostly herbs and grasses); and
  - an instream habitat comprised mostly of sparse amounts of filamentous algae and aquatic macrophytes, sparse amounts of live roots, and sparse amounts of overhanging vegetation.

5.2 Benthic Macroinvertebrate Assessment

There was high variability in species richness measures among the five sites (i.e., 14-74 species at each site), with Mark West Creek site showing the most diverse biological community. Percent dominant taxa followed a similar pattern to overall biological diversity; as species richness increased a decreasing percentage of dominant taxa was observed, suggesting decreased human disturbance. The East Windsor Creek and Calder Creek sites both had a moderately rich biological community with the presence of EPT taxa, indicating relatively healthy streams but some presence of human disturbances. The Laguna de Santa Rosa and Hinebaugh Creek sites illustrated the lowest taxonomic richness among all sites. Due to the lack of mayflies, caddisflies,

stoneflies (EPT taxa) and high quantities of pollutant tolerant organisms, the composition measures were low and tolerance values were high for all sites except for Mark West Creek site.

All five sites had relatively high percentages of collectors, with the Hinebaugh Creek site comprised almost entirely of collectors. The Calder Creek site had a moderately diverse trophic assemblage, with the highest percentage of filterers among all sites comprising half of the entire reachs' trophic composition. The East Windsor Creek site also had a moderately diverse trophic assemblage, with a high percentage of collectors and a relatively high percentage of filterers. The Laguna de Santa Rosa site also had a high percentage of collectors and the highest percentage of scrapers for all sites. The Mark West Creek site had the most diverse trophic assemblage, supported by having the highest species richness of all streams. Overall organism abundance ranged from 181 organisms/ft^2 at the Laguna de Santa Rosa site to 1330 organisms/ft^2 at the Calder Creek site.

5.3 Algae Assessment

The East Windsor Creek site had the highest scores for three of the five IBIs calculated, while the Hinebaugh Creek site had the highest scores in the remaining two IBIs. The Mark West Creek site had the lowest scores for three of the five IBIs, while the Laguna de Santa Rosa had the lowest IBI scores for the remaining two IBIs. However, it is important to note that these IBIs were developed for southern California streams and state-wide algal IBIs have yet to be adopted. Therefore, the algal IBIs should be used for informational purposes only and not used to characterize impacts at each site.

6. REFERENCES

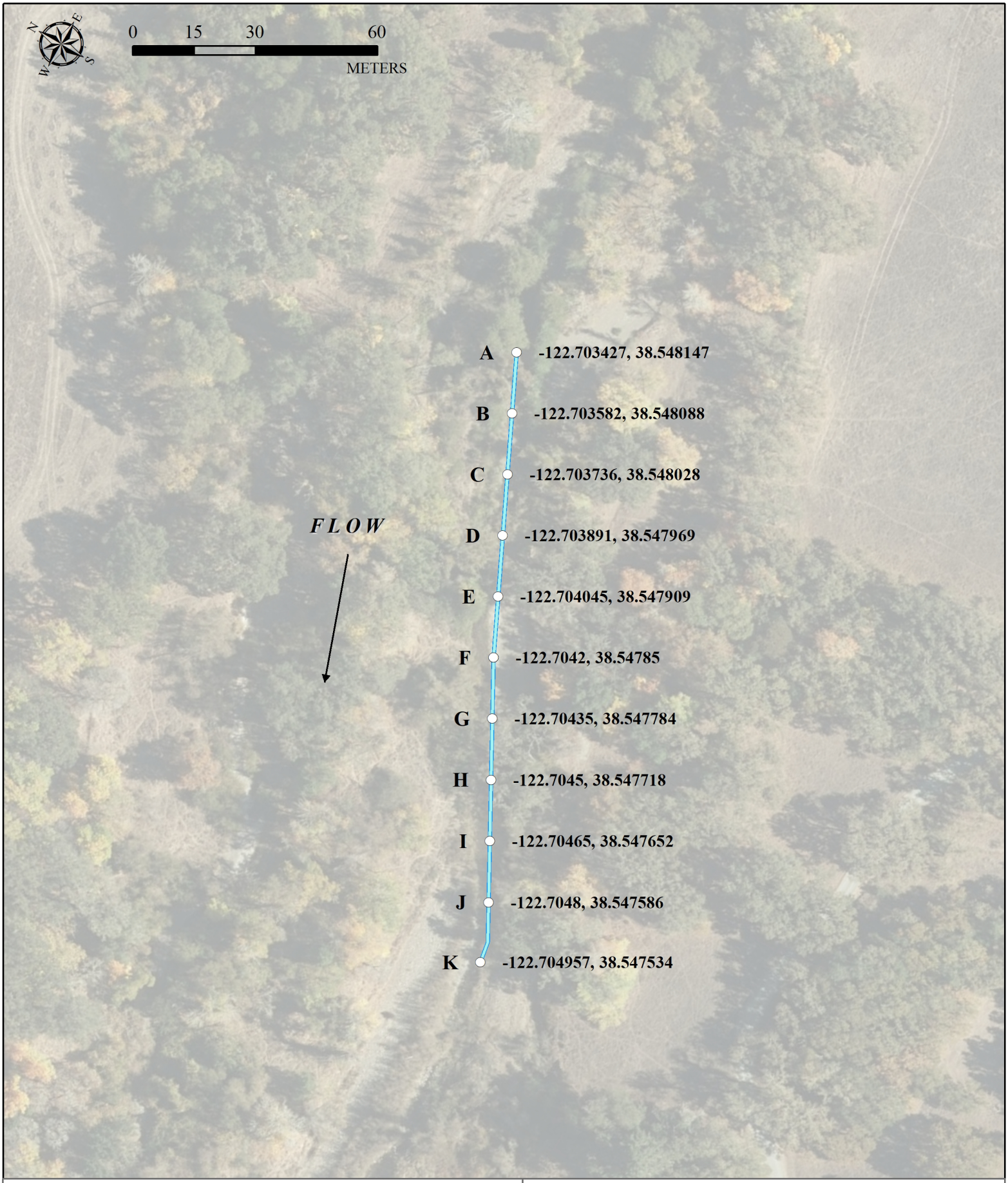
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Appendix A

Sonoma County Phase I MS4 Bioassessment Study Site Delineation Maps



LEGEND

MARK WEST CREEK REACH

MARK WEST CREEK MAIN TRANSECTS

FIGURE 6.

SITE MAP: SONOMA COUNTY
MARK WEST CREEK NEAR CRESTA ROAD
2018 PROPOSED SAMPLE LOCATIONS

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING



LEGEND

LAGUNA DE SANTA ROSA REACH

LAGUNA DE SANTA ROSA MAIN TRANSECTS

FIGURE 3.

SITE MAP: COTATI
LAGUNA DE SANTA ROSA AT GRAVENSTEIN WAY
2018 PROPOSED SAMPLE LOCATIONS

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING



LEGEND

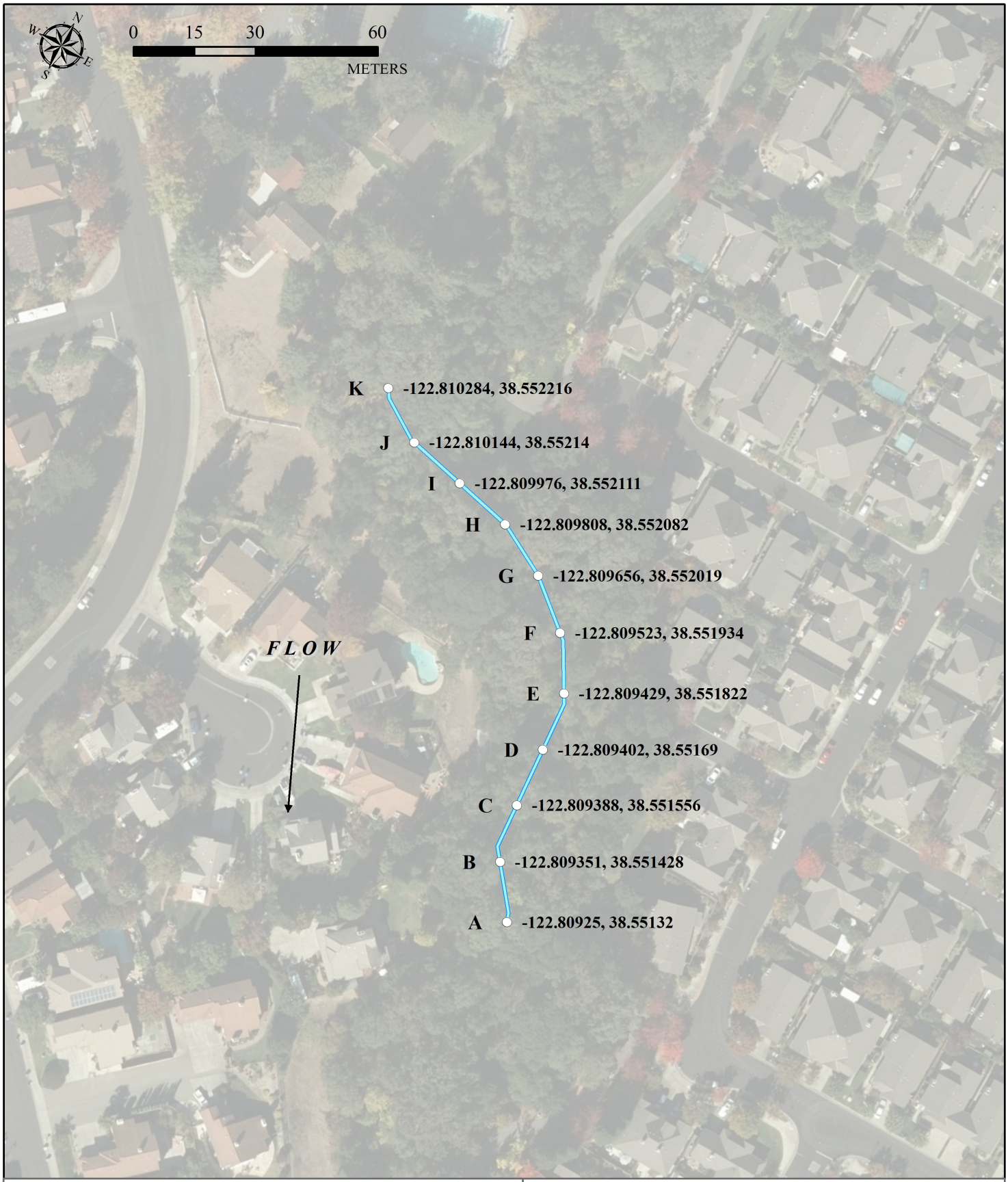
HINEBAUGH CREEK REACH

HINEBAUGH CREEK MAIN TRANSECTS

FIGURE 4.

SITE MAP: ROHNERT PARK
HIBEBAUGH CREEK AT STATE FARM DRIVE
2018 PROPOSED SAMPLE LOCATIONS

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING



LEGEND

EAST WINDSOR CREEK REACH

EAST WINDSOR CREEK MAIN TRANSECTS

FIGURE 8.

SITE MAP: WINDSOR
EAST WINDSOR CREEK BEHIND SENIOR CENTER
2018 PROPOSED SAMPLE LOCATIONS

PACIFIC ECORISK | ENVIRONMENTAL CONSULTING & TESTING



LEGEND

CALDER CREEK REACH

CALDER CREEK MAIN TRANSECTS

FIGURE 7.

SITE MAP: SEBASTOPOL
CALDER CREEK AT JOE RODOTA TRAIL
2018 PROPOSED SAMPLE LOCATIONS

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING

Appendix B

Sonoma County Phase I MS4 Bioassessment Study Field Data Sheets

Mark West Creek Site Data

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

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: Region 1 Stormwater Permit Bioassessment	Date: 6/5/2018	Sample Collection Time: 0845
Stream Name: Mark West Creek	Site Name/ Description: Mark West Creek near Cresta Road	
Site Code: MWCNCR	Crew Members: Scott Ford/Bella Volpatti/Wesley Cram	
Latitude (actual – decimal degrees): °N 38.54756	datum: NAD83	NAD83
Longitude (actual – decimal degrees): °W 122.70495	other:	GPS Device: [illegible]

AMBIENT WATER QUALITY MEASUREMENTS

* Turbidity, silica, oxygen saturation, and air temp are optional; calibration date required on page 24

Water Temp (Deg C)	pH	Alkalinity (mg/L)	Turbidity (ntu)*	Oxygen Sat. (%)*
17.12	7.16	135	0.0	76.8
Dissolved O^2 (mg/L)	**Specific. Conduct (uS/cm)**	**Salinity (ppt)**	**Silica (mg/L)***	**Air Temp (Deg C)***
7.31	308.8	0.15	=	16.3

Actual Reach Length (m) *(see reach length guidelines at top of form)*: 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)

cal. date

Transect Width ~~(m)~~:~~Ft~~ 12,4

	Distance from Left Bank ~~(cm)~~	Depth ~~(cm)~~	Velocity (ft/sec)		Distance from Left Bank ~~(cm)~~	Depth ~~(cm)~~	Velocity (ft/sec)
1	0.0	0.0	0.0	11	10	0.5	0.10
2	1	0.7	0.005	12	11	0.2	0.005
3	2	1	0.10	13	12	0.1	0.005
4	3	0.9	0.15	14	12.4	0.0	0.0
5	4	0.9	0.12	15			
6	5	0.9	0.19	16			
7	6	0.8	0.22	17			
8	7	0.7	0.20	18			
9	8	0.6	0.20	19			
10	9	0.5	0.10	20			

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

	Float 1	Float 2	Float 3
Distance (m)			
Float Time (sec)			

Float Reach Cross Section

width (m) depth(cm)	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		
Site is affected by recent scouring event	(NO)		YES				
Channel Engineered	(NO)		YES				

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed to attain target count of 25; measure in %)

1	2	3	4	5	6	7	8	9	10	11	12	13
70	80	95	30	60	60	90	30	70	85	85	40	40
14	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	
40	50	25	70	85	80	60	40	30	40	20	60	

Site Code: MWCNCR Date: 6 / 5 / 2018

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

AUTOLEVEL ☑ CLINOMETER ☐ HANDLEVEL ☐ OTHER ☐

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	1.26											
J	1.28		2	15	243	100						
I	1.45		17	15	213	100						
H	1.63	2.03	18	15	238	100						
G		2.43	40	15	261	100	2.02					100
F				15	280		2.03	1.28	1	15		100
E					222			1.29	1	15		100
D					213			1.30		15		100
C					229			1.30		15		100
B					217			1.31	1	15		100
A					227			1.35	4	15		100
additional calculation area												

ADDITIONAL HABITAT CHARACTERIZATION

High Gradient ☐ Low Gradient ☑

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: January 3, 2017

Site Code: MWCNCR	Site Name: Mark West Creek near Cresta Road	Date: 06/05/2018
Wetted Width (m): 3.3	Bankfull Width (m): 8.6 / Bankfull Height (m): 1.0	**Transect A**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	12	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	0.8	1.9	9	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	1.7	7.5	19	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	2.4	5.6	64	70	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	3.3	0	25	—	P (A) D	0	P A (D)	P A (D)	P A (D)

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	16
Center Upstream	7
Center Right	10
Center Downstream	14
Left Bank	17
Right Bank	15

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present,
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect betweeri wetted width and bankfull)

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

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

Downstream (**optional**) ☑

Upstream (**required**) ☑

Rubber

Inter-Transect: AB

Wetted Width (m): 6.2

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	1.6	30	18	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	3.1	22.5	25	—	P (A) D	3	P (A) D	P (A) D	P (A) D
Right Center	4.6	12.5	19	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	6.2	0	F	—	P (A) D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: MWCNCR	Site Name: Mark West Creek near Cresta Road		Date: 06/05/2018
Wetted Width (m): 8.0	Bankfull Width (m): 14.5	Bankfull Height (m): 1.0	**Transect B**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	2	34	6	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	4	25	12	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	6	22.5	6	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	8	0	138	80	P A (D)	0	P A (D)	P A (D)	P A (D)
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	15
Center Downstream	17
Left Bank	17
Right Bank	13

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present,
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: BC

Wetted Width (m): 9.1

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	2.3	25	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	4.5	29	25	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	6.8	20	69	95	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	9.1	0	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

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3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: MWCNCR	Site Name: Mark West Creek near Cresta Road	Date: 06/05/2018
Wetted Width (m): 10.7	Bankfull Width (m): 12.7	Bankfull Height (m): 2

Transect C

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	2.7	27	S	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	5.3	30	37	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	8	15	64	30	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Bank	10.7	0	S	—	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	15
Center Upstream	11
Center Right	12
Center Downstream	7
Left Bank	17
Right Bank	15

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank,
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: CD

Wetted Width (m): 8.7

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	S	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	2.2	10	31	—	P (A) D	3	P (A) D	P (A) D	P (A) D
Center	4.4	21	S	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	6.6	16	10	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	8.7	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: MWCNCR	Site Name: Mark West Creek near Cresta Road	Date: 06/05/2018
Wetted Width (m): 9.2	Bankfull Width (m): 15.8 / Bankfull Height (m): 1.0	**Transect D**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	S	–	P A D	1	P A D	P A D	P A D
Left Center	2.3	12	35	–	P A D	1	P A D	P A D	P A D
Center	4.6	12.5	12.5	–	P A D	1	P A D	P A D	P A D
Right Center	6.9	5	56	–	P A D	1	P A D	P A D	P A D
Right Bank	9.2	0	S	–	P A D	1	P A D	P A D	P A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	9
Center Right	11
Center Downstream	9
Left Bank	17
Right Bank	11

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel,
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: DE

Wetted Width (m): 6.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	S	—	(P) A D	1	P (A) D	P (A) D	(P) A D
Left Center	1.5	30	b	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	3	15	10	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	4.5	6	28	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	6	0	S	—	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

- **0** = No microalgae present, Feels rough, not slimy;
- **1** = Present but not visible, Feels slimy;
- **2** = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
- **3** = 1-5mm;
- **4** = 5-20mm;
- **5** = >20mm;
- **UD** = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
- **D** = Dry, not assessed

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

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

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: MWCNCR	Site Name: Mark West Creek near Cresta Road		Date: 06/05/2018
Wetted Width (m): 4.4	Bankfull Width (m): 12.2	Bankfull Height (m): 1.5	**Transect E**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	56	—	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	1.1	0	131	60	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	2.2	7.5	19	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	3.3	5	37	—	P (A) D	2	(P) A D	P (A) D	P (A) D
Right Bank	4.4	0	S	—	P (A) D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	8
Center Right	12
Center Downstream	13
Left Bank	17
Right Bank	15

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: EF

Wetted Width (m): 4.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	52	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	1	15	22	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	2	22	19	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	3	27	87	90	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	4	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: MWCNCR	Site Name: Mark West Creek near Cresta Road		Date: 06/05/2018
Wetted Width (m): 4.0	Bankfull Width (m): 22	Bankfull Height (m): 1.5	**Transect F**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	25	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	1	20	38	—	P (A) D	2	(P) A D	P (A) D	P (A) D
Center	2	37	8	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	3	21	RS	—	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Bank	4	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	8
Center Right	14
Center Downstream	7
Left Bank	0
Right Bank	14

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel,
Channel (record Yes or No, if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

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

Downstream (**required**)	☑
Upstream (**required**)	☑

Inter-Transect: FG

Wetted Width (m): 4.7

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	15	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	1.2	36	RS	—	P (A) D	2	P (A) D	P (A) D	P (A) D
Center	2.4	40	56	—	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Center	3.6	45	62	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	4.7	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm,
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: MWCNCR	Site Name: Mark West Creek near Cresta Road		Date: 06/05/2018
Wetted Width (m): 3.4	Bankfull Width (m): 23	Bankfull Height (m): 1.5	**Transect G**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	15	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	0.8	12	S	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	1.7	12	44	—	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Center	2.6	22	214	85	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Bank	3.4	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	16
Center Upstream	17
Center Right	17
Center Downstream	17
Left Bank	17
Right Bank	17

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: GH

Wetted Width (m): 3.7

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	19	—	P (A) D	2	P (A) D	P (A) D	P (A) D
Left Center	0.9	2.5	12	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	1.6	0	72	40	P A (D)	0	P A (D)	P A (D)	P A (D)
Right Center	2.8	0	~~72~~ 288	~~40~~ 160	P A (D)	0	P A (D)	P A (D)	P A (D)
Right Bank	3.7	0	100	70	P A (D)	0	P A (D)	P A (D)	P A (D)
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	20
Run	
Glide	30
Pool	
Dry	50

Site Code: MWCNCR	Site Name: Mark West Creek near Cresta Road		Date: 06/05/2018
Wetted Width (m): 6.1	Bankfull Width (m): 27	Bankfull Height (m): 1.8	**Transect H**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	1.5	9	70	0	(P) A D	2	P (A) D	P (A) D	P (A) D
Center	3.0	0	150	40	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	4.5	0	S	—	P A (D)	0	P (A) (D)	P A (D)	P A (D)
Right Bank	6.1	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	17
Center Downstream	17
Left Bank	17
Right Bank	17

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present,
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: HI

Wetted Width (m): 3.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	38	—	P A D	1	P A D	P A D	P A D
Left Center	By GPS 0.7	8	78	40	P A D	1	P A D	P A D	P A D
Center	By GPS 1.5	9	44	—	P A D	1	P A D	P A D	P A D
Right Center	By GPS 2.3	0	142	50	P A D	2	P A D	P A D	P A D
Right Bank	3	0	45	—	P A D	1	P A D	P A D	P A D
	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 preferred)								

Microalgae Thickness Codes
- 0 = No microalgae present, Feels rough, not slimy;
- 1 = Present but not visible, Feels slimy;
- 2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
- 3 = 1-5mm;
- 4 = 5-20mm;
- 5 = >20mm;
- UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
- D = Dry, not assessed

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

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

Site Code: MWCNCR	Site Name: Mark West Creek near Cresta Road		Date: 06/05/2018
Wetted Width (m): 4.5	Bankfull Width (m): 13.1	Bankfull Height (m): 0.75	**Transect 1**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	56	–	P (A) D	1	P (A) D	P (A) D	P A D
Left Center	1.1	5	160	–	P (A) D	2	(P) A D	P (A) D	P (A) D
Center	2.2	9	108	25	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Center	3.3	26	28	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	4.5	6	16	–	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	9
Center Right	16
Center Downstream	11
Left Bank	13
Right Bank	17

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	(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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: IJ

Wetted Width (m): 5.8

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	42	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	1.5	2.5	60	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	2.9	5	45	–	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Center	4.4	4	25	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	5.8	0	50	–	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm, Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: MWCNCR	Site Name: Mark West Creek near Cresta Road		Date: 06/05/2018
Wetted Width (m): 7.3	Bankfull Width (m): 16.3	Bankfull Height (m): 1.5	**Transect J**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	6	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	1.8	19	23	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	3.6	12	148	70	P (A) D	2	(P) A D	P (A) D	P (A) D
Right Center	5.4	5	60	—	P (A) D	2	(P) A D	P (A) D	P (A) D
Right Bank	7.3	0	45	—	P (A) D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	14
Center Right	13
Center Downstream	16
Left Bank	17
Right Bank	17

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No, if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: JK

Wetted Width (m): 6.6

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	2.2	20	40	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	4.3	23	164	85	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Center	6.5	23	31	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	8.6	0	S	—	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: MWCNCR	Site Name: Mark West Creek near Cresta Road	Date: 06/05/2018
Wetted Width (m): 8.3	Bankfull Width (m): 17.3	Bankfull Height (m): 2.0

Transect K

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	2.1	18	6	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	4.1	26	10	60	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Center	6.2	32	48	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	8.3	0	178	40	P (A) D	1	P (A) D	P (A) D	P (A) D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
U = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	17
Center Downstream	17
Left Bank	17
Right Bank	17

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

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

Downstream (**required**)	☑
Upstream (**optional**)	☑

Site Code: MWCMCR Date: 06/05/2018

BENTHIC INVERTEBRATE SAMPLES

Collection Method (indicate standard or margin-center-margin)			Replicate	# Jars
RWB (standard)	**RWB** (MCM)	**TRC**	1	3
RWB (standard)	**RWB** (MCM)	**TRC**	2	
RWB (standard)	**RWB** (MCM)	**TRC**		
RWB (standard)	**RWB** (MCM)	**TRC**		

Field Notes/ Comments:
Was macroalgae (e.g., filamentous algae) collected in the composite algae sample? Yes / No
If YES, how many of the 11 transect samples contained macroalgae? _____
If YES, what was the original size of the macroalgae cylinder roll before sectioning into ¼ and ¾ pieces? _____ mm length x _____ mm diameter

Analyte	Equipment & Calibration Date
pH	Hydrolab DS4a Cal date: 6/5/18
Wat temp	Hydrolab DS4a Cal date: 6/5/18
dissolved oxygen	Hydrolab DS4a Cal date: 6/5/18
oxygen sat	Hydrolab DS4a Cal date: 6/5/18
specific cond	Hydrolab DS4a Cal date: 6/5/18
Salinity	Hydrolab DS4a Cal date: 6/5/18
Alkalinity	Cal date: 06/13/18
Turbidity	Hydrolab DS4a Cal date: 6/5/18
Silica	Cal date: / /
Air temp	Cal date: / /
Velocity	Cal date: / /

ALGAE SAMPLES

Collection Method (circle one or write new method if applicable)	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP
Collection Device (sum # of transects per device)	Rep. 1	Rep. 2	Rep.	Rep.
Rubber Delimiter (area=12.6cm^2)	11			
PVC Delimiter (area=12.6cm^2)				
Syringe Scrubber (area=5.3cm^2)				
Other area=				
Number of transects sampled (0-11)	11			
Composite Volume (mL)	1000			
Assemblage ID volume **(diatoms)** (50 mL tube)	40			
Assemblage ID volume **(soft algae)** (50 mL tube)	45			
Check if Qualitative Algae sample was collected with soft algae/diatom sample (required even if macroalgae not visible)	☑	☐	☐	☐
Check if a water chem. **integrated** sample was collected (chl, AFDM)	☑	☐	☐	☐
Chlorophyll a volume use GF/F filter (25 mL **(preferred volume)**	25			
Ash Free Dry Mass (AFDM) volume use GF/F filter (25 mL **(preferred vol)**	25			

Water and Sediment Chemistry Samples

Check if a WATER chemistry **grab** sample was collected (nutrients, SSC, etc.)	☑
Check if a DUPLICATE WATER chemistry **grab** sample was collected	☐
Check if a SEDIMENT chemistry sample was collected	☐
Check if a DUPLICATE SED chemistry sample was collected	☐

Sed Coll Device: SCOOP CORE GRAB
Material: Stainless Steel Polyethylene Polycarbonate Other

Sediment Collection Depth (cm): 2 or 5

Create Lab Collection records for each checked box for integrated and grab water chemistry samples

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Laguna de Santa Rosa Site Data

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: Region 1 Stormwater Permit Bioassessment	Date: 6 / 7 / 2018	Sample Collection Time: 0810
Stream Name: Laguna de Santa Rosa	Site Name/ Description: Laguna de Santa Rosa at Gravenstein Way	
Site Code: LDSRAGW	Crew Members: Scott Ford/Bella Volpatti/Wesley Cram	
Latitude (actual – decimal degrees): °N 38.33455	datum: NAD83	
Longitude (actual – decimal degrees): °W 122.70883	other:	GPS Device: Garmin GPSmap 76

AMBIENT WATER QUALITY MEASUREMENTS

* Turbidity, silica, oxygen saturation, and air temp are optional; calibration date required on page 24

Water Temp (Deg C)	pH	Alkalinity (mg/L)	Turbidity (ntu)*	Oxygen Sat. (%)*
12.14	7.30	277	4.6	34.1
Dissolved O^2 (mg/L)	**Specific. Conduct (uS/cm)**	**Salinity (ppt)**	**Silica (mg/L)***	**Air Temp (Deg C)***
3.27	653.	0.34	-	13.2.

Actual Reach Length (m) *(see reach length guidelines at top of form)*: 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)

cal. date

Transect Width (m): 7.9

	Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)
1	0	0	0	11	13.0	1.5	0.03
2	1.3	0.3	0.005	12	14.3	1.3	0.005
3	2.6	0.5	0.005	13	15.6	1.5	0.005
4	3.9	0.7	0.05	14	16.9	1.5	0.02
5	5.2	0.7	0.005	15	18.2	1.3	0.005
6	6.5	0.8	0.005	16	19.5	1.2	0.005
7	7.8	0.9	0.005	17	20.8	1.1	0.005
8	9.1	1.0	0.005	18	22.1	1.0	0.005
9	10.4	1.1	0.005	19	23.4	0.9	0.005
10	11.7	1.2	0.005	20	24.7	0.4	0.005

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

	Float 1	Float 2	Float 3
Distance (m)			
Float Time (sec)			

Float Reach Cross Section

width (m) depth(cm)	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
Site is affected by recent scouring event	NO	YES	
Channel Engineered	NO	YES	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed to attain target count of 25; measure in %)

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	

* No cobbles present at site.

Site Code: LDSRAGW Date: 06/07/2018

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

AUTOLEVEL ✓ CLINOMETER HANDLEVEL OTHER

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	1.05											
J	1.05		0	15	335	100						
I	1.06		1	15	336	100						
H	1.04		0	15	330	100						
G	1.06		0	15	330	100						
F	1.06		0	15	316	100						
E	1.06		0	15	308	100						
D	1.06		0	15	310	100						
C	1.06		0	15	315	100						
B	1.06		0	15	312	100						
A	1.06		0	15	308	100						
additional calculation area												

ADDITIONAL HABITAT CHARACTERIZATION

High Gradient ☐ Low Gradient ☑

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

Site Code: LDSRAGW	Site Name: Laguna de Santa Rosa at Gravenstein Way	Date: 06/07/2018
Wetted Width (m): 7.0	Bankfull Width (m): 12.6	Bankfull Height (m): 0.7
		Transect A

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	1.7	34	F	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	3.5	78	F	–	P (A) D	1	(P) A D	P (A) D	(P) A D
Right Center	5.2	26	F	–	P (A) D	1	(P) A D	P (A) D	(P) A D
Right Bank	7	0	F	–	P (A) D	1	(P) A D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	0
Center Downstream	11
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

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

Downstream (**optional**)	☑
Upstream (**required**)	☑

Inter-Transect: AB

Wetted Width (m): 8.2

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.0	25	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	4.1	65	S	–	P A D	1	(P) A D	P (A) D	P (A) D
Right Center	6.1	45	S	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	8.2	0	F	–	P (A) D	1	(P) A D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	50
Pool	50
Dry	

Site Code: LDSRAGW	Site Name: Laguna de Santa Rosa at Gravenstein Way	Date: 06/07/2018
Wetted Width (m): 8.4	Bankfull Width (m): 12.9	Bankfull Height (m): 0.5
		Transect B

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.1	37	F	–	P (A) D	1	(P) A D	P (A) D	(P) A D
Center	4.2	85	S	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.3	40	F	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	8.4	0	F	–	P (A) D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	0
Center Downstream	0
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: BC

Wetted Width (m): 9.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.2	42	F	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	4.5	85	F	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.7	48	F	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	9.0	0	F	–	P (A) D	1	(P) A D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: LDSRAGW	Site Name: Laguna de Santa Rosa at Gravenstein Way		Date: 06/07/2018
Wetted Width (m): 8.0	Bankfull Width (m): 12.0	Bankfull Height (m): 0.5	**Transect C**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	-	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.0	40	F	-	(P) A D	1	(P) A D	P (A) D	P (A) D
Center	4.0	82	F	-	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.0	48	20	-	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	8.0	0	F	-	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	2
Center Right	4
Center Downstream	0
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: CD

Wetted Width (m): 9.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.0	40	22	–	P (A) D	1	(P) A D	P (A) D	(P) A D
Center	4.0	82	S	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.0	42	12	–	P (A) D	1	(P) A D	P (A) D	(P) A D
Right Bank	8.0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	50
Pool	50
Dry	

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: LDSRAGW	Site Name: Laguna de Santa Rosa at Gravenstein Way		Date: 06/07/2018
Wetted Width (m): 7.6	Bankfull Width (m): 12.1	Bankfull Height (m): 0.4	**Transect D**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	1.9	35	F	–	(P) A D	1	(P) A D	P (A) D	(P) A D
Center	3.8	85	23	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	5.7	37	20	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	7.6	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy,
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	5
Center Right	10
Center Downstream	2
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No, if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: DE

Wetted Width (m): 7.4

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	-	(P) A D	1	P (A) D	P (A) D	(P) A D
Left Center	1.8	42	30	-	P (A) D	1	(P) A D	P (A) D	(P) A D
Center	3.7	88	90	-	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	5.5	33	F	-	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	7.4	0	F	-	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: LDSRAGW	Site Name: Laguna de Santa Rosa at Gravenstein Way	Date: 06/07/2018
Wetted Width (m): 7.8	Bankfull Width (m): 9.3	Bankfull Height (m): 0.3

Transect E

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	1.7	48	10	–	P (A) D	1	(P) A D	P (A) D	(P) A D
Center	3.4	82	10	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	5.1	38	F	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	7.8	0	F	–	P A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	13
Center Downstream	10
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present,
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No, if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: EF

Wetted Width (m): 8.8

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	2.2	58	F	—	P (A) D	1	(P) A D	P (A) D	(P) A D
Center	4.4	85	12	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.6	48	9	—	P (A) D	1	(P) A D	P (A) D	(P) A D
Right Bank	8.8	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: LDSRAGW	Site Name: Laguna de Santa Rosa at Gravenstein Way	Date: 06/07/2018
Wetted Width (m): 9.2	Bankfull Width (m): 11.2	Bankfull Height (m): 0.5

Transect F

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.3	52	F	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	4.6	90	F	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.9	40	F	–	P (A) D	1	(P) A D	P (A) D	(P) A D
Right Bank	9.2	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	3
Center Right	7
Center Downstream	7
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank,
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

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

Downstream (**required**) ☑

Upstream (**required**) ☑

Inter-Transect: FG

Wetted Width (m): 10.5

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.6	45	F	–	P (A) D	1	(P) A D	P (A) D	(P) A D
Center	5.2	87	F	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	7.8	42	F	–	P (A) D	1	(P) A D	P (A) D	(P) A D
Right Bank	10.5	0	F	–	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: LDSRAGW	Site Name: Laguna de Santa Rosa at Gravenstein Way	Date: 06/07/2018
Wetted Width (m): 9.6	Bankfull Width (m): 12.6	Bankfull Height (m): 0.7

Transect G

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	1	P A D	P A D	P A D
Left Center	2.4	50	F	—	P A D	1	P A D	P A D	P A D
Center	4.8	80	F	—	P A D	1	P A D	P A D	P A D
Right Center	7.2	42	F	—	P A D	1	P A D	P A D	P A D
Right Bank	9.6	0	F	—	P A D	1	P A D	P A D	P A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	0
Center Right	0
Center Downstream	0
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel,
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: GH

Wetted Width (m): 8.4

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	(P) A D	1	P (A) D	P (A) D	(P) A D
Left Center	2.1	45	F	–	P (A) D	1	(P) A D	P (A) D	(P) A D
Center	4.2	78	F	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.3	53	F	–	P (A) D	1	(P) A D	P (A) D	(P) A D
Right Bank	8.4	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: LDSRAGW	Site Name: Laguna de Santa Rosa at Gravenstein Way	Date: 06/07/2018
Wetted Width (m): 9.2	Bankfull Width (m): 11.2 / Bankfull Height (m): 0.5	**Transect H**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	1	P A D	P A D	P A D
Left Center	2.3	50	F	—	P A D	1	P A D	P A D	P A D
Center	4.6	70	F	—	P A D	1	P A D	P A D	P A D
Right Center	6.9	33	F	—	P A D	1	P A D	P A D	P A D
Right Bank	9.2	0	F	—	P A D	1	P A D	P A D	P A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	0
Center Downstream	3
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: HI

Wetted Width (m): 9.6

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.4	40	F	—	P (A) D	1	(P) A D	P (A) D	(P) A D
Center	4.8	60	F	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	7.2	37	F	—	P (A) D	1	(P) A D	P (A) D	(P) A D
Right Bank	9.6	0	10	—	P A (D)	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: LDSRAGW	Site Name: Laguna de Santa Rosa at Gravenstein Way	Date: 06/07/2018
Wetted Width (m): 9.6	Bankfull Width (m): 11.2	Bankfull Height (m): 0.5

Transect 1

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.4	30	F	—	(P) A D	1	(P) A D	P (A) D	(P) A D
Center	4.8	30	S	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	7.2	33	S	—	P (A) D	1	(P) A D	P (A) D	(P) A D
Right Bank	9.6	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	0
Center Downstream	0
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present,
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: IJ

Wetted Width (m): 9.2

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	0	P (A) D	P (A) D	(P) A D
Left Center	2.3	37	20	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	4.6	28	S	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.9	25	F	–	(P) A D	1	(P) A D	P (A) D	P (A) D
Right Bank	9.2	0	F	–	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: LDSRAGW	Site Name: Laguna de Santa Rosa at Gravenstein Way	Date: 06/07/2018
Wetted Width (m): 9.6	Bankfull Width (m): 12.1 / Bankfull Height (m): 0.7	**Transect J**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.4	30	F	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	4.8	33	F	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	7.2	20	S	—	P A D	1	(P) A D	P (A) D	(P) A D
Right Bank	9.6	1	F	—	P A D	1	P (A) D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	1
Center Right	0
Center Downstream	0
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel,
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: JK

Wetted Width (m): 9.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	RC	-	P (A) D	0	P (A) D	P (A) D	P (A) D
Left Center	2	35	12	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	4	38	F	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6	22	S	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	9	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: LDSRAGW	Site Name: Laguna de Santa Rosa at Gravenstein Way	Date: 06/07/2018
Wetted Width (m): 7.2	Bankfull Width (m): 10.2 / Bankfull Height (m): 0.5	**Transect K**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	1.8	55	S	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	3.6	42	F	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	5.4	22	F	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	7.2	0	F	-	P (A) D	1	P (A) D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
U = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

RIPARIAN VEGETATION
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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

HUMAN INFLUENCE
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

BANK STABILITY
(assess point of transect between wetted width and bankfull)

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

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

Downstream (**required**)	☑
Upstream (**optional**)	☑

Site Code: LDSRAGW Date: 06 / 07 /2018

BENTHIC INVERTEBRATE SAMPLES

Collection Method (indicate standard or margin-center-margin)			Replicate	# Jars
RWB (standard)	RWB (MCM)	TRC	1	2
RWB (standard)	RWB (MCM)	TRC	2	
RWB (standard)	RWB (MCM)	TRC		
RWB (standard)	RWB (MCM)	TRC		

Field Notes/ Comments:
Was macroalgae (e.g., filamentous algae) collected in the composite algae sample? (Yes) / No
If YES, how many of the 11 transect samples contained macroalgae? 11
If YES, what was the original size of the macroalgae cylinder roll before sectioning into ¼ and ¾ pieces? 9 mm length x 2 mm diameter

Analyte	Equipment & Calibration Date
pH	Hydrolab DS4a Cal date: 6 / 7 / 18
Wat temp	Hydrolab DS4a Cal date: / /
dissolved oxygen	Hydrolab DS4a Cal date: 6 / 7 / 18
oxygen sat	Hydrolab DS4a Cal date: 6 / 7 / 18
specific cond	Hydrolab DS4a Cal date: 6 / 7 / 18
Salinity	Hydrolab DS4a Cal date: 6 / 7 / 18
Alkalinity	Cal date: 06 / 13 / 18
Turbidity	Hydrolab DS4a Cal date: 6 / 7 / 18
Silica	Cal date: / /
Air temp	Cal date: / /
Velocity	Cal date: / /

ALGAE SAMPLES

Collection Method (circle one or write new method if applicable)	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP
Collection Device (sum # of transects per device)	Rep. 1	Rep. 2	Rep.	Rep.
Rubber Delimiter (area=12.6cm^2)				
PVC Delimiter (area=12.6cm^2)	11			
Syringe Scrubber (area=5.3cm^2)				
Other area=				
Number of transects sampled (0-11)	11			
Composite Volume (mL)	2170			
Assemblage ID volume **(diatoms)** (50 mL tube)	40			
Assemblage ID volume **(soft algae)** (50 mL tube)	45			
Check if Qualitative Algae sample was collected with soft algae/diatom sample (required even if macroalgae not visible)	☑	☐	☐	☐
Check if a water chem. **integrated** sample was collected (chl, AFDM)	☑	☐	☐	☐
Chlorophyll a volume use GF/F filter (25 mL **(preferred volume)**	10			
Ash Free Dry Mass (AFDM) volume use GF/F filter (25 mL **(preferred vol)**	10			

Water and Sediment Chemistry Samples

Check if a WATER chemistry **grab** sample was collected (nutrients, SSC, etc.)	☑
Check if a DUPLICATE WATER chemistry **grab** sample was collected	☐
Check if a SEDIMENT chemistry sample was collected	☐
Check if a DUPLICATE SED chemistry sample was collected	☐

Sed Coll Device: SCOOP CORE GRAB
Material: Stainless Steel Polyethylene Polycarbonate Other

Sediment Collection Depth (cm): 2 or 5

Create Lab Collection records for each checked box for integrated and grab water chemistry samples

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Hinebaugh Creek Site Data

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

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: Region 1 Stormwater Permit Bioassessment	Date: 06/07/2018	Sample Collection Time: 1200
Stream Name: Hinebaugh Creek	Site Name/ Description: Hinebaugh Creek at State Farm Drive	
Site Code: HBCASFD	Crew Members: Scott Ford/Bella Volpatti/Wesley Cram	
Latitude (actual – decimal degrees): °N 38.35058	datum: NAD83	
Longitude (actual – decimal degrees): °W 122.70531	other:	GPS Device: Garmin GPSmap 76

AMBIENT WATER QUALITY MEASUREMENTS

* Turbidity, silica, oxygen saturation, and air temp are optional; calibration date required on page 24

Water Temp (Deg C)	pH	Alkalinity (mg/L)	Turbidity (ntu)*	Oxygen Sat. (%)*
19.61	8.16 7.85	241	4.0 0.7	108.5
Dissolved O^2 (mg/L)	**Specific. Conduct (uS/cm)**	**Salinity (ppt)**	**Silica (mg/L)***	**Air Temp (Deg C)***
9.74	658 493	0.34 0.25	-	20.4

Actual Reach Length (m) *(see reach length guidelines at top of form)*: 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)

cal. date

Transect Width (m): 67.0

	Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)
1	0.0	0	0	11	11.0	1.8	0.1
2	1.1	1.4	0.00	12	12.1	1.7	0.1
3	2.2	1.6	0.005	13	13.2	1.7	0.005
4	3.3	1.9	0.00	14	14.3	1.6	0.005
5	4.4	1.9	0.00	15	15.4	1.6	0.00
6	5.5	1.9	0.0	16	16.5	1.6	0.00
7	6.6	1.9	0.1	17	17.6	1.1	0.00
8	7.7	1.9	0.1	18	18.7	0.8	0.005
9	8.8	1.9	0.005	19	19.8	0.7	0.00
10	9.9	1.8	0.1	20	20.9	0.6	0.00

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

	Float 1	Float 2	Float 3
Distance (m)			
Float Time (sec)			

Float Reach Cross Section

width (m) depth(cm)	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			
Site is affected by recent scouring event	NO		YES					
Channel Engineered	NO		YES					

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed to attain target count of 25; measure in %)

1	2	3	4	5	6	7	8	9	10	11	12	13
25	30	50	85	40	30	30	20	40	30	20	40	n/c
14	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	
30	20	20	20	30	10	40						

* Cobble encountered on transect data fill >25 embeddedness counts

Site Code: HBCASFD Date: 06/07/2018

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

AUTOLEVEL ☐ CLINOMETER ☐ HANDLEVEL ☐ OTHER ☐

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	0.69											
J	0.69		0	15	265	100						
I	0.69		0	15	258	100						
H	0.69		0	15	259	100						
G	0.69		0	15	261	100						
F	0.70	0.81	1	15	255	100						
E		0.82	1	15	263	100						
D		0.82	0	15	259	100						
C		0.82	0	15	259	100						
B		0.82	0	15	257	100						
A		0.82	0	15	261	100						
additional calculation area												

ADDITIONAL HABITAT CHARACTERIZATION

High Gradient ☐ Low Gradient ☑

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: January 3, 2017

Site Code: HBCASFD	Site Name: Hinebaugh Creek at State Farm Drive		Date: 06/07/2018
Wetted Width (m): 9.0	Bankfull Width (m): 10.0	Bankfull Height (m): 0.8	**Transect A**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P A D	P (A) D	(P) A D
Left Center	2	60	S	–	P (A) D	1	(P) A D	P A D	P (A) D
Center	4	65	S	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	6	60	S	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	9	0	F	–	P (A) D	1	P (A) D	P (A) D	P (A) D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	15
Center Right	17
Center Downstream	13
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank,
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

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

Downstream (**optional**) ☑

Upstream (**required**) ☑

Inter-Transect: AB

Wetted Width (m): 7.6

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	1.9	68	6	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	3.8	62	5	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	5.7	60	S	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	7.6	0	F	–	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	20
Pool	80
Dry	

Site Code: HBCASFD	Site Name: Hinebaugh Creek at State Farm Drive	Date: 06/07/2018
Wetted Width (m): 8.4	Bankfull Width (m): 10.0 / Bankfull Height (m): 1.0	**Transect B**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.1	50	13	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	4.2	52	30	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.3	52	S	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	8.4	0	F	–	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	0
Center Right	8
Center Downstream	0
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: BC

Wetted Width (m): 8.4

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
Left Center	2.1	60	28	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	4.2	58	28	—	(P) A D	1	(P) A D	P (A) D	P (A) D
Right Center	6.3	55	S	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	8.4	0	F	—	P (A) D	1	P (A) D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	35
Pool	65
Dry	

Site Code: HBCASFD	Site Name: Hinebaugh Creek at State Farm Drive		Date: 06/07/2018
Wetted Width (m): 8.4	Bankfull Width (m): 9.9	Bankfull Height (m): 0.5	**Transect C**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
Left Center	2.1	63	S	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	4.2	63	SG	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.3	63	S	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	8.4	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	0
Center Right	4
Center Downstream	7
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: CD

Wetted Width (m): 6.8

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.2	68	S	—	P (A) D	2	(P) A D	P (A) D	P (A) D
Center	4.4	65	34	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.6	65	8	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	8.8	0	F	—	P (A) D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: HBCASFD	Site Name: Hinebaugh Creek at State Farm Drive	Date: 06/07/2018
Wetted Width (m): 7.6	Bankfull Width (m): 8.6	Bankfull Height (m): 0.7

Transect D

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	1.9	60	S	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	3.8	70	S	—	P A D	1	(P) (A) D	P (A) D	P (A) D
Right Center	5.7	58	S	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	7.6	0	F	—	(P) A D	0	P (A) D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	4
Center Right	6
Center Downstream	5
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel,
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: DE

Wetted Width (m): 8.8

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.2	60	29	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	4.4	65	17	—	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.6	62	6	—	(P) A D	1	(P) A D	P (A) D	P (A) D
Right Bank	8.8	0	F	—	P (A) D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: HBCASFD	Site Name: Hinebaugh Creek at State Farm Drive	Date: 06/07/2018
Wetted Width (m): 9.0	Bankfull Width (m): 10.0 / Bankfull Height (m): 1.0	**Transect E**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.3	55	8	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	4.5	50	9	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	6.8	50	F	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	9	0	F	–	P (A) D	1	(P) A D	P (A) D	P (A) D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	1
Center Right	2
Center Downstream	0
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: EF

Wetted Width (m): 9.6

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	24	58	35	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Center	48	42	10	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Center	7.2	25	F	–	(P) A D	1	(P) A D	P (A) D	P (A) D
Right Bank	9.6	0	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: HBCASFD	Site Name: Hinebaugh Creek at State Farm Drive	Date: 06/07/2018
Wetted Width (m): 9.6	Bankfull Width (m): 10.5 / Bankfull Height (m): 1.2	**Transect F**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P A D	1	P A D	P A D	P A D
Left Center	1.9	65	9	–	P A D	1	P A D	P A D	P A D
Center	3.8	60	24	–	P A D	1	P A D	P A D	P A D
Right Center	6.7	50	21	–	P A D	1	P A D	P A D	P A D
Right Bank	7.6	0	F	–	P A D	0	P A D	P A D	P A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	15
Center Upstream	8
Center Right	3
Center Downstream	2
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No, if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

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

Downstream (**required**)	☑
Upstream (**required**)	☑

Inter-Transect: FG

Wetted Width (m): 8 6

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	D	F	—	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.1	50	51	—	(P) A D	2	(P) A D	P (A) D	P (A) D
Center	4.3	58	15	—	(P) A D	1	(P) A D	P (A) D	P (A) D
Right Center	6.4	60	7	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	8.6	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D

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 preferred)

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	35
Pool	65
Dry	

Site Code: HBCASFD	Site Name: Hinebaugh Creek at State Farm Drive	Date: 06/07/2018
Wetted Width (m): 8.6	Bankfull Width (m): 10.6 / Bankfull Height (m): 1.0	**Transect G**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	2.1	55	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Center	4.3	15	F	–	P (A) D	2	P (A) D	P (A) D	(P) A D
Right Center	6.4	37	F	–	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Bank	8.6	0	F	–	(P) A D	0	P (A) D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	5
Center Right	14
Center Downstream	16
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No, if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: GH

Wetted Width (m): 7.1

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Left Center	1.8	24	17	–	P (A) D	1	P (A) D	P (A) D	(P) A D
Center	3.5	33	5	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	5.3	40	6	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	7.1	0	F	–	(P) A D	0	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: HBCASFD	Site Name: Hinebaugh Creek at State Farm Drive	Date: 06/07/2018
Wetted Width (m): 9.0	Bankfull Width (m): 9.5	Bankfull Height (m): 1.0

Transect H

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	2	40	30	–	P (A) D	2	P (A) D	P (A) D	P (A) D
Center	4	48	10	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	6	37	F	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	8	0	F	–	P (A) D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm, Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	15
Center Upstream	13
Center Right	9
Center Downstream	5
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: HI

Wetted Width (m): 7.2

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	~	P (A) D	1	(P) A D	P (A) D	P (A) D
Left Center	1.8	70	S	-	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	3.6	72	22	-	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	5.4	78	13	-	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	7.2	0	F	0	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy,
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: HBCASFD	Site Name: Hinebaugh Creek at State Farm Drive		Date: 06/07/2018
Wetted Width (m): 7.6	Bankfull Width (m): 8.6	Bankfull Height (m): 0.7	**Transect 1**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
Left Center	1.9	68	S	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	3.8	90	S	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	5.7	68	S	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	7.6	0	310	60	(P) A D	1	P (A) D	P (A) D	P (A) D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm, Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	17
Center Downstream	17
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel,
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: IJ

Wetted Width (m): 8.8

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	192	30	P (A) D	0	P (A) D	P (A) D	P (A) D
Left Center	2.2	82	74	30	P (A) D	2	P (A) D	P (A) D	P (A) D
Center	4.4	85	126	20	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Center	6.6	72	F	–	(P) A D	2	P (A) D	P (A) D	P (A) D
Right Bank	8.8	0	F	–	P (A) D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	20
Pool	80
Dry	

Site Code: HBCASFD	Site Name: Hinebaugh Creek at State Farm Drive	Date: 06/07/2018
Wetted Width (m): 9.0	Bankfull Width (m): ~9.5 / Bankfull Height (m): 1.0	**Transect J**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	WD	–	P (A) D	0	P (A) D	P (A) D	(P) A D
Left Center	2	87	S	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	4	87	66	10	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Center	6	66	S	–	P (A) D	1	(P) A D	P (A) D	P (A) D
Right Bank	8	0	F	–	(P) A D	1	P (A) D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	0
Center Right	1
Center Downstream	1
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: JK

Wetted Width (m): 8.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	0	P (A) D	P (A) D	(P) A D
Left Center	2	82	84	50	P (A) D	2	P (A) D	P (A) D	P (A) D
Center	4	72	14	~	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	6	60	S	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	8	0	F	–	(P) A D	0	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: HBCASFD	Site Name: Hinebaugh Creek at State Farm Drive		Date: 06/07/2018
Wetted Width (m): 9.0	Bankfull Width (m): 10.0	Bankfull Height (m): 1.2	**Transect K**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	2	97	65	10	P (A) D	2	P (A) D	P (A) D	P (A) D
Center	4	95	S	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	6	70	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	9	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
U = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	1
Center Right	5
Center Downstream	4
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

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

Downstream (**required**) ☐

Upstream (**optional**) ☑

Site Code: HBCAS FD Date: 06/07/2018

BENTHIC INVERTEBRATE SAMPLES

Collection Method (indicate standard or margin-center-margin)			Replicate	# Jars
RWB (standard)	RWB (MCM)	TRC	1	3
RWB (standard)	RWB (MCM)	TRC	2	
RWB (standard)	RWB (MCM)	TRC		
RWB (standard)	RWB (MCM)	TRC		

Field Notes/ Comments:
Was macroalgae (e.g., filamentous algae) collected in the composite algae sample? (Yes) / No
If YES, how many of the 11 transect samples contained macroalgae? 4
If YES, what was the original size of the macroalgae cylinder roll before sectioning into ¼ and ¾ pieces? 6 mm length x 1 mm diameter

Analyte	Equipment & Calibration Date
pH	Hydrolab DS4a Cal date: 06/07/2018
Wat temp	Hydrolab DS4a Cal date: 6/7/18
dissolved oxygen	Hydrolab DS4a Cal date: 6/7/18
oxygen sat	Hydrolab DS4a Cal date: 6/7/18
specific cond	Hydrolab DS4a Cal date: 6/7/18
Salinity	Hydrolab DS4a Cal date: 6/7/18
Alkalinity	Cal date: 06/13/18
Turbidity	Hydrolab DS4a Cal date: 6/7/18
Silica	Cal date: / /
Air temp	Cal date: / /
Velocity	Hach Digital flow Cal date: / /

ALGAE SAMPLES

Collection Method (circle one or write new method if applicable)	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP
Collection Device (sum # of transects per device)	Rep. 1	Rep. 2	Rep.	Rep.
Rubber Delimiter (area=12.6cm²)				
PVC Delimiter (area=12.6cm²)	11			
Syringe Scrubber (area=5.3cm²)				
Other area=				
Number of transects sampled (0-11)	11			
Composite Volume (mL)	1700			
Assemblage ID volume **(diatoms)** (50 mL tube)	40			
Assemblage ID volume **(soft algae)** (50 mL tube)	45			
Check if Qualitative Algae sample was collected with soft algae/diatom sample (required even if macroalgae not visible)	☑	☐	☐	☐
Check if a water chem. **integrated** sample was collected (chl, AFDM)	☑	☐	☐	☐
Chlorophyll a volume use GF/F filter (25 mL **(preferred volume)**	10			
Ash Free Dry Mass (AFDM) volume use GF/F filter (25 mL **(preferred vol)**	10			

Water and Sediment Chemistry Samples

Check if a WATER chemistry **grab** sample was collected (nutrients, SSC, etc.)	☑
Check if a DUPLICATE WATER chemistry **grab** sample was collected	☐
Check if a SEDIMENT chemistry sample was collected	☐
Check if a DUPLICATE SED chemistry sample was collected	☐

Sed Coll Device: SCOOP CORE GRAB
Material: Stainless Steel Polyethylene Polycarbonate Other

Sediment Collection Depth (cm): 2 or 5

Create Lab Collection records for each checked box for integrated and grab water chemistry samples

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

East Windsor Creek Site Data

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

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: Region 1 Stormwater Permit Bioassessment	Date: 06 / 06 / 2018	Sample Collection Time: 0645
Stream Name: East Windsor Creek	Site Name/ Description: East Windsor Creek behind Senior Center	
Site Code: EWCBSC	Crew Members: Scott Ford/Bella Volpatti/Wesley Cram	
Latitude (actual – decimal degrees): °N 38.55132	datum: NAD83	
Longitude (actual – decimal degrees): °W 122.80925	other:	GPS Device: Garmin GPSmap 76

AMBIENT WATER QUALITY MEASUREMENTS

* Turbidity, silica, oxygen saturation, and air temp are optional; calibration date required on page 24

Water Temp (Deg C)	pH	Alkalinity (mg/L)	Turbidity (ntu)*	Oxygen Sat. (%)*
15.62	6.63	127	15.1	89.6
Dissolved O^2 (mg/L)	**Specific. Conduct (uS/cm)**	**Salinity (ppt)**	**Silica (mg/L)***	**Air Temp (Deg C)***
1.91	348	0.17	15.1	13.7

Actual Reach Length (m) *(see reach length guidelines at top of form)*: 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)

cal. date: 10/1/17 Transect Width (m): 12.4

	Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)
1	0	0.0	0.0	11	10	0.4	0.005
2	1	1.2	0.005	12	11	0.2	0.005
3	2	1.2	0.005	13	12	0.1	0.005
4	3	1.3	0.005	14	12.4	0.0	0.0
5	4	1.4	0.005	15			
6	5	1.5	0.005	16			
7	6	1.4	0.005	17			
8	7	1.1	0.005	18			
9	8	0.9	0.005	19			
10	9	0.6	0.005	20			

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

	Float 1	Float 2	Float 3
Distance (m)			
Float Time (sec)			

Float Reach Cross Section

width (m) depth(cm)	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	
Site is affected by recent scouring event	NO		YES			
Channel Engineered	NO		YES			

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed to attain target count of 25; measure in %)

1	2	3	4	5	6	7	8	9	10	11	12	13
30	95	80	60	50	90	50	10	90	80	40	80	85
14	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	
40	30	30	80	80	80	40	50	20	85	75	10	

Site Code: EWCBSC Date: 6/10/2018

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

AUTOLEVEL ☑ CLINOMETER ☐ HANDLEVEL ☐ OTHER ☐

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	1.17											
J	1.55		38	15	121	100						
I	1.58		3	15	113	100						
H	1.59	0.87	1	15	79	100						
G		1.02	15	15	74	100						
F		1.03	1	15	150	100						
E		1.05	2	15	170	100	0.96					
D				15	105	100	0.96		0			
C				15	153	100	0.96	1.35	0			
B				15	168	100		1.57	22			
A				15	134	100		1.64	7			
additional calculation area												

ADDITIONAL HABITAT CHARACTERIZATION

High Gradient ☐ Low Gradient ☒

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: January 3, 2017

Site Code: EWCBSC	Site Name: East Windsor Creek behind Senior Center	Date: 06/06/2018
Wetted Width (m): 6.3	Bankfull Width (m): 9.0	Bankfull Height (m): 1.0

Transect A

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	0	P A D	P A D	P A D
Left Center	1.6	55	S	—	P A D	1	P A D	P A D	P A D
Center	3.2	98	6	—	P A D	1	P A D	P A D	P A D
Right Center	4.8	72	S	—	P A D	1	P A D	P A D	P A D
Right Bank	6.3	0	F	—	P A D	1	P A D	P A D	P A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	17
Center Downstream	17
Left Bank	17
Right Bank	17

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

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

Downstream (optional)	☑
Upstream (required)	☑

Inter-Transect: AB

Wetted Width (m): 2.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	36	-	P A D	1	P A D	P A D	P A D
Left Center	0.5	5	S	-	P A D	1	P A D	P A D	P A D
Center	1	9	8	-	P A D	1	P A D	P A D	P A D
Right Center	1.5	12	29	-	P A D	1	P A D	P A D	P A D
Right Bank	2	0	F	-	P A D	1	P A D	P A D	P A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: EWCBSC	Site Name: East Windsor Creek behind Senior Center	Date: 06/06/2018
Wetted Width (m): 0.6	Bankfull Width (m): 9.8	Bankfull Height (m): 2.0

Transect B

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	8	—	P A D	1	P A D	P A D	P A D
Left Center	0.1	2	38	—	P A D	2	P A D	P A D	P A D
Center	0.3	2	31	—	P A D	1	P A D	P A D	P A D
Right Center	0.4	0	49	—	P A D	1	P A D	P A D	P A D
Right Bank	0.6	0	F	—	P A D	1	P A D	P A D	P A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	17
Center Downstream	17
Left Bank	17
Right Bank	17

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No, if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: BC

Wetted Width (m): 3.7

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	0.9	17	65	30	(P) A D	2	P (A) D	P (A) D	P (A) D
Center	1.8	21	10	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	2.8	15	12	-	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	3.7	0	S	—	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: EWCBSC	Site Name: East Windsor Creek behind Senior Center	Date: 06/06/2018
Wetted Width (m): 5.0	Bankfull Width (m): 9.5 / Bankfull Height (m): 1.0	**Transect C**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	1	P (A) D	P (A) D	(P) A D
Left Center	1.2	15	F	—	P A D	1	P (A) D	P (A) D	(P) A D
Center	2.5	38	18	—	P (A) D	1	P A D	P (A) D	P A D
Right Center	3.7	24	13	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	5	0	F	—	P (A) D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
- 0 = No microalgae present, Feels rough, not slimy;
- 1 = Present but not visible, Feels slimy;
- 2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
- 3 = 1-5mm;
- 4 = 5-20mm;
- 5 = >20mm;
- UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
- D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	16
Center Upstream	15
Center Right	17
Center Downstream	17
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: CD

Wetted Width (m): 5.2

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	2	P A D	P A D	P A D
Left Center	1.3	95	305	95	P A D	1	P A D	P A D	P A D
Center	2.6	82	230	80	P A D	1	P A D	P A D	P A D
Right Center	3.9	60	7	—	P A D	1	P A D	P A D	P A D
Right Bank	5.2	0	F	—	P A D	1	P A D	P A D	P A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: EWCBSC	Site Name: East Windsor Creek behind Senior Center	Date: 06/06/2018
Wetted Width (m): 5.2	Bankfull Width (m): 7.0	Bankfull Height (m): 1.25

Transect D

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	W	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	1.3	100	16	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	2.6	95	265	60	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Center	3.9	74	210	50	P A D	2	P (A) D	P (A) D	P (A) D
Right Bank	5.2	0	270	90	P A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry; not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	15
Center Upstream	17
Center Right	17
Center Downstream	16
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: DE

Wetted Width (m): 4.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	WD	—	(P) A D	1	P (A) D	P (A) D	(P) A D
Left Center	1	64	S	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	2	82	225	50	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Center	3	16	SD	10	(P) A D	2	P (A) D	P (A) D	P (A) D
Right Bank	4	0	210	90	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	25
Pool	75
Dry	

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: EWCBSC	Site Name: East Windsor Creek behind Senior Center	Date: 06/06/2018
Wetted Width (m): 6.6	Bankfull Width (m): 14.6	Bankfull Height (m): 3.0

Transect E

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	1	P A D	P A D	P A D
Left Center	1.6	170	6	—	P A D	1	P A D	P A D	P A D
Center	3.3	73	200	80	P A D	3	P A D	P A D	P A D
Right Center	4.9	20	186	40	P A D	3	P A D	P A D	P A D
Right Bank	6.6	0	320	80	P A D	1	P A D	P A D	P A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	16
Center Upstream	17
Center Right	17
Center Downstream	15
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present,
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: EF

Wetted Width (m): 3.8

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	440	85	(P) A D	2	P (A) D	P (A) D	P (A) D
Left Center	0.9	8	360	40	P (A) D	2	P (A) D	P (A) D	P (A) D
Center	1.9	4	120	30	(P) A D	2	P (A) D	P (A) D	P (A) D
Right Center	2.8	12	27	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	3.8	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy,
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: EWCBSC	Site Name: East Windsor Creek behind Senior Center	Date: 06/06/2018
Wetted Width (m): 4.0	Bankfull Width (m): 9.5	Bankfull Height (m): 2.0

Transect F

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	360	30	(P) A D	2	P (A) D	P (A) D	P (A) D
Left Center	1	33	20	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	2	17	35	—	P A D	2	P A D	P A D	P (A) D
Right Center	3	23	9	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	4	0	F	—	P A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	16
Center Upstream	13
Center Right	17
Center Downstream	16
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

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

Downstream **(required)**	☑
Upstream **(required)**	☑

Inter-Transect: FG

Wetted Width (m): 4.8

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	WD	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	1.2	68	24	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	2.4	56	21	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	3.6	35	8	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	4.8	0	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy,
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: EWCBSC	Site Name: East Windsor Creek behind Senior Center		Date: 06/06/2018
Wetted Width (m): 3.8	Bankfull Width (m): 11.4	Bankfull Height (m): 2.5	**Transect G**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	1	P A D	P A D	P A D
Left Center	1	42	25	—	P A D	1	P A D	P A D	P A D
Center	19	40	29	—	P A D	1	P A D	P A D	P A D
Right Center	2.8	19	10	—	P A D	1	P A D	P A D	P A D
Right Bank	3.8	0	22	—	P A D	1	P A D	P A D	P A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	15
Center Right	16
Center Downstream	15
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank,
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: GH

Wetted Width (m): 1.8

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	31	—	P A D	1	P A D	P A D	P A D
Left Center	0.4	12	36	—	P A D	2	P A D	P A D	P A D
Center	0.9	8	26	—	P A D	1	P A D	P A D	P A D
Right Center	1.3	6	27	—	P A D	1	P A D	P A D	P A D
Right Bank	1.8	0	23	—	P A D	1	P A D	P A D	P A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: EWCBSC	Site Name: East Windsor Creek behind Senior Center	Date: 06/06/2018
Wetted Width (m): 1.0	Bankfull Width (m): 10 / Bankfull Height (m): 1.5	**Transect H**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	24	—	P A D	1	P A D	P A D	P A D
Left Center	0.25	1	12	—	P A D	1	P A D	P A D	P A D
Center	0.5	0	19	—	P A D	1	P A D	P A D	P A D
Right Center	0.75	1	21	—	P A D	1	P A D	P A D	P A D
Right Bank	1	0	36	—	P A D	1	P A D	P A D	P A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	17
Center Downstream	17
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: HI

Wetted Width (m): 4.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	1	55	WD	–	P (A) D	2	P (A) D	P (A) D	P (A) D
Center	2	65	16	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	3	25	12	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	4	0	S	—	P (A) D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	50
Pool	50
Dry	

Site Code: EWCBSC	Site Name: East Windsor Creek behind Senior Center	Date: 06/06/2018
Wetted Width (m): 4.4	Bankfull Width (m): 12.4 / Bankfull Height (m): 3.0	**Transect 1**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	1	P A D	P A D	P A D
Left Center	1.1	30	44	—	P A D	1	P A D	P A D	P A D
Center	2.2	28	56	—	P A D	2	P A D	P A D	P A D
Right Center	3.3	16	35	—	P A D	2	P A D	P A D	P A D
Right Bank	4.4	6	30	—	P A D	1	P A D	P A D	P A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	17
Center Downstream	15
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: IJ

Wetted Width (m): 2.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	43	-	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	0.5	4	15	-	(P) A D	2	P (A) D	P (A) D	P (A) D
Center	1	6	140	80	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Center	1.5	9	150	80	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Bank	2	0	F	-	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

- **0** = No microalgae present, Feels rough, not slimy;
- **1** = Present but not visible, Feels slimy;
- **2** = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
- **3** = 1-5mm;
- **4** = 5-20mm;
- **5** = >20mm;
- **UD** = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
- **D** = Dry, not assessed

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

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

Site Code: EWCBSC	Site Name: East Windsor Creek behind Senior Center	Date: 06/06/2018
Wetted Width (m): 3.4	Bankfull Width (m): 11.4	Bankfull Height (m): 2.8
		Transect J

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	0.8	17	25	–	P (A) D	2	P (A) D	P (A) D	P (A) D
Center	1.7	27	49	–	P (A) D	2	P (A) D	P (A) D	P (A) D
Right Center	2.5	7	28	–	P A D	2	P (A) D	P (A) D	P (A) D
Right Bank	3.4	0	16	–	P A D	1	P (A) D	P (A) D	P (A) D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	17
Center Downstream	17
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present,
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: JK

Wetted Width (m): 3.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	100	90	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	0.8	0	30	40	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	1.5	0	260	50	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	2.3	0	270	20	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	3	0	68	85	P (A) D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: EWCBSC	Site Name: East Windsor Creek behind Senior Center		Date: 06/06/2018
Wetted Width (m): 4.3	Bankfull Width (m): 9.1	Bankfull Height (m): 1.5	**Transect K**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	136	75	P A D	1	P A D	P A D	P A D
Left Center	1.1	21	39	–	P A D	2	P A D	P A D	P A D
Center	2.2	21	46	–	P A D	2	P A D	P A D	P A D
Right Center	3.3	8	163	10	P A D	2	P A D	P A D	P A D
Right Bank	4.3	0	18	–	P A D	1	P A D	P A D	P A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
U = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	17
Center Downstream	17
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No, if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

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

Downstream (**required**) ☑

Upstream (**optional**) ☑

Site Code: FWCBSC Date: 06 / 06 / 2018

BENTHIC INVERTEBRATE SAMPLES

Collection Method (indicate standard or margin-center-margin)			Replicate	# Jars
RWB (standard)	RWB (MCM)	TRC	1	2
RWB (standard)	RWB (MCM)	TRC	2	
RWB (standard)	RWB (MCM)	TRC		
RWB (standard)	RWB (MCM)	TRC		

Field Notes/ Comments:
Was macroalgae (e.g., filamentous algae) collected in the composite algae sample? Yes / No
If YES, how many of the 11 transect samples contained macroalgae? _____
If YES, what was the original size of the macroalgae cylinder roll before sectioning into ¼ and ¾ pieces? _____ mm length x _____ mm diameter

Analyte	Equipment & Calibration Date
pH	Cal date: 06 / 06 / 2018
Wat temp	Cal date: 06 / 06 / 2018
dissolved oxygen	Cal date: 06 / 06 / 2018
oxygen sat	Cal date: 06 / 06 / 2018
specific cond	Cal date: 06 / 06 / 2018
Salinity	Cal date: 06 / 06 / 2018
Alkalinity	Cal date: 06 / 13 / 18
Turbidity	Cal date: 06 / 06 / 2018
Silica	Cal date: / /
Air temp	Cal date: 06 / 06 / 2018
Velocity	Cal date: / /

ALGAE SAMPLES

Collection Method (circle one or write new method if applicable)	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP
Collection Device (sum # of transects per device)	Rep. 1	Rep. 2	Rep.	Rep.
Rubber Delimiter (area=12.6cm²)	1000			
PVC Delimiter (area=12.6cm²)	11			
Syringe Scrubber (area=5.3cm²)				
Other area=				
Number of transects sampled (0-11)	11			
Composite Volume (mL)	780			
Assemblage ID volume **(diatoms)** (50 mL tube)	40			
Assemblage ID volume **(soft algae)** (50 mL tube)	45			
Check if Qualitative Algae sample was collected with soft algae/diatom sample (required even if macroalgae not visible)	☑	☐	☐	☐
Check if a water chem. **integrated** sample was collected (chl, AFDM)	☑	☐	☐	☐
Chlorophyll a volume use GF/F filter (25 mL **(preferred volume)**	10			
Ash Free Dry Mass use GF/F filter (AFDM) volume (25 mL **(preferred vol)**	10			

Water and Sediment Chemistry Samples

Check if a WATER chemistry **grab** sample was collected (nutrients, SSC, etc.)	☑
Check if a DUPLICATE WATER chemistry **grab** sample was collected	☐
Check if a SEDIMENT chemistry sample was collected	☐
Check if a DUPLICATE SED chemistry sample was collected	☐

Sed Coll Device: SCOOP CORE GRAB
Material: Stainless Steel Polyethylene Polycarbonate Other

Sediment Collection Depth (cm): 2 or 5

Create Lab Collection records for each checked box for integrated and grab water chemistry samples

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Calder Creek Site Data

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

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: Region 1 Stormwater Permit Bioassessment	Date: 6 / 6 / 2018	Sample Collection Time: 1252
Stream Name: Calder Creek	Site Name/ Description: Calder Creek at Joe Rodata Trail	
Site Code: CCAJRT	Crew Members: Scott Ford/Bella Volpatti/Wesley Cram	
Latitude (actual – decimal degrees): °N 38.40044	datum: NAD83	
Longitude (actual – decimal degrees): °W -122.81982	other:	GPS Device: #5 Garmin GPS map 76

AMBIENT WATER QUALITY MEASUREMENTS

* Turbidity, silica, oxygen saturation, and air temp are optional; calibration date required on page 24

Water Temp (Deg C)	pH	Alkalinity (mg/L)	Turbidity (ntu)*	Oxygen Sat. (%)*
15.25	7.44	55	4.0	SF 6/6/18 ~~83.0~~ 86.4
Dissolved O^2 (mg/L)	**Specific. Conduct (uS/cm)**	**Salinity (ppt)**	**Silica (mg/L)***	**Air Temp (Deg C)***
8.62	~~230.7~~ 231	0.11	-	16.4

Actual Reach Length (m) *(see reach length guidelines at top of form)*: 100

Explanation: Reach shortened to avoid bridge.

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

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

VELOCITY AREA METHOD (preferred)

cal. date

Transect Width (m): 6.5 Ft

	Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)
1	0	0.0	0.0	11	5	0.2	0.005
2	0.5	0.3	0.005	12	5.5	0.1	0.005
3	1	0.5	0.005	13	6	0.1	0.005
4	1.5	0.7	0.13	14	6.5	0.0	0.0
5	2	0.7	0.29	15			
6	2.5	0.7	0.13	16			
7	3	0.6	0.005	17			
8	3.5	0.5	0.005	18			
9	4	0.4	0.005	19			
10	4.5	0.3	0.005	20			

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

	Float 1	Float 2	Float 3
Distance (m)			
Float Time (sec)			

Float Reach Cross Section

width (m) depth(cm)	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	
Site is affected by recent scouring event	NO		YES			
Channel Engineered	NO		YES			

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed to attain target count of 25; measure in %)

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	

*No cobbles present at site.

Site Code: CCAJRT Date: 6 / 6 / 2018

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

AUTOLEVEL ☑ CLINOMETER ☐ HANDLEVEL ☐ OTHER ☐

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	2.27											
J	2.28		1	10	78	100						
I	2.67		39	10	62	100						
H	2.67	1.06	0	10	66	100						
G		1.06	0	10	57	100						
F		1.06	0	10	67	100						
E		1.07	1	10	67	100	1.08		1			
D		1.1		10	72	100	1.08		0			100
C				10	7		1.12		4	10	78	100
B				10			1.14		2	10	-18	100
A				10			1.15		1	10	36	100
additional calculation area												

ADDITIONAL HABITAT CHARACTERIZATION

High Gradient ☐ Low Gradient ☑

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: January 3, 2017

Site Code: CCAJRT	Site Name: Calder Creek at Joe Rodata Trail		Date: 06/06/2018
Wetted Width (m): 1.6	Bankfull Width (m): 4.2	Bankfull Height (m): 1.0	**Transect A**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	0.4	10	S	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	0.8	14	S	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	1.2	13	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	1.6	0	F	—	(P) A D	0	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	14
Center Right	16
Center Downstream	16
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

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

Downstream (**optional**)	☑
Upstream (**required**)	☑

Inter-Transect: AB

Wetted Width (m): 1.6

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P A D	1	P A D	P A D	P A D
Left Center	0.4	25	12	–	P A D	1	P A D	P A D	P A D
Center	0.8	29	6	–	P A D	1	P A D	P A D	P A D
Right Center	1.2	8	F	–	P A D	1	P A D	P A D	P A D
Right Bank	1.6	0	F	–	P A D	1	P A D	P A D	P A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: CCAJRT	Site Name: Calder Creek at Joe Rodata Trail	Date: 06/06/2018
Wetted Width (m): 2.4	Bankfull Width (m): 3.0 / Bankfull Height (m): 1.0	**Transect B**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	-	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	0.6	49	F	-	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	1.2	67	F	-	P A D	1	P (A) D	P (A) D	P (A) D
Right Center	1.8	62	F	-	(P) A D	1	P (A) D	P (A) D	P A D
Right Bank	2.4	0	F	-	P A D	1	P (A) D	P (A) D	P A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	16
Center Upstream	14
Center Right	16
Center Downstream	17
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	(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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: BC

Wetted Width (m): 2.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	1	P A D	P A D	P A D
Left Center	0.5	10	F	—	P A D	1	P A D	P A D	P A D
Center	1	26	WD	—	P A D	1	P A D	P A D	P A D
Right Center	1.5	30	F	—	P A D	1	P A D	P A D	P A D
Right Bank	2	0	F	—	P A D	1	P A D	P A D	P A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	80
Pool	20
Dry	

Site Code: CCAJRT	Site Name: Calder Creek at Joe Rodata Trail		Date: 10/06/2018
Wetted Width (m): 2.0	Bankfull Width (m): 5.6	Bankfull Height (m): 1.0	**Transect C**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	1	P A D	P A D	P A D
Left Center	0.5	17	F	—	P A D	1	P A D	P A D	P A D
Center	1	12	F	—	P A D	1	P A D	P A D	P A D
Right Center	1.5	2	W	—	P A D	1	P A D	P A D	P A D
Right Bank	2	0	F	—	P A D	1	P A D	P A D	P A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

RIPARIAN VEGETATION (facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)
0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy (>75%)
2 = Moderate (10-40%)

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 & 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 (5 m u/s, 5 m d/s)
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 Right	16
Center Downstream	16
Left Bank	
Right Bank	

HUMAN INFLUENCE (circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)
0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

BANK STABILITY (assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: CD

Wetted Width (m): 1.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	1	P A D	P A D	P A D
Left Center	0.25	4	F	—	P A D	1	P A D	P A D	P A D
Center	0.5	4	F	—	P A D	1	P A D	P A D	P A D
Right Center	0.75	6	S	—	P A D	1	P A D	P A D	P A D
Right Bank	1	0	S	—	P A D	1	P A D	P A D	P A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: CCAJRT	Site Name: Calder Creek at Joe Rodata Trail	Date: 06/06/2018
Wetted Width (m): 2.6	Bankfull Width (m): 2.9 / Bankfull Height (m): 0.8	**Transect D**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	0.6	23	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	1.3	40	13	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	1.9	22	F	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	2.6	0	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	12
Center Right	17
Center Downstream	17
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present,
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: DE

Wetted Width (m): 3.2

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
Left Center	0.8	63	F	-	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	1.6	60	F	-	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	2.4	49	F	-	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	3.2	0	F	—	P A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	50
Pool	50
Dry	

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: CCAJRT	Site Name: Calder Creek at Joe Rodata Trail	Date: 06/06/2018
Wetted Width (m): 2.8	Bankfull Width (m): 3.7	Bankfull Height (m): 0.5
		Transect E

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P A D	0	P A D	P A D	P A D
Left Center	0.7	25	F	–	P A D	1	P A D	P A D	P A D
Center	1.4	48	WD	–	P A D	1	P A D	P A D	P A D
Right Center	2.1	63	F	–	P A D	1	P A D	P A D	P A D
Right Bank	2.8	0	F	–	P A D	1	P A D	P A D	P A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	12
Center Right	16
Center Downstream	17
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel,
Channel (record Yes or No, if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: EF

Wetted Width (m): 2.8

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	0	P (A) D	P (A) D	P (A) D
Left Center	0.7	8	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	1.4	26	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	2.1	11	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	2.8	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	50
Pool	50
Dry	

Site Code: CCAJRT	Site Name: Calder Creek at Joe Rodata Trail		Date: 2/6/2018
Wetted Width (m): 2.5	Bankfull Width (m): 4.1	Bankfull Height (m): 0.8	**Transect F**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	0	P (A) D	P (A) D	P (A) D
Left Center	0.6	8	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	1.2	2	F	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	1.8	17	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	2.5	0	F	—	(P) A D	0	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them; scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	16
Center Downstream	15
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel,
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

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

Downstream **(required)**	☑
Upstream **(required)**	☑

Inter-Transect: FG

Wetted Width (m): 2.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	0.5	6	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	1	17	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	1.5	16	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	2	0	F	–	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

- **0** = No microalgae present, Feels rough, not slimy;
- **1** = Present but not visible, Feels slimy;
- **2** = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
- **3** = 1-5mm;
- **4** = 5-20mm;
- **5** = >20mm;
- **UD** = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
- **D** = Dry, not assessed

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

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

Site Code: CCAJRT	Site Name: Calder Creek at Joe Rodata Trail	Date: 06/06/2018
Wetted Width (m): 2.2	Bankfull Width (m): 5.4	Bankfull Height (m): 1.0
		Transect G

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	4	(P) A D	1	P (A) D	P (A) D	P A D
Left Center	0.5	8	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	1.1	31	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	1.6	29	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	2.2	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	16
Center Upstream	17
Center Right	17
Center Downstream	15
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present,
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: GH

Wetted Width (m): 1.6

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	1	P A D	P A D	P A D
Left Center	0.4	13	F	—	P A D	1	P A D	P A D	P A D
Center	0.8	39	WD	—	P A D	1	P A D	P A D	P A D
Right Center	1.2	37	F	—	P A D	1	P A D	P A D	P A D
Right Bank	1.6	0	F	—	P A D	1	P A D	P A D	P A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: CCAJRT	Site Name: Calder Creek at Joe Rodata Trail	Date: 06/06/2018
Wetted Width (m): 2.3	Bankfull Width (m): 3.8	Bankfull Height (m): 1.0

Transect H

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	(P) A D	1	P (A) D	P (A) D	(P) A D
Left Center	0.6	16	F	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	1.1	24	F	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	1.7	20	F	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	2.2	0	F	–	(P) A D	1	P (A) D	P (A) D	(P) A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	15
Center Right	17
Center Downstream	17
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present,
B = On Bank,
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: HI

Wetted Width (m): 3.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
Left Center	0.8	34	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	1.5	28	F	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	2.3	40	WD	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	3	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

- **0** = No microalgae present, Feels rough, not slimy;
- **1** = Present but not visible, Feels slimy;
- **2** = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
- **3** = 1-5mm;
- **4** = 5-20mm;
- **5** = >20mm;
- **UD** = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
- **D** = Dry, not assessed

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

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

Site Code: CCAJRT	Site Name: Calder Creek at Joe Rodata Trail		Date: 06/06/2018
Wetted Width (m): 3.4	Bankfull Width (m): 6.5	Bankfull Height (m): 1.0	**Transect 1**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	0.8	14	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	1.7	30	WD	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	2.5	13	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	3.4	0	F	—	(P) A D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	17
Center Right	17
Center Downstream	16
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

Inter-Transect: IJ

Wetted Width (m): 0.4

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	WD	—	(P) A D	1	P (A) D	P (A) D	(P) A D
Left Center	0.1	0	WD	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	0.2	4	WD	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Center	0.3	4	WD	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	0.4	0	F	—	P (A) D	1	P (A) D	P (A) D	(P) A D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	10
Run	
Glide	70
Pool	20
Dry	

SWAMP Stream Habitat Characterization Form FULL VERSION Revision Date: January 3, 2017

Site Code: CCAJRT	Site Name: Calder Creek at Joe Rodata Trail	Date: 06/06/2018
Wetted Width (m): 2.0	Bankfull Width (m): 5.1	Bankfull Height (m): 0.9
		Transect J

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	—	P A D	1	P A D	P A D	P A D
Left Center	0.5	15	S	—	P A D	1	P A D	P A D	P A D
Center	1	6	WD	—	P A D	1	P A D	P A D	P A D
Right Center	1.5	15	S	—	P A D	1	P A D	P A D	P A D
Right Bank	2	0	F	—	P A D	1	P A D	P A D	P A D

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 preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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	15
Center Upstream	13
Center Right	16
Center Downstream	16
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: JK

Wetted Width (m): 4.0

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Left Center	1	22	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Center	2	37	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	3	55	18	–	P (A) D	1	P (A) D	P (A) D	P (A) D
Right Bank	4	0	F	–	(P) A D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
UD = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

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

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

Site Code: CCAJRT	Site Name: Calder Creek at Joe Rodata Trail		Date: 2/6/2018
Wetted Width (m): 4.0	Bankfull Width (m): 6.2	Bankfull Height (m): 1.0	**Transect K**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank	0	0	WD	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Left Center	1	34	WD	—	P (A) D	1	P (A) D	P (A) D	P (A) D
Center	2	22	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Center	3	28	F	—	(P) A D	1	P (A) D	P (A) D	P (A) D
Right Bank	4	0	F	—	P (A) D	1	P (A) D	P (A) D	P (A) D
	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 preferred)								

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
U = Cannot determine if microalgae present, substrate too small or covered with silt (formerly Z code).
D = Dry, not assessed

Riparian Vegetation
(facing downstream, 5 m u/s, 5 m d/s, 10 m from wetted width)

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

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 & 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
(5 m u/s, 5 m d/s)

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 Right	17
Center Downstream	17
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel; assess 5 m u/s, 5 m d/s)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No; if Y for an analyte, do not assess banks)

	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 Crop	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

Bank Stability
(assess point of transect between wetted width and bankfull)

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

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

Downstream (**required**)	☑
Upstream (**optional**)	☑

Site Code: CCAJRT Date: 06 / 06 / 2018

Benthic Invertebrate Samples

Collection Method (indicate standard or margin-center-margin)			Replicate	# Jars
RWB (standard)	**RWB** (MCM)	**TRC**	1	3
RWB (standard)	**RWB** (MCM)	**TRC**	2	
RWB (standard)	**RWB** (MCM)	**TRC**		
RWB (standard)	**RWB** (MCM)	**TRC**		

Field Notes/ Comments:
Was macroalgae (e.g., filamentous algae) collected in the composite algae sample? Yes / (No)
If YES, how many of the 11 transect samples contained macroalgae? _____
If YES, what was the original size of the macroalgae cylinder roll before sectioning into ¼ and ¾ pieces? _____ mm length x _____ mm diameter

Analyte	Equipment & Calibration Date
pH	Cal date: 6 / 6 / 2018
Wat temp	Cal date: 6 / 6 / 2018
dissolved oxygen	Cal date: 6 / 6 / 2018
oxygen sat	Cal date: 6 / 6 / 2018
specific cond	Cal date: 6 / 6 / 2018
Salinity	Cal date: 6 / 6 / 2018
Alkalinity	Cal date: 6 / 13 / 18
Turbidity	Cal date: 6 / 6 / 2018
Silica	Cal date: / /
Air temp	Cal date: / /
Velocity	Cal date: / /

ALGAE SAMPLES

Collection Method (circle one or write new method if applicable)	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP	SWAMP EMAP
Collection Device (sum # of transects per device)	Rep. 1	Rep. 2	Rep.	Rep.
Rubber Delimiter (area=12.6cm^2)				
PVC Delimiter (area=12.6cm^2)	11			
Syringe Scrubber (area=5.3cm^2)				
Other area=				
Number of transects sampled (0-11)	11			
Composite Volume (mL)	1650			
Assemblage ID volume **(diatoms)** (50 mL tube)	40			
Assemblage ID volume **(soft algae)** (50 mL tube)	45			
Check if Qualitative Algae sample was collected with soft algae/diatom sample (required even if macroalgae not visible)	☑	☐	☐	☐
Check if a water chem. **integrated** sample was collected (chl, AFDM)	☑	☐	☐	☐
Chlorophyll a volume use GF/F filter (25 mL **(preferred volume)**	10			
Ash Free Dry Mass use GF/F filter (AFDM) volume (25 mL **(preferred vol)**	10			

Water and Sediment Chemistry Samples

- Check if a WATER chemistry **grab** sample was collected (nutrients, SSC, etc.) ☑
- Check if a DUPLICATE WATER chemistry **grab** sample was collected ☐
- Check if a SEDIMENT chemistry sample was collected ☐
- Check if a DUPLICATE SED chemistry sample was collected ☐

Sed Coll Device: SCOOP CORE GRAB
Material: Stainless Steel Polyethylene Polycarbonate Other

Sediment Collection Depth (cm): 2 or 5

Create Lab Collection records for each checked box for integrated and grab water chemistry samples

Additional Photographs

Description	Photo Code	Description	Photo Code

Appendix C

Sonoma County Phase I MS4 Bioassessment Study Nutrient Analytical Reports

Pacific EcoRisk
Report to: Stephen Clark
2250 Cordelia Rd.
Fairfield, CA 94534

Monterey Bay Analytical Services
4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS (6227)
www.MBASinc.com
ELAP Certification Number: 2385

Tuesday, June 19, 2018

Lab Number 180612_03-01 Sample Description: MWCNCR

Collection Date/Time: 6/5/2018 8:45 Sample Collector: Ford S, Volpatti B, Cram W Client Sample #:
Submittal Date/Time: 6/12/2018 9:45 Sample ID: Sonoma County Phase I MS4 Bioassessment

Analyte	Method	Unit	Result	Dil.	Qual	PQL	MCL	Anal. Date	Anal. Time	Analyst
Total Nitrogen	Calculation	mg/L	ND	1		0.5				
Total Kjeldahl Nitrogen	EPA 351.2	mg/L	ND	1	IL	0.5		6/14/2018	12:30	BS
Phosphorus, Total	EPA 365.1	mg/L	0.06	1		0.02		6/15/2018	12:13	BS
Nitrate+Nitrite as N	EPA300.0	mg/L	ND	4		0.4		6/13/2018	15:49	HM

Comments: IL: RPD exceeds laboratory control limit

Lab Number 180612_03-02 Sample Description: EWCBSC

Collection Date/Time: 6/6/2018 6:45 Sample Collector: Ford S, Volpatti B, Cram W Client Sample #:
Submittal Date/Time: 6/12/2018 9:45 Sample ID: Sonoma County Phase I MS4 Bioassessment

Analyte	Method	Unit	Result	Dil.	Qual	PQL	MCL	Anal. Date	Anal. Time	Analyst
Total Nitrogen	Calculation	mg/L	ND	1		0.5				
Total Kjeldahl Nitrogen	EPA 351.2	mg/L	ND	1	IL	0.5		6/14/2018	12:32	BS
Phosphorus, Total	EPA 365.1	mg/L	0.04	1		0.02		6/15/2018	12:14	BS
Nitrate+Nitrite as N	EPA300.0	mg/L	ND	4		0.4		6/13/2018	16:05	HM

Comments: IL: RPD exceeds laboratory control limit

Lab Number 180612_03-03 Sample Description: CCAJRT

Collection Date/Time: 6/6/2018 12:56 Sample Collector: Ford S, Volpatti B, Cram W Client Sample #:
Submittal Date/Time: 6/12/2018 9:45 Sample ID: Sonoma County Phase I MS4 Bioassessment

Analyte	Method	Unit	Result	Dil.	Qual	PQL	MCL	Anal. Date	Anal. Time	Analyst
Total Nitrogen	Calculation	mg/L	2.1	1		0.5				
Total Kjeldahl Nitrogen	EPA 351.2	mg/L	ND	1	IL	0.5		6/14/2018	12:34	BS
Phosphorus, Total	EPA 365.1	mg/L	0.13	1		0.02		6/15/2018	12:16	BS
Nitrate+Nitrite as N	EPA300.0	mg/L	2.1	4		0.4		6/13/2018	16:20	HM

Comments: IL: RPD exceeds laboratory control limit

mg/L : Millgrams per liter (=ppm) ug/L : Micrograms per liter (=ppb) PQL : Practical Quantitation Limit MCL : Maximum Contamination Level
H = Analyzed outside of hold time E = Analysis performed by External Laboratory; See Report attachments T = Temperature Exceedance
MDL = Method Detection Limit J = Result is less than PQL

Pacific EcoRisk
Report to: Stephen Clark
2250 Cordelia Rd.
Fairfield, CA 94534

Monterey Bay Analytical Services
4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS (6227)
www.MBASinc.com
ELAP Certification Number: 2385

Tuesday, June 19, 2018

Lab Number 180612_03-04 Sample Description: LDSRAGW

Collection Date/Time: 6/7/2018 8:10 Sample Collector: Ford S, Volpatti B, Cram W Client Sample #:
Submittal Date/Time: 6/12/2018 9:45 Sample ID: Sonoma County Phase I MS4 Bioassessment

Analyte	Method	Unit	Result	Dil.	Qual	PQL	MCL	Anal. Date	Anal. Time	Analyst
Total Nitrogen	Calculation	mg/L	ND	1		0.5				
Total Kjeldahl Nitrogen	EPA 351.2	mg/L	ND	1	IL	0.5		6/14/2018	12:36	BS
Phosphorus, Total	EPA 365.1	mg/L	0.34	1		0.02		6/15/2018	12:17	BS
Nitrate+Nitrite as N	EPA300.0	mg/L	ND	4		0.4		6/13/2018	16:35	HM

Comments: IL: RPD exceeds laboratory control limit

Lab Number 180612_03-05 Sample Description: HBCASFD

Collection Date/Time: 6/7/2018 12:00 Sample Collector: Ford S, Volpatti B, Cram W Client Sample #:
Submittal Date/Time: 6/12/2018 9:45 Sample ID: Sonoma County Phase I MS4 Bioassessment

Analyte	Method	Unit	Result	Dil.	Qual	PQL	MCL	Anal. Date	Anal. Time	Analyst
Total Nitrogen	Calculation	mg/L	ND	1		0.5				
Total Kjeldahl Nitrogen	EPA 351.2	mg/L	ND	1	IL	0.5		6/14/2018	12:38	BS
Phosphorus, Total	EPA 365.1	mg/L	0.12	1		0.02		6/15/2018	12:19	BS
Nitrate+Nitrite as N	EPA300.0	mg/L	ND	4		0.4		6/13/2018	16:50	HM

Comments: IL: RPD exceeds laboratory control limit

Report Approved by:
David Holland, Laboratory Director

mg/L : Millgrams per liter (=ppm) ug/L : Micrograms per liter (=ppb) PQL : Practical Quantitation Limit MCL : Maximum Contamination Level
H = Analyzed outside of hold time E = Analysis performed by External Laboratory; See Report attachments T = Temperature Exceedance
MDL = Method Detection Limit J = Result is less than PQL

Pacific EcoRisk
Report to: Stephen Clark
2250 Cordelia Rd.
Fairfield, CA 94534

MBAS
Monterey Bay Analytical Services
4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS (6227)
www.MBASinc.com
ELAP Certification Number: 2385

Tuesday, June 19, 2018

QC Results

QCBatch ID	QC ID	Parameter	Results	Units	% Rec	% RPD	Control Limits
QC18061401	180612_13-01: MS 1	Nitrate+Nitrite as N	10	mg/L	106.27		80 - 120
	180612_13-01: MSD 1	Nitrate+Nitrite as N	10	mg/L	104.87	1.33	0 - 10
	CCVB 1	Nitrate+Nitrite as N	ND	mg/L	0.0	0.0	
	LCS 1	Nitrate+Nitrite as N	4.2	mg/L	106.03		90 - 110
	LCSD 1	Nitrate+Nitrite as N	4.2	mg/L	105.98	0.05	0 - 10
	LCSL 1	Nitrate+Nitrite as N	0.39	mg/L	97.32		50 - 150
	Method Blank 1	Nitrate+Nitrite as N	ND	mg/L	0.0	0.0	
QC18061405	180606_04-02: MS 1	Total Kjeldahl Nitrogen	5.5	mg/L	105.36		80 - 120
	180606_04-02: MSD 1	Total Kjeldahl Nitrogen	5.5	mg/L	104.51	0.81	0 - 20
	CCVB 1	Total Kjeldahl Nitrogen	ND	mg/L	0.0	0.0	
	LCB 1	Total Kjeldahl Nitrogen	ND	mg/L	0.0	0.0	
	LFB 1	Total Kjeldahl Nitrogen	5.2	mg/L	103.41		90 - 110
	LFBD 1	Total Kjeldahl Nitrogen	4.7	mg/L	93.1	10.49	0 - 10
	LFBL 1	Total Kjeldahl Nitrogen	0.49	mg/L	97.18		50 - 150
	QCS 1	Total Kjeldahl Nitrogen	5.3	mg/L	106.7		90 - 110
QC18061508	180612_03-05: MS 1	Phosphorus, Total	0.46	mg/L	112.03		80 - 120
	180612_03-05: MSD 1	Phosphorus, Total	0.45	mg/L	108.37	3.33	0 - 25
	CCVB 1	Phosphorus, Total	ND	mg/L	0.0	0.0	
	LCB 1	Phosphorus, Total	ND	mg/L	0.0	0.0	
	LFB 1	Phosphorus, Total	0.32	mg/L	106.4		90 - 110
	LFBD 1	Phosphorus, Total	0.29	mg/L	98.0	8.22	0 - 25
	LFBL 1	Phosphorus, Total	0.028	mg/L	141.5		50 - 150
	QCS 1	Phosphorus, Total	0.31	mg/L	104.1		90 - 110

mg/L : Millgrams per liter (=ppm) ug/L : Micrograms per liter (=ppb) PQL : Practical Quantitation Limit MCL : Maximum Contamination Level
H = Analyzed outside of hold time E = Analysis performed by External Laboratory; See Report attachments T = Temperature Exceedance
MDL = Method Detection Limit J = Result is less than PQL

~~180612-03~~ 180612-03
KC 06/12/18

Pacific EcoRisk
ENVIRONMENTAL CONSULTING & TESTING
2250 Cordelia Road, Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

MBAS CHAIN-OF-CUSTODY RECORD

Section A: Client Information		**Section B:** Project Information		**Section C:** Invoice Information	
Name:	Pacific EcoRisk	Report To:	Stephen Clark	Attention:	Jillian Ewing
Address:	2250 Cordelia Road Fairfield, CA 94534	Address:	2250 Cordelia Road Fairfield, CA 94534	Address:	2250 Cordelia Road Fairfield, CA 94534
Email:	slclark@pacificecorisk.com	Project manager:	Stephen Clark	Email:	jewing@pacificecorisk.com
Phone:	707-207-7766			Phone:	707-207-7764
Sampled By:	S. Ford, B. Volpatti, & W. Cram				
Project Name:	**Sonoma County Phase I MS4 Bioassessment**			**PO Number:** 28655	

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Container Number	Container Type	Unpreserved	Preserved	Field Filtered	Total Nitrogen*	Total Phosphorous (EPA 365.1)	Receiving Temperature					
1	01 MWCNCR	6/5/18	0845	FW	1	HDPE		x		x	x	1.4°C					
2	02 EWCBSC	6/6/18 ~~6/5/18~~	0645	FW	1	HDPE		x		x	x						
3	03 CCAJRT	6/6/18	1256	FW	1	HDPE		x		x	x						
4	04 LDSRAGW	6/7/18 ~~6/6/18~~	0810	FW	1	HDPE		x		x	x						
5	05 HBCASED	6/7/18	1200	FW	1	HDPE		x		x	x						
6																	
7																	
8																	
9																	

RELINQUINSHED BY / AFFILIATION	Date	Time	RECEIVED BY / AFFILIATION	Date	Time	Sample Conditions (Lab Use Only)		
JF/SF/PER	6/11/18	1000	MBAS	06/12/18	0945	Y / N	Y / N	Y / N
						Y / N	Y / N	Y / N
						Y / N	Y / N	Y / N
						Y / N	Y / N	Y / N

Comments:
*** - Total Nitrogen to include Nitrate and Nitrite (by EPA 300.0) and TKN by EPA 351.2**

Received on Ice | Custody Sealed Cooler | Samples Intact

***MATRIX CODES**: (**SED** = Sediment); (**FW** = Freshwater); (**WW** = Wastewater); (**STRMW** = Stormwater)

180612-03
1803 FC 06/12/18

Sample Condition Upon Receipt

COC Info

Was temp acceptable? Chemistry ≤6°C Micro ≤10°C (YES) NO NA <2 Hr Is there evidence of chilling? (YES) NO NA

Did bottles arrive intact? (YES) NO NA

Did bottle labels agree with COC? (YES) NO NA

Discrepency Documentation:

Person Contacted: _____ Method: In Person/Phone/Email _____

Problem _____

_____

Resolution _____

_____

Person Contacted: _____ Method: In Person/Phone/Email _____

Problem _____

_____

Resolution _____

_____

Sample Split/Filtration

Lab ID	Cont. Size	Pres	Date/Initials

Lab ID	Cont. Size	Pres	Date/Initials

Comments

1) Samples received preserved with H_2SO_4. FC 06/12/18

Appendix D

Sonoma County Phase I MS4 Bioassessment Study Benthic Macroinvertebrate Identification Data

	Station Code	Sample ID	MMI_Score	Clinger PercentTaxa	Clinger PercentTaxa predicted	Clinger PercentTaxa score	Coleoptera PercentTaxa	Coleoptera PercentTaxa predicted	Coleoptera PercentTaxa score	Taxonomic Richness	Taxonomic Richness predicted
1	MWCNCR	7968.08-01	1.061480046	0.478491578	0.550434663	0.599345147	0.086648489	0.111934207	0.484090217	39.25	39.25843333
2	EWCBSC	7968.08-02	0.300461584	0.231051587	0.466769638	0.334915711	0.109036378	0.113846068	0.578776141	17.9	36.82126667
3	CCAJRT	7968.08-03	0.162115069	0.2125	0.453682128	0.326093466	0	0.105134212	0.114852179	13.4	35.76636667
4	LDSRAGW	7968.08-04	0.067959824	0	0.427608402	0.025091451	0	0.10446838	0.117931141	10.5	35.94846667
5	HBCASFD	7968.08-05	0.062098685	0	0.527595198	0	0	0.107977628	0.101703561	2.9	36.97916667

	Station Code	Taxonomic Richness score	EPT PercentTaxa	EPT PercentTaxa predicted	EPT PercentTaxa score	Shredder Taxa	Shredder Taxa predicted	Shredder Taxa score	Intolerant Percent	Intolerant Percent predicted	Intolerant Percent score
1	MWCNCR	0.670764967	0.569431203	0.475208747	0.92302116	4	3.048433333	0.703678469	0.271378768	0.198057472	0.618861607
2	EWCBSC	0.160761291	0.097251247	0.489398534	0.015185278	1	4.5227	0	0.002	0.231161286	0.042530481
3	CCAJRT	0.067860686	0.137774725	0.483379603	0.102059246	0.85	4.9075	0	0.001705218	0.283558129	0
4	LDSRAGW	0	0.095454545	0.4704772	0.047149347	0	4.435766667	0	0	0.216892113	0.065907385
5	HBCASFD	0	0	0.46911305	0	0	3.612766667	0	0	0.182051534	0.132290414

Station Code	Sample ID	Count	Number of MMI Iterations	Number of OE Iterations	Pcnt Ambiguous Individuals	Pcnt Ambiguous Taxa	E	Mean_O	OoverE	OoverE Percentile	MMI	MMI Percentile	CSCI	CSCI Percentile	Status
MWCNCR	7968.08-01	610	20	20	16.72	9.88	14.7	16.5	1.12	0.74	1.06	0.63	1.09	0.72	Likely Intact
EWCBSC	7968.08-02	611	20	20	2.78	13.73	15.9	6.5	0.41	0.00	0.30	0.00	0.35	0.00	Very Likely Altered
CCAJRT	7968.08-03	610	20	20	0.98	5.26	17.0	7.8	0.46	0.00	0.16	0.00	0.31	0.00	Very Likely Altered
LDSRAGW	7968.08-04	601	20	20	0.33	11.11	13.7	4.4	0.32	0.00	0.07	0.00	0.19	0.00	Very Likely Altered
HBCASFD	7968.08-05	612	20	20	0.00	0.00	13.7	3.9	0.28	0.00	0.06	0.00	0.17	0.00	Very Likely Altered

PacEcoRisk Sonoma Stormwater SWAMP BMI&Algae 2018
Data are adjusted for subsampling in the lab
Calculations use EcoAnalysts Inc. standard attributes

Sample ID	**MWCNCR**
Collection Date	**06-05-2018**
Percent Subsampled in the Lab	**10.42**
EcoAnalysts Sample ID	**7968.08-1**
Abundance Measures	
Corrected Abundance	5856.00
EPT Abundance	2937.60
Dominance Measures	
Dominant Taxon	Leptophlebiidae
Dominant Abundance	87.00
2nd Dominant Taxa	Gumaga sp.
2nd Dominant Abundance	46.00
3rd Dominant Taxa	Paratanytarsus sp.
3rd Dominant Abundance	34.00
% Dominant Taxon	14.26
% 2 Dominant Taxa	21.80
% 3 Dominant Taxa	27.38
Richness Measures	
Species Richness	74.00
EPT Richness	28.00
Ephemeroptera Richness	9.00
Plecoptera Richness	7.00
Trichoptera Richness	12.00
Chironomidae Richness	26.00
Oligochaeta Richness	1.00
Non-Chiro. Non-Olig. Richness	47.00
Rhyacophila Richness	1.00
Community Composition	
% Ephemeroptera	32.95
% Plecoptera	4.59
% Trichoptera	12.62
% EPT	50.16
% Coleoptera	2.46
% Diptera	40.82
% Oligochaeta	1.80
% Baetidae	10.66
% Brachycentridae	0.00
% Chironomidae	38.20
% Ephemerellidae	2.46
% Hydropsychidae	0.49
% Odonata	0.16
% Perlidae	0.66

% Pteronarcyidae	0.66
% Simuliidae	1.64
Functional Group Composition	
% Filterers	9.34
% Gatherers	47.21
% Predators	10.00
% Scrapers	9.67
% Shredders	22.46
% Piercer-Herbivores	0.66
% Unclassified	0.33
Filterer Richness	7.00
Gatherer Richness	27.00
Predator Richness	19.00
Scraper Richness	8.00
Shredder Richness	8.00
Piercer-Herbivore Richness	2.00
Unclassified	2.00
Diversity/Evenness Measures	
Shannon-Weaver H' (log 10)	1.55
Shannon-Weaver H' (log 2)	5.14
Shannon-Weaver H' (log e)	3.56
Margalef's Richness	8.41
Pielou's J'	0.83
Simpson's Heterogeneity	0.95
Biotic Indices	
% Indiv. w/ HBI Value	96.72
Hilsenhoff Biotic Index	4.33
% Indiv. w/ MTI Value	58.03
Metals Tolerance Index	3.39
% Indiv. w/ FSBI Value	25.08
Fine Sediment Biotic Index	75.00
FSBI - average	1.01
FSBI - weighted average	3.67
% Indiv. w/ TPM Value	38.85
Temp. Pref. Metric - average	1.55
TPM - weighted average	3.65
Karr BIBI Metrics	
Long-Lived Taxa Richness	7.00
Clinger Richness	35.00
% Clingers	44.10
Intolerant Taxa Richness	13.00
% Tolerant Individuals	0.58
% Tolerant Taxa	12.16
Coleoptera Richness	5.00
Montana DEQ Metrics	
MT Biotic Index	4.33
C-Gatherers + C-Filterers	56.56

% Scraper + % Shredder	32.13
% Univoltine	17.54
% Multivoltine	31.64
% Semivoltine	5.90
Community Tolerance Quotient	N/A
% Hydropsychinae	0.49
Lake Metrics	
% Orthocladiinae	9.18
Orthocladiinae Richness	10.00
% Chironomini	15.90
Chironomini Richness	8.00
% Tanytarsini	10.66
% Chironomus	0.66
% Tanytarsus	2.46
% Dicrotendipes	0.00
% Dicrotendipes + Chironomus	0.66
% Corbicula	0.00
% Manayunkia speciosa	0.00
% Intolerant	27.46
% Intolerant Indiv. (S.CA)	26.56
% Individuals w/ CAHBI value	78.20
% Intolerant Indiv. (CAHBI)	29.98
% Sensitive EPT (CAHBI)	39.62
% Non-Insect Individuals (S.CA)	3.28
% Non-Insect Taxa	13.51
% Crustacea + Mollusca	0.66
Average Abundance (per Taxon)	79.14
NYDEC PMA Metrics	
% Crustacea	0.00
% Mollusca	0.66
% Non-Chironomidae	58.52

EWCBSC	CCAJRT	LDSRAGW	HBCASFD
06-06-2018	06-06-2018	06-07-2018	06-07-2018
29.17	4.17	30.17	10.42
7968.08-2	7968.08-3	7968.08-4	7968.08-5
2094.86	14640.00	1992.27	5875.20
123.43	120.00	13.26	0.00
Chironomus sp.	Tanytarsus sp.	Oligochaeta	Oligochaeta
191.00	248.00	399.00	477.00
Oligochaeta	Oligochaeta	Physa sp.	Stictochironomus sp.
68.00	71.00	62.00	61.00
Micropsectra sp.	Micropsectra sp.	Chironomus sp.	Chironomus sp.
44.00	46.00	30.00	28.00
31.26	40.66	66.39	77.94
42.39	52.30	76.71	87.91
49.59	59.84	81.70	92.48
47.00	36.00	18.00	14.00
2.00	3.00	1.00	0.00
1.00	2.00	1.00	0.00
0.00	0.00	0.00	0.00
1.00	1.00	0.00	0.00
24.00	19.00	6.00	12.00
1.00	1.00	1.00	1.00
22.00	16.00	11.00	1.00
0.00	0.00	0.00	0.00
0.16	0.66	0.67	0.00
0.00	0.00	0.00	0.00
5.73	0.16	0.00	0.00
5.89	0.82	0.67	0.00
0.82	0.00	0.00	0.00
73.81	72.62	10.32	21.73
11.13	11.64	66.39	77.94
0.16	0.66	0.67	0.00
0.00	0.00	0.00	0.00
68.74	71.48	10.32	21.73
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.16	0.00	0.00	0.00
0.00	0.00	0.00	0.00

0.00	0.00	0.00	0.00
4.42	0.82	0.00	0.00
17.02	50.49	8.65	4.41
64.16	33.44	75.37	94.44
5.89	1.15	2.50	0.98
6.06	4.75	13.14	0.00
6.06	9.84	0.17	0.16
0.00	0.00	0.17	0.00
0.16	0.16	0.00	0.00
7.00	6.00	3.00	3.00
19.00	18.00	6.00	7.00
12.00	5.00	4.00	3.00
3.00	2.00	3.00	0.00
3.00	3.00	1.00	1.00
0.00	0.00	1.00	0.00
1.00	1.00	0.00	0.00
1.17	1.01	0.60	0.39
3.88	3.35	1.98	1.29
2.69	2.32	1.37	0.89
6.02	3.65	2.24	1.50
0.70	0.65	0.47	0.34
0.87	0.80	0.54	0.38
96.89	99.18	100.00	99.67
7.50	6.49	7.82	8.10
65.79	74.10	16.31	9.97
3.54	3.08	3.53	3.54
4.09	1.48	0.00	0.00
7.00	12.00	N/A	N/A
0.15	0.33	N/A	N/A
3.04	3.67	N/A	N/A
14.08	52.46	2.83	4.25
0.94	0.92	0.44	0.71
3.38	2.34	2.12	2.19
2.00	3.00	3.00	1.00
12.00	8.00	4.00	4.00
23.08	58.85	13.14	5.07
1.00	1.00	0.00	0.00
15.27	0.88	26.10	9.78
23.40	27.78	38.89	50.00
3.00	0.00	0.00	0.00
7.50	6.49	7.82	8.10
81.18	83.93	84.03	98.86

12.11	14.59	13.31	0.16
17.02	47.21	2.83	15.36
48.77	18.03	9.48	5.23
0.00	0.00	0.17	0.00
N/A	N/A	N/A	N/A
0.00	0.00	0.00	0.00
3.93	5.25	0.17	0.33
7.00	8.00	1.00	2.00
45.17	17.38	4.99	15.52
7.00	7.00	1.00	4.00
16.86	48.20	3.16	4.90
31.26	3.93	4.99	4.58
7.20	40.66	2.50	3.76
0.49	0.16	0.00	0.00
31.75	4.10	4.99	4.58
0.00	0.00	0.00	0.33
0.00	0.00	0.00	0.00
0.17	0.17	0.00	0.00
0.16	0.16	0.00	0.00
61.54	89.34	74.04	83.17
2.13	1.10	0.00	0.00
9.31	0.18	0.00	0.00
19.31	26.56	88.85	78.27
25.53	30.56	55.56	14.29
5.89	14.59	21.96	0.33
44.57	406.67	110.68	419.66
1.64	4.59	2.66	0.00
4.26	10.00	19.30	0.33
11.95	1.97	0.83	0.00

Appendix E

Sonoma County Phase I MS4 Bioassessment Study Algae Identification Data

Algae ChI AFDM

CEDEN Online LookUp Lists
http://ceden.org/CEDEN_checker/Checker/LookUpLists.php

CEDEN Online Data Checker

CV RDC
http://checker.cv.mpsl.mlml.calstate.edu/CVRDC/CVRDCUpload.php

SCCWRP Data Center
http://www.sccwrp.org/Data/DataSubmission/SouthernCaliforniaRegionalDataCenter.aspx

SFEI Data Center
http://rdcdataupload.sfei.org/

MPSL-MLML Data Center
http://checker.calducs.mpsl.mlml.calstate.edu/calducs
If you do not know what data center to utilize, use the following link: http://ceden.org/data_centers.shtml

CEDEN Chemistry Template Documentation
http://www.ceden.org/ceden_datatemplates.shtml

Notes for all tabs

Location — This tab should only be filled out if actual latitude and longitude measurements are being recorded.

1. Bolded Green text indicates a Minimum/Required field necessary for loading data into CEDEN

2. Black bolded text indicates a Desireable/Default Required field to help increase the usability of the data by CEDEN users. Desireable/Default Required fields cannot be left blank and must be populated with a default value if an actual value cannot be provided.

3. Cells with orange text and grey background indicate an extra field used for additional information and completeness purposes. Although not required, it is desireable that you provide this information if available.

4. Grey highlighted cells with blue bolded text (located only in the stations tab) indicate an extra field used for additional information and completeness purposes unless your project is submitting bioassessment data for that particular station. These fields are required when utilizing the Bioassessment Reporting Module.

* Please see the notation/comment box located in the top right corner of the column headers to view the name of the corresponding LookUp List, any associated Default Values, and/or proper formatting for each field.

Template Updates

2/14/14	Bacteria examples have been added to this template to provide guidance to data submitters
5/27/14	LabBatches listed in ChemResults tab have been added to the LabBatch tab
7/5/16	Updated links; created blank template in addition to existing template with examples; modified example data; changed not required fields to have orange, unbolded text; added instruction that Station tab can be left blank; added macros to help entry of the the correct CollectionTime format
1/3/17	Removed Stations tab and references to it.

StationCode	SampleDate	ProjectCode	EventCode	ProtocolCode	AgencyCode	SampleComments	LocationCode	GeometryShape	CoordinateNumber	ActualLatitude	ActualLongitude	Datum	CoordinateSource	Elevation	UnitElevation	StationDetailVerBy	StationDetailVerDate	StationDetailComments
CCAJRT	06/Jun/2018		BA				X											
EWCBSC	06/Jun/2018		BA				X											
HBCASFD	07/Jun/2018		BA				X											
LDSRAGW	07/Jun/2018		BA				X											
MWCNCR	05/Jun/2018		BA				X											

StationCode	SampleDate	ProjectCode	EventCode	ProtocolCode	AgencyCode	SampleComments	LocationCode	GeometryShape	CollectionTime	CollectionMethodCode	SampleTypeCode	Replicate	CollectionDeviceName	CollectionDepth	UnitCollectionDepth	PositionWaterColumn	LabCollectionComments	LabBatch	AnalysisDate	MatrixName	MethodName	AnalyteName	FractionName	UnitName	LabReplicate	Result	ResQualCode	MDL	RL	QACode	ComplianceCode	DilutionFactor	ExpectedValue
CCAJRT	06/Jun/2018		BA				X				Integrated	1	PVCDelimiter	-88	cm	Not applicable		7968_Chl	19/Jun/2018 00:00	benthic	EPA 446.0	Chlorophyll a	Particulate	mg/m2	1	15.607	=	-88	0.030	None	NR	1	
EWCBSC	06/Jun/2018		BA				X				Integrated	1	PVCDelimiter	-88	cm	Not applicable		7968_Chl	19/Jun/2018 00:00	benthic	EPA 446.0	Chlorophyll a	Particulate	mg/m2	1	37.282	=	-88	0.032	None	NR	1	
HBCASFD	07/Jun/2018		BA				X				Integrated	1	PVCDelimiter	-88	cm	Not applicable		7968_Chl	19/Jun/2018 00:00	benthic	EPA 446.0	Chlorophyll a	Particulate	mg/m2	1	162.886	=	-88	0.031	None	NR	1	
LDSRAGW	07/Jun/2018		BA				X				Integrated	1	PVCDelimiter	-88	cm	Not applicable		7968_Chl	19/Jun/2018 00:00	benthic	EPA 446.0	Chlorophyll a	Particulate	mg/m2	1	124.297	=	-88	0.039	None	NR	1	
MWCNCR	05/Jun/2018		BA				X				Integrated	1	RubberDelimiter	-88	cm	Not applicable		7968_Chl	19/Jun/2018 00:00	benthic	EPA 446.0	Chlorophyll a	Particulate	mg/m2	1	27.146	=	-88	0.018	None	NR	1	
CCAJRT	06/Jun/2018		BA				X				Integrated	1	PVCDelimiter	-88	cm	Not applicable		7968_Pheo	19/Jun/2018 00:00	benthic	EPA 446.0	Pheophytin	Particulate	mg/m2	1	14.857	=	-88	0.030	None	NR	1	
EWCBSC	06/Jun/2018		BA				X				Integrated	1	PVCDelimiter	-88	cm	Not applicable		7968_Pheo	19/Jun/2018 00:00	benthic	EPA 446.0	Pheophytin	Particulate	mg/m2	1	31.837	=	-88	0.032	None	NR	1	
HBCASFD	07/Jun/2018		BA				X				Integrated	1	PVCDelimiter	-88	cm	Not applicable		7968_Pheo	19/Jun/2018 00:00	benthic	EPA 446.0	Pheophytin	Particulate	mg/m2	1	111.285	=	-88	0.031	None	NR	1	
LDSRAGW	07/Jun/2018		BA				X				Integrated	1	PVCDelimiter	-88	cm	Not applicable		7968_Pheo	19/Jun/2018 00:00	benthic	EPA 446.0	Pheophytin	Particulate	mg/m2	1	92.781	=	-88	0.039	None	NR	1	
MWCNCR	05/Jun/2018		BA				X				Integrated	1	RubberDelimiter	-88	cm	Not applicable		7968_Pheo	19/Jun/2018 00:00	benthic	EPA 446.0	Pheophytin	Particulate	mg/m2	1	33.905	=	-88	0.018	None	NR	1	
CCAJRT	06/Jun/2018		BA				X				Integrated	1	PVCDelimiter	-88	cm	Not applicable		7968_AFDM	01/Jan/1950 00:00	benthic	SM 10300 CD	AFDM_Algae	Particulate	g/m2	1	41.6667	=	-88	11.9048	None	NR	1	
EWCBSC	06/Jun/2018		BA				X				Integrated	1	PVCDelimiter	-88	cm	Not applicable		7968_AFDM	01/Jan/1950 00:00	benthic	SM 10300 CD	AFDM_Algae	Particulate	g/m2	1	51.371	=	-88	12.843	None	NR	1	
HBCASFD	07/Jun/2018		BA				X				Integrated	1	PVCDelimiter	-88	cm	Not applicable		7968_AFDM	01/Jan/1950 00:00	benthic	SM 10300 CD	AFDM_Algae	Particulate	g/m2	1	53.9683	=	-88	12.2655	None	NR	1	
LDSRAGW	07/Jun/2018		BA				X				Integrated	1	PVCDelimiter	-88	cm	Not applicable		7968_AFDM	01/Jan/1950 00:00	benthic	SM 10300 CD	AFDM_Algae	Particulate	g/m2	1	118.9899	=	-88	15.6566	None	NR	1	
MWCNCR	05/Jun/2018		BA				X				Integrated	1	RubberDelimiter	-88	cm	Not applicable		7968_AFDM	01/Jan/1950 00:00	benthic	SM 10300 CD	AFDM_Algae	Particulate	g/m2	1	8.658	=	-88	2.886	None	NR	1	

StationCode	PrepPreservationName	PrepPreservationDate	DigestExtractMethod	DigestExtractDate	SampleID	LabSampleID	LabResultComments	Lab Value	MDL	RL	Field Volume Filtered (L)	Composite Volume (mL)	Grab Size (cm2)	Water Column Value (Lab)	Water Column Value (MDL)	Water Column Value (RL)	Composite Volume (Lab)	Composite Volume (MDL)	Composite Volume (RL)	Grab Size (Lab)	Grab Size (MDL)	Grab Size (RL)	Final Result (Lab)	Final Result (MDL)	Final Result (RL)
CCAJRT	FieldFiltered,FieldFrozen	06/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.06-03		1.311		0.25	0.01	1650	138.6	0.1311		0.00025	1.65		1.65	0.01386		0.01386	15.607		0.030
EWCBSC	FieldFiltered,FieldFrozen	06/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.06-02		2.903		0.25	0.01	1780	138.6	0.2903		0.00025	1.78		1.78	0.01386		0.01386	37.282		0.032
HBCASFD	FieldFiltered,FieldFrozen	07/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.06-05		13.28		0.25	0.01	1700	138.6	1.328		0.00025	1.7		1.7	0.01386		0.01386	162.886		0.031
LDSRAGW	FieldFiltered,FieldFrozen	07/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.06-04		7.939		0.25	0.01	2170	138.6	0.7939		0.00025	2.17		2.17	0.01386		0.01386	124.297		0.039
MWCNCR	FieldFiltered,FieldFrozen	05/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.06-01		9.406		0.25	0.025	1000	138.6	0.37624		0.00025	1		1	0.01386		0.01386	27.146		0.018
CCAJRT	FieldFiltered,FieldFrozen	06/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.06-03		1.248		0.25	0.01	1650	138.6	0.1248		0.00025	1.65		1.65	0.01386		0.01386	14.857		0.030
EWCBSC	FieldFiltered,FieldFrozen	06/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.06-02		2.479		0.25	0.01	1780	138.6	0.2479		0.00025	1.78		1.78	0.01386		0.01386	31.837		0.032
HBCASFD	FieldFiltered,FieldFrozen	07/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.06-05		9.073		0.25	0.01	1700	138.6	0.9073		0.00025	1.7		1.7	0.01386		0.01386	111.285		0.031
LDSRAGW	FieldFiltered,FieldFrozen	07/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.06-04		5.926		0.25	0.01	2170	138.6	0.5926		0.00025	2.17		2.17	0.01386		0.01386	92.781		0.039
MWCNCR	FieldFiltered,FieldFrozen	05/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.06-01		11.748		0.25	0.025	1000	138.6	0.46992		0.00025	1		1	0.01386		0.01386	33.905		0.018
CCAJRT	FieldFiltered,FieldFrozen	06/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.07-03		0.0035		0.001	0.01	1650	138.6	0.35		0.1	1.65		1.65	0.01386		0.01386	41.6667		11.9048
EWCBSC	FieldFiltered,FieldFrozen	06/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.07-02		0.004		0.001	0.01	1780	138.6	0.4		0.1	1.78		1.78	0.01386		0.01386	51.371		12.843
HBCASFD	FieldFiltered,FieldFrozen	07/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.07-05		0.0044		0.001	0.01	1700	138.6	0.44		0.1	1.7		1.7	0.01386		0.01386	53.9683		12.2655
LDSRAGW	FieldFiltered,FieldFrozen	07/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.07-04		0.0076		0.001	0.01	2170	138.6	0.76		0.1	2.17		2.17	0.01386		0.01386	118.9899		15.6566
MWCNCR	FieldFiltered,FieldFrozen	05/Jun/2018 00:00	None	01/Jan/1950 00:00		7968.07-01		0.003		0.001	0.025	1000	138.6	0.12		0.04	1		1	0.01386		0.01386	8.658		2.886

LabBatch	LabAgencyCode	LabSubmissionCode	BatchVerificationCode	SubmittingAgencyCode	LabBatchComments
7968_Chl	EcoAnalysts	NR	NR	EcoAnalysts	
7968_Pheo	EcoAnalysts	NR	NR	EcoAnalysts	
7968_AFDM	UIASL	NR	NR	EcoAnalysts	

StationCode	Device	Area_cm2	CompositeVolume_mL	VolumeFiltered_Chl_mL	VolumeFiltered_AFDM
CCAJRT	PVCDelimiter	138.6	1650	10	10
EWCBSC	PVCDelimiter	138.6	1780	10	10
HBCASFD	PVCDelimiter	138.6	1700	10	10
LDSRAGW	PVCDelimiter	138.6	2170	10	10
MWCNCR	RubberDelimiter	138.6	1000	25	25

Algae IBI: D18 Daitom

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Station Name	Target Latitude	Target Longitude	Datum	Sample Date	Location Code	Collection Time
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	X	combined
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC					6/6/18	X	combined
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	X	combined
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	X	combined
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR					6/5/18	X	combined

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Collection Method Code	Collection Device Descr	Collection Depth	Unit Collection Depth	Sieve Size	Replicate	Proportion halobiontic (d)	Proportion low TP indicators (d)
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT	Algae_SWAMP	combined	-1	combined	combined	1	0.245	0.06
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC	Algae_SWAMP	combined	-1	combined	combined	1	0.063	0.026
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD	Algae_SWAMP	combined	-1	combined	combined	1	0.179	0.064
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Algae_SWAMP	combined	-1	combined	combined	1	0.135	0.081
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR	Algae_SWAMP	combined	-1	combined	combined	1	0.489	0.273

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Proportion N heterotrophs (d)	Proportion requiring >50% DO saturation (d)	Proportion sediment tolerant (highly motile) (d)	Proportion halobiontic (d) Score	Proportion low TP indicators (d) Score	Proportion N heterotrophs (d) Score	Proportion requiring >50% DO saturation (d) Score	Proportion sediment tolerant (highly motile) (d) Score
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT	0.243	0.793	0.226	5	1	5	4	6
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC	0.136	0.965	0.122	9	1	7	9	8
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD	0.286	0.877	0.471	7	1	4	7	1
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW	0.579	0.88	0.528	7	1	0	7	0
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR	0.444	0.978	0.453	1	4	2	9	1

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	MMI Score	Comments
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT	42	
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC	68	
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD	40	
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW	30	
MMI_SoCal_D18_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR	34	

Algae IBI: H20 Hybrid

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	StationName	TargetLatitude	TargetLongitude	Datum
MMI_SoCal_H20_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT				
MMI_SoCal_H20_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC				
MMI_SoCal_H20_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD				
MMI_SoCal_H20_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW				
MMI_SoCal_H20_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR				

SampleDate	Location Code	Collection Time	CollectionMethodCode	Collection DeviceDescr	Collection Depth	Unit Collection Depth	Sieve Size	Replicate	Proportion halobiontic (d)	Proportion high Cu indicators (s, sp)	Proportion high DOC indicators (s, sp)	Proportion low TN indicators (d)
6/6/18	X	combined	Algae_SWAMP	combined	-1	combined	combined	1	0.245	0	0.5	0.085
6/6/18	X	combined	Algae_SWAMP	combined	-1	combined	combined	1	0.063	0	0	0.025
6/7/18	X	combined	Algae_SWAMP	combined	-1	combined	combined	1	0.179	0	0	0.054
6/7/18	X	combined	Algae_SWAMP	combined	-1	combined	combined	1	0.135	0	0	0.016
6/5/18	X	combined	Algae_SWAMP	combined	-1	combined	combined	1	0.489	1	1	0.248

Proportion low TP indicators (s, sp)	Proportion N heterotrophs (d)	Proportion requiring >50% DO saturation (d)	Proportion sediment tolerant (highly motile) (d)	Proportion halobiontic (d) Score	Proportion high Cu indicators (s, sp) Score	Proportion high DOC indicators (s, sp) Score	Proportion low TN indicators (d) Score	Proportion low TP indicators (s, sp) Score	Proportion N heterotrophs (d) Score	Proportion requiring >50% DO saturation (d) Score	Proportion sediment tolerant (highly motile) (d) Score	MMI Score	Comments
0	0.243	0.793	0.226	5	10	4	1	0	5	4	6	44	
0	0.136	0.965	0.122	9	10	10	1	0	7	9	8	68	
0	0.286	0.877	0.471	7	10	10	1	0	4	7	1	50	
0	0.579	0.88	0.528	7	10	10	1	0	0	7	0	44	
0	0.444	0.978	0.453	1	0	0	3	0	2	9	1	20	

Algae IBI: H21 Hybrid

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Station Name	Target Latitude	Target Longitude	Datum	Sample Date	Location Code	Collection Time	Collection Method Code
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	X	combined	Algae_SWAMP
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC					6/6/18	X	combined	Algae_SWAMP
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	X	combined	Algae_SWAMP
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	X	combined	Algae_SWAMP
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR					6/5/18	X	combined	Algae_SWAMP

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Collection Device Descr	Collection Depth	Unit Collection Depth	Sieve Size	Replicate	Proportion Chlorophyta (s, b)	Proportion halobiontic (d)	Proportion low TP indicators (d)
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT	combined	-1	combined	combined	1	0.186	0.245	0.06
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC	combined	-1	combined	combined	1	0	0.063	0.026
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD	combined	-1	combined	combined	1	0	0.179	0.064
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW	combined	-1	combined	combined	1	0.723	0.135	0.081
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR	combined	-1	combined	combined	1	0.84	0.489	0.273

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Proportion N heterotrophs (d)	Proportion requiring >50% DO saturation (d)	Proportion sediment tolerant (highly motile) (d)	Proportion ZHR (s, b)	Proportion Chlorophyta (s, b) Score	Proportion halobiontic (d) Score	Proportion low TP indicators (d) Score
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT	0.243	0.793	0.226	0	8	5	1
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC	0.136	0.965	0.122	0	10	9	1
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD	0.286	0.877	0.471	1	10	7	1
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW	0.579	0.88	0.528	0	3	7	1
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR	0.444	0.978	0.453	0.16	2	1	4

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Proportion N heterotrophs (d) Score	Proportion requiring >50% DO saturation (d) Score	Proportion sediment tolerant (highly motile) (d) Score	Proportion ZHR (s, b) Score	MMI Score	Comments
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT	5	4	6	0	41	
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC	7	9	8	0	63	
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD	4	7	1	10	57	
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW	0	7	0	0	26	
MMI_SoCal_H21_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR	2	9	1	2	30	

Algae IBI: H23 Hybrid

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Station Name	Target Latitude	Target Longitude	Datum	Sample Date	Location Code	Collection Time	Collection Method Code	Collection Device Descr
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	X	combined	Algae_SWAMP	combined
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC					6/6/18	X	combined	Algae_SWAMP	combined
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	X	combined	Algae_SWAMP	combined
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	X	combined	Algae_SWAMP	combined
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR					6/5/18	X	combined	Algae_SWAMP	combined

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Collection Depth	Unit Collection Depth	Sieve Size	Replicate	Proportion halobiontic (d)	Proportion high DOC indicators (s, sp)	Proportion low TP indicators (d)	Proportion N heterotrophs (d)
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT	-1	combined	combined	1	0.245	0.5	0.06	0.243
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC	-1	combined	combined	1	0.063	0	0.026	0.136
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD	-1	combined	combined	1	0.179	0	0.064	0.286
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW	-1	combined	combined	1	0.135	0	0.081	0.579
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR	-1	combined	combined	1	0.489	1	0.273	0.444

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Proportion of green algae belonging to CRUS (s, b)	Proportion requiring >50% DO saturation (d)	Proportion sediment tolerant (highly motile) (d)	Proportion ZHR (s, m)	Proportion halobiontic (d) Score	Proportion high DOC indicators (s, sp) Score	Proportion low TP indicators (d) Score
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT	0	0.793	0.226	0	5	4	1
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC	0	0.965	0.122	0	9	10	1
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD	0	0.877	0.471	0.667	7	10	1
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW	0	0.88	0.528	0	7	10	1
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR	0.84	0.978	0.453	0.33	1	0	4

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Proportion N heterotrophs (d) Score	Proportion of green algae belonging to CRUS (s, b) Score	Proportion requiring >50% DO saturation (d) Score	Proportion sediment tolerant (highly motile) (d) Score	Proportion ZHR (s, m) Score	MMI Score	Comments
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	CCAJRT	5	10	4	6	0	44	
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	EWCBSC	7	10	9	8	0	39	
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	HBCASFD	4	10	7	1	10	62	
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	LDSRAGW	0	10	7	0	0	44	
MMI_SoCal_H23_2012	MMI_SoCal_2012	Level3			Not Recorded	SonomaCo		Not Recorded	MWCNCR	2	2	9	1	5	30	

Algae IBI: S2 Softbodied

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Station Name	Target Latitude	Target Longitude	Datum	Sample Date	Location Code
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	X
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	X
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	X
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	MWCNCR					6/5/18	X

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Collection Time	Collection Method Code	Collection Device Descr	Collection Depth	Unit Collection Depth
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	CCAJRT	combined	Algae_SWAMP	combined	-1	combined
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	HBCASFD	combined	Algae_SWAMP	combined	-1	combined
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	LDSRAGW	combined	Algae_SWAMP	combined	-1	combined
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	MWCNCR	combined	Algae_SWAMP	combined	-1	combined

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Sieve Size	Replicate	Proportion high Cu indicators (s, sp)	Proportion high DOC indicators (s, sp)	Proportion low TP indicators (s, sp)
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	CCAJRT	combined	1	0	0.5	0
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	HBCASFD	combined	1	0	0	0
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	LDSRAGW	combined	1	0	0	0
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	MWCNCR	combined	1	1	1	0

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Proportion non-reference indicators (s, sp)	Proportion of green algae belonging to CRUS (s, b)	Proportion ZHR (s, m)	Proportion high Cu indicators (s, sp) Score	Proportion high DOC indicators (s, sp) Score
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	CCAJRT	0	0	0	10	4
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	HBCASFD	0	0	0.667	10	10
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	LDSRAGW	0	0	0	10	10
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	MWCNCR	1	0.84	0.33	0	0

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Proportion low TP indicators (s, sp) Score	Proportion non-reference indicators (s, sp) Score	Proportion of green algae belonging to CRUS (s, b) Score	Proportion ZHR (s, m) Score	MMI Score
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	CCAJRT	0	10	10	0	57
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	HBCASFD	0	10	10	10	83
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	LDSRAGW	0	10	10	0	67
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	MWCNCR	0	0	2	5	12

MMI	MMI Group	Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Comments
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	CCAJRT	
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	HBCASFD	
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	LDSRAGW	
MMI_SoCal_S2_2012	MMI_SoCal_2012	Level3	1		Not Recorded	SonomaCo		Not Recorded	MWCNCR	

Algae Metrics

Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Station Name	Target Latitude	Target Longitude	Datum	Sample Date	Location Code	Collection Time	Collection Method Code	Collection Device Descr	Collection Depth
Level3	1		Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	X	combined	Algae_SWAMP	combined	-1
Level3	1		Not Recorded	SonomaCo		Not Recorded	EWCBSC					6/6/18	X	combined	Algae_SWAMP	combined	-1
Level3	1		Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	X	combined	Algae_SWAMP	combined	-1
Level3	1		Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	X	combined	Algae_SWAMP	combined	-1
Level3	1		Not Recorded	SonomaCo		Not Recorded	MWCNCR					6/5/18	X	combined	Algae_SWAMP	combined	-1

Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Unit Collection Depth	Sieve Size	Replicate	Proportion A minutissimum (d)	Proportion Chlorophyta (s, b)	Proportion halobiontic (d)	Proportion high Cu indicators (s, sp)	Proportion high DOC indicators (s, b)	Proportion high DOC indicators (s, sp)
Level3	1		Not Recorded	SonomaCo		Not Recorded	CCAJRT	combined	combined	1	0.013	0.186	0.245	0	0.025	0.5
Level3	1		Not Recorded	SonomaCo		Not Recorded	EWCBSC	combined	combined	1	0.013		0.063			
Level3	1		Not Recorded	SonomaCo		Not Recorded	HBCASFD	combined	combined	1	0.002	0	0.179	0	0	0
Level3	1		Not Recorded	SonomaCo		Not Recorded	LDSRAGW	combined	combined	1	0	0.723	0.135	0	0	0
Level3	1		Not Recorded	SonomaCo		Not Recorded	MWCNCR	combined	combined	1	0.157	0.84	0.489	1	1	1

Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Proportion highly motile (d)	Proportion low TN indicators (d)	Proportion low TP indicators (d)	Proportion low TP indicators (s, sp)	Proportion N heterotrophs (d)	Proportion non-reference indicators (s, b)	Proportion non-reference indicators (s, sp)	Proportion of green algae belonging to CRUS (s, b)
Level3	1		Not Recorded	SonomaCo		Not Recorded	CCAJRT	0.189	0.085	0.06	0	0.243	0	0	0
Level3	1		Not Recorded	SonomaCo		Not Recorded	EWCBSC	0.12	0.025	0.026		0.136			
Level3	1		Not Recorded	SonomaCo		Not Recorded	HBCASFD	0.452	0.054	0.064	0	0.286	0	0	0
Level3	1		Not Recorded	SonomaCo		Not Recorded	LDSRAGW	0.52	0.016	0.081	0	0.579	0	0	0
Level3	1		Not Recorded	SonomaCo		Not Recorded	MWCNCR	0.439	0.248	0.273	0	0.444	1	1	0.84

Ecoregion Level	Ecoregion Code	Upstream Area	Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Proportion oligo- & beta-mesosaprobic (d)	Proportion poly- & eutrophic (d)	Proportion requiring >50% DO saturation (d)	Proportion requiring nearly 100% DO saturation (d)	Proportion sediment tolerant (highly motile) (d)	Proportion ZHR (s, b)	Proportion ZHR (s, m)	Proportion ZHR (s, sp)
Level3	1		Not Recorded	SonomaCo		Not Recorded	CCAJRT	0.372	0.621	0.793	0.129	0.226	0	0	0
Level3	1		Not Recorded	SonomaCo		Not Recorded	EWCBSC	0.804	0.879	0.965	0.041	0.122			
Level3	1		Not Recorded	SonomaCo		Not Recorded	HBCASFD	0.62	0.51	0.877	0.118	0.471	1	0.667	0.333
Level3	1		Not Recorded	SonomaCo		Not Recorded	LDSRAGW	0.296	0.815	0.88	0.106	0.528	0	0	0
Level3	1		Not Recorded	SonomaCo		Not Recorded	MWCNCR	0.547	0.692	0.978	0.193	0.453	0.16	0.33	0.5

Algae Top 5 Taxa

Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Station Name	Target Latitude	Target Longitude	Datum	Sample Date	Collection Time	Collection Method Code
Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	CCAJRT					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	EWCBSC					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	EWCBSC					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	EWCBSC					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	EWCBSC					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	EWCBSC					6/6/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	HBCASFD					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	LDSRAGW					6/7/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	MWCNCR					6/5/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	MWCNCR					6/5/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	MWCNCR					6/5/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	MWCNCR					6/5/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	MWCNCR					6/5/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	MWCNCR					6/5/18	12:00:00 AM	Algae_SWAMP
Not Recorded	SonomaCo		Not Recorded	MWCNCR					6/5/18	12:00:00 AM	Algae_SWAMP

Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Collection Device Descr	Collection Depth	Unit Collection Depth	Sieve Size	Replicate	Location Code
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	EWCBSC	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	EWCBSC	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	EWCBSC	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	EWCBSC	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	EWCBSC	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Not Recorded	-88	m	None	1	X
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Not Recorded	-88	m	None	1	X

Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Lab Sample ID	Algae List	Unit Name	Rank
Not Recorded	SonomaCo		Not Recorded	CCAJRT	7968.04-03_7968.05-03	Diatom_2012	count	1
Not Recorded	SonomaCo		Not Recorded	CCAJRT	7968.04-03_7968.05-03	Diatom_2012	count	2
Not Recorded	SonomaCo		Not Recorded	CCAJRT	7968.04-03_7968.05-03	Diatom_2012	count	3
Not Recorded	SonomaCo		Not Recorded	CCAJRT	7968.04-03_7968.05-03	Diatom_2012	count	4
Not Recorded	SonomaCo		Not Recorded	CCAJRT	7968.04-03_7968.05-03	Diatom_2012	count	5
Not Recorded	SonomaCo		Not Recorded	CCAJRT	7968.04-03_7968.05-03	SoftAlgae_2012	um3/cm2	1
Not Recorded	SonomaCo		Not Recorded	CCAJRT	7968.04-03_7968.05-03	SoftAlgae_2012	um3/cm2	2
Not Recorded	SonomaCo		Not Recorded	CCAJRT	7968.04-03_7968.05-03	SoftAlgae_2012	um3/cm2	3
Not Recorded	SonomaCo		Not Recorded	CCAJRT	7968.04-03_7968.05-03	SoftAlgae_2012	um3/cm2	4
Not Recorded	SonomaCo		Not Recorded	CCAJRT	7968.04-03_7968.05-03	SoftAlgae_2012	um3/cm2	5
Not Recorded	SonomaCo		Not Recorded	EWCBSC	7968.01-02_7968.05-02	Diatom_2012	count	1
Not Recorded	SonomaCo		Not Recorded	EWCBSC	7968.01-02_7968.05-02	Diatom_2012	count	2
Not Recorded	SonomaCo		Not Recorded	EWCBSC	7968.01-02_7968.05-02	Diatom_2012	count	3
Not Recorded	SonomaCo		Not Recorded	EWCBSC	7968.01-02_7968.05-02	Diatom_2012	count	4
Not Recorded	SonomaCo		Not Recorded	EWCBSC	7968.01-02_7968.05-02	Diatom_2012	count	5
Not Recorded	SonomaCo		Not Recorded	HBCASFD	7968.01-05_7968.02-05_7968.04-05_7968.05-05	Diatom_2012	count	1
Not Recorded	SonomaCo		Not Recorded	HBCASFD	7968.01-05_7968.02-05_7968.04-05_7968.05-05	Diatom_2012	count	2
Not Recorded	SonomaCo		Not Recorded	HBCASFD	7968.01-05_7968.02-05_7968.04-05_7968.05-05	Diatom_2012	count	3
Not Recorded	SonomaCo		Not Recorded	HBCASFD	7968.01-05_7968.02-05_7968.04-05_7968.05-05	Diatom_2012	count	4
Not Recorded	SonomaCo		Not Recorded	HBCASFD	7968.01-05_7968.02-05_7968.04-05_7968.05-05	Diatom_2012	count	5
Not Recorded	SonomaCo		Not Recorded	HBCASFD	7968.01-05_7968.02-05_7968.04-05_7968.05-05	SoftAlgae_2012	um3/cm2	1
Not Recorded	SonomaCo		Not Recorded	HBCASFD	7968.01-05_7968.02-05_7968.04-05_7968.05-05	SoftAlgae_2012	um3/cm2	2
Not Recorded	SonomaCo		Not Recorded	HBCASFD	7968.01-05_7968.02-05_7968.04-05_7968.05-05	SoftAlgae_2012	um3/cm2	3
Not Recorded	SonomaCo		Not Recorded	HBCASFD	7968.01-05_7968.02-05_7968.04-05_7968.05-05	SoftAlgae_2012	um3/cm2	4
Not Recorded	SonomaCo		Not Recorded	HBCASFD	7968.01-05_7968.02-05_7968.04-05_7968.05-05	SoftAlgae_2012	um3/cm2	5
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	7968.01-04_7968.04-04_7968.05-04	Diatom_2012	count	1
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	7968.01-04_7968.04-04_7968.05-04	Diatom_2012	count	2
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	7968.01-04_7968.04-04_7968.05-04	Diatom_2012	count	3
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	7968.01-04_7968.04-04_7968.05-04	Diatom_2012	count	4
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	7968.01-04_7968.04-04_7968.05-04	Diatom_2012	count	5
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	7968.01-04_7968.04-04_7968.05-04	SoftAlgae_2012	um3/cm2	1
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	7968.01-04_7968.04-04_7968.05-04	SoftAlgae_2012	um3/cm2	2
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	7968.01-04_7968.04-04_7968.05-04	SoftAlgae_2012	um3/cm2	3
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	7968.01-04_7968.04-04_7968.05-04	SoftAlgae_2012	um3/cm2	4
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	7968.01-04_7968.04-04_7968.05-04	SoftAlgae_2012	um3/cm2	5
Not Recorded	SonomaCo		Not Recorded	MWCNCR	7968.01-01_7968.02-01_7968.04-01_7968.05-01	Diatom_2012	count	1
Not Recorded	SonomaCo		Not Recorded	MWCNCR	7968.01-01_7968.02-01_7968.04-01_7968.05-01	Diatom_2012	count	2
Not Recorded	SonomaCo		Not Recorded	MWCNCR	7968.01-01_7968.02-01_7968.04-01_7968.05-01	Diatom_2012	count	3
Not Recorded	SonomaCo		Not Recorded	MWCNCR	7968.01-01_7968.02-01_7968.04-01_7968.05-01	Diatom_2012	count	4
Not Recorded	SonomaCo		Not Recorded	MWCNCR	7968.01-01_7968.02-01_7968.04-01_7968.05-01	Diatom_2012	count	5
Not Recorded	SonomaCo		Not Recorded	MWCNCR	7968.01-01_7968.02-01_7968.04-01_7968.05-01	SoftAlgae_2012	um3/cm2	1
Not Recorded	SonomaCo		Not Recorded	MWCNCR	7968.01-01_7968.02-01_7968.04-01_7968.05-01	SoftAlgae_2012	um3/cm2	2

Protocol Code	Project Code	Project Name	Sample Agency Code	Station Code	Final ID	Percent Contribution
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Planothidium frequentissimum	21.5
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Planothidium lanceolatum	8
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Hippodonta capitata	4.7
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Nitzschia palea	4.7
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Navicula gregaria	3.3
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Dictyosphaerium	67.5
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Phormidium	26.4
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Scenedesmus acutiformis	4.2
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Scenedesmus	1.7
Not Recorded	SonomaCo		Not Recorded	CCAJRT	Monoraphidium arcuatum	0.1
Not Recorded	SonomaCo		Not Recorded	EWCBSC	Amphora pediculus	39.9
Not Recorded	SonomaCo		Not Recorded	EWCBSC	Planothidium frequentissimum	8.3
Not Recorded	SonomaCo		Not Recorded	EWCBSC	Platessa bahlsii	8.2
Not Recorded	SonomaCo		Not Recorded	EWCBSC	Sellaphora nigri	6
Not Recorded	SonomaCo		Not Recorded	EWCBSC	Melosira varians	2.7
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Nitzschia fonticola	20.5
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Staurosira construens	6.3
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Amphora copulata	5.5
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Melosira varians	5.5
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Nitzschia inconspicua	4.7
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Spirogyra	100
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Oscillatoria	0
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Phormidium	0
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Scenedesmus	0
Not Recorded	SonomaCo		Not Recorded	HBCASFD	Heteroleibleinia	0
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Nitzschia supralitorea	19.5
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Rhoicosphenia stoermeri	16.6
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Rhoicosphenia abbreviata	7.5
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Nitzschia amphibia	6.5
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Nitzschia palea	3.7
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Cladophora	96.4
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Scenedesmus	2.2
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Phormidium	0.9
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Oocystis	0.3
Not Recorded	SonomaCo		Not Recorded	LDSRAGW	Leptolyngbya	0.2
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Nitzschia inconspicua	34.8
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Achnanthidium minutissimum	15.7
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Cocconeis placentula	7.4
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Cocconeis pediculus	6.8
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Rhoicosphenia abbreviata	6.1
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Cladophora glomerata	84
Not Recorded	SonomaCo		Not Recorded	MWCNCR	Spirogyra	16

Appendix F

Sonoma County Phase I MS4 Bioassessment Study
Algae Metrics

Table 11. Diatom (D18) IBI Scores and Metrics for Sonoma County Sites.					
Diatom IBI scores and metrics	Mark West Creek Site	East Windsor Creek Site	Calder Creek Site	Laguna de Santa Rosa Site	Hinebaugh Creek Site
Diatom IBI Scores					
D18 IBI (Diatom)	34	68	42	30	40
Proportion halobiontic(d)	1	9	5	7	7
Proportion low TP indicators (d)	4	1	1	1	1
Proportion N heterotrophs (d)	2	7	5	0	4
Proportion requiring >50% DO saturation (d)	9	9	4	7	7
Proportion sediment tolerant (highly motile)	1	8	6	0	1
Diatom Metrics					
Proportion A minutissimum (d)	0.157	0.013	0.013	0	0.002
Proportion halobiontic(d)	0.489	0.063	0.245	0.135	0.179
Proportion highly motile (d)	0.439	0.12	0.189	0.52	0.452
Proportion low TN indicators (d)	0.248	0.025	0.085	0.016	0.054
Proportion low TP indicators (d)	0.273	0.026	0.06	0.081	0.064
Proportion N heterotrophs (d)	0.444	0.136	0.243	0.579	0.286
Proportion oligo- & beta-mesosaprobic (d)	0.547	0.804	0.372	0.296	0.62
Proportion poly- & eutrophic (d)	0.692	0.879	0.621	0.815	0.51
Proportion requiring >50% DO saturation (d)	0.978	0.965	0.793	.880	0.877
Proportion requiring nearly 100% DO	0.193	0.041	0.129	0.106	0.118
Proportion sediment tolerant (highly motile)	0.453	0.122	0.226	0.528	0.471

Table 12. Soft bodied algae (S2) IBI algae Scores and Metrics for Sonoma County Sites.

Soft Algae (S2) IBI scores and metrics	Mark West Creek Site	East Windsor Creek Site	Calder Creek Site	Laguna de Santa Rosa Site	Hinebaugh Creek Site
Soft Algae IBI Scores					
S2 IBI (Soft bodied)	12	-	57	67	83
Proportion high Cu indicators (s, sp)	0	-	10	10	10
Proportion high DOC indicator (s, sp)	0	-	4	10	10
Proportion low TP indicators (s, sp)	0	-	0	0	0
Proportion non-reference indicators(s,sp)	0	-	10	10	10
Proportion green algae belonging to CRUS (s, b)	2	-	10	10	10
Proportion ZHR (s, m)	5	-	0	0	10
Soft Algae Metrics					
Proportion high Cu indicators (s, sp)	1	-	0	0	0
Proportion high DOC indicator (s, sp)	1	-	0.5	0	0
Proportion low TP indicators (s, sp)	0	-	0	0	0
Proportion non-reference indicators(s,sp)	1	-	0	0	0
Proportion ZHR (s, sp)	0.5	-	0	0	0.333
Proportion Chlorophyta (s, b)	0.84	-	0.186	0.723	0
Proportion high DOC indicators (s, b)	1	-	0.025	0	0
Proportion non-reference indicators (s, b)	1	-	0	0	0
Proportion green algae belonging to CRUS (s, b)	0.84	-	0	0	0
Proportion ZHR (s, b)	0.16	-	0	0	1
Proportion ZHR (s, m)	0.33	-	0	0	0.667

Table 13. Hybrid (diatom and soft aglae) IBI (H20) Algae Scores for Sonoma County Sites.

Hybrid Algae IBI Scores	Mark West Creek Site	East Windsor Creek Site	Calder Creek Site	Laguna de Santa Rosa Site	Hinebaugh Creek Site
H20 IBI (Hybrid)	20	68	44	44	50
H21 IBI (Hybrid)	30	63	41	26	57
H23 IBI (Hybrid)	30	39	44	44	62
Proportion halobiontic(d)	1	9	5	7	7
Proportion high Cu indicators (s, sp)	0	10	10	10	10
Proportion high DOC indicators (s, sp)	0	10	4	10	10
Proportion low TN indicators (d)	3	1	1	1	1
Proportion low TP indicators (s, sp)	0	0	0	0	0
Proportion N Heterotrophs (d)	2	7	5	0	4
Proportion requiring >50% DO saturation (d)	9	9	4	7	7
Proportion sediment tolerant (highly motile)	1	8	6	0	1
Proportion Chlorophyta (s, b)	2	10	8	3	10
Proportion low TP indicators (d)	4	1	1	1	1
Proportion ZHR (s, b)	2	0	0	0	10
Proportion high DOC indicators (s, sp)	0	10	4	10	10
Proportion low TP indicators (d)	4	1	1	1	1
Proportion of green algae belonging to CRUS (s, b)	2	10	10	10	10
Proportion ZHR (s, m)	5	0	0	0	10

Table Notes: D18 = IBI based on diatoms; S2 = IBI based on soft bodied algae; and H20= Hybrid IBI based on diatoms and soft bodied algae (species level identification of soft bodied algae and excluding biovolume data).