



Florida Department of Environmental Protection

**Water Quality Standards Program
Aquatic Ecology and Quality Assurance Section**

Proposed Changes to DEP Bio SOPs

**DEAR ROCfest
May 17, 2017**





Outline

- SOP 001/01- Field Activities
 - General Sampling
 - Water Sampling
 - Field Testing
- SOP 002/01- Laboratory Activities
 - Macroinvertebrate lab processing
- SOP 003/11 Selected Bioassessment Activities
 - BioRecon, Stream Condition Index, Lake Vegetation Index



Including Aquatic Mosses

- **Linear Vegetation Survey (FS 7320, section 3.2)**

Added allowance for aquatic moss to be included in LVS if mat is 15 cm or greater in length

- **Habitat Assessment (FT 3100, section 2.3)**

Added clarification to include moss as aquatic macrophytes in stream and river habitat assessments if the predominant length is greater than 15 centimeters



Photo by Peggy Morgan



Including Aquatic Mosses, cont'd

- **SCI Sampling (SCI 1100, section 2.5 & 2.6.3)**
 - Added clarification about how to include moss in SCI sweeps (include as macrophyte if the predominant length is greater than 15 cm, or include in substrate sweep if less than 15 cm)





Biological Sample Preservation

- **FD 5300** – Clarified that preservation method must be documented for biological samples
- Algal Sample Preservation
(**FS 7100**, section 3.2; **FS 7110**, section 3.5; **FS 7210**, section 3.1; **FS 7220**, section 3; **FS 7240**, section 3.5)
 - Changed the requirement for chemical preservation time from 24 hours to 36 hours from sampling time



Biological Sample Preservation

- Macroinvertebrate Sample Preservation (FS 7430, section 4.1; FS 7440, sections 2 & 4.1; FS 7450, sections 2 & 4.1; FS 7460, sections 1 & 3.1; FS 7470, sections 2, 4.2 & 4.3, LT 7010, section 1 & 3.3; SCI 1100, sections 1 & 3)
 - Added allowance for use of non-formalin based fixative that penetrates and stabilizes tissue without compromising analytical capability (e.g. NOTOXhisto®)
 - Demonstration of efficacy has been made for NOTOXhisto®. Similar demonstration would be needed for use of other substitutes.



Crayfish preserved with Notox (top) and Formalin (bottom)



Large River HA

- **Phys/Chem Characterization (FT 3001, section 2.4)**
 - Removed the instruction to use only visible portions of the 100 meter stretch as the denominator in habitat availability calculations for stream and river habitat assessment -
"If you cannot observe portions of the system (e.g., due to dark color and depth), include only the number of grids where observations were possible as the denominator in this calculation."
 - This caveat was intended to prevent underestimating habitat in natural rivers, but consequence is that we are overestimating habitat in canals (and rivers, too)
 - Use of full area of stretch for calculation will give more accurate estimate of % habitat
 - New language: *"Use the full area of the stretch for the habitat availability calculation, regardless of your ability to observe all of the habitat due to dark color or depth."*



FT 3000 Changes

- **FT 3001**, section 2.23 – Added **hydrologic modification score** to list of documentation items for phys/chem characterization
- **FT 3100**, section 2.11 – clarified instructions for **Riparian Zone Vegetation Quality** scoring –
Assess the riparian zone as 18 m on either side of the stream, with emphasis on the area immediately adjacent to the stream.



Stream HA and SCI Training

- **Forms FD 9000-34 and FD 9000-35**
 - Removed the checklists from SOPs (FA 1000 and SCI Appendices)
 - Combined the Training and Evaluation checklists;
 - Reduced the required number of training sites from 12 to 9
 - Removed requirement for boat site training (still recommended)
- **FA 5720, section 1**
 - Form FD 9000-34 was added as a required document for training, to be submitted when testing for habitat assessment



Training Checklists

- Signature page

DEP Form 9000-35 Stream Condition Index Training and Evaluation Checklist and Event Log

One copy of this form FD 9000-35, Stream Condition Index Training Checklist and Event Log, will be completed for each trainee. The trainee or the trainee's supervisor may retain the document. The document as proof of completion of these training requirements.

DEP Form FD 9000-34 Stream Habitat Assessment Training Checklist and Event Log

One copy of this form, FD 9000-34 Stream Habitat Assessment Training Checklist and Event Log, will be completed for each trainee. The trainee or the trainee's supervisor may retain the document. The trainee will be required to provide this document as proof of completion of these training requirements.

By signing here, the Trainee and Supervisor attest to the completion of ALL competencies outlined in this form.

Sign off: _____
Trainee Name (print) / Trainee signature / Signoff Date / Supervisor Signature

Signature and Initial Log (Name, initials and signatures are used to verify authenticity)

<i>Training Role</i>	<i>Name Printed</i>	<i>Initials</i>	<i>Signature</i>
Trainer	_____	/	/
Trainer	_____	/	/
Trainer	_____	/	/
Trainer	_____	/	/
Trainer	_____	/	/
Evaluator	_____	/	/



Training Checklists, cont'd

- Clarified instructions

Order of Events for Habitat Assessment Training and Evaluation

1. First, trainers and the trainee, over the course of training at nine unique sites, will follow the training items described below in the **Training and Evaluation Activities** Section, and initial once each training item has been completed. Each of the nine training events (and any additional events) should be recorded in the **Training and Evaluation Event Log**.
2. Second, in a separate evaluation event at a tenth site, the trainee will convey/and or demonstrate to the evaluator, mastery of each of the items in the **Training and Evaluation Activities Section**, and initial each item once complete competency is demonstrated. The evaluation event also should be recorded in the **Training and Evaluation Event Log**.
3. Third, trainees wishing to submit stream habitat assessment data to DEP, per SOP FT 3000, shall conduct the Habitat Assessment at benchmark proficiency sites, per FA 5720, section 2, and must pass a minimum of three sites (as defined in FA 5720, section 2.6), and may attempt a habitat assessment at up to five established benchmark streams, in order to obtain "Pass" status.

Important Notes

1. Items in the **Training and Evaluation Activities** Section do not need to be completed in any particular order, nor do all items need to be completed in a single event.
2. Each training or evaluation event should be identified in the **Training Event Log**, regardless of whether a competency was completed or not.
3. The **evaluator is NOT the DEP auditor**, but rather a qualified trainer performing a "mock audit" for the trainee to ensure that the trainee has the skills required for the audit process.
4. The same individual may be both a **trainer** and an **evaluator**.
5. The Habitat Assessment procedure is also a companion tool to Bio-Recon sampling (BRN 1100), so individuals wishing to conduct Bio-Recon sampling (BRN 1100) and submit data to DEP should also complete the training and demonstration of proficiency for the Habitat Assessment.
6. Two sites on the same waterbody may be considered unique and count toward the required nine sites, if the stretches are markedly different in character (e.g. different habitats present, degree of channelization or alteration, riparian areas).
7. Logistics and required skills associated with sampling from a boat are significantly different from sampling via wading. It is strongly recommended that trainees who plan to sample large rivers or other nonwadeable systems by boat, train by sampling from a boat, at multiple sites



Training Checklists, cont'd

- Combined Training and Evaluation checklists

1. Identify the appropriate and applicable SOPs and forms used or referenced for performing a Habitat Assessment. This includes DEP-SOP-001/01:

- FT 3000 Aquatic Habitat Characterization
- FS 7000 General Biological Community Sampling
- Form FD 9000-3 Physical/Chemical Characterization Field Sheet
- Form FD 9000-4 Stream/River Habitat Sketch Sheet
- Form FD 9000-5 Stream/River Habitat Assessment Field Sheet

Trainer / Trainee / Evaluator / Signoff Date

____/____/____/____

2. Discuss and recognize circumstances where a Habitat Assessment should be postponed.

- List the normal stream factors to consider for the determination of representative samples as continuous water flow, intact and available substrate, and accessibility for sampling.
- Determine if the stream flow has remained continuous and has not been intermittent or stagnant.
- In flood or high water conditions, wait until habitats become accessible, the water recedes, normal flow

Trainer / Trainee / Evaluator / Signoff Date

____/____/____/____



Training Checklists, cont'd

- Site list
- Reduced training sites from 12 to 9
- Clearly distinguished evaluation visit from training visits

Training and Evaluation Event Log

Trainer or evaluator should initial and date the entry, as applicable.
Write a brief description of the training or evaluation. Describe the site name, habitats mapped, etc.
(Unnumbered rows are for additional training events beyond the required nine, or additional evaluation events beyond the required one)

	Trainer Initials	Date	Training Event Description
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	Evaluator Initials	Date	Evaluation Event Description
1.			



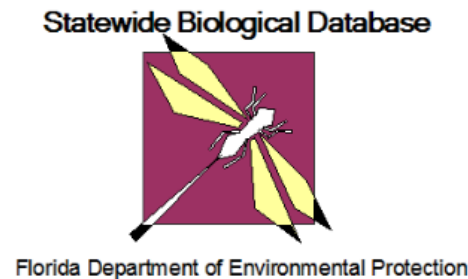
Macroinvertebrate Metric Calculations

- Macroinvertebrate metric calculations (LT 7613, section 4.4; LT 7623, section 4.6; BRN 2100, section 5; SCI 2200, section 5.5)
 - Replaced the reference to Merritt *et al.* with reference to the FDEP Statewide Biological Database for taxonomic metric information (scraper and predator identification)
 - Merritt *et al.* only includes insects, so it's not a sufficient reference to find all metric information
 - Taxonomic attributes can be downloaded from:
<http://dep.state.fl.us/labs/cgi-bin/sbio/database.asp>



Macroinvertebrate Attributes

- <http://dep.state.fl.us/labs/cgi-bin/sbio/database.asp>



Florida Taxonomic Lists

Complete listing of all macroinvertebrate, algae or macrophyte taxa listed in the Biological Database.

☐ Taxa List	Count	Updated	☐ Clingers (290)	☐ Ephemeroptera (218)
☐ Macroinvertebrates	7773	04-May-2017	☐ Sensitive (312)	☐ Long-Lived (1366)
			☐ Suspension Feeders 50 ¹ (309)	☐ Trichoptera (218)
			☐ Suspension Feeders 100 ¹ (1054)	☐ Tanytarsini (108)
			☐ Very Tolerant (310)	
☐ Algae	4211	10-Feb-2017		
☐ Macrophytes	1374	10-Feb-2017		

Create List

Reset

Note: List created in **Excel** format. If your browser asks for username and password, choose. When you save the file; save as file type Excel Workbook.

- ¹ There are two categories for the suspension feeders:
1. Suspension feeders 50 and
 2. Suspension feeders 100



Macroinvertebrate Taxonomy

- **Table LT 7900-1 and SCI 2230**
 - Revised some inaccuracies to Trichoptera and Oligochaeta
 - Clarified that all oligochaetes are to be taken to species with the exception of two families and two complexes listed.
 - Clarified that all members of Leptoceridae should be taken to species, not only the ones previously listed
 - A few minor taxonomic corrections and name updates



Stream Condition Index

- Sample Score Reporting (**SCI 2200**, section 5)
 - Removed the requirement to report the SCI score with the "A" qualifier

CODE	DEFINITION
A	Value reported is the arithmetic mean (average) of two or more determinations. This code shall be used if the reported value is the average of results for two or more discrete and separate samples. These samples shall have been processed and analyzed independently. Do not use this code if the data are the result of replicate analysis on the same sample aliquot, extract or digestate <u>(for example, for Stream Condition Index, biochemical oxygen demand or bacteriological analyses, or instrumental analyses such as Inductively Coupled Plasma).</u>



Biological Reconnaissance (BioRecon)

- **BRN 1100, section 3**
 - Added guidance for sites with five productive habitats
 - Field sorting now recommended but not required
- **BRN 1200**
 - Requires use of Form FD 9000-35 to document training
- **FD 9000-1 BioRecon Field Sheet**
 - Revised station information fields of the form to be consistent with other forms



Vegetation Sampling Caution

- **FS 7320 and LVI 1100**
 - Added instruction to rinse boat and trailer thoroughly between sites and dispose of voucher specimens properly to prevent spread of invasive exotic plants.





Plant Taxa Lists

Table LT 7600-1 and LVI Appendix

- Added Coefficient of Conservatism (C of C) scores for new plants or those missing scores; Updated Florida Exotic Pest Plant Council (FLEPPC) status as needed

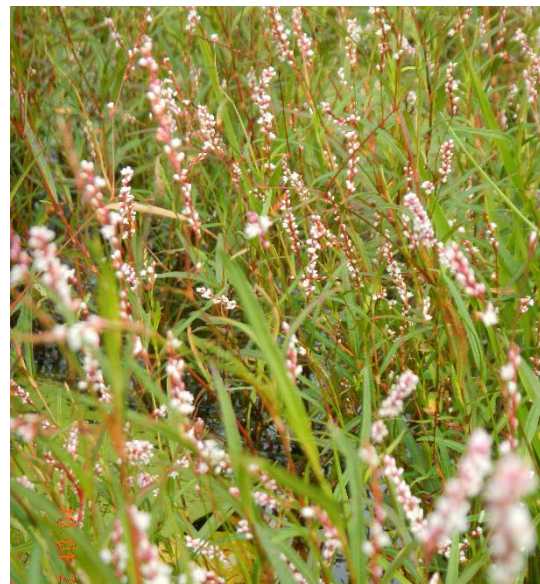
Species Name	CC Score	FLEPPC Status	Nativity
<i>Equisetum hyemale</i> var. <i>affine</i>	-	-	Native
<i>Fontinalis</i>	-	-	Native
<i>Ludwigia hexapetala</i>	0	Category 1	Exotic
<i>Myriophyllum</i> NATIVE	4.77	-	Native
<i>Rotala rotundifolia</i>	0	Category 2	Exotic
<i>Scleria lacustris</i>	0	Category 1	Exotic
<i>Scleria microcarpa</i>	0	-	Exotic
<i>Spermacoce verticillata</i>	0	Category 2	Exotic



Plant Taxa Lists, cont'd

Table LT 7600-1 and LVI Appendix

- *Ludwigia grandiflora* was edited, changed CC score to 0 and nativity status to Exotic
- All *Polygonum* species changed to genus *Persicaria*, to reflect updated taxonomy





Documentation Reminders

- Important to complete field documentation
- Required field forms
 - Form FD 9000-5 Stream/River Habitat Assessment Field Sheet
 - Form FD 9000-6 Lake Habitat Assessment Field Sheet
 - Form FD 9000-34 Stream Habitat Assessment Training Checklist and Event Log
 - Form FD 9000-35 Stream Condition Index Training Checklist and Event Log
- Remaining forms may be modified



Stream HA Sketch Sheet

DEP Form FD 9000-4 Stream/River Habitat Assessment Sketch Sheet

Location: Holiday Springs
 Date: Aug 1, 2010
 Sampler: [Signature]

100 m: Latitude _____
 Longitude _____
 0 m: Latitude _____
 Longitude _____

Substrates: Code key, draw proportionate habitat abundance. %

<u>S</u>	Snags	_____
<u>R</u>	Roots/undercut banks	_____
<u>L</u>	Leaf Packs (or mats)	_____
<u>A</u>	Aquatic Macrophytes	_____
<u>RO</u>	<u>ROCKS</u>	_____
<u>4</u>	Pools	total # observed = _____ # range expected = _____

Average width 3 m
 Average depth _____ m

Velocity measured at _____ meter mark.

WQ & chemistry taken at 100 meter mark.

Habitat Smothering:
 Note areas (on map) where sand or silt is smothering substrates, limiting habitability.

Bank Stability:
 Note areas (on map) with unstable, eroding banks.

Riparian Buffer Width:
 Note areas (on map) where natural vegetation is altered or eliminated.

Plants observed / other notes:

S - 1.3
R - 2.0
L - 1.5
A - .3
RO - .3

Left Bank

Right Bank

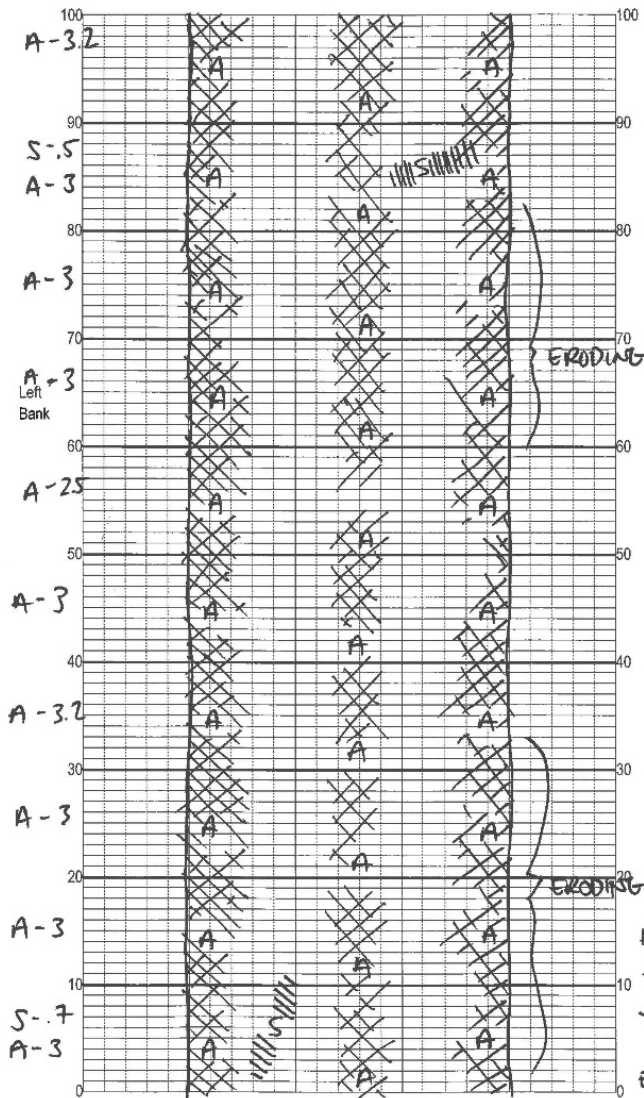
Downstream

Length of grid represents 100 m of stream (not linear meters).
 (Horizontal scale is double vertical scale, draw proportionately).



Stream HA Sketch Sheet

DEP Form FD 9000-4 Stream/River Habitat Assessment Sketch Sheet



Location: Apopka Beaverlane

Date: 7-14-16

Sampler: Leif Boman/MKE

100 m: Latitude 28.74789
Longitude -81.68870
0 m: Latitude 28.750327
Longitude -81.688506

Substrates: Code key, draw proportionate habitat abundance.		%
☒ S	Snags	<u><1</u>
☒ R	Roots/undercut banks	<u>✓</u>
☒ L	Leaf Packs (or mats)	<u>✓</u>
☒ A	Aquatic Macrophytes	<u>55</u>
☐		
☐		
☐ P	Pools	total # observed = <u>0</u> # range expected = <u>1</u>

Average width 15 m
Average depth 1 m

Velocity measured at 50 meter mark.

WQ & chemistry taken at 100 meter mark.

Habitat Smothering:
Note areas (on map) where sand or silt is smothering substrates, limiting habitability.

Bank Stability:
Note areas (on map) with unstable, eroding banks.

Riparian Buffer Width:
Note areas (on map) where natural vegetation is altered or eliminated.

Plants observed / other notes:

Heavily dominated by Hydrilla. Algae smothering throughout stretch.

Entire system affected by heavy silting.

Length of grid represents 100 m of stream (not linear meters).
(Horizontal scale is double vertical scale, draw proportionately).
NO BUFFER



Modified HA Sketch Sheet

DEP Form FD 9000-4 Stream/River Habitat Assessment Sketch Sheet

100
90
80
70
60
50
40
30
20
10
0

Left Bank

Snag Root Leaf Plant

Downstream

0

Length of grid represents 100 m of stream (not linear meters).
(Horizontal scale is double vertical scale, draw proportionately).

Location: _____

Date: _____

Sampler: _____

100 m: Latitude _____

Longitude _____

0 m: Latitude _____

Longitude _____

Substrates: Code key, draw proportionate habitat abundance. %

☐ Snags _____

☐ Roots/undercut banks _____

☐ Leaf Pads (or mats) _____

☐ Aquatic Macrophytes _____

☐ _____

☐ _____

☐ Pools total # observed = _____

range expected = _____

Average width _____ m

Average depth _____ m

Velocity measured at _____ meter mark.

WQ & chemistry taken at _____ meter mark.

Habitat Smothering:

Note areas (on map) where sand or silt is smothering substrates, limiting habitability.

Bank Stability:

Note areas (on map) with unstable, eroding banks.

Riparian Buffer Width:

Note areas (on map) where natural vegetation is altered or eliminated.

Plants observed / other notes:



Modified HA Sketch Sheet

DEP Form FD 9000-4 Stream/River Habitat Assessment Sketch Sheet

Recorder Level: _____

Location: School House

Date: 2-22-17 (1408)

Sampler: J. Williams

100 m: Latitude _____
Longitude _____

0 m: Latitude 29.392553
Longitude -81.181236

Substrates: Code key, draw proportionate habitat abundance.

☐ Snags	6.7	3.7
☐ Roots/undercut banks	3.2	1.8
☐ Leaf Packs (or mats)	3.6	2
☐ Aquatic Macrophytes	0.3	1.8
		7.8 Total
☐ Pools	total # observed = 7 # range expected = 5	

Average width _____ m
Average depth _____ m

Velocity measured at _____ meter mark.

WQ & chemistry taken at _____ meter mark.

Habitat Smothering:
Note areas (on map) where sand or silt is smothering substrates, limiting habitability.

Bank Stability:
Note areas (on map) with unstable, eroding banks.

Riparian Buffer Width:
Note areas (on map) where natural vegetation is altered or eliminated.

Plants observed / other notes:
Golden club = AM
Hog mounds
velocity @ 50
0 velocity @ 10
some flow overall, but deep / no flow
on
some
except
at
concrete

AVERAGE CANOPY COVER: _____

AVERAGE DISTANCE FROM WATER TO TOP OF THE BANK: _____

Length of grid represents 100 m of stream (not linear meters).
(Horizontal scale is double vertical scale, draw proportionately).

Fill out LVS sheet only if the total area of Aquatic Macrophytes exceeds 2 square meters in the 100m stretch.

ESP Revised 10/30/2014
Revision Date: March 1, 2014

Velocity = 0.02



Modified RPS Field Sheet

DEP FORM FD 9000-25 Rapid Periphyton Survey Field Sheet										
Site:					County:		Date:		Investigators:	
Transect (m)	Point 1=right 9=left	Algal Thickness Rank (N-8, X)	Estimated	Canopy Cover	Transect (m)	Point 1=right 9=left	Algal Thickness Rank (N-8, X)	Estimated	Canopy Cover	STORET Station Number:
0	1				60	1				Secchi depth (N to 1 mm) Estimated? (3) 6mm # points ranked 4-6 total points assessed % points ranked 4-6 (4) 20mm (Exclude X's) Check accompanying data collected at same site/date. Algal mat sample Linear Veg Survey Habitat Assessment SCI/Biorecon Water sample RQ-
	2					2				
	3					3				
	4					4				
	5					5				
	6					6				
	7					7				
	8					8				
	9					9				
10	1				70	1				Algal Thickness Rank N rough, no algae, silty, algae up to 1mm 3 >1mm - 6mm 4 >6mm - 20mm 5 >20mm - 10 cm 6 >10 cm (> 3 considered smothered) (5) 10cm (6)
	2					2				
	3					3				
	4					4				
	5					5				
	6					6				
	7					7				
	8					8				
	9					9				
20	1				80	1				
	2					2				
	3					3				
	4					4				
	5					5				
	6					6				
	7					7				
	8					8				
	9					9				
30	1				90	1				
	2					2				
	3					3				
	4					4				
	5					5				
	6					6				
	7					7				
	8					8				
	9					9				
40	1				100	1				
	2					2				
	3					3				
	4					4				
	5					5				
	6					6				
	7					7				
	8					8				
	9					9				
50	1				Record "N" and check "Estimated" for points deeper than the Secchi depth; algae are presumed absent. Check "Estimated" if thickness estimated for deep points which can be seen but not reached. Record "X" for points shallower than Secchi depth for which substrate cannot be seen or reached with the hand. No estimated rank. Record canopy cover as the number of small densiometer quadrants (out of 96) that HAVE canopy cover. Measure facing upstream at point 4, 5, or 6. Collect algal mat sample following DEP SOP FS 7240 if the percentage of total sampled points with a thickness rank of 4, 5, or 6 is >20%.					
	2									
	3									
	4									
	5									
	6									
	7									
	8									
	9									



HA Sketch Sheet Example

DEP Form FD 9000-4 Stream/River Habitat Assessment Sketch Sheet

Left Bank

Downstream

Length of grid represents 100 m of stream (not linear meters).
(Horizontal scale is double vertical scale, draw proportionately).

Location: _____

Date: _____

Sampler: _____

100 m: Latitude _____
Longitude _____

0 m: Latitude _____
Longitude _____

Substrates: Code key, draw proportionate habitat abundance. %

☐	Snags	_____
☐	Roots/undercut banks	_____
☐	Leaf Packs (or mats)	_____
☐	Aquatic Macrophytes	_____
☐	_____	_____
☐	_____	_____
☐	Pools	total # observed = _____ # range expected = _____

Average width _____ m
Average depth _____ m

Velocity measured at _____ meter mark.

WQ & chemistry taken at _____ meter mark.

Habitat Smothering:
Note areas (on map) where sand or silt is smothering substrates, limiting habitability.

Bank Stability:
Note areas (on map) with unstable, eroding banks.

Riparian Buffer Width:
Note areas (on map) where natural vegetation is altered or eliminated.

Plants observed / other notes: