Washington State Department of Ecology

Environmental Assessment Program

Standard Operating Procedures for Identification and Delineation of Headwaters Wetlands

Version 1.0

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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 the Ecology uses an alternative methodology, procedure, or process.

SOP Revision History

Revision Date	Rev number	Summary of changes	Sections	Reviser(s)
05/07/10	V.0	Recertified	all	Kammin

1.0 Purpose and Scope

1.1 This document is the Environmental Assessment Program's (EAP) Standard Operating Procedure (SOP) for surveying wetlands intersecting the bankfull zone (BFZ) of headwaters channels (Dept. of Natural Resources stream Types 4 and 5).

1.2 Despite the seasonal flows and moderate-to-high gradients often characteristic of headwaters channels, pockets of obligate wetland vegetation and gley soils are often associated with the channel. These pockets (frequently < 10 m^2) may be relatively stable and persistant, such as on alluvial fans or near the headwall, or more ephermal, developing as silt accumulates behind CWD then declining as wood decays and water tables change. Both types, however, usually fall well below the .25 acre threshold used by timber sale planners and are rarely surveyed. These procedures are designed to locate and evaluate pockets with wetland character, treating the BFZ of headwaters channels as belt transects, then surveying for the presence of the wetland triad: soils, hydrology, and vegetation. Key details found in the Washington State Wetland Identification and Delineation Manual (ECY Pub. 96-94) are thus retained but simplified for rapid assessment of streams often < 1 m wide. The resultant data set can be used to produce polygon shapefiles showing area, orientation, and shape of each wetland realtive to its location on the channel. The survey can also be repeated to determine change in shape or position of wetlands over time, or after disturbances such as clearcutting. Using this methodology a crew of two can, on average, survey >500 m of headwaters channel in six-eight hours. The survey is conservative in that only candidate sites intersecting the bankfull zone are described. This restriction is due to expediance, however, and the survey could be expanded to the riparian zone or adjacent uplands.

2.0 Applicability

2.1 Headwaters or other low-order streams as needed to summarize metrics such as wetland counts and area. The methods rely on definition of a surface channel. If the channel is undefined or sub-surface without clear boundaries, counts of wetlands associated with the BFZ may be underestimates. If extended to channels east of the Cascases, triad definitions should be matched to the low rainfall and geology of that region.

3.0 Definitions

3.1 Bankfull: If the stream is entrenched then a scour line, bench, or top of the point bar. If the stream is not entrenched, then the top of the bank.

3.2 Bankfull Zone (BFZ): Width of the channel between bankfull marks on opposite banks. It is essentially a belt transect of variable width.

3.3 Chroma: In the Munsell soil color system, color strength relative to a neutral of the same value, ranked via color chips which are visually equidistant.

3.4 Facultative (FAC): Plant species equally likely to occur in wetlands and non-wetlands (estimated probability 34-66%).

3.5 Facultative Upland (FACU): Plant species usually occuring in non-wetlands.

3.6 Facultative Wet (FACW): Under natural conditions, plant species usually occuring in wetlands (estimated probability 67-99%).

3.7 Hue: In the Munsell soil color system, a color's relationship to red, yellow, green, blue, and purple.

3.8 Obligate Wetland (OBL): Under natural conditions, plant species occuring almost always in wetlands (estimated probability >99%).

3.9 Obligate Upland (UPL): Under natural conditions, plant species rarely associated with wetlands in the study region. Species which never are found associated with wetlands are not included on the National List.

3.10 Type 4 water: Perennial stream <2 ft diameter bankfull. A component of new waters classification Type Np.

3.11 Type 5 water: Seasonal stream < 2 ft diameter bankfull. Equivalent to new waters classification Type Ns.

3.12 Value: In the Munsell soil color system, a measure of color lightness, ranked via color chips which are visually equidistant.

3.13 Wetlands: areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil. (Forest Practices Manual, 2000)

3.14 Wetland Triad: Specific vegetation, soil, and hydrology criteria indicating presence of a wetland.

4.0 Personnel Qualifications/Responsibilities

4.1 Prior experience delineating wetlands or measuring forest variables. Ability to identify obligate and facultative wetland plants and wetland/gley soils. Familiarity with international plant ID code system. Ability to create shapefiles, populate/edit attribute tables, and assign projections. Ability to navigate on unimproved roads with maps and compass. Understanding of datums, coordinate systems and other terms related to GPS

operation. Experience working safely and efficiently on steep forested or slash-covered slopes and/or steep-walled channels. First aid training.

4.2 Typical Job Class: aptitute for field tasks is more relevant than job class.

5.0 Equipment, Reagents, and Supplies

5.1 Equipment: tiling spade, 50 m tape, Hipchain ® (stringbox), obligate and facultative wetland plant species list, Munsell charts, compass, digital camera + cleared photo card, camera battery, WAAS-enabled GPS, vegetation key, clipboard, small erasable board, erasable marker.

5.2 Reagents: None

5.3 Supplies: data sheets, pencils, paint markers, flagging, platic bags

6.0 Summary of Procedure

6.1 STEP 1: SELECT CANDIDATE SITES

6.1.1 Beginning at the confluence of the study stream and downstream water, conduct a walking survey of the channel, moving towards the headwall. Each section of channel expressing gley soils, obligate wetland plants, and standing water (the wetland triad), either individually or in combination, is a candidate site. Candidate sites should then be evaluated against robust wetland criteria (Step 2). This is because degree of wetland character varies from slight to strong and some sites will be excluded when threshold criteria is fairly stringent, as is the case with this protocal. When status of a candidate site is uncertain, survey the site as though it qualified as a wetland. Borderline sites can be excluded from the anlysis later if necessary, or separated via differences in shapefile symbology and attribute coding. The survey can be widened beyond the BFZ to adjacent uplands, or the entire buffer width, as needed, but threshold criteria should be revised. Otherwise, restrict the search to candidate sites intersecting the BFZ and qualifying for a closer look via at least one of three ways:

6.1.2 Hydrology: Seeps, side channels, and innundation beyond the main channel

6.1.3 Vegetation: Search for OBL and FACW plants. Many of these species thrive along stream banks or even in the shallows of the stream itself so weigh the presence and location of wetland vegetation against the presence and location of upland vegetation. If a wetland species occurs intermittently along a stretch of stream, but an upland species dominates to the channel edge, a wetland is probably not present. Conversely, if wetland vegetation occurs beyond the flowing channel as or more prevalently than upland vegetation in a given area, further investigation is warranted.

6.1.4 Soils: Muddy or gley soils or marshy regions. Such soils often pull at your boots but not all wetland soils are soft and not all upland soils are well drained.

6.2 STEP 2: ASSESS WETLAND TRIAD

6.2.1 At each candidate site, verify the presence of the wetland triad via the 'dichotomous' data sheet. The steps below follow the order on the data sheet. Candidate sites must meet all four criteria (the triad plus size) to qualify as a wetland. Note: Do not record data unless a) the wetland triad is satisfied, b) the site's wetland status is in dispute, or c) all degrees of wetland character are of interest.

6.2.2 Hydrology: If there is standing water (inundation) throughout the site not related to a recent precipitation event, the site has wetland hydrology. If there is little to no inundation, choose a representative point in the prospective wetland and dig a soil pit using the tiling spade. The pit should be at least 12" deep and about 6" across. To qualify as a wetland, you should strike water within the top 12" OR within a few minutes, water seeping from the walls of the pit should fill it to within 12" of the soil surface. If neither of these occurs, the site lacks the wetland hydrology component of the triad.

6.2.3 Soils: Using the same pit (or digging a new one if the site was obviously inundated) determine if the soil is predominantly sand (coarse grains). If unclear due to a mix of clay and sand-sized particles, other indicators of hydric soils (such as color) must be present:

6.2.3.1. *sandy*: check for high organic content in the surface layer, organic streaking through lower layers (will stain your fingers) and recently deposited material. If the soil in a stream-side site was deposited too recently to attain wetland character, it may still qualify as hydric via the "recently deposited" exemption. Otherwise, if a sandy soil does not have either high organic content in the surface layer or organic streaking, it lacks the soils component of the triad.

6.2.3.2. *non-sandy*: Check for the following: an organic horizon > 8" thick, sulfidic or "rotten-egg" odor, gleyed or low-chroma soil matrix color. If the color matches any GLEY 1 or GLEY 2 sheet chips (Munsell Soil Charts) the soil is hydric. If the color matches any chip in the first column (chroma 1) of subsequent sheets (10R, 2.5YR, etc) the soil qualifies. If the color matches a chip in the second column (chroma 2) from these sheets AND there are higher-chroma mottles dispersed throughout the low-chroma matrix, the soil qualifies. If the color matches the chroma 3 column or greater, or if it matches chroma 2 but without mottling, there is no color indication of wetland status. If a non-sandy soil shows no organic horizon, has no sulfidic smell and is not an appropriate color, it lacks the soils component of the triad.

6.2.4 Vegetation: Visually estimate the site boundaries based on soil changes. Within this boundary, search for OBL and FACW understory species. Compare the approximate % cover of OBL and FACW species to that covered by UPL and FACU species, taking into account trampling that might skew the estimate. Wetland plants should show dominance by covering greater area than their upland counterparts. Where heterogeneous microtopography results in upland plants growing on logs, stumps, or

mounds of soil, exclude these when estimating cover (provided they are anomalous to the overall nature of the site). In cases where there is a balance of vegetation, consider revising the wetland boundaries inward to only those portions expressing strong wetland character. If there is support for wetland presence through other components of the triad, wetland designation may be assigned in cases where wetland and upland vegetation cover are similar. If the site has predominantly upland vegetation however it lacks the vegetation component of the triad.

6.2.5 Size: Because candidate sites are often <3m diameter and BFZ width varies, use of a strict quantitative lower size limit could exclude sites which should be inventoried. Conversely, some minimum criteria is needed so the survey crew is not forced to evaluate single OBL plants or tiny pockets of muddy sediment, which are too fine scale for our allowed time and methods. We thus applied a more qualitative criterion:

6.2.5.1. If the boundaries of a candidate site extend significantly beyond the BFZ, assess the site. If the site boundaries are at or near the farthest extent of the BFZ then the site should be excluded.

6.2.6 For example, a site with a meter of wetland to either side of a 0.5 meter channel that is otherwise bounded by fairly steep banks might qualify, even though the total width is quite small (2.5m). A site where the channel spreads out over a broad, gravelly bed over 3 meters wide with a few wetland plants present and moist soil 0.5 meters to either side of the channel might not qualify despite being 4 meters wide since most of the width is occupied by the stream. Uncertainty in this judgement can be reduced by focusing on the following question: are you observing a stream channel with some wetland character, or a small wetland that is distinct in its shape and character from the rest of the stream?

6.3 STEP 3: WETLAND DELINIATION

6.3.1 After verifying the wetland triad, complete both pages of the wetland mapping data sheet and the wetland photography form. The data sheet is designed to "walk you through" each indicator; simply follow the arrows. Survey notes build a case for the presence or absence of a wetland so record enough detail to establish this.

6.3.1.1 Page 1

6.3.1.1.1 Header: DFC (distance from confluence) should be recorded to the nearest meter at the downstream boundary of the wetland. Record the gradient segment the wetland falls in; if it straddles several list all segments. Record the GPS coordinates (latitude/longitude, decimal degrees, NAD83, (see EAP SOP 013, GPS)) of the wetland center or as close to the center as satellite lock will permit. Copy the appropriate header information onto the second sheet.

6.3.1.1.2 Hydrology: Record the presence of significant recent precipitation, inundation, and soil saturation.

6.3.1.1.3 Soils: Record the soil category found (non-sandy vs. sandy) and any hydric indicators present. Also record the soil color, including both color group and Munsell nomenclature (hue/value/chroma).

6.3.1.1.4 Vegetation: Record the species name (or four-letter code, if known), its wetland indicator status (OBL, FACW, etc.), and percent cover of each indicator plant. Give preference to OBL species. If more than four species are present choose the four with the greatest cover.

6.3.1.2 Page 2

6.3.1.2.1 Record any relevant notes about your findings, especially borderline calls of one or more of the triad components. If more than one triad component is borderline, reconsider whether the site is a wetland.

6.3.1.2.2 In the box provided, draw a diagram of the wetland, including: a set of dimensions with a bearing on the longer one, where and in which direction the stream flows, the general location of the soil pit(s), location of any nearby segment markers and any other distinguishing features, such as a weir, tree, log or stump. Aim for correct general shape as this will be used to draw the wetland polygons in ArcGIS. Excessive detail is unnecessary.

6.3.1.3 Photography Form

6.3.1.3.1 Record the following photos (taken with the digital camera): i) white board with wetland id (Stand Code_Stream_WL#), ii) upstream (from lower end), iii) downstream (from upper end), iv) additional photos showing wetland character (for instance overhead views from streambanks, soil pits, gley soil colors, etc.).

6.4 STEP 4: ONWARD

6.4.1 Fill soil pits, gather all gear, and proceed upstream.

7.0 Records Management

7.1 Headwaters Wetland Evaulation Form. Attached as Appendix 1.

7.2 Headwaters Wetland Description Form. Attached as appendix 1.

7.3 Headwaters Wetland Photography Form. Attached as Appendix 2.

8.0 Quality Control and Quality Assurance Section

8.1 Data Collection: Each staff member should 1) understand the data sheet and various codes, 5) be able to accurately measure or estimate length to 30 m, 6) understand how to collect latitude and longitude via global positioning system (GPS) receiver.

8.1.1 After assessing each candidate wetland, all written data must be checked for completeness and accuracy.

8.1.2 Data is collected by two-member teams. When conflicting views on wetland character arise, team members must discuss until consensus is reached.

8.2 Data Entry: Data Entry: 1) After transfer of data to a db file or spreadsheet, each entry of each record is proofed twice (separate staff).

8.3 Shapefile Production: Before adding data to the data frame, set the projection to WA State Plane South, NAD83. Confirm data frame units are correct via the measuring tool and unit settings.

9.0 Safety

9.1 As needed be aware of slash and forest undergrowth, steep slopes, large animals and bees, fire, potholes, washboards, road dust, log trucks, target practice, and hunters.

10.0 References

10.1 Field Indicators of Hydric Soils in the United States, V. 5.01. 2003. G. W. Hurt, P.M. Whited, and R.F. Pringle (eds.). U.S.D.A. and National Resources Conservation Service in cooperation with the national Technical committee for Hydric Soils, Fort Worth, TX. ftp://ftp-fc.sc.egov.usda.gov/NSSC/Hydric_Soils

10.2 Washington Forest Practices Board manual. 2000. Various updates to present. http://www.dnr.wa.gov/forestpractices/board/manual/

10.3 Keys to Soil Taxonomy. 2006. U.S. Department of Agriculture, Natural Resources Conservation Service. 10th Ed. http://soils.usda.gov/technical/classification/tax_keys/

10.4 Munsell Soil Color Charts. 2000. GretagMacbeth. New Windsor, NY.

10.5 National List of Plant Species that Occur in Wetlands. 1993. Northwest Region 9 supplement. U.S. Fish and Wildlife Service. http://www.fws.gov/nwi/bha/list88.html

10.6 Washington State Wetlands Identification and Delineation Manual. 1997. Washington Department of Ecology Pub. 96-94. Olympia, WA.

10.7 Westerm Wetland Flora: Field office guide to plant species. No date. U.S. Department of Agriculture, Soil Conservation Service. West National Technical Center, Portland, OR. http://www.npwrc.usgs.gov/index.htm

Appendix 1: Headwaters wetland survey evaluation and description forms

Headwaters Wetland Evaluation

Crew: _____ Date: _____

Region: _____ Site: _____ Stream: _____ DFC: _____

Gradient Segment(s): _____ GPS: Lat _____ Long _____

Hydrology:

Signif. recent precip?		Site inundated?		Soil saturated?[1]	
? Yes (note)	? No ?	? Yes ? ____% [1]	? No ?	? Yes ?	? No (note)[2]

Soils:

Non-sandy soil? ? Yes ? ? No ?	Sandy soil:
? Organic horizon > 8" (Histosol or Histic epipedon)[3]	? High organic content in sfc. Layer
? Sulfidic material (odor of rotten eggs)	? Organic streaking (stains fingers)
? Gleyed or low-chroma (=1) matrix	
? Matrix chroma ? 2 with high-chroma mottles[3]	? Recently deposited--no indicators

Vegetation:

Species name	Status	% Cover			
		? <5	? 5-20	? 20-50	? >50
		? <5	? 5-20	? 20-50	? >50
		? <5	? 5-20	? 20-50	? >50
		? <5	? 5-20	? 20-50	? >50

[1] **Hydrology:** record inundation to nearest 10%; soil saturation = water in pit (or seeping from pit walls) within 12" of surface

[2] Oxidized rhizospheres = indicator of wetland hydrology; note presence, esp. if saturation is lacking/minimal

[3] **Soils:** Histosol: >50% top 32" organic; Histic epipedon: 8-16" layer ? 30% organic; matrix chroma of 1 or 2 to use "mottles"

Headwaters Wetland Description

Region: _____ Site: _____ Stream: _____ DFC: _____ Date: _____

Notes:	**Diagram/Dimensions:**

Appendix 2: Headwaters wetland survey photography form

page _____ of _____

Wetland Survey Photography

Date ________________________

Photo Set ID	Code	Stand	Stream	Description

Comments: ____

stand ID: ELFL= Ellsworth Flats; LORI=Lonely Ridge; MCCO=McCorkel; MOSH=Moonshine; ROTT=Rot; SESA=See Saw

ID format two char stand ID + WET+four digit year (EFWET_2004)