Guidance for Using the Oregon Rapid Wetland Assessment Protocol (ORWAP) in the State and Federal Permit Programs

May 2009



OREGON DEPARTMENT OF STATE LANDS

US Army Corps of Engineers®
Portland District

Table of Contents

Acknowledgements

The Department of State Lands wishes to acknowledge the efforts of the following persons in preparing this guidance document:

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1. Using This Guide

The purpose of this users guide is to provide guidance to Oregon removal-fill permit and Department of the Army permit applicants, consultants and regulatory staff for using the Oregon Rapid Wetland Assessment Protocol (ORWAP) to further state and federal wetland regulatory objectives. The guide specifically offers instruction on: 1) selecting the assessment area for regulatory application of ORWAP; 2) using the ORWAP outputs for wetland mitigation planning; and, 3) presenting assessment results in the Joint Permit Application (JPA). This document is not intended to supplant Oregon Revised Statutes, Oregon Administrative Law, Clean Water Act (33 USC 1251 et seq.), or the Rivers and Harbors Act (33 USC 403); all applicable laws and rules still apply.

User Note: In several places throughout this document, it is stated that DSL requires the submittal of specific information or the use of specific methodologies per Oregon Administrative Rules. The Corps of Engineers does not require the use of a specific assessment method; however, the use of ORWAP or the appropriate HGM reference based method is recommended. Specific mitigation-related requirements can be obtained at 33 CFR 332 .http://www.usace.army.mil/CECW/Documents/cecwo/reg/news/final_mitig_rule.pdf

This guide cannot anticipate every situation or contingency that may arise in the wetland regulatory programs; therefore, users are encouraged to consult with a Department of State Lands (DSL) resource coordinator and U.S. Army Corps of Engineers (Corps) regulatory project manager if there are any questions on the use of this guide in real-world situations. The reader is cautioned to consult agencies' regulations first, and to rely on this guidance only as a guide to understanding those regulations. This guide should be used in conjunction with:

- "Manual for the Oregon Rapid Wetland Assessment Protocol" (ORWAP Manual) and accompanying electronic files (wetland calculator spreadsheet)
- Oregon Administrative Rule (OAR) 141-085-0680, *et seq*. (Compensatory Mitigation for Wetlands and Tidal Waters)
- Oregon Revised Statute (ORS), 196.800 *et seq.*
- Section 404 of the Clean Water Act
- Section 10 of the Rivers and Harbors Act

ORWAP Outputs: A Brief Description

Fundamental to using ORWAP and this guide is an understanding of what the six basic assessment outputs mean. Table 1 summarizes those six outputs and their specific meanings as used in this guide.

Table 1
ORWAP Key Outputs and Definitions

Function:	The physical, chemical and biological processes that characterize wetland ecosystems. The ORWAP function scores rate the relative[1] effectiveness of the wetland in performing each function.
Value:	Importance or worth of a wetland function to societal needs. Includes public attitudes and the wetland's opportunity to provide a given function based on its location. ORWAP considers land uses in both the "contributing" and down slope areas from the wetland when calculating value.
Grouped Services:	These are a "roll-up" of individual functions and their associated values organized into thematic categories.[2]
Condition:	The integrity or health of a wetland based primarily on its vegetation. Often referred to as "naturalness".
Stressors:	The degree to which the wetland has recently been altered by, or exposed to risk from, human and natural factors.
Sensitivity:	The resistance and resilience of a wetland to human and natural stressors.

2. Delimiting the Assessment Area for Regulatory Uses of ORWAP

Repeatable assessment of a wetland using ORWAP depends greatly upon correctly delimiting the assessment area. The ORWAP Manual generally instructs users to include the entirety of the wetland when determining the assessment area. However, in the regulatory setting, it may not be possible or practical to do so for reasons such as: the proposed impact[3] area may only be a small part of a large wetland, the characteristics of the proposed impact site may not be representative of the whole wetland (e.g., be of substantially different condition), or large portions of the wetland may be inaccessible. Therefore, for regulatory uses of ORWAP, the following additional guidance is offered.

- **If the proposed project impact or mitigation area is the entirety of the wetland**, then the assessment area should be defined as the whole wetland using the standard assessment area delimiting guidance provided in the ORWAP Manual. Normally, only one set of scores should be calculated for the entire wetland, regardless of the number of vegetation types, HGM classes, tax lots, or other factors.

- **If the proposed project impact or mitigation area is less than the entire wetland**, then the assessment area may be defined based on the study area boundary identified in the wetland delineation report. However, if any additional wetland area, whether in or out of the study area, could be adversely affected by the proposed project (for example, any off-site wetland area that may be hydrologically altered by the proposed project), then that additional area

[1] Relative to the idealized naturally attainable condition across all wetland types for the given function.
[2] Users should note that the meaning given to the term "services" in ORWAP is different than that given in the federal mitigation rule (33 CFR 332). The latter describes "services" as the benefits that human populations receive from functions that occur in ecosystems.
[3] As used herein, the term "impact" means any reasonably expected adverse effect at the project site or mitigation site.

should be included as part of the wetland assessment. Most ORWAP indicator questions can be answered considering a limited assessment area. However, the following 18 ORWAP indicator questions (see Table 2) must still be answered considering the entire wetland using the standard assessment area delimiting guidance provided in the ORWAP Manual. These 18 indicator questions are denoted in the ORWAP office form "OF" and field form "F" with a "**W**" in column D.

Table 2
Indicators That Must be Applied Considering Entire Wetland

Field Form "F"		Office Form "OF"	
F1	Presence of specific wetland types	D21	Extent of dominant vegetation class in wetland
F2	Wetland type of conservation concern	D22	Wetland size uniqueness in watershed
F4	Tidal/non-tidal hydroconnectivity	D24	Historical hydrologic connectivity
F17	Groundwater	D36	Contributing area (CA) percent
F18	Outflow duration	D37	Unvegetated surface in the contributing area
F19	Outflow confinement	D38	Upslope storage
F20	Inlet + Outlet	D39	Transport from upslope
F27	Islands	D40	Known water quality issues in the input water
F56	Upland edge shape complexity	D41	Known water quality issues below the wetland

- **If the proposed project impact or mitigation area includes more than one wetland**, then all wetlands may be included in a single assessment area if all the following are true:
    1) they have the same predominant hydrology source;
    2) they have a similar degree of disturbance;
    3) they contain the same predominant mapped soil series; and,
    4) they have similar abutting land uses.

  There are limits to this approach for very large projects and linear projects; DSL and Corps staff should be consulted on assessment area determinations in these cases. If all of the above are not true, a separate assessment of each affected wetland will be necessary.

In all other regards, ORWAP practitioners should defer to the ORWAP Manual for instructions on how to carry out the office and field portions of the assessment. DSL and Corps staff should be consulted if there is any question regarding selection of the proper assessment area. DSL and the Corps retain final decision authority for assessment area determination for their respective permitting authorities.

3. Regulatory Uses of ORWAP

ORWAP can inform many aspects of the wetland regulatory programs. Table 3 provides a summary of which ORWAP outputs are generally the most relevant to which elements of the wetland regulatory programs. Each regulatory use is described, in turn, thereafter.

Table 3
ORWAP Outputs and Regulatory Uses

Regulatory Use		Function	Value	Condition	Stressors	Sensitivity
3.1. Alternatives analysis for avoidance & minimization		X	X	X	X	X
3.2. CWM scoping	3.2.1 Site selection	X	X	X	X	X
	3.2.2 Site design	X	X		X	
3.3. Demonstrating replacement in JPA		X	X			
3.4. Inform performance standards		X		X		
3.5. Verify replacement		X	X			

User Note: In several places in Section 3, readers are asked to pay particular attention to "relatively high" ORWAP output scores. Because of the way the ORWAP scoring models were developed, it is impossible to identify a single threshold number above which any score can be considered "relatively high". Rather, "relatively high" will vary depending on the output being considered. To help users gauge this, Appendix A summarizes the outcome of ORWAP scoring for 221 wetlands to provide the minimum, maximum, median and mean scores for the functions, values, conditions, stressors, and sensitivity outputs. Generally, the median score for a given output should be used as the threshold, i.e., scores above the median should be considered "relatively high" for that output.

3.1 The Alternatives Analysis

Assessment of wetlands on alternative sites and/or all wetlands within the proposed project site, while not mandatory in the regulatory setting, can provide valuable information for the alternatives analysis. ORWAP allows us to consider factors beyond just acreage when determining where and to what extent alternatives with lesser, or no, wetland impact should be pursued.

- **Consider function and value**. Greater emphasis should be placed on minimizing impact to wetlands that have both relatively high function and associated value scores. Such wetlands are relatively effective in performing the given function in a location that has the opportunity to do so. This can be a good indicator of the wetland's local importance.

- **Consider the condition.** Greater emphasis should be placed on minimizing impact to wetlands with a relatively high condition score (that is, wetlands of relatively very good health and/or intactness, as indicated most commonly by their dominantly-native plant communities).

- **Consider sensitivity**. Greater emphasis should be placed on avoidance and minimization opportunities for wetlands that have a relatively high sensitivity score in conjunction with relatively high function and associated value scores. These wetlands may suffer adverse

effects to functions disproportionately large to the scale of the impact. This consideration generally applies when the wetland extends beyond, and may be adversely affected by, the proposed project.

If an assessment is conducted for more than one wetland on the project site, the outputs should be presented in a table format; see Table 4 as an example.

Table 4
Example Format for JPA Reporting for Multiple Wetlands on a Project Site

Grouped Services		Wetland A	Wetland B	Wetland C	….
Hydrologic	Function				
	Value				
Water Quality Support	Function				
	Value				
Fish Support	Function				
	Value				
Aquatic Support	Function				
	Value				
Terrestrial Support	Function				
	Value				
Carbon Sequestration	Function				
Public Use & Recognition	Value				
Provisioning	Value				
Condition					
Sensitivity					
Stressors					

3.2 Scoping Compensatory Wetland Mitigation (CWM)

The following considerations should be made when the applicant may be evaluating multiple CWM sites and may also be useful to prospective bankers and in-lieu fee project proponents. The use of ORWAP (or other assessment methods) in this capacity is not required. When being used in this capacity, it may not be necessary to perform the entire ORWAP assessment. Familiarity with the ORWAP indicators for functions and values may be sufficient to allow for a quick review of various CWM sites' characteristics to determine which option provides the best opportunity to replace functions and values lost at the proposed impact site.

3.2.1 Site Selection Assistance

- **Consider functions.** Is the proposed CWM site in a landscape position appropriate to restore, create or enhance the functions sought? Refer to the indicators for the sought functions and assess whether the site and its landscape position have the potential to sustainably improve or create those characteristics.

- **Consider values.** Wetland values at the proposed impact site can be used to help guide CWM site selection. For example, consideration of on-site or near-site mitigation opportunities should be emphasized where there are highly valued wetland functions being

impacted. Also, the opportunity of a wetland to provide functions depends largely on spatial context, i.e., the wetland's landscape position. For example:

- If water storage is a target function, then replacing or maintaining this function is more likely to be successful if mitigation sites are located upgradient of (or higher in the watershed than) the impact site.
- If nitrate removal is a target function, then replacing or maintaining this function at a mitigation site with no upgradient nitrate inputs or downgradient beneficiaries will not achieve this.

- **Consider the condition.** Enhancement of a relatively high condition wetland probably doesn't make sense since the opportunity for additional ecological "lift" is probably very limited. Wetland creation or restoration contiguous to high condition wetlands may be more appropriate.

- **Consider the stressors.** The "stressors" output evaluates the degree to which a wetland has been recently altered or exposed to risk. As such, the "stressors" assessment can help determine the appropriateness of a wetland for CWM particularly when enhancement is proposed. Are there stressors that will continue to impair the functioning of this wetland as a mitigation site?

- **Consider sensitivity**. This provides some indication of the degree to which the wetland's functions will respond to the removal (or addition) of stressors.

3.2.2 Site Design Assistance

- **Consider functions.** Functions with high scores at the impact site (or reference wetland for CWM planning) should be used to inform the design at the mitigation site. Look at the indicators for high scoring functions – can those indicators'wetland characteristics be reasonably incorporated into mitigation site design? In considering this, it is important to understand the natural limitations of the site, its landscape position and the wetland classes present there. Trying to create wetlands customized to address a specific suite of functions without considering the natural limitations of the land will likely result in non-sustainable CWM.

- **Consider values.** High values at the mitigation site suggest that mitigation design elements that can create or enhance the associated functions will better improve watershed health.

- **Consider stressors.** Can mitigation design elements sustainably reduce or reverse existing stressors? By rule (OAR 141-085-0705), DSL requires that CWM plans involving wetland enhancement identify the causes of degradation and how they will be reversed. Using ORWAP data form "S," have stressors been identified that could be sustainably reversed so as to enhance the functions or condition at the CWM site? Have stressors been identified that cannot be reasonably reversed that will continue to constrain the site after treatment?

> **User Note:** For the Corps, stressors should be considered when developing the mitigation plan, in particular site selection, baseline information, and the work plan (33 CFR 332.4(c)).

3.3 Replacement Assessment in the Joint Permit Application (JPA)

This section applies specifically to applicants proposing permittee-responsible CWM, either on-site or off-site. DSL requires a functions and values assessment on wetlands or tidal waters proposed for impact (OAR 141-085-0685(3)(a)), regardless of CWM method proposed. However, assessment of the proposed CWM is not required when CWM is proposed by means of purchasing bank credits, advance mitigation credits, fee-in-lieu program credits or payment-in-lieu program credits.

> **User Note**: There is not a federal process for the establishment of advance mitigation credits. Furthermore, DSL's payment-in-lieu program is not approved by the Corps and will not satisfy Federal mitigation requirements.

3.3.1 Replacement at the Grouped Services Level

Replacement will be evaluated at the Grouped Services level, that is, in terms of aggregated functions and values. Generally, replacement of the Grouped Services identified in Table 5 must be demonstrated, as these are considered the primary groups for the regulatory program. However, there may be circumstances where an individual function is identified as being of critical importance or value within the given setting. In such cases, specific replacement of that particular function may be sought. Currently, no procedure has been adopted for adding or combining function and value scores mathematically.

Table 5
Primary Grouped Services for Replacement in the Regulatory Program

Primary Grouped Services	Aggregated Functions Within Each Grouped Service[4]
Hydrologic	water storage & delay
Water Quality Support	sediment retention & stabilization phosphorus retention nitrate removal & retention thermoregulation
Fish Support	anadromous fish habitat non-anadromous fish habitat
Aquatic Support	aquatic invertebrate habitat amphibian & reptile habitat waterbird feeding habitat waterbird nesting habitat organic matter export
Terrestrial Support	songbird, raptor & mammal habitat native plant diversity pollinator habitat

[4] In ORWAP, the function and value score for each grouped service is calculated as the maximum score among its component functions.

Carbon sequestration, public use and recognition, and provisioning will, in most cases, be considered of secondary importance for which less than full replacement may be acceptable. Exceptions to this might include wetlands on public land with documented high public use or wetlands with documented significant use for food or fiber collection. In such cases, public use and recognition or provisioning may be elevated to primary status.

3.3.2 Acres and Outputs

ORWAP scores should not be multiplied by the acreage of the proposed impact or mitigation site as a means of calculating debits or credits. Why? Because in ORWAP, a wetland's score does not measure its capacity to perform a given function on a per acre (or other per unit area) basis. Instead, ORWAP scores are estimates of the relative effectiveness in performing the function based on the area being assessed, whatever its size. For example, it is not meaningful to say that a 2-acre mitigation site with an Aquatic Support Grouped Service score of 5, if then doubled to 4 acres, would generate a score of 10. All we can say with certainty is that the mitigation will create 2 acres of wetland that are moderately effective in providing aquatic support, and if doubled, would create 4 acres of wetland that are moderately effective for aquatic support.

3.3.3 Formatting the Outputs

Assessment scores for the impact site should be compared side-by-side to the predicted scores for the CWM site. Table 6 provides an example format for this comparison. Scores may be rounded to the nearest whole number for JPA reporting purposes.

Table 6
Example Format for JPA Reporting

Grouped Services		CWM Site			Impact Site
		Existing	Predicted	Net Gain	Predicted Loss
Hydrologic	Function				
	Value				
Water Quality Support	Function				
	Value				
Fish Support	Function				
	Value				
Aquatic Support	Function				
	Value				
Terrestrial Support	Function				
	Value				
Carbon Sequestration	Function				
Public Use & Recognition	Value				
Provisioning	Value				

A. Function Scores

- If the CWM site is restoration or creation: it may be assumed that the beginning or existing wetland function scores are 0.

- If the CWM is enhancement: the pre-enhancement function score (existing state), post enhancement function score (predicted state) and net increase (or decrease) function score must all be shown.

B. Value Scores

In most cases, a change in the value score for a given Grouped Service should not be expected between the current state and the predicted state of existing wetland(s) for CWM-by-enhancement proposals. This is because value is driven primarily by conditions offsite from the CWM (i.e., in the contributing area and downslope area). Therefore, unless there is reason for the contrary, the current and predicted scores for a wetland's Grouped Service values at a CWM-by-enhancement site will usually be reported as the same number. Possible exceptions to this include: 1) where a project or CWM action eliminates or introduces an ESA-listed species at an assessment area; or 2) where a project or CWM action eliminates or introduces public accessibility.

3.3.4 Making Future Predictions

This format requires that the applicant make some predictions about the future, post-treatment state of the CWM site. Because many of the ORWAP indicator questions are of a very detailed nature, it may be difficult to accurately apply ORWAP to a conceptual, future state. Therefore, users may wish to select a reference wetland site (that is, an existing wetland of the same HGM and Cowardin class(es) that reasonably and realistically represents the envisioned future state of the proposed CWM) and run the ORWAP assessment on the reference site as a means to calculate the predicted (post-treatment) function scores. If this approach is used, the value scores of the reference site should be disregarded. Value scores should be calculated only for the actual CWM site.

3.3.5 Using the Outputs

As you compare the loss of functions and values at the impact site to the anticipated net result at the mitigation site, considering the following for each Grouped Service:

- **Are function and value replaced?** In this situation the regulatory objective is met.

- **Is function replaced but value not?** This situation suggests that the mitigation site is at least as effective in providing the Grouped Service function as the impact site, but the benefit resulting from that functioning is less valued here as compared to the impact site. If the value score of that Grouped Service is relatively high at the impact site, then failure to achieve value replacement at the mitigation site is problematic -- you may have a mitigation site selection problem. If the value score of that Grouped Service is relatively low at the impact site, then failure to achieve full replacement of this value may be acceptable depending on "other considerations" (defined below).

- **Value is replaced but function not?** This situation suggests that the mitigation has the opportunity to deliver the Grouped Service comparably to the impact site, but there will be a net loss of functional effectiveness. If the value score of that Grouped Service is relatively high at the impact site, then failure to achieve function replacement is problematic – you may have a mitigation site design problem or the site may simply not have the physical

characteristics necessary for the given function. If the value score of that Grouped Service is relatively low at the impact site, failure to fully achieve function replacement may be acceptable depending on "other considerations" (defined below).

- **Neither function nor value is replaced?** This situation will typically be considered unsatisfactory. The mitigation concept may be rejected unless "other considerations" (defined below) are compelling.

3.3.6 What Constitutes "Replacement"?

Generally, replacement will be considered "achieved" if the net function and value scores for a given Grouped Service at the CWM site are within one whole number of the Grouped Service scores at the impact site. (This is in addition to acreage replacement requirement as defined by the DSL mitigation ratios (OAR 141-085-0690(4))). Table 7 provides an example showing when function and value replacement would and would not be considered "achieved."

Table 7
"Replacement" Example Using Enhancement

Grouped Service		CWM Site			Impact Site
		Existing	Predicted	Net Gain	Predicted Loss
Hydrologic	Function score	2	8	6	7
	Value score	4			5
Water Quality Support	Function score	3	5	2	6
	Value score	2			8

Conclusion:

- Hydrologic replacement is considered "achieved". The net function gain of 6 at CWM site offsets the expected loss of 7 at impact site (within 1 point). The value of the Hydrologic service at the CWM site (4) and impact site (5) is within 1 point.

- Water Quality Support replacement is not achieved. There is a relative loss of Water Quality Support function (net gain of 2 at CWM site does not offset expected function loss of 6 at the impact site). Further, the value of that service at the CWM site (2) is relatively low as compared to the value of that service at the impact site (8).

The next section discusses the implications when the analysis indicates that the proposed CWM will not achieve function or value replacement.

3.3.7 Other Considerations if Replacement Is Not Reasonably Achievable

If replacement is not reasonably anticipated for a given Grouped Service, the proposed action may not be permittable without meeting one or more of the following "other considerations".

- Does the mitigation have other ecological benefits not adequately described by the assessment of its functions and values? For example, does it:
    - address an important, documented watershed-level need, e.g., in a watershed management plan or water quality management plan? Examples of such plans may

include the Oregon Conservation Strategy[5] or watershed assessments prepared by the US Forest Service, Bureau of Land Management, or local watershed council.
    - replace wetland type(s) and functions disproportionately lost in the region?
    - replace rare or uncommon plant communities appropriate to the region? Note that ORWAP addresses this as a component of the value score for the Plant Diversity function.

- Is the value of functions at the mitigation site likely to increase over time? For example, is downgradient urbanization reasonably anticipated that will, over time, benefit from the CWM site's functioning?

- Is the failed replacement a "secondary" function or value (i.e., public use & recognition, carbon sequestration or provisioning) for which less than full replacement can be accepted?

- Application of best professional judgment: Are there other factors not adequately considered by the assessment or masked by the summary outputs that may still make the proposed mitigation ecologically or societally appropriate?

If one or more of these other considerations apply, documentation supporting such should be included in the CWM Plan. If none of these "other considerations" apply, then the applicant may need to consider a different CWM proposal or providing additional CWM to address the failed replacement.

3.4 Inform Performance Standards

Establishing performance standards is an important part of the CWM planning and development process because it is the means by which the success of the mitigation effort will be measured. At the most basic level, performance measures are typically established for the vegetation condition (e.g., percent cover, survival rate, extent of invasive species) and hydrology (e.g., depth, duration). Such standards are, in some cases, assumed to be a proxy for the measurement of a wetland's functions, which can otherwise be time- and labor-intensive.

Using the Indicators by Functions Matrix ("Matrix" tab in the ORWAP calculator spreadsheet), the user can create a more refined set of performance standards that can directly estimate a wetland's relative effectiveness in providing selected functions and thereby provide more informed conclusions regarding CWM success or failure.

The "Indicators by Function Matrix" allows the user to quickly see which indicators were used to estimate each function. With this, the user can look for those indicators that most commonly represent the key functions sought for replacement and then incorporate those indicators, as appropriate, as performance standards for the CWM site. For example, indicator F11 (Predominant Water Fluctuation Range) is a significant consideration for eight functions. Therefore, it may be appropriate to establish a performance standard that establishes the most desirable annual change in surface water level between the driest and wettest time of year. Using this example, it must be cautioned that while a greater fluctuation benefits the water storage,

[5] Hhttp://www.dfw.state.or.us/conservationstrategy/

nitrate removal, and organic material export functions, it simultaneously degrades several other functions. Therefore, it is important to consider what the optimal standard is that balances all of the functions that the indicator influences.

Also, ORWAP indicators should not be used as the **sole** basis for performance standards, because: 1) not all of ORWAP's numeric thresholds have been scientifically validated for the function(s) they address; 2) ORWAP users estimate rather than measure most indicators, as was necessary for ORWAP to be configured as a rapid method; and, 3) many indicators were chosen because they *correlate* with a given function but this does not necessarily mean they *driv*e the function, in a causal sense.

3.5 Verify Replacement in Mitigation Site Monitoring

DSL requires (OAR 141-085-0710 (4)), by the fifth monitoring year, a comparison of actual functions and values attained at the CWM site to the predicted functions and values identified in the CWM Plan. Assuming that ORWAP was used in the original CWM plan, the permittee will run a fifth monitoring year ORWAP assessment on the CWM site and include the following in the monitoring report:

- Completed ORWAP data forms: "Coverpg," "OF," "Field F," "Field S" and "Scores."
- Side-by-side comparison of actual scores to predicted scores as originally included in the approved CWM plan.
- Discussion of the results, including identification of any shortfalls in Grouped Services replacement. Likely reasons for the shortfall and proposed actions, as appropriate, to address that shortfall should be included.

If another assessment method or an earlier version of ORWAP was used for the original CWM plan, then that same method/version must be used for the fifth year monitoring report assessment.

4. ORWAP Assessment Documentation to be Included in the JPA

When using ORWAP to meet assessment documentation requirements, the following materials must be included in the JPA.

- Within the body of the CWM plan:
    - Completed ORWAP forms: "Coverpg" and "Scores" for the impact site and the proposed CWM site.
    - Side-by-side comparison as described in Section 3.3 above
    - Documentation and discussion of "other considerations" (Section 3.3.7) used where function or value replacement for a Grouped Service is not anticipated.

- As an appendix to the JPA:
    - Completed ORWAP forms: "OF," "Field F," and "Field S" for impact site and proposed CWM site.
    - 7.5' topo map, soils map, and aerial photo illustrating the assessment area and contributing area.
    - Photographs of the assessment area, while helpful, are not mandatory.

The following materials may be included in the JPA to the extent ORWAP was used for these aspects:

- Alternatives Analysis: A summary of the ORWAP assessment results for all wetlands on the project site discussed as part of the alternatives analysis process.
- As an Appendix to the JPA: ORWAP assessment results used as part of the alternatives analysis or CWM scoping process.

Users are encouraged to retain electronic ORWAP results including other forms that are not submitted as they may provide valuable information for further refinement of the CWM concept or design through the application processing period. Users are also encouraged to upload their electronic ORWAP results to the Oregon Wetlands Explorer data repository (see ORWAP Manual for more information on uploading and uses of the repository).

5. Comparing ORWAP to HGM in the Regulatory Context

ORWAP and Oregon's hydrogeomorphic methods (HGM) have many similarities and a few important differences as it pertains to using their outputs in the regulatory context.

- Unlike ORWAP, there is no alternative assessment area delimiting guidance for regulatory uses of the HGM.
- Generally, HGM function and value outputs can be used and compared in the same way as described herein for ORWAP outputs.
- ORWAP outputs are on a 0-to-10 scale whereas HGM outputs are on a 0-to-1 scale. HGM output scores may be converted to a 0-to-10 scale by multiplying each score by 10 then rounding to the nearest whole number.
- HGM does not provide a roll-up of the 13 assessed functions and values into Grouped Services. Therefore, in the regulatory context, comparisons between impact site and mitigation site using HGM must still be done on a function-by-function and value-by-value basis.
- The Willamette HGM does not provide outputs for "Condition," Stressors" or "Sensitivity"; ORWAP and the tidal HGM do.

User Note: For the Department of State Lands, OAR 141-085-0685 requires that applicants use a HGM reference-based method when all of the following are true:

- A DSL-adopted HGM reference based method exists for the ecoregion and for the impact site's HGM class.
- The impact site wetlands and mitigation site wetlands are of the same HGM class.

For ecoregions and HGM classes without an approved HGM reference based method, or where the impact site wetlands and mitigation site wetlands are of different HGM classes, then ORWAP or the HGM judgmental method may be used at the applicant's discretion. However, DSL encourages the use of ORWAP as a more informative and refined tool for wetland assessment.

It is very important that the same assessment method be used on the impact site as the mitigation site to ensure an apples-to-apples comparison.

Appendix A

Summary of ORWAP Output Scores for 221 Wetlands in Oregon Summer-Fall 2008

Function Scores

Function:	Min.	Max.	Median	Mean
Water Storage (WS)	0	8	3	3
Sediment Retention (SR)	2	10	5	6
Phosphorus Retention (PR)	0	10	6	6
Nitrate Removal (NR)	3	10	5	6
Thermoregulation (TR)	0	8	1	2
Carbon Sequestration (CS)	0	7	2	3
Organic Matter Export (OE)	0	9	6	5
Aquatic Invertebrate Habitat (INV)	2	7	5	5
Anadromous Fish Habitat (FA)	0	7	0	1
Non-anadromous Fish Habitat (FR)	0	8	2	2
Amphibian and Reptile Habitat (AM)	0	9	6	5
Waterbird Feeding Habitat (WBF)	0	8	5	5
Waterbird Nesting Habitat (WBN)	0	7	0	2
Songbird, Raptor and Mammal Habitat (SBM)	0	10	5	5
Pollinator Habitat (POL)	2	9	6	6
Native Plant Diversity (PD)	2	9	5	5
Grouped Service Functions:				
Hydrologic	0	8	3	3
Water Quality Support	3	10	7	7
Fish Support	0	8	2	3
Aquatic Support	4	9	7	7
Terrestrial Support	3	10	6	6
Carbon Sequestration	0	7	2	3

Value Scores

Value:	Min.	Max.	Median	Mean
Water Storage (WS)	1	9	3	4
Sediment Retention (SR)	2	8	5	5
Phosphorus Retention (PR)	3	8	5	6
Nitrate Removal (NR)	2	7	5	5
Thermoregulation (TR)	0	10	2	3
Aquatic Invertebrate Habitat (INV)	3	10	9	9
Anadromous Fish Habitat (FA)	0	10	5	6
Non-anadromous Fish Habitat (FR)	1	10	7	6
Amphibian and Reptile Habitat (AM)	1	10	7	7
Waterbird Feeding Habitat (WBF)	1	10	5	6
Waterbird Nesting Habitat (WBN)	1	10	5	6
Songbird, Raptor and Mammal Habitat (SBM)	1	10	7	7
Pollinator Habitat (POL)	0	8	3	3
Native Plant Diversity (PD)	1	10	7	8
Grouped Service Values:				
Hydrologic	1	9	3	4
Water Quality Support	3	10	6	6
Fish Support	3	10	7	7
Aquatic Support	3	10	9	9
Terrestrial Support	2	10	7	8
Public Use and Recognition	0	10	4	5
Provisioning	0	4	0	1

Condition, Stressor & Sensitivity Scores

Attribute:	Min.	Max.	Median	Mean
Condition	3	9	6	6
Stressors	2	8	4	4
Sensitivity	2	9	5	5