

Washington State Department of Ecology

Environmental Assessment Program

Standard Operating Procedure for Establishing a Reach Length for the Extensive Riparian Status and Trends Monitoring Program

Version 1.0

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Please note that the Washington State Department of Ecology's Standard Operating Procedures (SOPs) are adapted from published methods, or developed by in-house technical experts. Their primary purpose is for internal Ecology use, although SOPs may have a wider utility. Our SOPs do not supplant official published methods. Distribution of these SOPs does not constitute an endorsement of a particular procedure or method.

Any reference to specific equipment, manufacturer, or supplies is for descriptive purposes only and does not constitute an endorsement of a particular product or service by the author or by the Department of Ecology.

Although Ecology follows the SOP in most instances, there may be instances in which Ecology uses an alternative methodology, procedure or process.

SOP Revision History

Revision date	Rev number	Summary of changes	Sections	Reviser(s)
5/22/2009	1	Numerous edits	All	Liz Werner
6/10/2009	2	Numerous edits	All	Brian Engeness
9/5/2009	3	Numerous edits	All	Martha Maggi
10/5/2009	4	Numerous edits	All	Brian Engeness
11/17/2009	5	Removed Underlining	All	Bill Kammin

Environmental Assessment Program

Standard Operating Procedure for Establishing a Reach Length for the Extensive Riparian Status and Trends Monitoring Program

1.0 Purpose and Scope

- 1.1 This document is the Environmental Assessment Program (EAP) Standard Operating Procedure (SOP) for determining reach length on fish bearing and non-fish bearing streams (Type F and Type N, respectively) at an established Extensive Riparian Status and Trends (ERST) monitoring program site.
- 1.2 ERST study sites are randomly selected from the Washington Department of Natural Resources (WDNR) statewide hydrological GIS layer to prevent bias in the data. The sites are defined by an assigned latitude and longitude. Field crews navigate to the randomly selected coordinates and verify the stream as a study site. A study reach is established if the site is determined to be viable.

2.0 Applicability

- 2.1 This SOP was adapted from the Environmental Protection Agency's Environmental Monitoring and Assessment Program (EMAP) Field Manual (Peck et al., 2003) for use within the ERST Program. This procedure allows for varying reach lengths and can be used on a wide range of stream sizes.

3.0 Definitions

- 3.1 Bank: any land surface above the bankfull edges that adjoins a body of water and contains it except during large-scale flood events; banks form above the bankfull edges as a conglomeration of vegetation, roots, rocks, and other structures.
- 3.2 Bankfull edge: the line on the bank that coincides with the water's elevation during bankfull stage.
- 3.3 Bankfull width (BFW): the distance between bankfull edges at a given point perpendicular to flow; if a channel is dry, measure distance perpendicular to perceived flow.
- 3.4 Random point: the randomly generated geographical location that intersects with the WDNR hydrological GIS layer; these points identify study site locations for the ERST project.
- 3.5 Reach: the entire length of the stream that is being surveyed for ERST; also referred to as a site.

- 3.6 Segment: a section of the stream reach whose start and end points are determined by consecutive transects; each reach for the ERST project has five segments.
- 3.7 Site: the area in which the study is being conducted; determined by the location of the randomly selected point on the stream.
- 3.8 Transect: a line which crosses perpendicular to stream flow across the bankfull channel; each reach for the ERST project has six transects.

4.0 Personnel Qualifications/Responsibilities

- 4.1 Staff must have knowledge of the contents of all SOP's relating to the Extensive Riparian Status and Trends Monitoring Program.
- 4.2 Each staff member must be adequately trained to identify bankfull edges. (See the Standard Operating Procedure for Determining Channel Dimension in Streams and Rivers for the Extensive Monitoring Program).
- 4.3 The staff member's aptitude for field tasks is more important than job class.

5.0 Equipment and Supplies

- 5.1 Global Positioning System (GPS) Unit
- 5.2 Coordinates for the Random Point
- 5.3 String box
- 5.4 5 m Stadia rod
- 5.5 1.5 m PVC measuring pole
- 5.6 Rebar
- 5.7 Mallet
- 5.8 Flagging
- 5.9 Indelible marker
- 5.10 Waterproof "Temperature Logger Installation" datasheet (Appendix A)
- 5.11 Waterproof "Extra Water Temperature Logger Installation Form at Randomly Selected Point" datasheet (Appendix B)
- 5.12 Waterproof field notebook
- 5.13 Wading Boots and Chest Waders
- 5.14 Pencils

6.0 Summary of Procedure

- 6.1 Determining Reach Length
 - 6.1.1 Navigate to a point on the stream that corresponds most closely to the latitude and longitude of the randomly selected point.

- 6.1.2 Identify the bankfull width at the random point using the procedures outlined in the Standard Operating Procedures for Determining Channel Dimensions in Streams and Rivers. Measure the bankfull width (BFW) of the cross section perpendicular to the direction of stream flow at the random point using the stadia rod or other measuring device. Record this number in meters.
- 6.1.3 Measure a distance upstream equal to the BFW measured at the random point. Take a second BFW measurement here. Again, measure upstream from this point a distance equal to the original BFW and take a third BFW measurement. Repeat this procedure downstream of the random point, taking two more BFW measurements. There will be a total of five BFW measurements.

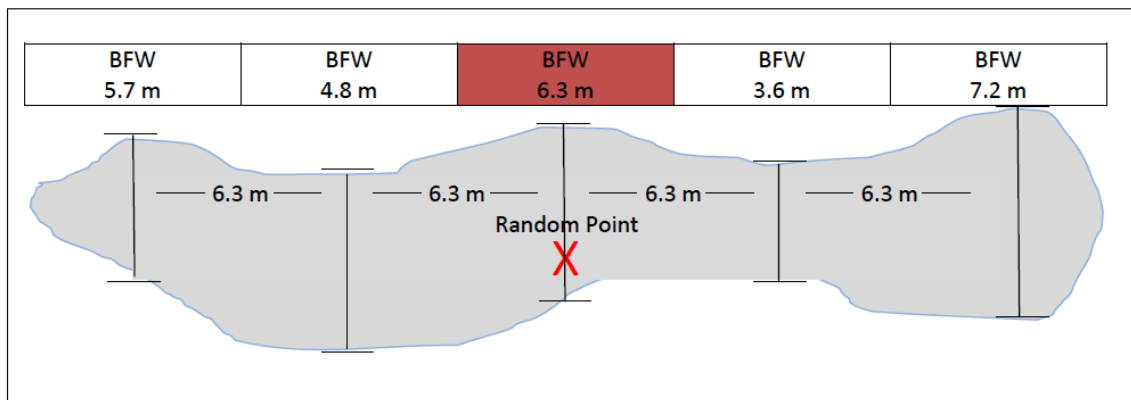


Figure 1. Example of five Bankfull Width Measurements Taken at a Distance of the Bankfull Width Measurement at the Random Point

- 6.1.4 Average the five BFW measurements. In the example, the average is 5.5 m. Multiply the average BFW by 30 to obtain the length of the reach. Round the result to a whole number and record the reach length on the “Temperature Logger Installation” datasheet (Appendix A). In the example, the calculated reach length is 166m.
- 6.1.5 Note: The minimum reach length is 150 meters and the maximum is 500 meters. It is unnecessary to take the five BFW measurements if it is obvious that the bankfull width of the stream is consistently less than five meters. In this case, the length of the reach will be 150 meters. Likewise, it is unnecessary to take the five BFW measurements if it is obvious that the bankfull width of the stream is consistently greater than 16.7 m. In this case, the length of the reach will be 500 m.
- 6.2 Transects and Segments
- 6.2.1 Divide the reach into five equal sections, each of which is designated as a segment. Record the segment length on the “Temperature Logger Installation” datasheet (Appendix A).

- 6.2.2 The five segments are separated by six transects. Transect 1 is at the randomly selected point. Mark this with flagging labeled “T1,” the site number, the date, and the initials of the field crew laying out the reach. Tie the flagging to vegetation at any point along the transect. To delineate Segment 1, measure one segment length upstream of Transect 1. This point is Transect 2. Mark it with flagging labeled “T2” and the site number. Continue measuring segments and marking transects upstream until all five segments and six transects are measured and marked.
- 6.3 Shifting a Reach
- 6.3.1 There are several circumstances in which a reach must be shifted. In all circumstances, the reach is shifted downstream and the random point must remain within the reach. If a reach is shifted, T1 will not be at the random point.
- 6.3.2 The entire study reach must have flow. If the reach extends past a point on the stream above which there is no flow, shift the reach so that the entire reach has flow.
- 6.3.3 If the reach ends on a portion of the stream that has subsurface flow, the reach must be shifted if the flow does not resurface above Transect 6. If flow does resurface above Transect 6, do not shift the reach.
- 6.3.4 If the reach extends into land not covered by Forest Practices Rules (RCW 76.09.040) (e.g. private property belonging to a non-cooperating landowner), shift the reach so that the entire reach is on land managed under forest and fish regulations.
- 6.3.5 If a portion or portions of the reach are inaccessible or unsafe, shift the reach to make the entire reach safely accessible.
- 6.3.6 If the determined point is in a naturally impounded area (e.g. a beaver pond or wetland), shift the reach so that both Transect 1 and Transect 6 are not in a naturally impounded area. Impounds may still occur within the reach.
- 6.3.7 The length the reach is shifted is equal to the distance between the random point and the beginning of the shifted reach (Transect 1). Record this measurement in the “Notes” section of the “Extra Water Temperature Logger Installation Form at Randomly Selected Point” datasheet (Appendix B).
- 6.3.8 If shifting the reach causes the study reach to extend into another stream of which the original stream is a tributary, the study reach can continue into this stream only if it is less than twice the average BFW of the original stream.
- 6.3.9 The study reach can be truncated if there are less than 150 meters suitable for the study reach. The resulting distance is still divided by five to determine the segment length and there are still six transects.
- 6.4 Review the field notes for completeness before leaving the site.

7.0 Records Management

- 7.1 Blank datasheets available to print are located in
Y:\SHARED Files\Engeness\ERST\Data Sheets
- 7.2 All completed datasheet hard copies from a specific site are filed together.
- 7.3 Datasheets are scanned and saved in folders according to year of survey and site type (Type N or Type F). These folders are located in

Y:\SHARED Files\Engeness\ERST\Type F07E
Y:\SHARED Files\Engeness\ERST\Type F08W
Y:\SHARED Files\Engeness\ERST\Type N08W
Y:\SHARED Files\Engeness\ERST\Type N09E
- 7.4 Data is entered into Access Database tables. These databases are located in
Y:\SHARED Files\Engeness\ERST\Database Stuff\ERST_DATABASES

8.0 Quality Control and Quality Assurance Section

- 8.1 Data collection
 - 8.1.1 Select 10% of the total number of sites for QA and take all field measurements twice; the second time with a different staff member collecting data. Record the QA measurements on separate data sheets. For the sake of efficiency, reassess the site immediately after the first assessment.
 - 8.1.2 Ensure data sheets are completely filled out.
- 8.2 Data entry: After transferring data to a database file, two staff members check each entry of each record. Alternatively, enter the data twice and compare the tables.

9.0 Safety

- 9.1 Safety Equipment
 - 9.1.1 Hard hat
 - 9.1.2 Field vest
 - 9.1.3 Wading Boots / Chest Waders
 - 9.1.4 Compass
 - 9.1.5 Whistle
 - 9.1.6 First aid kit
 - 9.1.7 Weather protection (i.e., raingear, sun protection, extra clothing)
- 9.2 Field team must always consist of at least two staff members.
- 9.3 Applicable Ecology Safety Policies

- 9.3.1 Accessing Private Property: Follow Ecology Executive Policy 1-11.
- 9.3.2 Field work Notification Procedures: Follow procedure outlined in EAP Safety Manual on pages 1-19 through 1-22.
- 9.3.3 Working in Rivers and Streams: Follow procedure outlined on pages 1-35 and 1-36.
- 9.4 Use a CB radio to communicate with other traffic on logging roads.

10.0 References

- 10.1 Ecology, 2006. Environmental Assessment Program Safety Manual. Olympia, WA.
- 10.2 Ehinger, W., McConnell, S., Schuett-Hames, D., Black, J. 2007. Study plan: Extensive Riparian Status and Trends monitoring program. Draft. Prepared for CMER’s Riparian Scientific Advisory Group.
- 10.3 Kaufmann, P., Robison, E. 1998. Physical Habitat Assessment. pp 77-118 In Environmental Monitoring and Assessment Program – Surface Waters: Field Operations and Methods for Measuring the Ecological Condition of Wadeable Streams. EPA/620/R-94/004F. U.S. Environmental Protection Agency, Washington D.C.
- 10.4 Moberg, J. 2006. A Field Manual for the Habitat Protocols of the Upper Columbia Monitoring Strategy,. Final Draft of 2006 Working Version. Prepared for Bonneville Power Administration’s Integrated Status and Effectiveness Monitoring Program. Wauconda, WA: Terraqua, Inc. pgs 16-18
- 10.5 Peck, D., J.M. Lazorchak, and D.J. Klemm (editors), 2003. Environmental Monitoring and Assessment Program-Surface Waters: Western Pilot Study Field Operations Manual for Wadeable Streams. U.S. Environmental Protection Agency, Western Ecology Division, Corvallis, OR.
<http://www.epa.gov/emap/html/pubs/docs/groupdocs/surfwatr/field/ewwsm01.pdf>
- 10.6 RCW 76.09.040. Forest Practice Rules – Program for the acquisition of Riparian Open Space. Washington State Legislature. Olympia, WA.
<http://apps.leg.wa.gov/RCW/default.aspx?cite=76.09.040>

11.0 Appendices

11.1 Appendix A. Temperature Logger Installation datasheet

ERST TYPE N F Westside MM/DD _____ 2009 CREW _____ Site ID# _____

Temperature Logger Installation		Reach Length (m) _____						Segment Length (m) _____				
	Serial Number	Position (m)	Install Time	H2O Dep (cm)	DAS (cm)	DFBFCE (m)	Aspect (deg)	Latitude (deg N)	Longitude (deg W)	EPE (m)	# Of Sat's	WA AS
DS AT:				X			X		-			
DS WT:									-			
US WT:									-			
Downstream Diagram:							Upstream Diagram:					
Notes:												

WD = water depth at logger. DAS = distance above streambed. EPE = estimated position error. If reach is slided fill out "Extra Form"
 Mark "W" if was present. Sat's=Satellites. DFBFCE = distance from bank-full channel edge; note RR/RL. Datum is NAD 83. Coord. System is Lat/Long

11.2 Appendix B. Extra Water Temperature Logger Installation Form at Randomly Selected Point datasheet

ERST TYPE N Westside MM/DD _____ 2009 CREW _____ Site ID# _____

Extra Water Temperature Logger Installation Form at Randomly Selected Point												
	Serial Number	Position (m)	Install Time	H2O Dep (cm)	DAS (cm)	DFBFCE (m)	Aspect (deg)	Latitude (deg N)	Longitude (deg W)	EPE (m)	# Of Sat's	WA AS
WT								-	-			
Diagram:							Note: Reaches can only be moved downstream.					
							Reason for Sliding Reach (note how far reach slid as well):					
Notes:												

WD = water depth at logger. DAS = distance above streambed. EPE = estimated position error. If reach is slided fill out "Extra Form"
 Mark "W" if was present. Sat's=Satellites. DFBFCE = distance from bank-full channel edge; note RR/RL. Datum is NAD 83. Coord. System is Lat/Long