

Washington State Department of Ecology

Environmental Assessment Program

Standard Operating Procedure for Assessing Storm Damage

Version 1.0

Author – Tanya Roberts

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Reviewer – Martha Maggi

Date –

QA Approval – Bill Kammin, Ecology Quality Assurance Officer

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Signatures on File

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*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)
5/28/2009	1	Numerous edits	All	Tanya Roberts
6/25/2009	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 Assessing Storm Damage

#### **1.0 Purpose and Scope**

- 1.1 This document is the Environmental Assessment Program (EAP) Standard Operating Procedure (SOP) for assessing recent Storm Damage observed at an established Extensive Riparian Status and Trends (ERST) monitoring program site. This is not a method for evaluating storm damage comprehensively, but rather for assessing damage from the last two years that occurred within a strictly defined area along the riparian channel of ERST study sites.
- 1.2 Storm events frequently cause major changes to the structure and conditions of the riparian zone. This method allows field staff to document and report storm damage consistently.

#### **2.0 Applicability**

- 2.1 This method applies to all ERST study sites.

#### **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 Bank blowdown: any portion of a blown down tree that is causing a disturbance on the stream bank.
- 3.3 Bank erosion: the wear on a bank's surface by the action of water; indications of bank erosion include when bank material is unstable, barren, actively moving, or shows evidence of recent movement .
- 3.4 Bankfull stage: the point at which a river or stream completely fills its channel, just before water begins to flow into the flood plain; bankfull stage is defined by the flow during moderate-sized floods that occur an average of every 1.5 years.
- 3.5 Bankfull width (BFW): the distance between bankfull edges at a given point perpendicular to flow; if a channel is dry, this distance is measured perpendicular to perceived flow.
- 3.6 Bankfull zone: the area between the channel's bankfull edges and along the streambed; bankfull zone can be seen as a two-dimensional plane at a transect or as a three-dimensional area along the stream.

- 3.7 Blowdown: trees that have been knocked down by wind or other storm-related forces.
- 3.8 Diameter at Breast Height (DBH): the diameter of a tree taken outside the bark 4.5 feet above the ground on the uphill side of the tree.
- 3.9 Landslide: the downward sliding of a mass of earth and rock.
- 3.10 Landslide disturbance: when a large amount of bank material enters the riparian zone.
- 3.11 Left bank (LB): the left-hand bank when facing downstream.
- 3.12 Harvest: logging activities.
- 3.13 Harvest disturbance: logging-related activity that has impacted the channel or riparian zone, such as ruts, trails, or skid marks; this does not include trees downed as part of routine thinning.
- 3.14 Right bank (RB): the right-hand bank when facing downstream.
- 3.15 Riparian zone: the area encompassing the channel and 30 m from the channel (perpendicular to flow) on either side.
- 3.16 Segment: a section of the stream whose start and end points are determined by consecutive transects; each site for the ERST project has five segments.
- 3.17 Storm damage: disturbance to tree stand or riparian zone resulting from severe weather events.
- 3.18 Storm damage zone: the 20m of land abutting the stream on the left and right banks (for ERST sites).
- 3.19 Transect: a line which crosses perpendicular to stream flow across the bankfull channel; each site for the ERST project has six transects.

#### **4.0 Personnel Qualifications/Responsibilities**

- 4.1 Knowledge of the contents of this SOP.
- 4.2 Data collection: Staff members must understand the notations on the datasheet (see Appendix A). Each staff member should be adequately trained to identify the bankfull zone, the riparian zone, storm damage, bank erosion, landslides, and harvest disturbance. Staff must also be able to distinguish storm damage that occurred in the past two years from storm damage that occurred earlier.
- 4.3 The staff member's aptitude for field tasks is more important than job class.

## **5.0 Equipment and Supplies**

- 5.1 Storm Damage Assessment Datasheet (Appendix A)
- 5.2 Pencil
- 5.3 Wading Boots and Chest Waders
- 5.4 Waterproof field notebook

## **6.0 Summary of Procedure**

- 6.1 This procedure assumes that the study reach has already been laid out and segments have been demarcated. To lay out the reach, see SOP for determining reach layout.
- 6.1.2 Observe the 20 m of land abutting the stream on the left and right banks for the length of each segment. Use the Storm Damage Assessment Datasheet to record observations. If no storm damage is observed within the reach, clearly write “no storm damage” at the bottom of the data sheet. If storm damage is observed in any segment along the reach, fill in the columns as directed on the data sheet, putting a line through the total trees box for the segment/s with no storm damage. Do not estimate the number of trees on either side of the segment unless there is accompanying blowdown within the 20 m zone on that side of the segment.  
  
Record observations and additional information at the bottom of the data sheet, such as anything unique, or damage observed outside of the riparian zone.
- 6.2 Bank Erosion
  - 6.2.1 Starting with the left bank of Segment 1, observe the storm damage zone along the channel for the entire length of the segment. Estimate the percent length of the segment affected by or experiencing bank erosion. Record this percent in the “Bank Erosion LB%” cell on the Storm Damage Assessment Datasheet (Appendix A).
  - 6.2.2 Repeat this bank erosion assessment for the right bank of Segment 1 and record the percent in the “Bank Erosion RB%” cell on the datasheet.
- 6.3 Blowdown
  - 6.3.1 Total Trees  
  
Observe the storm damage zone along the left bank of Segment 1. If there is recent blowdown in the storm damage zone, count the total number of trees with a DBH equal to or greater than 20 cm within the zone. This count includes both blowdown and standing trees. Record total trees in the “Blowdown LB Total Trees” cell.

- 6.3.2           Severity
- 6.3.2.1         Estimate the percent of total trees that have blown down within the past two years in the storm damage zone on the left bank. Indications that a tree was recently downed include the presence of living vegetation and a large amount of soil still clinging to the root bole. If a tree has no living vegetation of its own, is supporting other vegetation (i.e. is a nurse log), has a relatively clean (soil-free) root bole, or has a significant blanket of moss on the upturned side, it may not have been a recent fall. The severity scale on the datasheet is in increments of 25%. Circle the severity number corresponding to the determined percent in the “Blowdown LB Severity” cell.
- 6.3.3           Repeat the total trees and severity assessments for the storm damage zone of the right bank of Segment 1.
- 6.3.4           Note: If there is no blowdown on one or both sides of a segment, draw a line through the total trees cell and circle 0 for severity. Note anything particular to the segment, such as “no trees” if it is a clear cut, or “all small trees” if there are trees present, but they have a DBH of less than 20 cm DBH.
- 6.4             Bank Blowdown
- Bank blowdown is assessed for each segment within the left and right storm damage zones together. If the rootwads or boles of any of the blowdown is disturbing the stream bank within the BFW, circle Y for yes. If not, or if there is no blowdown, circle N for no.
- 6.5             Landslide Disturbance
- 6.5.1           Landslide disturbance is assessed for each segment within the left and right riparian zones. Look within the 30 m riparian zone on either side of the channel along Segment 1. If there is no evidence of landslide, such as freshly upturned soil or rocks within the riparian zone, circle N for no in the “Landslide Disturbance” cell on the datasheet. If there is any disturbance, circle R if it occurs in the riparian zone, C if it occurs within the BFW of the channel, or both R and C if it occurs in both areas. If the landslide originated from the adjacent side slope, circle SS; if it is from a tributary, circle T; if it is from both, circle both SS and T.
- 6.6             Harvest Disturbance
- 6.6.1           Harvest disturbance is assessed for each segment within the left and right storm damage zones together. If no evidence of harvest-related disturbance exists within the riparian zone of Segment 1, circle N in the “Harvest Disturbance” column on the datasheet. If there is harvest-related disturbance that is impacting the banks (within the BFW of the stream), circle B. If the disturbance impacts the ground outside the BFW of the stream, circle G. Circle both B and G if the disturbance impacts both areas.
- 6.7             Repeat procedures 6.2 through 6.6 for Segments 2 through 5.

6.8 Ensure data sheet is completely filled out.

## **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 N09W

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.

8.2 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 Compass

9.1.4 Whistle

9.1.5 First aid kit

9.1.6 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 File a field work plan before commencing field activities.
- 9.5 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 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

11.0 Appendices

11.1 Appendix A. Storm Damage Field Sheet

ERST TYPE N F Westside MM/DD \_\_\_\_\_ 2008 CREW \_\_\_\_\_ Site ID# \_\_\_\_\_

**Storm Damage Assessment Data** Segment Length = \_\_\_\_\_ m

Segment Number	Bank Erosion		Blowdown LB		Blowdown RB		Bank		Landslide			Harvest					
	LB %	RB %	Total Trees	Severity	Total Trees	Severity	Blowdown		Disturbance			Disturbance					
1				0 1 2 3 4		0 1 2 3 4	Y	N	N	R	C	/	SS	T	N	B	G
2				0 1 2 3 4		0 1 2 3 4	Y	N	N	R	C	/	SS	T	N	B	G
3				0 1 2 3 4		0 1 2 3 4	Y	N	N	R	C	/	SS	T	N	B	G
4				0 1 2 3 4		0 1 2 3 4	Y	N	N	R	C	/	SS	T	N	B	G
5				0 1 2 3 4		0 1 2 3 4	Y	N	N	R	C	/	SS	T	N	B	G

**Bank Erosion:** note the % of active bare eroded banks as it occurs across the length of the habitat segment for each bank.

**Blowdown (bd):** estimate the number of trees in the area defined 20m from the bankfull edge x segment length. Consider standing trees and recent blowdown only, not fallen, older, dead trees. Do this for left and right bank.

**Blowdown Severity:** 1=(1-25%), 2=(26-50%), 3=(51-75%), 4=(76-100%). Severity refers to the percentage of trees recently blown down in the area defined by the 20m buffer and segment length.

**Bank Blowdown:** Is rootwad or bole of blowdown trees disturbing stream bank within bankfull width?

(i.e, crushing bank causing erosion, roots ripped out of bank). Circle Y for yes and N for no.

**Landslide Disturbance:** does a landslide from adjacent sideslope or tributary enter the riparian zone "R" or the channel "C" on either side? Riparian zone is area within 30m of channel. Circle appropriate option. N = no, SS = sideslope, T = Tributary

**Harvest Disturbance:** Is there evidence of harvest related bank disturbance "B" or ground disturbance "G" in riparian zone on either side of stream? Examples of harvest disturbance are log yarding ruts, machine ruts, and skidder trails. N = no.

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