Guidance on Wetland Mitigation in Washington State

Part 2: Guidelines for Developing Wetland Mitigation Plans and Proposals

Washington Department of Ecology
U.S. Army Corps of Engineers, Seattle District
Environmental Protection Agency, Region 10

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Refer to publication #04-06-013B.

For *Part 1 – Laws, Rules, Policies and Guidance Related to Wetland Mitigation* refer to publication #04-06-013A.

Part 2 supersedes the following publication:

Guidelines for Developing Freshwater Wetlands Mitigation Plans and Proposals, Washington State Department of Ecology Publication #94-29

A recommended citation will be provided here in the final document

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PREFACE

Over the past decade numerous studies of wetland mitigation have been conducted. The results of these studies reveal that mitigation continues to have significant shortcomings. Although mitigation may be doing better than it was 10 years ago and better than some previous studies have shown, a recent set of studies[1] suggests that the state of Washington is still experiencing a net loss of wetland acreage and functions due to authorized wetland impacts. Additionally, the study suggested that changes in the use of enhancement as a mitigation tool and increased follow-up on mitigation projects could substantially improve the success of wetland mitigation.

The Washington State Department of Ecology (Ecology), Seattle District of the US Army Corps of Engineers (Corps) and Region 10 of the Environmental Protection Agency (EPA) have jointly developed this updated guidance on wetland mitigation with the goal of improving the success of compensatory mitigation in Washington State overall and in the context of a regional landscape approach. This new guidance is intended to update and replace the previously published 1994 *Guidelines for Developing Freshwater Mitigation Plans and Proposals* (Ecology Publication #94-29).

This updated guidance is also part of a long-term effort by the Corps of Engineers (Corps) to improve compensatory mitigation stemming from the recommendations of a 2001 National Academy of Sciences (NAS) study ("Compensating For Wetland Losses Under the Clean Water Act") and consequential National Wetlands Mitigation Action Plan. The new guidance will incorporate recommendations from the NAS study (see Appendix A, National Research Council's Mitigation Guidelines) along with implementation guidance from the Corps Headquarters.

About this document

This document does not provide new requirements for wetland mitigation but rather attempts to compile all of the existing information, including currently available science, and current agency policies on mitigation. It provides an overview of the role the agencies play in regulating wetlands and some of the factors that go into the agencies' wetland permitting decisions in regards to mitigation. This document also updates and replaces the portions of the 1997 Ecology publication, *How Ecology Regulates Wetlands* (Ecology Publication #97-112), pertaining to wetland mitigation.

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[1] *Washington State Wetland Mitigation Evaluation Study Phase 1: Compliance.* Ecology Publication # 00-06-016.
Washington State Wetland Mitigation Evaluation Study Phase 2: Evaluating Success. Ecology Publication # 02-06-009.

What are the goals and objectives of this document?

The agencies developed this guidance document, Parts 1 and 2, in order to:

- Improve the quality and effectiveness of compensatory mitigation.
- Streamline the permit process and provide more predictability by providing clear and useful guidance on state and federal requirements for compensatory mitigation.
- Establish guidance on compensatory mitigation that is consistent among the federal and state wetland regulatory agencies in Washington (Corps, EPA, and Ecology).
- Provide guidance on compensatory mitigation that is based on "Best Available Science" (BAS).
- Establish guidance that should be consistent with local government mitigation requirements as they update their wetland regulations to include BAS.
- Provide guidance in a format that is user-friendly, easy to update, and web-accessible.

This guidance should assist in the development of proposals for compensatory mitigation for impacts to wetlands (primarily for single projects) authorized under Section 404 of the Clean Water Act (33 USC § 1344) and/or the State of Washington's Water Pollution Control Act (Chapter 90.48 RCW). The contents of this document range from basic principles for wetland mitigation for the general public to more detailed information and guidance for wetland professionals. The document also contains many references to additional sources of information pertinent to wetland mitigation.

What is different about this guidance compared to the previous published guidance documents?

- The 1994 *Guidelines for Freshwater Mitigation Plans and Proposals* has been expanded to provide more details on environmental considerations during the planning process. Previously it only had an annotated outline of what needed to be in a mitigation plan. Part 2 of this document has an updated version of the annotated outline.
- There has been a shift from always requiring "on-site and in-kind" mitigation and having that preference drive site design to landscape-driven site selection and design.
- The agencies encourage applicants to shift their emphasis from excessive engineering and climax communities to compensatory mitigation that makes ecological sense and is sustainable. This includes assuring there is an ample

and stable supply of water for the wetlands that invasive species are minimized, and the mitigation is appropriate for its landscape location.

- The recommended approach to compensation is doing what makes the most ecological sense and has the greatest potential to replace or improve on what is being lost in a landscape context (if a watershed plan already exists in the area of project development, considering that plan in site selection should be a priority)
- Complex planting schemes are discouraged. Instead, plantings should be kept simple with attention paid to the basic principles of plant succession.

How is this publication organized?

This publication is divided into two parts:

Part 1 describes the laws, rules, policies, and guidance pertinent to wetland mitigation and is intended to provide an overview of wetland regulatory programs in Washington, describe the basic elements of the mitigation process, particularly compensatory mitigation, and provide detailed guidance on agency mitigation policies.

Part 2 provides technical information and guidance on developing proposals for wetland mitigation and preparing project as-built plans and monitoring reports.

Both parts of this guidance, while focusing on freshwater wetlands, are relevant to mitigation involving estuarine and tidal wetlands as well as other aquatic resources, such as streams and upland buffers associated with these resources.

The guidelines are relatively general to allow for site-specific flexibility. Furthermore, due to the dynamic nature of wetland science and regulatory frameworks, the guidelines are subject to revision. Make sure you have the most recent version of this document as well as any addendums.

If viewing this document on your computer, there are numerous links to referenced sections within the document. If you are also connected to the internet there are hyperlinks to referenced documents. Just click the CTRL key and the link you wish to go to.

If you have a hard copy version of this document please see the Web Addresses for Hyperlinks and Additional Resources sections at the end of the document for a complete list of internet addresses and references for hyperlinked documents.

Words found in the **Glossary** are bold and underlined.

ACKNOWLEDGEMENTS

We'd like to thank all of those who assisted in the development of this document, including the members of the project Steering Committee. Other individuals, including wetland consultants and local government staff also provided much needed input. Thanks to their help, we expect that this document will prove valuable to both wetland professionals and those simply seeking a basic understanding of wetland mitigation.

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Note: If you are reading a paper copy of this document after January 1, 2005 please check the guidance website at http://www.ecy.wa.gov/programs/sea/wet-updatedocs.htm to make sure you have the most recent version.

Part 2

Guidelines for Developing Wetland Mitigation Proposals and Plans in Washington State

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INTRODUCTION

The U.S. Army Corps of Engineers' (Corps) and U.S. Environmental Protection Agency's (EPA) regulations (33 CFR 320-330 and 40 CFR 230) authorize the Corps to require compensatory mitigation for unavoidable impacts to **wetlands** and other jurisdictional **"waters of the U.S."** Ecology's authority rest with the state Water Pollution Control Act (90.48 RCW) and it's implementing regulations (Chapter 173-201A WAC). Based on the antidegradation policy (Chapter 173-201A-300 WAC), with adequate mitigation that effectively offsets the impacts, Ecology can permit projects that would not otherwise comply with the regulations.

The Corps and EPA have formulated policy and procedures to be used in determining the mitigation necessary to demonstrate compliance with the Clean Water Act 404 (b)(1) Guidelines (40 CFR 230). This information is set forth in the "Memorandum of Agreement (MOA) Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act Section 404 (b)(1) Guidelines," dated February 7th, 1990 (refer to Part 1, p. 9 for more details on other pertinent laws, rules, policies, and guidance related to wetland mitigation).

Regulatory agencies are aware of problems with past compensatory mitigation sites and are committed to improving the success of future compensatory mitigation projects. These guidelines, accompanied with *Part 1 – Laws, Rules, Policies and Guidance Related to Wetland Mitigation*, are intended to assist the regulated public with all aspects of the mitigation process and provide information to ensure future compensatory mitigation sites successfully replace lost functions and values associated with regulated impacts to waters of the U.S. This document provides technical considerations for developing mitigation proposals and provides a format for submitting mitigation plans to the appropriate agencies.

Purpose

The purpose of this document is to provide permit applicants, wetland consultants and landscape architects, with an approach to follow when determining mitigation for project impacts, and guidance on preparing compensatory mitigation and monitoring plans for unavoidable impacts to the aquatic environment. It updates and replaces the 1994 *Guidelines for Developing Freshwater Mitigation Plans and Proposals* (Ecology Publication #94-29). The information has been prepared using experience of resource agency staff, field experience and input from applicants and consultants during the *Washington State Wetland Mitigation Evaluation Study*, and currently available scientific information collected as part of Ecology's Best Available Science for Freshwater Wetlands project.

It provides technical guidance for improving the likelihood that the compensatory mitigation project will be successful, and identifies the information usually needed by agencies to review mitigation and monitoring plans. This guidance is not intended to provide all the details for collecting data, analyzing it, and writing wetland mitigation plans, since many of the information needs are site and project specific. It does, however, list the type of information needed and describes methods that may be used to collect the necessary data for **freshwater wetlands**. Mitigation projects involving estuaries or streams will usually require data collected using other methods that are not described in this guidance. However, the process for developing mitigation for other aquatic resources is similar.

It is recommended that mitigation documents use a standard format for reporting crucial information. These mitigation and monitoring guidelines outline the acceptable format for their organization and provide checklists[2] in the appendices of information needed by agencies to evaluate a project. If the pertinent information described here is included in the mitigation plans, review of the project can be expedited.

NOTE: This document does not address the process for submitting **mitigation bank** plans and proposals or the use / purchase of credits from a bank for compensation. Please refer to the Draft state Wetland Banking Rule[3] (WAC 173-700), which outlines the review and approval process and provides technical guidance on designing and constructing a wetland mitigation bank. Prospective bank sponsors should contact the Corps Seattle District (see Appendix B, Agency Contacts) to initiate the mitigation bank review process.

Organization

The first section, *Considerations for Developing a Compensatory Mitigation Proposal*, provides a discussion and technical guidance on the various stages involved in the mitigation planning process. The second section, *Developing a Mitigation Plan*, provides an overview of wetland compensatory mitigation and monitoring plans, including stages of development, report expectations, and level of expertise needed. Finally, the third section details the information needed by regulatory agencies during each stage of the

[2] For standardization purposes, as part of the National Wetlands Mitigation Action Plan, each Corps District was asked to incorporate a Mitigation Checklist in the new/revised guidance. This standardized checklist has been attached as Appendix A to meet this requirement. However, please be aware that this document refers you to a different Mitigation Checklist (Appendix H) that has been adapted to more appropriately reflect the needs of the Corps, EPA, and Ecology in Washington State.

[3] Ecology published its draft rule for a certification program for wetland mitigation banks pursuant to the Wetlands Mitigation Banking Act (Ch. 90.84 RCW), which is consistent with the 1995 Federal Guidance for the Establishment, Use and Operation of Mitigation Banks (60 FR 58605-58614), November 28, 1995. Although the rule was withdrawn prior to its adoption, Ecology uses it as its primary guidance for the review of wetland bank proposals. Please check the Ecology Wetland Mitigation Banking Home Page for the current status.

plan development and provides an annotated outline for mitigation and monitoring plans. In addition, checklists and plan templates are provided in the appendices.

EXAMPLE: The discussion of "Site Selection" in the first section provides technical guidance on how to select a site, whereas the "Annotated Outline" in the third section indicates that the rationale for selecting the mitigation site should be included in the plan.

CONSIDERATIONS FOR DEVELOPING A COMPENSATORY MITIGATION PROPOSAL

The key stages in the development of a compensatory mitigation project are:

- Impact Assessment (including demonstration that mitigation sequencing and evaluation of practicable alternatives has occurred)
- Site Selection
- Site Planning and Design
- Site Construction
- Post-Construction Maintenance and Monitoring

The following sections provide important considerations when preparing draft and final compensatory mitigation and monitoring proposals and plans. During the regulatory review process, agencies will evaluate whether these considerations have been sufficiently incorporated into the compensatory mitigation proposal.

Impact Assessment

Introduction

Compensatory mitigation is part of a sequence of activities that should not be considered until impact avoidance and then minimization of impacts have been accomplished. Whatever cannot be avoided or minimized must then be compensated (refer to Part 1, p. 37, What is Mitigation Sequencing?). Also, the Clean Water Act Section 404(b)(1) Guidelines ((Guidelines) refer to Part 1, p. 19 – Federal Policies and Guidance) requires that no discharge of dredged or fill material to **waters of the United States** be permitted unless appropriate and practicable steps have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem. If the applicant has complied with the Guidelines by first evaluating alternatives that would avoid impacts, and then taken appropriate and practicable steps to minimize adverse impacts to the maximum extent practicable, then compensatory mitigation is required for the unavoidable impacts.

Therefore, an important aspect of any permit application is the assessment of the project site before impacts occur. An adequate assessment of the current functions and values before the construction of the project is important for determining the relative importance of the aquatic resources to the site and to the region or watershed. Assessment results can provide a basis for modifying pre-construction plans to avoid and/or minimize impacts to these resources. This assessment should be completed before the proposed project is designed or the proposed compensatory mitigation site is selected.

Once unavoidable impacts are determined, the wetland type(s), area(s) and functions that will be directly and indirectly impacted must be determined (refer to Part 1, p. 39 - Types

of Impacts). The mitigation should normally strive to replace both the wetland area lost and the functions lost by both direct and indirect impacts.

The information gathered during the assessment will dictate the requirements for compensation and help in selecting and designing a mitigation site that makes ecological sense. Possible compensation sites can be evaluated to determine the best fit. A wetland assessment usually includes two major activities:

- Conducting a wetland delineation to determine the size, and
- Performing an assessment to determine the type(s) of wetland(s) and the functions provided by the wetland(s)

NOTE: The lead federal agency will coordinate with the applicant to ensure compliance with the Endangered Species Act when assessing impacts for project development proposals. Refer to Part 1, p. 9 – Federal Laws and Rules.

Wetland Delineation

Typically, a separate wetland delineation report is submitted prior to and in addition to a mitigation plan. Conducting a wetland delineation simply determines the existence (location) and physical limits (size) of a wetland (s) for the purposes of federal, state, and local regulations. A wetland delineation is normally just one element of a jurisdictional determination. Subject to Corps verification, the jurisdictional determination identifies which water bodies, including wetlands, within the project boundaries meet the definition of **waters of the United States** (refer to Part 1, p. 5 –Do You Have a Wetland Present?).

Wetland Delineations must be done in accordance with the currently acceptable methodology. At present, this is the Corps 1987 Wetlands Delineation Manual and all applicable guidance. Ecology has adopted the 1997 Washington State Wetland Identification and Delineation Manual (Chapter 173.22.080 WAC), which includes clarification guidance on the 1987 manual published by the Corps as well as regional clarification guidance issued by the Seattle Corps and Region 10 office of the EPA. The state manual is required to be used by all state agencies in the application of any state laws and regulations as well as by any city or county in the implementation of any regulations under the Growth Management Act (RCW 36.70A.175).

Important Note: The Corps of Engineers, not applicants or their consultants, has authority to determine whether or not a wetland is a water of the U.S. and thus regulated under the federal Clean Water Act (CWA). If the Corps determines that a wetland is not subject to regulation under the CWA, applicants should be aware that these wetlands are still subject to regulation by Ecology under the State's Water Pollution Control Act (Chapter 90.48 RCW) as well as certain local jurisdictions.

A wetland delineation should result in three things: 1) a wetland boundary clearly marked in the field, 2) a map that accurately represents the boundary and location of data collection points, and 3) a report that provides an explanation for how the boundary was determined. The report should explain both how and when the delineation was conducted and include the data sheets used to delineate the wetland areas, a map (topographic and aerial site maps are very helpful) with data plots and the boundaries of the delineated wetland areas clearly identified, and photographs. Refer to Appendix C for a checklist of what information should be included in a wetland delineation report as well as a sample outline for a report.

Types of Wetlands and Functions Provided

An initial determination of the type(s) of wetland(s) and the functions provided can often be done in combination with a wetland delineation. During an assessment the wetland(s) should be characterized based on:

- The U.S. Fish and Wildlife Service (Cowardin) classification,
- **Hydrogeomorphic (HGM)** classification, and
- Washington State Wetland Rating System.

The functions provided by the wetland impact area must, at a minimum, be described by best professional judgment (BPJ) or the 2004 revised Washington State Wetland Rating System. However, depending on the size and quality of the impact area, a detailed function assessment may be required such as the Washington State Function Assessment Method (WAFAM). Refer to Part 1, p. 58 - Which Function Assessment Method Should I Use?

A similar assessment of functions should also be completed at the proposed compensation site, particularly if enhancement or rehabilitation of existing wetland areas is proposed as compensation. The functions can be compared and goals and objectives developed for the compensation project to ensure that the mitigation will replace the functions lost at the impact site. This information will provide a baseline from which an increase (ecological lift) in functions can be measured or determined.

Site Selection

Introduction

Once unavoidable wetland impacts are identified, in terms of acreage and functions lost, the applicant must find (propose) a suitable location for wetland compensation and determine the type of mitigation that is appropriate. There are often many options for providing compensatory mitigation. In the past most compensatory mitigation sites were located on or very near the impact site. The 2001 report[4] on wetland mitigation by the National Academy of Science recommends that mitigation be considered in a

[4] "Compensating for Wetland Losses Under the Clean Water Act"

watershed context, and that locating mitigation sites on or near the impact site may not necessarily be desirable.

To establish effective wetland compensation, the selection of a site is as important as the design of the site. For example, a good site may not provide effective compensation if the design is inappropriate. Likewise, a good design will not achieve its fullest potential in a poor location. Site selection and site design are tied together. Generally, the physical characteristics of the sites considered determine which type (creation, restoration, enhancement, or preservation) of compensation and design is appropriate.

In the past, there has been a regulatory preference for on-site compensation and many applicants have relied on project economics to choose compensatory mitigation sites, without considering the underlying physical characteristics. Applicants generally approach site selection and site design in one of two ways. In one case, the applicant or local government already owns a property that is designated for use as wetland compensation. The applicant's challenge is then to come up with a design for the site that is feasible in terms of goals and functions to be provided, and appropriate considering the landscape position of the site. In this case the site dictates the design.

In the other case the design (e.g., goals and functions to be provided) is developed based on what was lost or what is of critical importance in the basin. A site must then be found that can effectively accommodate the design in a sustainable manner. In this case the design dictates the site. Go to p. 15 for more information on Site Planning and Design.

Selecting an appropriate site helps insure the compensation will provide desired functions and be ecologically effective over the long-term. A site should be selected that can provide enough of an increase in functions to compensate for the functions lost to wetland impacts. However, a site should also be able to sustain itself as a wetland over the long term. This means avoiding **hydroperiods** and sources of water that are overly engineered, such as water control structures that will require long term maintenance. Likewise, the existing and proposed future land uses and landscape position of the site also affect its sustainability and, therefore, its ecological effectiveness.

Ultimately the most appropriate site is the one that makes the most ecological sense. In addition to considering on-site and other off-site project-specific compensation options, the applicant should investigate and consider other programmatic compensation alternatives, including Corps-approved mitigation banks and in-lieu fee programs serving the area where the proposed impacts would occur (refer to Part 1, p. 94 – Ways to Compensate for Wetland Losses). For example, on-site compensatory mitigation could be impracticable if the created, restored, enhanced, and/or preserved habitat would be isolated, of small acreage, or experience substantial changes in hydrologic condition over the long term. With many Corps-approved **mitigation banks** and in-lieu fee mitigation programs, the responsible entity has analyzed the type(s) of habitat and location(s) benefiting the region or watershed(s) within the bank or program's service area. In these cases, the purchase of mitigation credits in existing banks or the payment of in-lieu fees could provide a more practicable option, which could also

enhance the regional or watershed's aquatic resources. However, the Corps will make the final decision whether to accept purchase of credits from a Corps-approved mitigation bank or in-lieu fee mitigation program, after examining all relevant considerations, including landscape-level issues such as wildlife corridors and water quality. These options should be discussed with the agencies during the conceptual planning stage.

Wetlands are dynamic systems whose existence depends on a variety of physical, chemical, and biological factors in the landscape, such that many locations will not support a wetland. This section discusses the factors that should be considered when selecting an appropriate site for compensation. When an applicant already owns a property, regulatory agencies will use these same factors to determine if the property will be able to provide effective wetland compensation.

Important factors to be considered in selecting an appropriate mitigation site include:

- Source of water and potential water regime for the proposed compensation site
- Soils on the site
- Landscape position of the site and the (proposed) hydrogeomorphic (HGM) subclass
- Land uses of the site and adjacent areas
  - Historical
  - Current and future
- Connectivity and Corridors to protected wildlife habitats or existing wetlands
- Buffers
- Invasive species present and their extent on the site and seed sources nearby or upstream
- Seed bank of natives existing on the site
- Long-term maintenance requirements for the site
- Site Ownership
- Other Practical Considerations

Each if these factors are in more detail in the following subsections.

Source of Water

Water is the most critical component of wetland establishment, and perhaps the most important influence in success. Failure to establish an adequate and self-sustaining source of water is a major cause of failure for compensation projects. A site proposed for compensation must demonstrate that it has a natural source of water (e.g. over bank flooding, precipitation, ground water) sufficient to support the target ecosystem and functions. The source of water must also be sustainable and relatively predictable. Artificial structures and mechanisms should be used only temporarily. Sites primarily supported by long-term irrigation are not self-sustaining, and therefore would not support the long-term functioning of the site. Regulatory agencies strongly discourage the use of long-term (i.e. longer than three years) irrigation as the main water source. Short-term irrigation sufficient to establish plant roots is not discouraged and is, in some cases, essential.

NOTE: Droughts are not predictable and are always possible; however, a site with an adequate source of water should be a wetland by the end of the monitoring period despite a year or two of drought.

Regulatory agencies will often require some form of hydrologic monitoring to document that the proposed source of water and predicted **hydroperiod** are attainable and suitable for the site (see p. 16 - Hydrologic Considerations, for more information about hydroperiods). Analysis of existing conditions should include examination of the groundwater availability; frequency, depth, duration, and timing of flooding; and an estimate of the water budget. Modification of hydrologic characteristics should be kept to a minimum with the goal to have the site be self-sustaining with little or no long term maintenance required. A site constructed in an area that was historically upland may have more difficulty establishing a self-sustaining source of water than a site that was historically wetland or is adjacent to existing stream channels, lakes, or other natural water features. Restoring a source of water may include plugging ditches or removing drain tiles, a berm, dike, or flood gate. (Refer to Part 1, p. 43 for information on what types of wetland compensation activities are preferred and p. 69 for guidance on replacement ratios.)

Soils

Soil is another critical component in successful wetland establishment. Soil affects a site's ability to retain water, support plant communities, and provide abiotic functions (e.g., nutrient transformation).

In general it is important to know what kind of soils are on a site proposed as wetland compensation. Examination of existing reference sites may provide important information on the development of suitable soils for future sites (see p. 32, Reference Sites). The type of soil currently present will affect how the site is designed and what functions the site will be able to provide. For example, if a site contains deep sandy soil,

it may drain so rapid that establishment of a self-sustaining wetland hydroperiod (i.e., without engineered solutions requiring long-term maintenance) would be difficult or impossible. Refer to the respective county's soil survey or contact the appropriate Washington Natural Resources Conservation Service (NRCS) office for site specific soil information.

Soils at a potential site should be investigated to determine the following:

a. Does the soil have hydric indicators? The presence of hydric soils on an upland site is an indication of a past wetland hydroperiod. It also provides a clue that the site may be a good candidate for re-establishment.
b. Does the soil have organic content? Organic material is often necessary to foster the development of hydric soil conditions. If there is no organic material it may be necessary to augment the soil.
c. Is there any soil contamination? Contaminated soils are not suitable for wetland compensation. Contamination may result from heavy metals (such as arsenic), toxic organics (such as creosote), or a combination. However, a site down stream from a contaminated site, such as a dairy, could provide important water quality improvement functions. Check the Washington Facility/Site Atlas for locations of state and federal clean-up sites.
d. Is the soil compacted? Soils that are very compacted could limit the infiltration and sub-surface flow of water, thereby resulting in surface water run-off. Compacted soils may also hinder root growth in plants, thereby deterring or delaying plant establishment. However, compacted soils can be amended.

Often, the most costly portion of a compensatory project is grading/earthwork. If the soils at a potential site will require extensive modification, it may be worthwhile to look for another site.

Refer to the discussion of soils in the section on Site Planning and Design, p. 18.

Landscape Position

When selecting a site it is important to consider its position in the landscape. As mentioned in Part 1, wetlands can be classified according to their **HGM** class (i.e. their position in the landscape and their source of water). Wetlands form where the shape of the land allows water to pool at or near the surface of the ground (depressional wetlands), at the intersection of different soil layers where water flows laterally between layers due to differences in permeability, where there are breaks in the topography and subsurface flows are exposed (slope wetlands), and where surface waters regularly flow due to increased precipitation causing flooding (riverine wetlands).

Regulatory agencies may or may not require an applicant to provide compensatory mitigation of the same HGM class as the permitted impacts. Replacing the HGM class means that the wetlands are more likely to be functionally equivalent to those lost. However, this assumes that the compensatory wetland is not an atypical HGM class. For example, a depressional wetland is lost. And the applicant proposes to excavate a

depression in a slope or a floodplain, both of which are atypical hydrogeomorphic locations for a depression (see p. 16, Hydrologic Considerations for a discussion of hydroperiod).

Applicants should ensure that a site will have an HGM class appropriate for its position in the landscape regardless of whether it is the same HGM class as the wetland impacts. In some areas options for on-site or in-basin compensation might not exist. Goals for the larger watershed might also be considered in determining the location and type of mitigation. For example, if the watershed has lost most of its former salt marsh area, an applicant may choose to compensate for impacts to a common palustrine shrub-scrub wetland with salt marsh habitat.

In addition, applicants should consider the position of a potential site in relation to other wetlands, habitats, and processes occurring in the landscape. For example, are there wetlands or other habitat areas in proximity to the potential site? If not, the potential site may not be able to provide any significant habitat for wildlife. Refer to the following sections on Land Uses and Habitat Connectivity.

Land Use

Historic, current, and future land uses affect any potential compensatory wetland site. For example, previous agricultural activities may have altered the flow of water, which could influence the water source for a compensatory wetland. This could be either an obstacle causing an applicant to select another site, or a boon allowing beneficial opportunities for restoration or rehabilitation of hydrologic processes.

Furthermore, a potential site will not only be affected by land uses on-site, but also the land uses of adjacent properties. Elements of the landscape are functionally connected, and land uses on one site often influence **environmental processes** in surrounding locations. A compensatory wetland meant to provide amphibian habitat may have difficulty meeting that goal if the site is soon surrounded by high density residential apartments and parking lots, which could alter the hydroperiod and affect water quality by generating stormwater inputs.

Historic land use

It is important to obtain as much information as possible on past history of potential sites, because current and historical land use can affect the quality of a compensatory project. Some land uses have long term consequences that may inhibit project success. For example, land previously used as a chemical dump or landfill will likely be contaminated. Even with expensive cleanup, this may continue to impair its ability to provide habitat for wildlife. Sites previously seeded with invasive pasture grasses may retain a seed bed of these species which makes invasive control difficult or impossible. Similarly, knowing that land contains old buried drain tiles that must be removed or disabled may be key to restoring hydrologic processes. Understanding past land uses will allow you to identify

both constraints and opportunities. It is also important to coordinate with local tribal governments, including the **Tribal Historic Preservation Office,** and the **State Historic Preservation Office** to determine if there are any cultural resources present.

Current and Future Land Use

During site selection current uses of adjacent land should be considered because they can significantly affect site functions and overall sustainability. For example, sites adjacent to airports may have restrictions to prevent the establishment of bird habitat. In addition, airports produce continual noise and light disturbance.

Likewise, sites adjacent to residential or high density development will be subject to a variety of direct and indirect impacts. Excessive human and pet intrusion as well as indirect impacts of noise, light, lawn runoff and other pollutants all greatly reduce wildlife habitat functions.

Existing industrial areas may leach pollutants into surface or subsurface water, thereby diminishing water quality in adjacent wetlands. However, a compensatory wetland situated downstream of industrial development will have an excellent opportunity to perform water quality improvement.

Very small sites surrounded by buildings and roads are not likely to provide quality wildlife habitat, but they may still provide very good water quality functions. However, a small site may become more significant for wildlife if it is the only wetland in the area.

Though all compensatory wetlands need a buffer to protect the functions the site is proposed to provide (refer to Part 1, p. 79 - Buffers), existing undeveloped areas, such as pasture and timber lands adjacent to a site can further buffer the wetland and increase wildlife habitat functions. Unfortunately, unless these areas are designated parks, wildlife areas, or are protected with a **conservation easement** (see p. 33, Long-Term Monitoring, Maintenance and Site Protection) they probably will not remain undeveloped. At which point, wildlife functions may decrease and the hydroperiod may be altered. It is therefore important to attempt to extrapolate future land use and development trends since the effectiveness of the compensation will probably decrease with increased urbanization.

As development increases so does the amount of impervious surface, which is an important factor affecting the hydroperiod of existing water courses. Increased impervious surface normally results in a “flashier” flow (i.e., greater and more frequent water level fluctuations). High flows can scour stream channels, causing an ever deepening channel that will ostensibly be removed from its floodplain and may result in the de-watering of adjacent riverine wetlands. Fluctuating water levels will affect the ability of some plant and animal species to survive, either drowning them out or, when levels drop, stranding egg masses above the waterline. Impervious surface also affects a number of water quality factors including temperature, contaminants, and routing and flow of water, nutrients and organisms. Selecting a site in an area that conflicts least with

the existing and expected surrounding land use will yield the best long-term functional benefits.

Habitat Connectivity

If a goal of the compensatory project is to provide wildlife habitat a site should be selected that is connected to other aquatic systems or habitats since landscape connectivity may be critical for species persistence. When a landscape becomes too fragmented, processes are disrupted, and many functions and species are lost.

Part of a mitigation proposal may include purchasing and protecting an undeveloped corridor or removing a barrier thereby connecting a compensatory site to other wetlands, buffers, refuges, or other preserved upland elements of the landscape. Small sites may become more significant for wildlife and may augment functions of other aquatic areas nearby if they are connected via vegetated corridors. Establishing connectivity and incorporating natural processes and energies will help ensure resistance to surrounding landscape disturbances. Be aware, however, that removing barriers and/or establishing a new direct connection to other aquatic habitats may also allow entrance of invasive species such as bullfrogs, which have been previously unable to colonize or access your site. The use of spatial analysis tools (GIS) on a regional basis could provide valuable assistance in the choice of preferable locations for compensatory mitigation sites (check with local planning agencies to see if any spatial analysis tools have been developed or are being developed for any areas of interest.

Buffers

Buffers play an important part in supporting and maintaining wetland functions (refer to Part 1, p. 79 - Buffers). Buffer width and quality needed to protect a compensatory wetland depend to a great extent on the functions the site is expected to provide, and on the current and expected future condition of the surrounding landscape.

Applicants must consider the width of buffer that will be required to protect the wetland. If wildlife habitat will be a goal of the project, the required buffer width may amount to a significant acreage. This will therefore influence the overall size of the site to be selected. In urban areas sites with a buffer may be difficult or even impossible to find, and even more difficult to maintain.

Invasive species

The National Invasive Species Council (NISC) defines **invasive species** as (1) “a non-native (alien) to the ecosystem under consideration and (2) a species whose introduction is likely to cause economic or environmental harm, or harm to human health” (Executive Order 13112, refer to Part 1, p. 19 - Federal Policies and Guidance for a description).

Not all invasive species are of foreign origin. Species that contribute positively to other U.S. ecosystems, when transported here, can pose significant ecological problems without the traditional predators and other mechanisms that would normally keep them in check. Cordgrass (*Spartina spp.*) and the American bullfrog (*Rana catesbiana*) now both found in Washington, are just two examples of good East Coast organisms now severely affecting ecosystems on the West Coast (see Appendix D for the Washington State Noxious Weed List).

In most cases, the compensatory site should provide a good chance for establishment of native vegetation. The importance of invasive species for a specific site depends in some measure on the functions to be established on the site. Invasive species are significant ecosystem stressors, and the inability to control invasive species such as reed canarygrass (*Phalaris arundinacea*) is a major cause of failure where wildlife habitat is desired.

If the site itself and/or areas surrounding the compensatory wetland are heavily infested with invasive species, the ability to control invasive species on the site will be impaired, and/or the site will at least require intensive and long-term maintenance to control unwanted species. In the Pacific Northwest, reed canarygrass is one of the most difficult species to eradicate. If water quality is the only functional consideration for the mitigation project, reed canarygrass can be an efficient filter, and it may not be worthwhile to spend resources on an effort to remove it. Mitigation efforts could be focused on other site characteristics to enhance water quality. However, a site that can perform a variety of functions is preferable to a site providing only a single function, and it will provide better ecological lift. In most circumstances a compensatory project proposing to provide only one function is inadequate. A list of identified noxious species to be aware of in Washington is provided in Appendix D.

Seed banks

Many seeds can remain dormant but viable in the soil for years or decades, awaiting the proper conditions for germination. However, it may be difficult to predict what type of seeds a soil may contain. If wetlands previously existed on the site and native wetland plant seeds still remain, establishing the correct hydrology may allow many of them to germinate. This will not only help speed restoration and perhaps decrease your planting needs, but will help to establish species diversity and make it more likely that your wetland will approximate historical conditions on the site. However, if the seeds are remnants of a past reed-canary grass (*Phalaris arundinacea*) pasture, this may make it difficult to establish the plant diversity you want. Knowing the past history of your site will give you an idea what types of seeds you may expect in the site seed bed (see p. 11, Historic Land Use).

Long Term Maintenance

When selecting a site you should also consider the potential long-term maintenance activities and costs. One of the most common maintenance activities for mitigation projects is control of noxious species. As mentioned above, if the site itself and/or areas surrounding the compensatory wetland, particularly upstream areas, are heavily infested with invasive species, the ability to control invasive species on the site will be impaired, and/or the site will at least require intensive and long-term maintenance to control unwanted species.

Selecting a site that will require extensive hydrologic modifications and/or engineered structures to provide an adequate water regime may also have potential long term maintenance requirements and costs. This will be an important consideration when selecting a site as well as planning and designing the mitigation project (see p. 15, Site Planning and Design). In addition, vandalism and recreational vehicle use (ATV and off-road vehicles) could also potentially cause site damage and require maintenance activities.

Site Ownership

Site ownership is important because mitigation sites must be able to be legally and permanently protected. Leased property or other property where certainty of future protection cannot be provided, are not acceptable sites for wetland compensation. Placing the ownership into a land trust or under the supervision of an established land management organization is the preferred option to assure long term protection (see below, Site Planning and Design).

Other Practical Considerations

One consideration would be whether any Endangered Species Act (ESA) listed species are present at site(s) that you are considering. Compensation activities (e.g. excavation) may require ESA consultation even if the impacts at the development site had no effect on endangered species. The presence of endangered species may make this site a priority site for protection, which may be appropriate for mitigation or mitigation activities may be limited depending on the habitat requirements of that particular species. The agencies will coordinate with the applicant to determine if there are any ESA concerns.

In addition, land cost and ease of construction and monitoring (which translates into costs) are practical considerations that may also figure into final site selection. No matter what, it is important to coordinate with appropriate agencies to make sure the site being selected will meet the regulatory requirements (refer to Part 1, p.55 - What are the Requirements for Compensatory Mitigation?).

For a checklist of things to consider when selecting a site, refer to Appendix E, Site Selection Checklist. The following section addresses considerations for designing a compensatory wetland.

Site Planning and Design

Introduction

Having an appropriate site design is equally as important as selecting the proper site. As described in the section on site selection, the two are intertwined. Once a site is identified and selected the proposed compensation actions should be designed around the constraints and strengths of that site. For example, a small site located in an urban area without any wildlife corridors should not be designed to provide wildlife habitat because, other than birds, no wildlife will be able to safely access the site.

In some cases a site design, meant to target specific functions that will be lost, may be proposed before a site is selected. A site would then need to be found that will accommodate this design. Even so, the design may need to be adjusted to fit the specific parameters of the site chosen.

Both the design and selection of a site may depend upon the proposed type of wetland compensation. Obviously, if re-establishment is desired an upland site that was previously wetland would need to be located. Likewise, if rehabilitation or enhancement are desired a site that is currently a degraded wetland would need to be found. However, an applicant proposing to rehabilitate a site will need a design that focuses on improving hydrologic processes, rather than improving structure, which would be enhancement. Refer Part 1, p. 47 for a discussion on the distinction between rehabilitation and enhancement.

The design of the site also needs to be tied to the goals and objectives of the project. If the goals are already defined, then the design must correspond to those goals. For example, if a project has a goal to provide amphibian breeding habitat, then the design should not include off-channel fish habitat. The design conflicts with the goal since fish will prey upon amphibians.

The following subsections focus on some important factors that should be considered when planning and designing a site.

- Hydrologic considerations
- Soils
- Vegetation
- Invasive species
- Wetland Functions
- Goals, Objectives, and Performance Standards
- Reference Sites
- Long term maintenance and site protection

Hydrologic Considerations

Water is the most critical element of a design. Without sufficient water the site will not be a wetland. Sufficient water means that soils must be saturated or inundated to the surface for a minimum of 5% of the growing season. However, specifically designing the hydroperiod of a site to meet this absolute minimum criterion is not recommended and will generally not be accepted by regulators reviewing the mitigation plan. Instead, sites should be designed to have inundation or soil saturation to the surface for at least 10% of the growing season (that generally means about 30 days beginning in mid-March[5]).

NOTE: A compensation wetland that relies solely on an artificial source of water is not acceptable.

There is a fine line in designing wetland hydroperiod. Designing for minimum saturation or inundation may result in a site that resembles upland and has more problems with invasive species. On the other hand, designing a site to ensure that there is plenty of water may result in a wetland with permanent inundation and deep ponding (i.e., an **atypical** HGM class) that will not replace the lost hydrologic functions.

The presence of water may produce a wetland, but the **hydoperiod** of a site (i.e., the depth, timing, frequency, and duration of inundation or saturation) affects the functions that will be provided. Therefore the mitigation plan should describe what the hydroperiod will be.

The hydroperiod should be designed based on the goals, objectives, and target functions. For example, if amphibian habitat is a target function then the hydroperiod should be designed to provide shallow ponding for long enough duration to allow native amphibian tadpoles to develop. Furthermore, the hydroperiod should be designed to avoid a rapid and widely fluctuating depth of inundation.

In cases where the site is driving the design, the hydroperiod, and therefore the goals, objectives, and target functions, should derive from what is available on-site. For example, the site contains a stream channel that is incised and separated from its floodplain except in extreme storm events. By reconnecting the channel to its floodplain the site could be designed to target functions that will reduce erosion and downstream flooding as well as retain sediments and nutrients.

Applicants should avoid designing a site that will require extensive engineering to produce the desired hydroperiod. Similarly, the designed hydroperiod should not result in an atypical HGM class, such as a depression excavated in a slope wetland or a

[5] For certain parts of eastern Washington this may vary. Contact the local Washington Natural Resources Conservation Service (NRCS) office or Conservation District for site specific information.

depression excavated in a creek, stream or river channel. In general, compensation actions should restore natural hydrologic processes whenever possible, rather than modifying natural water flow through the construction of weirs, deep basins, and berms that will require long term maintenance. Also, slopes and shoreline edges should be constructed to mimic natural systems. Slopes should generally be gradual and shoreline edges sinuous.

To help ensure the success of compensatory wetlands, regulators are increasingly suggesting that applicants wait a year after construction to observe the hydroperiod before planting. Taking a year to observe the duration and extent of ponding and saturation can expedite the discovery and correction of problems. It can also help to craft a planting plan that will result in vegetation that will establish faster and be healthier because planting zones will be based on actual water levels rather than the approximation of where water should be. In these cases the Corps recommends a seed mix to prevent erosion and limit infestation of invasive species.

Compensatory projects involving the reconfiguration of stream channels may likewise want to slowly re-introduce water to the new channel. Allowing the stream flow to return over the course of a couple years will give vegetation time to develop, thereby helping prevent erosion damage, which otherwise could affect the success of the project or result in costly re-construction.

Soils

As mentioned in the section on Site Selection (p. 6), soil performs a number of important functions in a wetland, which are often overlooked when planning a compensatory wetland project.

- Rooting medium. Soil serves as a rooting medium for plants, providing the physical support for above-ground plant structures
- Germination medium. Seed germination requires more specialized conditions than those required to sustain mature rooted plants. Germination of annuals, for example, is often promoted by a moist, temporarily exposed soil that is free of detritus.
- Seed bank. Seeds and rhizomes retained in the soil remain viable for months to years.
- Source of water and nutrients for plants. Soil is the site of water and nutrient uptake for rooted plants, even rooted plants that are submerged. The release of plant-available forms of nitrogen from unavailable organic forms stored in the soil (i.e., nitrogen mineralization) provides a constant source of nutrition to wetland plants.
- Habitat for mycorrhizae and symbiotic bacteria. Roots have complex relationships with soil fungi (mycorrhizae) and bacteria that enable and enhance nutrient uptake. Examples include nitrogen-fixing bacteria living symbiotically in root nodules of legumes and *Alnus* species and vascular arbuscular

mycorrhizae that associate with *Salix* species. Some plants require the presence of specific mycorrhizal species for survival.

- Water quality functions. The soil is the locus of most of the physical, chemical, and biological processes that give wetlands the ability to improve water quality. Sediment retention takes place at the soil surface. The chemical composition of the soil, such as the presence of iron and aluminum hydroxides, affects its ability to absorb phosphorus. Denitrifying bacteria dwell in the soil and depend on soil carbon as an energy source to support denitrification.
- Habitat for soil macrofauna. Soil-dwelling fauna sustain wading birds that probe the sediments of mud and sandflats with their long beaks. The role of soil-dwelling fauna in other types of wetlands is less well known.
- Conduit for ground water. Soil permeability affects its ability to convey water. Dense, low-permeability soils may serve as aquacludes, causing water in wetlands to be perched above the regional water table. More permeable soils have higher hydraulic conductivities, allowing wetlands to have greater interaction with ground

With these factors in mind, it becomes apparent that how the soil is treated on a site can affect the success of a wetland compensation project. Site design can either result in soils that will benefit or deter the development of the wetland.

Designs that require excavation often remove the part of the soil that contains the most organic material, nutrients, and beneficial microbes. The underlying subsoil usually has a different texture, structure, chemistry, and biota than the top soil that was removed. Often subsoil is nearly devoid of organic matter content, depauperate in nitrogen, and lacks mycorrhizal and microbial populations important to plant establishment and water quality functions. This material cannot provide the same functions as an intact wetland soil, and the plants that can successfully reproduce in such material may not be the desired ones.

When excavation or re-contouring is necessary a couple of options are recommended to improve soil conditions. The first and best option is to salvage the hydric topsoil from the wetland impact area and apply it to the compensatory wetland (vegetation can be salvaged too, refer to subsection on vegetation for more discussion, p.20). Salvaged soils should not be stockpiled. If they are, beneficial microbes, seeds, and rhizomes could be destroyed since the soil will heat up as it begins to compost itself. If hydric topsoil is to be salvaged from the impact site, implementation of the development project will have to correspond with implementation of the compensatory wetland. If stockpiling is necessary, for a short period of time, it should be covered with plastic to seal in moisture and keep the soils in an anaerobic, weed-free condition. Salvaging the hydric topsoil would not be recommended, however, if reed canarygrass (*Phalaris arundinaceae*), non-native pasture grasses, or other invasive species dominate the vegetation and seed sources at the wetland impact site (see Appendix D, Washington State Noxious Weed List).

The second option involves augmenting subsoil with organic amendments after excavation has occurred. Low soil organic matter concentrations are associated with

reduced levels of function, such as poor establishment and growth of vegetation, poor habitat food chain support for invertebrates and fish, and altered nutrient cycling. Redoximorphic processes, the precursors of basic wetland functions, require a minimum of 3% organic content in soils. Some kind of organic augmentation is therefore recommended.

The specific type of amendment will depend on what the target ecosystem is proposed to be. A soil sample from a nearby reference wetland (i.e., of the same Cowardin and HGM classes as the proposed compensatory wetland) should serve as a model. Soil amendments incorporated into the subsoil should try to duplicate the texture, bulk density, and organic matter content of the reference wetland (see p.32, Reference Sites).

To minimize introduction of invasive species, sterile soil amendments might be used to augment subsoil. If this is the case, applicants may want to look into inoculating the resulting soil with mycorrhizal fauna. Inoculation of mycorrhizae is most effective when used for the recovery and rehabilitation of marginal land, such as subsoil or sterile soil.

Another planning and design consideration is reducing or eliminating compacted soils. Compaction of soil can diminish soil permeability and pore space and severely limit root growth and plant establishment. Imagine plants growing in concrete; though a few plants may be able to establish in cracks, they generally are not the plants that you want. Use of heavy machinery during construction activities or previous land uses can compact soils. Saturated or moist soils are more easily compacted than dry soils.

To loosen and aerate the soil a chisel or ripper shank should be pulled to the depth of compaction, usually about 2 feet. The most effective time to rip is when the soil is dry. Ripping through moist soil does little to relieve compaction and could make matters worse.

A final design element for soils involves creating microtopography. Minor variability in the microtopography can result in hydrological variability, microclimates, and increased species diversity. For example, degraded reed canarygrass (*Phalaris arundinacea*) fields have been enhanced by cutting sections of the sod mat, rolling them up onto themselves, and covering them with some upland soil. This allows the reed canarygrass seed, roots, and rhizomes to compost as well as producing scattered mounds that can result in microtopography.

Vegetation

Vegetation is a necessary component of wetlands. It makes significant contributions to the performance of functions such as:

- Its fundamental role in the food chain as the primary energy producer in wetlands.

- Its ability to provide wildlife habitat and increase species diversity for other taxonomic groups through vegetative composition and diversity.
- Its influence on wetland chemistry and ability to improve water quality through uptake and incorporation/sequestration of nutrients, metals and other contaminants.
- Its influence on water flow and sedimentation through the deceleration of currents and flows, flood peak desynchronization, and soil stabilization.

One of the factors that distinguish a wetland from upland is the dominance of hydrophytic vegetation, plants that are adapted to growing in wet, anaerobic soil conditions. However, many of Washington's wetland ecosystems also experience extreme dry periods during the growing season. When designing a compensatory wetland plants should be chosen that will tolerate and thrive in the hydroperiod of the target ecosystem.

What is a target ecosystem? The target ecosystem is whatever type of wetland is being proposed. HGM class, hydroperiod, and vegetation all influence or affect what the target ecosystem will be. A target ecosystem should be designed based on a known HGM class, hydroperiod, or vegetation community, or vice versa the HGM class, hydroperiod, and vegetation should be designed based on a known target ecosystem. Even if a site is designed to replace or provide specific functions, a specific wetland ecosystem will be associated with those functions. The HGM class, hydroperiod, and vegetation should all be designed to correspond with those functions, thereby resulting in a target ecosystem.

The site may be designed to replace the wetland lost. In this case the target ecosystem would be the wetland impact site. Information on the historic vegetation community of the area could also be used as a target ecosystem. However, applicants should recognize that it may not be possible to re-establish historic communities if the hydrologic processes and nutrient levels have been altered. A nearby reference wetland (see p. 32, Reference Sites) of the same HGM class may likewise serve as a target ecosystem to lead design.

Whatever the target ecosystem, there are several considerations for designing vegetation that should improve the effectiveness of the compensatory wetland. The first considerations should be what to plant. In general, the planting plan should include a diversity of species rather than a monoculture. If an emergent community is proposed then a number of different emergent plants should be installed. The same goes for shrub or forested communities. Each species has its own environmental tolerances, so what might be too wet or too high of a pH for one species may be just right for another. Therefore, planting a diversity of species in each proposed cover class (e.g., herbaceous, shrub, tree) helps to ensure that some species will survive and become established. Furthermore, diversity of species generally fosters a diversity of organisms, thereby improving overall wildlife diversity.

Salvaging plants from impact site may be a great way to provide diversity and incorporate important hydric soil nutrients and fauna (see p. 18, Soils). For smaller trees and shrubs the plant with a root ball can be salvaged. Even if the plant itself does not survive, it will contribute a snag or woody debris. In addition, seeds, roots, and rhizomes from that plant or other species may be introduced, thereby adding diversity. Emergent species can also be salvaged by taking a mat of plants, roots and rhizomes, similar to grass sod. Salvaged plants can be stored until needed so long as the root ball or mat is kept moist and free from frost or freezing. Salvaged vegetation should not be used if the impact site was dominated by non-native or invasive species. Seeds, roots, or rhizomes of invasive and non-native species could unknowingly be introduced to the compensatory wetland by planting salvaged plants, and this could lead to unnecessary maintenance issues that may compromise the effectiveness of the site.

There are some species that do not need to be planted or salvaged, such as cattail (*Typha latifolia*) and soft rush (*Juncus effusus*). If conditions are appropriate, these species will appear on their own. In addition, red alder (*Alnus rubra*) and Oregon Ash (*Fraxinus latifolia*) do not need to be planted or salvaged if a nearby seed source exists. All the above mentioned species can be invasive and create monocultures in their cover classes, so there is no need to give them a head start by planting them.

The next considerations are when and where to plant. In general, if excavation is required applicants should wait before planting in order to monitor water levels through at least one wet season. This allows modifications to be made to site elevations and/or subsequent plant locations. If applicants are unable to wait, plantings of the same species should be placed over a range of elevations. This will help ensure that some plants survive if the water levels are not as predicted. To take advantage of bare root plant material, planting should generally occur between December and April.

If the proposed target ecosystem is a climax or later successional vegetation community (e.g., coniferous forested wetland), regulators may require that the project be designed with phased planting. Many later successional species, such as cedar (*Thuja plicata*) do not tolerate being planted in full sun and newly graded soil. Time and money could be wasted by replacing dead plants or waiting for struggling plants to establish and provide the required aerial cover. Instead applicants should plant early successional species first, such as willow (*Salix sp.*), cottonwood (*Populus balsamifera ssp. trichocarpa*), and shore pine (*Pinus contorta*). Let them get established (i.e., providing aerial cover and shade), and underplant with the later successional shade tolerant species.

Maintaining existing native upland areas in the project design can also provide some shading for new plants in the wetland area. In addition, habitats that are mosaics of wetland and upland can provide important habitat functions that wetlands alone cannot provide.

Final considerations are design elements that improve the survival of planted species (i.e., maintenance elements). For example, newly planted vegetation may need additional water during the dry summer season for the first year or two of site development in order

to aid establishment. However, beyond two years a sustainable compensatory wetland should not require irrigation to assure plant survival.

Likewise, design elements that limit or deter herbivory by waterfowl, deer, rodents, and beaver can greatly improve plant survival and establishment. Enclosures can include mesh or netting over emergent plants to keep geese and other waterfowl from browsing, open-ended containers around saplings and shrubs to prevent rodents from girdling the bark. Rodents can also be deterred by painting the lower stem of trees and shrubs with a mix of paraffin wax and cayenne pepper.

Enclosures for geese, deer, and rodents however, should not be permanent. Wetlands provide wildlife habitat, and vegetation, as the primary producer of energy in the ecosystem is meant to provide food and cover for wildlife. The purpose of an enclosure is to keep herbivores out temporarily so that emergent or shrub species can establish a sufficient root and/or rhizome system so that when they are browsed later, it will not diminish their survivability.

Invasive species

The inability to control **invasive species** is considered to be a major cause of restoration and mitigation site failure. Because invasive species may affect site functioning, the site selection, planning, design, and monitoring phases must all take invasive species into consideration. In heavily infested areas, success of vegetative enhancement is always problematic and questionable.

Invasive species may affect a site in a variety of ways. The type and degree of impact depends, of course, on the species involved and the condition and amount of site affected. There are some species that act as "ecosystem engineers," and their establishment may produce sweeping ecosystem changes by causing changes in entire nutrient cycles, food webs or substrates, or changing chemical or physical properties of soil or water. Other terrestrial or aquatic weeds may form monocultures that suppress or prevent growth of native plants; others form dense thickets that shade many of the native species. Some species, such as tansy, are toxic to wildlife. Others contain flammable chemicals which make them burn frequently, changing the fire regime and preventing reestablishment of native vegetation over time. Still others, such as salt cedar, change soil salinity and draw down water tables below root zones of the native species. Exotic animal species such as nutria or other rodents may also cause problems, as they may eat new plantings, reducing survivorship of the planting stock and requiring an expensive replanting. But regardless of the species, the result of an invasion is normally a reduction in the wildlife habitat value and the ecologic "lift" possible from the site, which will ultimately affect the value of the mitigation.

Many invasive terrestrial weed species (and a few aquatic species) are also listed on County Noxious Weed Lists. Each county maintains its own list, which is normally updated annually. It is important to obtain a copy of the county weed list that

corresponds to your project location, and to know what class your invasive weeds are listed under, because in some cases, listing may require the property owner to remove or eradicate the species, or receive a fine.

Because invasive species may have such an impact on a site, it is important to consider a few key questions in site planning and design:

Are invasive species already present on the site? And if so, what are their characteristics?

It is important to determine what invasive species are present on the site, because each species has its own growth characteristics, habitat requirements, patterns of establishment and reproductive mechanisms. Each species will therefore interact differently with other species on the site, and is likely to have specific ways that it is best controlled or eradicated. Knowing the species and their characteristics will help you determine how they will interact with the existing native species and those you plan to plant, and how they may impact the functions you expect to develop on the site. It also enables you to determine how and when to best to eradicate or control them.

For example, if you know that reed canary grass (*Phalaris arundinacea*) is a perennial grass that spreads by both seeds and rhizomes and creates dense tall monocultures that crowd out other low-lying species, this tells you that planting taller shrubs and trees that can compete with and/or eventually shade out the reed canary grass will probably be more successful than planting low-lying groundcover that will be shaded out and overrun by the grass. This information also tells you that control is best carried out before seed-set; that occasional mowing is not likely to reduce the population; and that if you cannot get it well under control, wildlife habitat functions on the site will be severely impacted.

In some cases, the Corps recommends a hydroseed mix that includes water foxtail (*Alopecurus geniculatus*), bent grass (*Agrostis stolonifera* or *A. oregonensis*), and red fescue (*Festuca rubra*), which has been shown to keep out reed canarygrass, but may lead to rodent girdling problems if planting trees and shrubs. Girdling may be prevented by placing bark or mulch in a 3 foot-wide circle around the trees and shrubs.

If invasives are present, how numerous are they?

Where invasive species are concerned, an ounce of prevention is definitely worth more than a pound of cure, because populations rarely remain static, and the control effort and cost rise geometrically as a population expands. If a species is very numerous, this may affect the functions your site can provide or, alternatively, require massive control and/or monitoring effort.

Some species, although very numerous, may be removed relatively easily by cutting, while others may be quite difficult to remove because they can regenerate from small fragments or because they have produced an established seed bed that will keep you fighting new germinations for years. Knowing the past history of your site will also give you an idea what types of seeds you may expect in the site seed bed.

When possible, eradication is preferable to long-term control. While invasive species may be impossible to totally eradicate on some sites, they must normally be controlled, and site maintenance may become a heavy functional burden. Some species, such as Japanese knotweed (*Polygonum cuspidatum*) or kudzu (*Pueraria Montana* var. *lobata*), are so devastating that they are best totally eliminated once discovered, regardless of any performance standards. In some cases like tansy ragwort (*Senecio jacobbaea*), the County Weed Board may also require removal.

How many invasive species and/or how much site infestation is acceptable?

The ideal number is zero, but there is no hard and fast acceptable number. In general, most mitigation sites strive to restrict the percent cover of invasive species on the site. But to some extent this number depends upon the species in question, how it affects the functions the site is expected to provide, and the ecological uplift desired (see p.26, Goals, Objectives, and Performance Standards). Some species may not affect the site functions at all, in which case a larger number may be tolerable. For example, if improving water quality is the only functional site consideration, dense reed canarygrass can make a very efficient filter, and its presence on your site may be less important than in areas where you are trying to establish wildlife habitat.

Are there invasive species present in areas immediately adjacent to the site?

Invasive species favor disturbed areas. Even if invasive species are not currently on the site itself, if areas surrounding the mitigation area are heavily infested with invasive species, disturbance of the mitigation site during grading and other activities can provide an invitation for establishment. The threat these species pose and the likelihood of their transference to the mitigation site will depend on the characteristics of the species involved and the condition of the site. Periodic monitoring and removal, as needed, will be required.

What is the potential that mitigation activity may introduce invasive species to the site?

There are many vectors for invasive species. One common mechanism of spread is the attachment of seeds or vegetation fragments onto equipment tires, boots, boat trailers and similar items. If the equipment to be used in site development is going to be operating in other areas where invasive species are a problem, it is quite possible this equipment could transfer invasive species to your site if it is not cleaned before use on your site. Try to anticipate this possibility, check equipment before site entry, and plan for control measures if needed.

Wetland Functions

Wetland functions are the physical, chemical, and biological processes that wetlands perform (for a list of wetland functions and a brief description of each refer to Appendix F). Many of these functions provide important benefits to society and are therefore valued. Impacts to a wetland result in a loss of wetland function. Thus, compensatory mitigation is required to replace functions lost due to wetland impacts, or in some cases provide other functions that are determined to be important.

Wetlands provide functions to varying degrees. For example, a slope wetland will perform sediment retention, but not as well as a closed depressional wetland. However, not all wetlands provide all functions. For instance, a wetland without organic or clay soils may not retain heavy metals or toxic organic chemicals. It is therefore important that the site and the design are appropriate for the wetland functions being targeted.

First, an applicant must know what functions to target (see p. 4, Impact Assessment). Analyzing functions at the impact site will provide information on what functions will be lost. In some cases the same functions will need to be replaced (refer to Part 1, p. 87 for guidance on "in-kind" replacement). These functions would then become the target functions, and the compensatory wetland should be designed to provide these functions.

For example, a wetland impact will primarily result in the loss of water quality functions (retention of sediments and removal of nutrients, metals, and toxic organic compounds). The compensation wetland should provide water quality functions. To do this most effectively the compensatory wetland should be located in a depression either without an outlet (closed) or with an outlet that is constricted enough to reduce the volume and velocity of water leaving the wetland. This will increase the amount of time water is retained in the wetland, thereby allowing suspended sediments, many with adsorbed nutrients and metals, to settle out. Dense emergent vegetation can likewise filter sediments and therefore is another important component in the design of a wetland performing water quality functions. The hydroperiod of the wetland should be designed to pond water during part of the growing season (to foster denitrification) and then to dry out (to foster nitrification), thus transforming nitrogen into an atmospheric gas. In addition, soils should have either a high clay content or high organic content to provide an acceptable surface for toxic metals and organic adsorbance[6].

Generally, a site will be designed to provide multiple wetland functions. In these cases it is important to ensure that the functions targeted are compatible with one another. For example, fish habitat and amphibian habitat are typically not compatible because fish will prey upon amphibians. Also, if you want to maximize the potential of a site to perform certain functions (e.g. water quality, quantity) other functions may not be able to be provided at a maximum level (e.g. habitat functions).

Target functions should be the same as or tie into the goals, or at least the objectives, for a project. Activities that are undertaken to provide target functions should be specifically identified in the mitigation plan, and whenever possible should be measurable and included as performance standards. Refer to the following section on Goals, Objectives, and Performance Standards.

[6] The *Washington State Function Assessment Methods* provides a list of indicators for each wetland function, which can aid in selecting design features for specific targeted functions.

Goals, Objectives, and Performance Standards

Before planning and design of a site can begin, the compensatory project needs a goal or goals. The goal provides the framework upon which all the other design components should be based. Even when the site is predetermined, the goals for the project should be based on what is appropriate, sustainable, and achievable given the strengths and constraints of that site. The goal(s) should then dictate what the particular design will be.

A goal identifies what the project is trying to accomplish – what the end product will be. The target function(s), mentioned in the section on wetland functions, could be a goal for the project. A goal could also be to provide a specific type of ecosystem.

Objectives are also critical for the planning and design of a project. Objectives identify specific elements of a goal and provide more detail on how that goal may be achieved. Additionally, objectives relate to the development of individual components of the goal. One goal may have several objectives, but each objective is tied to a particular goal.

Goals and objectives that are appropriate for a site should result in a site design that leads to ecological success. However, a third component, performance standards, provides the basis for determining if a site is a regulatory success (i.e., in compliance with permit requirements). Performance standards can also serve as very specific design criteria for attributes such as vegetation diversity, stem density, specific elevations, etc.

Performance standards describe a desired state, threshold value, or amount of change necessary to indicate that a particular function is being performed or structure has been established. Performance standards are also called performance criteria, success criteria, success measures, standards of success, and success standards. All of these terms refer to regulatory conditions used to indicate or determine whether a compensatory wetland is achieving objectives, goals, and therefore, regulatory requirements. Because regulatory requirements must be enforceable, performance standards need to be meaningful, observable, measurable and achievable by the methods and timeframe identified for monitoring the site (see p. 41, Monitoring and Reporting in the section on Post Construction).

A complete and articulate performance standard should have several components to ensure that it is meaningful, measurable, and achievable.

- Indicator – identifies what will be monitored, such as woody vegetation, invasive species, wetland area, or inundation.
- Attribute – identifies what aspect of the indicator will be monitored, such as percent cover (of vegetation), number/count (of stems or surviving vegetation), size (of wetland area), or height (of inundation).
- Action – identifies how the attribute should perform or change, such as *increasing* percent cover (of trees and shrubs), *achieving* size (of wetland area), *decreasing* height (of inundation), or *maintaining* number (of surviving vegetation).

- Quantity/Status – identifies the amount change or the desired level of the attribute, such as achieving *80%* aerial cover of trees and shrubs, achieving *4.5 acres* of wetland, or decreasing height of inundation *from 3 feet to 6 inches or less*.
- Time frame – identifies when the quantity should be achieved or when the effectiveness of the management should be determined. For example, achieving 4.5 acres of wetland *by the end of the monitoring period*, achieving 80% aerial cover of trees and shrubs *by year 10*, or decreasing height of inundation from 3 feet to 6 inches or less *by June 15 in at least 7 of the 10 years of monitoring*. Note: performance standards should be included for interim years, not just the end of the monitoring period.
- Location – identifies the geographical area where the indicator will be monitored, such as a particular compensatory wetland or a specific habitat type within a compensatory wetland. For example, the *forested zone* will achieve 80% aerial cover of trees and shrubs by year 10, or the "*Blue Wetlands Inc." compensatory wetland in Olympia* will achieve 4.5 acres of wetland by the end of the monitoring period.

Performance standards need to be tailored to each specific project. However, project-specific standards still need to target, in a measurable way, the basic parameters of wetland development, such as:

- Area of Wetland – the amount of wetland acreage resulting from compensatory activities to re-establish, create, rehabilitate, or enhance. For example, "compensatory activities will result in at least 8 acres of wetland, as demonstrated by wetland delineation in the final year of monitoring."
- Water and hydroperiod. All mitigation plans need to have a performance standard that addresses water. At a minimum, a performance standard that states, "The soils will be saturated to the surface, or ponded or flooded a minimum of 10% of the growing season measured consecutively." Based on the goals and target functions, a performance standard should also identify a benchmark for the desired hydroperiod (e.g., permanently ponded, seasonally inundated, seasonally saturated, or a mixture of these). For example, if native amphibian habitat is a goal/target function then performance standards for suitable hydroperiod might include:
  - "The compensatory wetland will not have permanent inundation."
  - "The compensatory wetland will be seasonally inundated. Height of inundation will decrease to zero by August 15."
  - "Water level fluctuation in the compensatory wetland will not exceed 21cm annually."
- Area of Cowardin class(es). If the goals or objectives aim to achieve specific ecosystems, such as forested or emergent wetland then performance standards need to identify the area (specific acreage or a range) of each type of ecosystem. For example, "the compensatory wetland will establish 1.5 – 1.8 acres of emergent wetland."

Ranges can be useful because they allow some flexibility, yet they still provide a measurable, enforceable benchmark to shoot for.

- Diversity – usually of vegetation. A diversity performance standard will probably be necessary if the goal is a specific ecosystem or if a target function is wildlife habitat for a guild that relies on multiple species, such as song birds. In addition, if the planting plan calls for a variety of different species of vegetation to be planted, then a performance standard for level of diversity at the end of monitoring will probably be required. For example, "a minimum of six species of shrubs will each provide at least 10% aerial cover in the compensatory wetland."
- Maximum percent cover of invasive vegetation species tolerated. Nearly every mitigation plan will have to identify a threshold for invasive and/or non-native plant species. For example, "aerial cover by invasive species (including: reed canarygrass, purple loosestrife, poison hemlock, climbing nightshade, and Japanese knotweed) will be reduced to no more than 15%."

All compensatory projects need goals, objectives, and performance standards. It is therefore better to identify what they will be ahead of time and let them guide the planning and design of the project, rather than design a site and try to devise goals, objectives, and performance standards that conform to the design. Begin with what you want the site to achieve, both holistically and in terms of particular parameters. Then identify how to measure or determine what has been achieved.

The following steps (adapted from Ossinger 1999) offer a sequential process for planning a project, from picking target functions/goals to identifying objectives and performance standards.

1. What functions do I want the site to perform?
2. Of those, which functions will the site have the opportunity to perform?
3. Of those, which functions can be achieved given my design constraints?
4. Of those, which functions are critical to the overall success of the compensatory project?
5. Of those, which functions can be evaluated through a known monitoring method that I am capable of implementing (considering time and budget constraints)?
6. Of those, which can I define with a performance standard that is both:
   - An observable and measurable benchmark of success, and
   - Achievable on my site within my designated monitoring period?
7. Of those, which functions could I expect to achieve after implementing contingency measures if the monitoring shows that the performance standard is not being met? (see p. 42, Maintenance and Contingency Plans in the section on Post Construction)

Some examples of goals, objectives and performance standards are provided below.

Example Goal 1. The compensatory project will re-establish wetland on 4.5 acres of ditched and tiled pasture, and improve downstream water quality.

Example Objective 1a. The compensatory project will re-establish 4.5 acres of wetland by plugging ditches and breaking drain tiles.

Example Performance Standard 1a. Wetland area will be a minimum of 4.5 acres as determined by a wetland delineation using the Washington State Wetland Identification and Delineation Manual (Ecology 1997).

Example Objective 1b. The compensatory wetland will provide sediment retention by reducing the volume and velocity of water leaving the wetland and filtering water through vegetation.

Example Performance Standard 1b1. The compensatory wetland will have a constricted outlet resulting in ponding (or evidence of ponding) with a minimum height of 15 inches above the bottom of the outlet.

Example Performance Standard 1b2. Persistent, emergent, native vegetation, which has a wetland indicator status of FAC or wetter, will provide a minimum of 80% aerial cover across the site.

Example Goal 2. The compensatory wetland will be a coniferous, forested, riverine, wetland ecosystem.

Example Objective 2a. The hydroperiod for the compensatory wetland will be based on receiving overbank flooding from the adjacent stream.

Performance standard 2a1. Grades of the existing upland area adjacent to the stream will be reduced by *X* feet.

Performance standard 2a2. The size of the compensatory wetland will be *X* acres.

Example Objective 2b. The compensatory wetland will decrease downstream erosion.

Performance standard 2b1. The width of the compensatory wetland will be equal to or greater than 20 times the width of the adjacent stream.

Performance standard 2b2. In year 1, survival of planted vegetation will be 100%.

Performance standard 2b3. In year 3, woody vegetation will have a stem density of at least 2000 stems/acre.

Performance standard 2b4. In year 10, woody vegetation will achieve at least 80% aerial cover; 30% of will be provided by coniferous species.

When identifying and proposing goals, objectives, and performance standards, applicants should avoid the following pitfalls.

- Objectives stating "the compensatory wetland will provide wildlife habitat." This statement is too broad. A landfill provides wildlife habitat, but hopefully that is not what is intended. Instead, objectives should specify a particular wildlife guild such as amphibians or, in rare cases, a specific species such as coho salmon.

- Performance standards that are too general or "easy to attain." For example, "the compensatory wetland will provide habitat for two species of passerine birds." This standard is not indicative of ecological development. It does not require wetland conditions at a site, and it can be met by observing two non-native passerine species (starling and house sparrow) that are highly adapted to disturbed conditions.

- Standards that are not measurable and, therefore, cannot be used to evaluate the success or compliance of projects.

- Standards that contain confusing or ambiguous language or rely on a complex calculation and, therefore, result in inaccurate assessment or preclude assessment.

- A lack of performance standards for targeted wetland functions or important wetland parameters.

Table 1. Some examples of **GOOD** performance standards and the rationale.

Performance standard	Rationale
"Non-native blackberries, reed canary grass, and purple loosestrife may not account for more than 10% of total cover at any monitoring occasion."	This standard identifies which plant species are of concern, sets a specific, measurable percent cover, and it specifies that the standard is for total (or cumulative) cover.
"After five growing seasons, there shall be at least 65% combined cover for trees and shrubs."	This standard identifies what will be monitored; it is measurable and realistic, and it specifies the time frame.
"By year 10, enhancement of wetland area B will result in an increase from 6 to 10 in the WAFAM function assessment scores for sediment removal, nutrient removal, and heavy metal and toxics removal."	This standard is measurable; it identifies what attribute of the wetland will be monitored, the action desired, and the quantity that should be reached.
"After 3 years, the emergent wetland has greater than 30% coverage of at least 2 FACW or OBL species (excluding reed canary grass)."	This standard is measurable. It identifies the attribute to be monitored, the quantity to be reached, and sets a timeframe.

Table 2. Some examples of **BAD** performance standards and the rationale.

Bad Performance Standard	Rationale	Improved Standard
"By the end of the fifth year, there will be 95-100% coverage."	This standard does not specify what type of coverage (cumulative or relative), nor what should be providing the cover – it could be Scot's broom or Canada thistle.	A better standard would be: "By the end of year 5, native, wetland species will provide 95-100% aerial cover across the site."
"7-9 acres dominated by native forested wetland vegetation in the *Alnus rubra*/*Rubus spectabilis*, *Alnus rubra*/*Lysichitum americanum*, and *Fraxinus latifolia*/*Carex obnupta* community types."	This standard provides a range for acreage, which is good. However, specifying the exact plants that need to dominate these areas could be setting this site up for failure by not allowing natural colonization and site conditions to influence plant community composition.	A more feasible standard would be, "7-9 acres with a tree layer that has at least three, native, wetland, tree species each providing a minimum of 10% aerial cover; a shrub layer that has at least three, native, wetland, shrub species each providing a minimum of 10% aerial cover; and an herbaceous layer that has at least three, native, wetland, emergent species each providing a minimum of 10% aerial cover."
"Within 5 years vegetation will provide adequate food and habitat to support populations of species found in natural areas of compatible size."	This standard is useless for regulatory purposes. It is not measurable. It does not identify an attribute of vegetation that would be measured, nor does it provide a quantity/status that should be reached.	A better standard would be: "By year 5 the wetland will establish X acres of a native, aquatic bed community, X acres of native, emergent community, and X acres of native scrub-shrub community."
"In the first year of monitoring, 80% of the planted species or appropriate volunteers must be present and viable."	This standard is confusing and may be hard to measure or enforce. The term viable only means capable of being alive. A tree that is planted in soil and irrigated is capable of being alive, but that does not ensure its survival.	A better standard would be: "In the first year of monitoring, there will be 80% survival of planted species. If 80% survival is not achieved, appropriate species of volunteer plants will be counted for each dead or missing plant."

Reference Sites

A reference site, or reference wetland, provides a source of data and a model for how a compensatory wetland should be designed, how it should develop, and how it should ultimately perform. Reference sites may be existing wetland ecosystems adjacent to or in the same area as the compensation site. In some cases the wetland to be lost may serve as a reference for designing the compensation and determining its level of performance. Alternatively, a reference site may be based on information about the historic condition of a site. However, a reference site based on historical conditions may not be appropriate in areas where the movement of water and sediment has been substantially altered due to factors such as urbanization.

In addition, a compensatory wetland could potentially use another more mature compensatory wetland, which has been recognized as a legal and ecological success, as a reference site. In most cases, the "success" or compliance of compensatory mitigation projects is determined or evaluated when the site is still relatively young and immature. If projects are to be evaluated within five to 20 years, then they should be compared to other successful compensatory mitigation projects, rather than comparing them to wetlands that have been in existence for hundreds or thousands of years. The use of successful compensatory wetlands as reference sites would be most beneficial for developing performance standards. The benchmarks for performance of future projects could be based on monitoring information from previous projects that successfully achieved their goals for target functions and/or ecosystems. This is also a way to generate performance standards that are realistic, feasible, and attainable.

Reference wetlands can serve as examples for site elevations, topography, soils, planting plans, site development, and benchmarks of performance. When a reference site is used for designing or measuring the performance of a compensatory wetland, make sure that it corresponds with the proposed compensation site in the following ways.

- Same HGM class.
- Same source of water.
- Same position in the basin or watershed.
- Same or similar soil types and substrates.
- Susceptible to the same or similar land use activities and potential disturbances.
- Same successional stage of development as the target ecosystem.

If the proposed reference site matches few if any of the above criteria, a new reference site should be chosen, or a reference site should not be used.

Assuming that a reference site meets all or most of the listed criteria, it may be useful for setting performance standards for the compensatory wetland, particularly for standards involving water. For example, "The compensatory wetland will have at least 2 inches of inundation during the months of March, April, May and June, or water levels as observed in reference wetland A." If the compensatory wetland suffered a drought and had less then 2 inches of water in May, it would still meet the standard if the reference wetland suffered the same drought and had less than 2 inches of inundation. By setting the standard to a similar reference wetland in the same area, droughts or floods can be accommodated since the reference wetland would experience the same events.

Similarly, compensatory wetlands in urban areas should rely on reference wetlands in urban areas because the urban environment imposes particular conditions that influence the development of sites. This may be useful for invasive species standards. If an existing wetland in an urban area is acknowledged as relatively good quality, but it exhibits a certain percent cover of invasive species, then a compensatory wetland in the same area should not be expected to have any less invasive species.

Long-Term Monitoring, Maintenance and Site Protection

During the planning and design stage, applicants and consultants must consider how the compensation site will be monitored, maintained and protected. A well-conceived and executed monitoring program is essential to identify and remedy problems that can reduce the success of compensatory mitigation projects. The monitoring information collected should be meaningful in the context of the established goals, objectives, and performance standards as the monitoring data will be used to determine if they are being achieved within the predicted timeframe and whether the project is compliant with permit obligations. To help ensure the success of projects it is recommended that mitigation site monitoring measure quantifiable performance standards for at least 5 years or until the performance standards are met. Longer monitoring periods may be required, particularly true for projects hoping to establish forested wetlands. In order to monitor the seasonal variability of certain site characteristics, it is also recommended that, on average, the site be monitored two times per year. Once in the early spring to monitor the water regime and once in the late summer or early fall to monitor vegetation.

Maintenance activities are typically initiated when problems are observed during monitoring. Maintenance can address compliance issues (i.e., insufficient or inappropriate hydrologic condition, invasive species, or poor plant survival), as well as problems with vandalism, recreational use, and trash. However, regularly scheduled maintenance visits may prevent minor issues from becoming big problems that will deter the development and compliance of the site. A maintenance plan should therefore be developed concurrent with site planning and design. (refer to p. 42 for a discussion of maintenance in the section on post construction).

Site protection encompasses ownership, legal mechanisms to prevent future development, and buffers that serve to maintain the level of wetland function. Regulators are increasingly requiring that compensatory wetlands be protected over the long-term. **Deed**

restrictions and **conservation easements** are a few examples of legal mechanisms used to protect sites from future development. During the planning and design stage, applicants should consider how the site will be protected over the long term, and who will be responsible for its protection (refer to discussion of site ownership on p. 14 in site selection section).

Legal mechanisms are the best way to protect compensatory wetlands from direct future impacts. However, buffers provide a physical line of defense against indirect impacts from adjacent development. When planning and designing a compensatory wetland, applicants and consultants should consider the size/width of buffer necessary to protect and maintain the target functions. (Refer to Part 1, p. 79 for guidance on buffer widths).

Because most buffers tend to shrink over time, particularly in urban areas, buffers also require protection. The boundaries of buffers should be clearly marked with signs, or the periphery should be enclosed by a 2-3 foot split rail fence if the width is to be maintained. An inadequate or diminishing buffer size may detrimentally affect wetland functions, thereby preventing a compensatory wetland from being fully successful.

Site Construction

Introduction

Construction should not begin until the appropriate agencies approve the final compensatory mitigation and monitoring plan. Like any other construction project, you should make sure you have all other relevant permits prior to commencing any on-site construction activities. Once the site plan is approved and all relevant permits are obtained site construction implementation should follow the approved site design and construction specifications.

A condition of most permits will be to notify the appropriate agencies of when construction activities will commence and when they have been completed. In addition, a copy of the approved plans, specifications, permits, and agency approvals should be on site whenever construction is in progress and shall remain on site until project completion.

Construction efforts for each individual compensation site will obviously vary depending on the size of the site, the type of compensatory mitigation, the amount of earthwork required, and the complexity of the compensatory mitigation and monitoring plan. This guidance cannot help you with actual site construction, however it does identify important factors to consider for site construction. Important factors to be considered for site construction include:

- Selection of qualified construction personnel
- Construction oversight
- Construction demarcation

- Unforeseen changes to the plan
- Timing, including phased construction
- Protection of sensitive areas
- Erosion control

Selection of Qualified Construction Personnel

In most cases, one or more construction personnel (licensed surveyor, landscape contractor, clearing/grading contractor, and/or general contractor) will be hired and be responsible for fully implementing the final mitigation plan and construction specifications. In general, construction work should not commence until there is a meeting between the applicant and/or their agent, a qualified wetland specialist, and the construction contractor. The approved plans and specifications should be reviewed to allow all parties involved to fully understand the intent and the specific details related to the construction documents, specifications, and site constraints.

Examples of things a construction contractor may be responsible for include:

1. General
   a. Perform construction in accordance with agency standards, codes, permit conditions, and other applicable ordinances and policies.
   b. Notify the applicant, their agent, and/or the qualified wetland specialist immediately if any modifications to the plans may be necessary.
   c. Verify the accuracy of utility locations, discover and avoid any utilities within the mitigation area not shown which may be affected by implementation of the plan, and clearly mark the areas in the field.
2. Grading/Clearing
   a. Survey, stake/flag the limits of clearing/grading.
   b. Resolve any conflicts with the approved grading plan prior to start of construction.
   c. Verify pre-construction topographic elevations prior to grading.
   d. Verify actual locations of any existing vegetation to be saved and request to modify the grading plan as necessary to avoid all significant vegetation depicted on the plan.
   e. Excavate the mitigation area per the approved grading plan and make minor field adjustments to ensure proper functioning of the mitigation area, with prior approval by applicant, their agent, and/or qualified wetland specialist.
   f. Avoid disturbance to existing vegetation located outside the limits of clearing/grading.
   g. Implement a Temporary Erosion and Sediment Control Plan
   h. Install silt fences and other Best Management Practices (BMP's) prior to any disturbance activity within sensitive areas.
   i. After completion of excavation, review subgrade and conduct an "as-built" survey.
   j. Finish grading, including placement of topsoil (in some cases stockpiled) and organic material.

3. Installation of Habitat Features
4. Temporary Irrigation Installation
5. Planting
    a. Follow the approved planting specifications, including hydroseeding (if required).
    b. Locate, stake, and verify planting areas as well as approve the locations prior to planting.
    c. Remove non-native and invasive species prior to plant installation.
    d. Add soil amendments, moisture retention agents, fertilizers, and/or mulch.
    e. Provide "as-built" drawings of planted material with actual locations and quantities of plantings within the mitigation areas.
6. Maintenance (usually for one year after construction)

It is recommended that you select a construction personnel that has had previous experience implementing wetland construction specifications, including the above mentioned responsibilities.

Construction Oversight

During the site construction phase of the mitigation project, the major effort by the applicant would be to monitor construction activities and to ensure all aspects of the compensatory mitigation and monitoring plan are completed without incident. This process will normally require on-site management of construction personnel by one or more of the applicant's representatives, who have complete knowledge of the compensatory mitigation and monitoring plan and some understanding of soil science, hydrology, botany, horticulture, or plant ecology.

One of the concerns frequently raised by consultants is the difficulty of getting sites constructed appropriately because of poor construction oversight. In many cases, the consultant who designs a mitigation plan is not involved in constructing, maintaining and monitoring the site. The applicant should retain a qualified wetland specialist/biologist to be on-site during construction of the mitigation project. If possible, this biologist should be the same person involved with the design of the project. The on-site wetland biologist would be responsible for:

- Ensuring that the approved plan is followed,
- Overseeing grading and soil preparation,
- Ensuring that delivered, or collected plant material is true-to-name, as specified, and alive upon installation.
- Authorizing alterations from the mitigation plan if specifically allowed in permit documents.
- Coordinating with permitting agency staff on any alterations from the plan.
- Documenting and justifying any plan alterations on an as-built.

As part of the *WA State Wetland Mitigation Evaluation Study*, consultants provided some input in to the benefits of having someone on-site to oversee project implementation. Some of the benefits include:

- Having someone on site to inspect grading and planting prevented installation of unspecified and poor quality plants;
- Oversight of the grading contractor was critical because wetland work/grading is very different from traditional grading work, e.g. finish grades in planting areas were left very rough and scarified to provide "niche habitat" and prevent compaction;
- Allowed the woody debris found during excavation to be incorporated into the project;
- Certain field decisions need to be made on a daily basis, e.g. as to how weather conditions affect what kind of work is to be done, or what quipment/manpower is needed to do a particular task;
- On-site biologist was able to handle questions/solutions for possible drainage problem;
- Ensured the correct layout and spacing of plant materials;
- Provided an interface between the applicant and three different project contractors;
- Construction oversight allowed minor adjustments to be made, such that excavation was routed around several large willow trees, thus preserving the trees – a benefit not called for in plan.

In addition to having a qualified wetland specialist on-site, it is recommended that a representative of the **State or Tribal Historic Preservation Office** be present if it is suspected that cultural resources may exist within the project boundaries.

Remember, that in most cases, permits will require evidence that the compensation site has been field inspected by a qualified wetland specialist (see Appendix G, Hiring a Qualified Wetlands Specialist) during grading and planting operations, and after the planting has been completed.

Construction Demarcation

As with most construction projects, the boundaries of the construction area should be clearly demarcated using temporary construction fencing. Buffer and wetland limits should be clearly flagged.

Unforeseen Changes to the Plan

The applicant is responsible for successful implementation of the compensatory mitigation plan, and any significant deviations identified during construction must be approved by the Corps and other appropriate permitting agencies (e.g. Ecology, Local government). Significant changes to the plan should be documented and justified in an "as-built" report and/or drawings (see page 40, Documenting "As-built" Conditions).

Timing

In most cases regulatory agencies will require that the mitigation site be constructed prior to, or concurrent with, the placement of wetland fill for the project's purpose.

As mentioned on page 16, Site Planning and Design – Hydrologic Considerations, phased construction may help ensure the success of compensatory wetlands. To better ensure planting success and ensure that plants are located at the correct hydrologic regime, regulators are increasingly suggesting that applicants wait a year after construction to observe the hydroperiod before planting.

In general, it is recommended that grading activities occur when it is dry. Earthwork could be completed prior to the winter rains with water levels monitored throughout at least one wet season. Taking a year to observe the duration and extent of ponding and saturation can expedite the discovery and correction of problems. It can also help to craft a planting plan that will result in vegetation that will establish faster and be healthier because planting zones will be based on actual water levels rather than the approximation of where water should be. In these cases the Corps recommends a seed mix to prevent erosion and limit infestation of invasive species. In general, it is recommended that planting occur when plants are dormant (November to March).

One final note on timing is that other factors may influence the allowable timing of site construction activities. If a Hydraulic Project Approval (HPA) or Biological Opinion (BO) has been issued for your project you must adhere to the permitted work windows of those approvals. Timing of construction activities may be affected by the presence of endangered species (e.g. salmon spawning habitat, breeding and nesting habitat of certain bird species should not be disturbed during certain times of the year).

Protection of Sensitive Areas and Erosion Control

During construction activities sensitive areas should be protected and erosion controlled to the extent possible. If heavy equipment will be used in the construction of the site, care must be taken to ensure that the equipment stays within the project boundaries. Sensitive areas should be staked or flagged to preclude unauthorized construction impacts. Best Management Practices (BMPs) must be installed and implemented prior to any disturbance activity within sensitive areas and to control erosion (e.g. silt or sediment fence (contiguous, not stakes) should be properly installed and typically removed after vegetation covers at least 75% of bare soil). Regulatory agencies will often recommend a seed mix to prevent erosion.

Many times, permits for construction activities will have a list conditions to ensure that sensitive areas are protected and that erosion is controlled. Conditions for approval might include the following:

- All construction debris shall be properly disposed of on land so that it cannot enter the waterway or cause water quality degradation to state waters.

- All excess excavated material shall be disposed of above the 100-year floodplain and shall be contained so as to prevent its re-entry into waters of the state.
- Wash water containing oils, grease, or other hazardous materials resulting from wash down of equipment or working areas shall not be discharged into state waters except as authorized by an NPDES or state waste discharge permit.
- Erosion control devices (e.g., filter fences, hay bales, etc.) suitable to prevent exceedances of state water quality standards shall be in place before starting project construction and shall be maintained throughout construction.
- At the completion of construction, hydroseeding may be done to stabilize slopes and soils until other required planting is completed. Hydroseed mix shall consist of native, non-invasive, or annual plant species only.

The following table lists some problems that occurred during construction of some of the mitigation sites that were evaluated as part of the *WA State Wetland Mitigation Evaluation Study*. This is not meant to be a comprehensive list, rather it is to provide some examples of real life scenarios. Many of these problems could be prevented or reduced if certain factors are considered during site selection, site planning and design, and site construction (this is a work in progress, feel free to add to this list while you are commenting).

Possible Problems During Project Implementation	Possible Solutions (All of the below must be approved by the appropriate regulatory agencies)
Desired plants not available	Make appropriate plant substitutions
Plan does not fit the actual on the ground conditions (e.g. creation in the designed area would require felling some large existing conifers)	Construct the project around the large existing trees
Site too wet to implement grading according to plan	- Make changes to the plan (reconfigure) - Wait until the site is dry
Unanticipated hydrology inputs made the site wetter than planned; Site too wet to implement planting according to plan	Wait one year prior to planting to evaluate the water regime of the site. Adapt the planting plan by relocating certain species and including species that are more adapted to wet conditions.
Grading done incorrectly: Inexperienced heavy machinery operator that did not implement the approved plan	Know who you are hiring and have construction oversight
Toxic organic contamination encountered during excavation activities	-When selecting a site determine the history of the site -Leave the site alone and contact the agencies to determine next steps
Site design too intricate for accurate implementation	Make appropriate adjustments in the field at the recommendation of the on-site wetland specialist/biologist
Heavily compacted soils	Rip and amend the soil

Post-Construction Maintenance and Monitoring

Introduction

The maintenance and monitoring phase of the compensatory mitigation project begins immediately following construction (grading and planting) activities. This phase is crucial to the success of the project, as most compensatory mitigation projects do not develop as expected. Changes in hydrologic and soil conditions, presence of non-native and invasive plant species, wildlife browsing, and other problems can occur on newly established compensation sites. Without a comprehensive maintenance and monitoring program, many of these minor problems can get out of hand and threaten the success of the compensation site.

Important factors to be considered for post-construction include:

- Documenting "As-built" Conditions
- Monitoring and Reporting
- Maintenance and contingency plans
- Adaptive management
- Compliance and Enforcement

Documenting "As-built" Conditions

An "as-built" documents what actually occurred on-site during construction and serves as a baseline (year 0) from which monitoring and follow-up can take place. Submitting an "as-built" serves to inform the permitting agencies of any necessary alterations to the mitigation plan. Often those changes are for the betterment of the project. However, if it is not documented in an "as-built", it may appear as if the project is out of compliance with the original approved mitigation plan. An "as-built" should be developed with the assistance of a qualified wetland specialist (see page 46, Level of Expertise Needed) or other party that was on-site during implementation. See page 68 for a description of what needs to be included in the "As-built."

Monitoring and Reporting

Monitoring requirements, including duration, frequency, and methods used, are typically identified in the wetland mitigation plan. In most cases, monitoring reports will be required and identified as a special condition for every permit requiring construction (grading and planting) of a compensatory mitigation site. Monitoring should be completed according to the approved mitigation plan and reports submitted to the appropriate agencies as defined in the plan and permit conditions. Monitoring reports are subject to formal compliance efforts and failure to submit complete and timely

monitoring reports could result in suspension of the permit or requirements for additional compensatory mitigation. (see p. 44 Compliance and Enforcement).

As recommended in Phase 1 of the *WA State Wetland Mitigation Evaluation Study*, monitoring reports should provide information on site development for applicants as well as for regulatory agencies. Monitoring information could alert an applicant of site conditions that are unfavorable for future attainment of performance standards. This could spur implementation of contingency plans, such as replanting dead or dying planted material, controlling invasive vegetation, or altering topography of surface water to achieve the planned water regime and wetland area.

Monitoring information also allows regulatory agencies to follow up on a permitted project and detect potential problems or areas that could be altered to provide improved functions and compliance attainment. In addition, monitoring reports document the progression of a site. For example, a performance standard requires less than 10% areal cover by invasive vegetation by the end of the monitoring period. The site has 15% cover of invasive vegetation at the end of the monitoring period. However, evidence from previous monitoring reports indicates that the 15% invasive cover is an improvement over the 60% invasive cover present in the first year of monitoring. This documentation of site progression could illustrate to permitting agencies that the site has significantly improved and that 15% invasive cover is acceptable.

While monitoring reports will generally be required on an annual basis, regulatory staff may require more frequent submittals of monitoring reports for specific projects. If a problem is identified within a monitoring report, regulatory staff can schedule a site visit to determine the extent of the problem and identify remedial measures. These shorter monitoring reports can then be made part of the official case file leading to improved regulatory documentation of permit compliance and compensatory mitigation success.

Most importantly, monitoring should also serve to increase our knowledge of the effects of mitigation actions. It is therefore important that monitoring reports be objective. Agency verification of monitoring reports could encourage this.

See Appendix L for an outline of what should be included in a monitoring report.

NOTE: Monitoring reports must accurately represent the on the ground conditions of the entire compensatory mitigation site (not just the monitoring plots and/or transects).

Maintenance and Contingency Plans

As stated in Part 1, compensatory wetland mitigation sites require maintenance to help ensure that performance standards and goals will be achieved. A **contingency plan** outlines actions that would be triggered if project monitoring revealed a problem that

would prevent the site from attaining its stated goals, objectives, and performance standards. Contingency plans should identify anticipated problems and the specific maintenance activity that would be implemented to rectify each problem. Maintenance includes implementing corrective actions to rectify problems, such as an insufficient water supply or inappropriate water regime, invasive species infestation (e.g., reed canarygrass, bull frogs, tent caterpillars), trash, vandalism, or anything else that may result in a project not meeting its stated goals, objectives, and performance standard.

If a wetland system is designed to emulate natural systems , maintenance efforts will hopefully be mimimized. For plantings, irrigation should only be used for the short term (no more than 3 years) and in the dry summer months (May thru September). This "tough love" approach forces(allows) the plantings to adapt to the water table and not the irrigation. As long as wetland hydrology is present and appropriate plantings of early succession species are done wetlands can restore themselves if impacted by natural events. It is only a matter of time.

Maintenance activities should occur as necessary, and in conjunction with monitoring and implementation of contingency plans, in order for the site to meet its stated goals, objectives, and performance standards. One year of maintenance is generally part of most construction contracts. This usually includes 100% replacement of any dead or dying plants.

One of the most important issues with maintenance and monitoring of compensation sites is the ongoing battle against invasive plant species. A proactive maintenance program is necessary to prevent their spread. Monthly inspections of the site during the spring and early summer could allow removal before they reproduce.

The text of a maintenance plan should specify replacement of failed plantings, requirements for irrigation, frequency that maintenance activities will be performed, weeding trees and shrubs to the dripline and mulching, removal of litter, percent cover by and removal of non-native vegetation, repairing or replacing damaged or missing structures, and the responsible parties address and phone number. If needed, a plan should show access points for ongoing maintenance activities, and the layout of the irrigation system.

Adaptive Management

There are many factors that may positively or negatively influence aquatic resources and the functions they provide. Wetlands and other aquatic resources are often subject to a wide range and frequency of events such as floods and fires. As with all natural systems, some things are beyond control. Well-crafted mitigation plans, however, recognize the likelihood of these events and attempt to plan for them, primarily through monitoring and adaptive management. In addition, it is important to realize the mobile nature of wetlands and streams. They change over time and over the landscape in response to internal and external forces.

Monitoring and adaptive management should be used to evaluate and adjust maintenance and design remedial actions. Adaptive management should consider changes in ecological patterns and processes, including biodiversity of the mitigation project as it evolves or goes through successional stages. Trends in the surrounding area must also be taken into account (i.e. landscape/watershed context). Being proactive helps ensure the ultimate success of the mitigation, and improvement of the greater landscape. One proactive method is incorporation of experimentation into the mitigation plan when possible, such as using experimental plots within a mitigation site with different controls, replication, different treatments, inputs, etc., to determine if specific mitigation efforts are meeting the desired goals.

As discussed in Part 1, adaptive management adaptive management may be implemented when unforeseen circumstances result in problems with a compensation project, such as, a hundred-year flood wiping out planted vegetation or depositing excessive amounts of sediment or gravels in the compensation area. Another example may be a site that has implemented its contingency plan to rectify problems, but the same problems remain. Adaptive management involves the applicant and the regulatory agencies discussing the problems and possible solutions or alternative approaches. It may entail acknowledging that a particular site-design is not compatible with conditions at the compensation site. In extreme cases adaptive management may result in a change in project goals, objectives, or performance standards due to unanticipated site conditions.

Compliance and Enforcement

The goal is for the applicant to work collaboratively with the agencies to ensure that the mitigation project is successful and in compliance with the permit conditions. However, under certain circumstances, non-compliance with Corps permit conditions, including mitigation project performance standards, submittal of reports ("as-built" and monitoring), which can result in additional compensatory mitigation requirements, may be subject to the Corps' Enforcement Procedures (33 CFR 326). Refer to Part 1, p.65 - Compliance and Enforcement.

Completion of Compensatory Mitigation Requirements

The applicant should notify the agencies in writing when the monitoring period is complete and the Corps-approved success criteria have been met. When applicable, a formal jurisdictional delineation of established wetlands should be submitted with the report (accompanied by legible copies of all field data sheets). If wetlands are not established, a delineation of non-wetland waters of the U.S. and other areas enhanced, restored, established, or preserved as part of the compensatory mitigation program shall be submitted. Following receipt of the final report, the agencies will contact the applicant (or agent) as soon as possible to schedule a site visit to confirm the completion of the compensatory mitigation effort and any jurisdictional delineation. The compensatory mitigation will not be considered complete without an on-site inspection by regulatory staff and written confirmation that approved success criteria have been achieved.

DEVELOPING A MITIGATION PLAN

Stages of Plan Development

Preparing a wetland compensatory mitigation plan generally involves several stages. It is recommended that the first stage is for the applicant to contact the agencies (Corps, Ecology, Local government) as early in the project development process as possible to determine whether compensatory mitigation will be required (see Appendix B, Agency Contacts). Pre-application meetings with resource agency representatives are highly encouraged. During these meetings, the resource agencies can evaluate preliminary project designs and discuss mitigation opportunities. The applicant should never purchase sites or finalize plans before the agencies have reviewed and approved the compensatory mitigation concept.

Therefore, a conceptual mitigation plan should be developed and brought to any pre-application meetings and/or submitted with application materials (see page 48, Conceptual Mitigation Plan). This plan should focus on discussing the mitigation concept(s); not providing a fully developed mitigation and monitoring plan. It should include an estimate of impacts, a summary of how on-site impacts would be avoided and minimized, and why the applicant believes that the remaining unavoidable, proposed impacts would be adequately compensated. The applicant should prepare a conceptual plan before any pre-application consultation with the permitting agencies.

The next stage generally involves development of a draft or preliminary mitigation and monitoring plan (see page 50, Draft and Final Mitigation Plans). This should not be developed until the agencies have agreed that the conceptual mitigation plan would likely compensate for the proposed impacts. The preliminary plan describes in greater detail the proposed plan for the wetland project including wetland type, amount, and general construction techniques and proposed monitoring plans. A preliminary plan offers agencies an opportunity to comment and provides a forum to discuss goals and approaches. This step will go a long way in reducing frustration for an applicant by involving regulatory and review agencies early in the mitigation development process.

Lastly, the final mitigation and monitoring plan provides all the information necessary to actually implement the mitigation. In addition to revisions of the preliminary plan resulting from agency comments, the final plan should include site design specifications, such as construction details, grading plans, and planting schedules (see page 50, Draft and Final Mitigation Plans). In general, the final plan should be developed only after public comment periods end and the Corps has made a preliminary determination that the proposed project complies with the Section 404 (b)(1) Guidelines. Furthermore, a field review of the project for the resource agencies may have to be arranged prior to preparing a final plan. This will, to a large degree, depend on the size and scope of the project and any problems that may have arisen. **Any comments from resource agencies on the preliminary plan should be addressed and reflected in the final mitigation**

plan/report. If comments have not been incorporated explanations should be provided.

This staged approach is needed to provide regulatory agencies an opportunity to review the project before too much effort is spent on designing a mitigation plan that does not meet the legal or regulatory needs. Furthermore, restoring, creating, or enhancing wetlands is still an evolving science, and the successful replacement of wetland functions is not always assured. A technical review of the conceptual and preliminary plans by a larger group of technical experts is very helpful in developing a final plan that will have a higher probability of attaining its ecological goals.

Reporting Expectations (Level of Detail)

The level of detail suggested for data collection in the mitigation plan outlines is geared to larger projects involving freshwater wetlands. Smaller, less complex projects involving wetlands with small areas or with simple ecology may not need to provide all the information described because it may not be relevant or applicable. For example, a shopping center development which proposes to create wetlands to replace 3 acres of unavoidable impacts to a Category II wetland will generally require a detailed report with supporting data, particularly on water sources and the anticipated water budget. Alternatively, a project for a small access road that proposes to reforest a degraded wet pasture for the loss of a less than a quarter acre of degraded wet pasture will not likely require extensive research or detailed construction plans. Decisions about the data needed for the mitigation plan may vary between the agencies, including local governments, depending on their mandates and the resources they are trying to protect or manage. **Each project should be assessed individually and more or less information provided depending on the scale of the project and comments by resource agencies during pre-application meetings or discussions**. The level of detail should be commensurate with the impacts.

The larger the impact, the higher the quality of the wetland, and the more complex the proposed compensation, the more supporting information will be necessary. More complex sites and larger projects will generally need to have supporting information on the water regime, soils, detailed monitoring procedures and other pertinent information. During the review of the conceptual proposal, agencies will notify the applicant of the need for specific studies necessary for review of the proposed mitigation.

Level of Expertise Needed

All wetland compensation projects will need, at a minimum, participation of a qualified wetland specialist. Several activities must be completed which require a degree of

expertise. Activities requiring wetland expertise include reliable delineation of wetland boundaries, assessment of wetland functions at the impact site and the proposed compensation site, and characterization of the hydrologic processes, soils, vegetation, and wildlife. Finally, all of this information needs to be compiled in to the mitigation and monitoring plan. For suggestions on how to select a qualified wetland specialist see Appendix G, Hiring a Qualified Wetlands Specialist.

In addition, mitigation projects may require the collection and analysis of data that are the domain of many different disciplines, and thus, often a team of experts needs to be assembled (e.g. plant ecologist, wildlife biologist, hydrologist, soils scientist, geologist, landscape architect, construction contractor, and horticulturist).

Whoever is selected to work on a project, it is highly recommended that the same individual or consulting team remain on the project from initial planning through project completion. The same individual or team provides consistency and continuity by knowing the background of the sites (development site(s) and compensation site(s)), the purpose of the project, as well as retaining the integrity of the project goals and objectives. This should minimize "surprises" or unforeseen site conditions. New consultants have to relearn the above (hopefully), which can lead to delays. Compromised mitigation effectiveness (especially in terms of specific functions) can also occur. This can lead to compliance actions by the agencies, including, where applicable, possible regrading, replanting and increased monitoring periods, as well as permit suspension, revocation and administrative penalties.

MITIGATION AND MONITORING PLAN CONTENTS

Introduction

As mentioned on p. 45, Stages of Plan Development, a compensatory mitigation project will proceed through several stages. There are specific issues the applicant must address at each stage in the process, to increase the probability of a successful compensatory mitigation project. This section will assist the reader in developing and reviewing compensatory wetland mitigation plans. This section describes the information that will be needed for each stage of the planning process, what types of information are needed in a mitigation plan, why the information is important and how the information can be collected.

Conceptual Mitigation Plan

What is a conceptual mitigation plan?

When a proponent has determined that they cannot avoid wetland impacts part of their permit applications include identifying what they propose to do to compensate for the impacted wetlands. The conceptual mitigation plan starts the dialogue between the applicant and the regulatory agencies. Creation of a conceptual plan is highly recommended. Before putting too much work into the plan, arrange a pre-application meeting with regulatory staff and present a conceptual plan. It may save time and money in the long run. The conceptual plan usually will rely on existing information and is a general narrative description with maps and drawings of the site.

The conceptual plan should generally include the following information:

- The proposed mitigation approach (identify the actions that will be taken to avoid, minimize, rectify, and compensate for the potential impacts of the project)
- Identification of unavoidable impacts to aquatic resources
  - Describe the existing site conditions (water regime, vegetation, soils, landscape position, surrounding land uses, and functions)
  - Also describe the potential impacts in terms of acreage of Cowardin Classification and Ecology Rating System Category
- Overall mitigation goals, including description of the targeted functions, landscape position/HGM classification, and wetland categories
- Potential compensation site(s), including location and rationale for selection
  - Describe the existing site conditions of the potential site(s) (landscape position, surrounding land uses, acreage of wetland/upland, vegetation, soils, sources of water)
  - Discussion of watershed approaches used in determining compensation site opportunities
- Proposed construction activities and timing of activities
- Proposed mechanism to permanently protect the site(s)

The conceptual mitigation plan provides the agencies an opportunity to identify whether the proposal appears to be feasible and outline what the compensation requirements will be for the project. Their feedback on the proposed site will assist the applicant in developing a preliminary mitigation plan.

Level of detail

The conceptual plan usually uses primarily existing information and a site field evaluation. Detailed hydrologic studies are generally not required for a conceptual plan; however, the plan should include a narrative on the proposed hydroperiod for the site and design considerations to ensure there is sufficient water to support the proposed compensation wetlands.

Draft and Final Mitigation Plans

The final mitigation plan builds onto the draft or preliminary plan (as revised by agency comments) and includes additional detailed information necessary to implement the mitigation plan (refer to Appendix I, Minimum Requirements for a Mitigation Package). Once approved, the final mitigation plan becomes a condition of the wetland permit (Corps 404 permit and/or Ecology Water Quality Certification).

The following section provides an annotated outline of the information that needs to be included for each item in the checklist given in Appendix H[7], for the draft and final mitigation and monitoring plans. The checklists can be used to help organize mitigation plans. Agencies reviewing the mitigation plan expect to receive information on all points listed unless justification in provided for exclusions. For example, if a category of information listed is not applicable to a specific project, the applicant should note the omission and provide a rationale. Review of a mitigation plan will be expedited if the checklist and an executive summary (Appendix K) are presented at the beginning of any submission to the agencies.

This section also identifies the approaches that may be used to collect data and make the necessary analyses.

As a result of the Washington State Wetland Mitigation Evaluation Study, several recommendations were made regarding the format of mitigation plans. The following are some of those recommendations:

- A detailed summary should be provided at the beginning of the mitigation plan
- Baseline information on the impact site should be presented together in one section at the beginning of a mitigation plan,
- Baseline information on the proposed mitigation site should be presented together in one section, along with information on the mitigation proposal,

[7] As part of the National Wetlands Mitigation Action Plan a Mitigation Checklist (Appendix A) has been developed for Corps Districts to use in their new guidelines. The Checklist in Appendix H, which is based on the Annotated Outline on the following page is an adaptation of that Checklist (Appendix A) in order to be consistent with agency (Corps, EPA, and Ecology) requirements in the state of Washington.

- Goals, objectives and performance standards of the mitigation project should be presented together in one section,
- Monitoring, maintenance and contingency plans should be presented in one section (a clear tie should be made between monitoring and performance standards).

NOTE: We are also working on developing a template (Microsoft Word) that could be filled in with the appropriate information for each section of the annotated outline (it will be provided as Appendix J).

Annotated Outline

This outline is a WORK IN PROGRESS. Any suggestions for its improvement (particularly format) would be appreciated. This guide currently does not specify the methods to be used to collect the necessary data and analyze it. A variety of qualitative and quantitative methods are available, but their use depends on the scale of the project, the severity of the impacts, and the type of wetland functions to be impacted. Future versions of this outline will contain more specific elements that need to be included in each section and the level of detail required. There will also be some discussion of scale (i.e. what information is minimum necessary for small projects versus larger more complex projects).

1. **COVER / TITLE PAGE**
   - Project Name
   - Reference #'s (e.g. Corps application #)
   - Date of publication
   - Who it was prepared for / contact information
   - Who it was prepared by / contact information
2. **TABLE OF CONTENTS**
3. **LIST OF FIGURES AND TABLES**

   Figures may be included in the document or all together as an Appendix of the document. They should be provided for both the impact and compensation site unless otherwise noted.

   - A vicinity map showing the general location of the project within the county or city. The map should have major roads, city, towns or other landmarks clearly identified.
   - A general site map using a U.S. Geological Survey (USGS) Quadrangle (1:25,000 or 1:24,000), with the site, and its immediate watershed, clearly marked. The map should be on an 8.5" x 11" page with north at the top. If the site is large and will not fit on a standard page, include several pages, but do not reduce the original scale. Provide match lines.
   - A site map (small scale - not larger than 1 in. = 400 ft.) the area that will be impacted and include location and size of developments in adjacent uplands (this map may be larger than the standard 8.5" x 11" page).
   - A topographic base map (small scale - not larger than 1 in. = 400 ft.) of the wetlands or other waters of the U.S./state that are under state, federal, or local jurisdiction.
   - Site identified on a National Wetlands Inventory Map.
   - Site identified on a soil survey map and note source (in text include a description of the soil series and note any hydric soils).

- Map showing soil sampling locations
- For large or complex projects, a small scale (1 in. = 400 ft. to 1 in. = 100 ft.) airphoto with overlays displaying site property and wetland boundaries (to obtain aerial photos of your location, check your local telephone directory under "Photographers - Aerial").
- One of the maps should include clearly identifiable markers on the ground for orientation. These "reference points" might include existing roads, fence lines, conspicuous trees, or structures to facilitate location of site "on the ground."
- Map showing the location of all existing wetlands, streams, and lakes at or near (within 300 feet) the mitigation site.

4. EXECUTIVE SUMMARY

An executive summary should be prepared and placed at the beginning of the Plan which summarizes the project, its impacts, and the proposed mitigation. It should be a one-two page summary of report contents. The executive summary can be in either a narrative or data page as shown in Appendix K. This sheet will allow for tracking of conditions and decisions. Please include the following information:

- Applicant Name/ Address / Phone
- Agent / Consultant
- Proposed type of work
- Location of work (county, city, state, STR, GPS coordinates)
- Description of avoidance and minimization measures (demonstrate that mitigation sequencing was followed)
- Describe unavoidable wetland impacts and compare to mitigation (restoration, creation, enhancement, and/or preservation)
  - Size (acres)
  - Cowardin classification
  - Hydrogeomorphic (HGM) classification
  - Wetland Rating (Ecology & Local)
  - Functions
  - Compensation ratios used
- Explain other impacts to waters of the state (streams, lakes, estuaries, coastal waters)
- Provide other details about the proposed mitigation site
  - Proposed Buffers for mitigation site (min and max width and total area)
  - Water regime at mitigation site (including source, existing and proposed outflows, how long soil surface will be saturated at the surface or flooded, identifying any nearby groundwater withdrawals)

- Soil types
- Goals, Objectives, and P.S. [8] (include estimated time to reach p.s./ length of monitoring period)
- Where has this mitigation approach been done before
- Description of storm water facilities (in wetlands, streams or buffers)

5. PROJECT DESCRIPTION

a) ***Brief Summary of Overall Project***

In one or two paragraphs, describe the overall project (not just the area to be filled). Include:

- Type of development (land use and type of construction)
- Project size
- Schedule (anticipated start date, construction time period for both the development project and the compensation site)

b) ***Project Location***

Describe location (County, T/S/R), including landscape setting)

Provide a vicinity map and a general site map using a U.S. Geological Survey (USGS) Quadrangle (1:25,000 or 1:24,000)

c) ***Responsible Parties***

Provide name(s), title(s), address(es), phone number(s), and professional experience information (if applicable) for the following (include contact person(s) if any of the below is a company or an agency):

- Applicant(s)
- Applicant's representative/agent
- Preparer of the mitigation plan
- Consulting firm responsible for the wetland delineation report if it is different from the firm responsible for the mitigation plan
- Preparer of construction plans and specifications (if different from preparer of the mitigation plan)
- Party (ies) responsible for long-term maintenance of mitigation site

6. ECOLOGICAL ASSESSMENT OF IMPACT

This section is to document the baseline conditions of the project development site prior to site design. Describe impacts (direct and indirect) to wetlands and other waters of the U.S./State. It is recommended that all wetland mitigation project

[8] If too numerous to mention then indicate where (what page) the performance standards can be found

proposals provide detailed documentation on how the wetlands at the proposed development site will be adversely affected. Types of information that should be collected include:

- Acreage of wetland impacts
- Survey of current contours
- Summary of historic and current on-site and nearby land uses (zoning designations)
- Description of any known cultural resources on the site
- Description of the site in context of other wetlands / "waters of the State", or other natural areas
- Description of the water regime of the impact site
- Description of the soils on the impact site using county soil survey and some representative soil samples
- Description of the plant communities at the impact site (type and acreage of the Cowardin class(es) affected)
- Description of fauna known to use the site, including any ESA listed species
- Description of the landscape position and geomorphology of the impact site (HGM classification of wetlands affected by the development)
- List of functions provided at the impact site and relative level of potential to perform each (include what methods were used to assess functions)
- Wetland Rating scores for all wetland impact sites
- Description of existing buffers
- Description of any other on-site "waters of the State"
- Floodplain mapping of the site
- If applicable, any information on specific water quality impacts (sedimentation, nutrients, hydrocarbons, and toxics)

The level of detail needed for each of the above will necessarily vary by site. What information may be needed for each of the above is described in the following sections.

A small scale (not larger than 1 in. = 400 ft.) site map of the area that will be impacted should be included. It should also show the location and size of developments in adjacent uplands.

a) ***Acreage of Wetland Impacts (Wetland Delineation)***

- Provide a topographic base map (scale 1in. = 400 feet or smaller) of the wetlands that are under state, federal, or local jurisdiction
- Identify which delineation manual was used

- Describe the methodology used (routine, intermediate, problem, or disturbed)
- Date(s) field work was performed
- Field data sheets
- List of reference material used

Note: If a separate wetland delineation report was developed you that document could be referenced.

b) ***Survey of current contours***

c) ***Summary of historic and current on-site and nearby land uses (zoning designations)***

d) ***Description of any known cultural resources on-site***

e) ***Existing Water Regime***

- Source of water: If several sources are present, estimate the percentage contribution from each.
- Duration and frequency of inundation and/or saturation.
- Map of the drainage area with flow directions.
- Depth of surface and/or subsurface water and time of year when it was measured (include estimated average and seasonal highs and lows and the soil type in which measurements were made).
- References used to substantiate this information or a description of the monitoring performed.

f) ***Existing Soils***

- Soil characteristics including soil type and classification, and a description of texture, color, structure, permeability, and organic content.
- Soil survey map
- Map showing soil sampling locations

g) ***Existing Vegetation***

- A qualitative description of each wetland community using the Cowardin (1979) classification (include subclass and water regime modifiers); if a forested class is present, also estimate the average age of the canopy species. (Include National Wetland Inventory Map for project location).
- Relative abundance of each plant community with a sketch showing distribution between June and mid-September. NOTE: If the plant community changes seasonally, then a description of each is needed. Different plant species may dominate a wetland depending on the season, especially if the dominants are emergent types. Emergent wetlands should be sampled both in late spring and in the fall.
- Relative abundance of dominant and subdominant plants within each community.

- Wetland indicator status of dominant and subdominant species (e.g., OBL, FAC, FACW).
- Distribution of non-native and/or invasive species, if any are present.
- Vegetation structure of adjacent upland plant communities.

Detailed methods for characterizing and sampling vegetation are found in…

h) ***Fauna***

Description of the animal community (including invertebrates, insects, and amphibians) using the wetland and its buffers, especially evidence of past or present beaver use. Make note of any endangered species using the site.

i) ***Wetland Functions***

Wetlands perform many different functions. Not all wetlands, however, perform all functions to the same level, and the level of detail needed in the assessment for each function may vary. A description of functions should be provided for the impact area and the baseline conditions of the mitigation area. The type of information needed (qualitative vs. quantitative) varies depending on the scale of the impact (size/type). See Part 1 (Functions) for a description of the various methods for assessing wetland functions in Washington. Documentation should be provided, including the sampling and assessment methods used, the training of professional people making judgments, and references consulted. **Note:** In order to compare the wetland impact site with the mitigation site, it is imperative that the methods used for assessing the impact site be the same as those for monitoring the mitigation site.

j) ***Position and Function of the Wetland in the Landscape***

Classify the wetland according the hydrogeomorphic classification to describe its position in the watershed. Also provide a qualitative description of the functions performed by the wetland relative to its position in the watershed. This may include its role in attenuating flooding, its role as a corridor for wildlife between different regions of the watershed, its role in regional flyways, or its regional value for the improvement of water quality.

k) ***Wetland Rating***

Rate the wetland according to the Washington State Rating System for eastern Washington or western Washington (Department of Ecology, as revised) into one of the four categories. Include copies of the original data sheets.

l) ***Buffers***

Report the size of undeveloped upland buffer (within 300 feet of the wetland) that would be degraded by the project. Also describe the dominant vegetation in the buffer and the physical structure of plants in this buffer (i.e. wooded deciduous, wooded coniferous, diameter at breast height (DBH), density, snags, canopy coverage, and downed woody debris). Provide maps of the buffer areas and the vegetation types.

m) ***Description of any other on-site "waters of the State"***

n) ***Floodplain mapping of the site***

Identify whether the project is within the 100 year floodplain

o) ***Water Quality***

Describe any potential water quality impacts, including:

- Dissolved oxygen (DO)
- pH and alkalinity
- Temperature (seasonal average daily averages and annual maximum and minimum)
- Turbidity, suspended solids and sediment accretion
- Nutrients (seasonal averages for inorganic nitrogen and phosphorus)
- Fecal coliform
- Heavy metals, in water and sediments

7. MITIGATION APPROACH

a) ***Mitigation Sequencing***

The first step of any project impacting wetlands should be to avoid impacts to wetland and aquatic resources to the maximum extent possible. Explain what steps were taken to avoid and minimize wetland impacts. Include the following:

- Alternative designs: Summary of design strategies used for avoiding impacts altogether (be specific and explain why the project requiring wetland fill cannot be completed on an upland site). For larger projects it may be necessary to include an Alternative Analysis in an appendix.
- Wetland impact minimization: Description of methods (design changes) that were considered to minimize wetland impacts on site or reduce impacts over time (e.g. timing of project, redesign of project, orientation, and/or location).
- Discussion of wetland rectification strategies or how impacts could be reduced or eliminated over time through restoration and maintenance operations during the life of the project (e.g. removal of temporary fill for access road, and re-vegetation of wetland area).
- Compensatory Mitigation: Description of the proposed wetland mitigation. Size / type of compensation being proposed.
- Replacement Ratios
- How wetland buffers and stormwater treatment facilities will be provided

b) ***Goals and Objectives***

The general goals and objectives for a site are intended to describe the planned ecological functions of the site and need not be defined too precisely. However, the purpose of stating performance objectives and standards is to allow the success of the project to be evaluated. Therefore each objective must be matched

with one or more appropriate and carefully crafted performance standard, monitoring method, and contingency measure. Contingencies are included because it is assumed that failure to meet a standard indicates a shortfall in the project which may require remediation in order to adequately compensate for wetland impacts.[9]

Goals are broad statements that generally define the intent or purpose of the proposal. The goal statement should include a listing of the major wetland functions and values to be achieved. **Objectives** specify the direct actions necessary to achieve those goals and should be performance-based and measurable. The list of objectives for a mitigation project should include all functions and values that are expected to be provided by the site along with any other key characteristics (e.g. acreage). See p. 27, Goals, Objectives and Performance Standards.

Describe the long-term goals of the mitigation project. Specifically identify:

- Size, Cowardin, and HGM class of wetlands to be restored, created, enhanced, and/or preserved.
- Functions and values to be restored, created, enhanced and/or preserved.

For each goal develop a list of objectives. There should be at least one measurable objective identified for each goal, but there often will be more. Specifically address objectives in terms of the water regime, the vegetation structure, and habitat features to be restored, created, enhanced, or preserved.

c) ***Performance standards***

Performance standards are the measureable values of specific variables that establish when objectives have been met. The actual performance standards applied to a project will depend on its goals and objectives. Describe what measures will be used to determine when the objectives have been achieved. If the standards are met, the related objectives are considered to have been successfully achieved. See p. 27, Goals, Objectives and Performance Standards.

d) ***Where has this approach previously been done successfully*** (if applicable)

Describe any previous experience the designer has had with this type of mitigation proposal. Discuss where and how the proposed approach has been done before. Provide references of similar mitigation that has been completed.

[9] Ossinger, M. 1999. Success Standards for Wetland Mitigation Projects – A Guideline. Washington State Department of Transportation, Environmental Affairs Office.

8. PROPOSED COMPENSATION SITE

a) ***Site description***

Describe the mitigation site. Include:

- Ownership
- Location in relation to impacts (distance) and within the landscape/watershed (Township, Range, Section, Latitude and Longitude), include maps (see List of Figures and Tables)
- Total area of mitigation site(s) (in acres)
- Area of existing wetlands and uplands (in acres)
- Current/past land use (also on adjacent properties)

b) ***Site Selection Rationale*** (see p. 58 Site Selection)

Discuss the reasons why the site was chosen for mitigation, and the technical information you have indicating the site will successfully compensate for lost functions. Discuss any other sites that may have been considered. You will need to demonstrate that there will be:

- Enough water at the right time of year, and of adequate quality, to support the target wetland systems.
- Adequate buffers to protect the wetland and functions of that wetland.
- Soils that are appropriate for a wetland or that can be modified.
- Adjacent land uses and zoning that will not degrade your mitigation site.
- An area that will work as a wetland in the natural landscape.

Finally, you should include a discussion of how the mitigation site fits into any watershed plans that have been developed for the region.

c) ***Existing/Baseline Ecological Conditions of the Compensation Site***

It is recommended that all wetland mitigation projects require documentation of baseline ecological conditions. This is particularly true for sites proposed for wetland enhancement. It is also important to record what the initial conditions were at a created or restored site. This information would be useful for a couple of reasons: to understand where a site is coming from for scientific purposes and future studies of how similar sites progress and develop; and to discover important features of a site that may have otherwise been overlooked. The baseline information that would be required for creation/restoration sites would be similar to the type of information necessary for selecting an appropriate mitigation site. Types of baseline information that should be collected include:

- Acreage of existing wetlands and uplands (based on wetland delineation)
- National Wetland Inventory or local jurisdiction wetland mapping of the site

- Survey of current contours
- Summary of historic and current on-site and nearby land uses (zoning designations)
- Description of any known cultural resources on the site
- Description of the site in context of other wetlands / "waters of the State", or other natural areas
- Description of the water regime(s) of the mitigation site(s)
- Description of the soils on the mitigation site using county soil survey and some representative soil samples
- Description of the plant communities at the mitigation site
- Description of fauna known to use the site, including any ESA listed species
- Description of the landscape position and geomorphology of the impact site (HGM classification of any existing wetlands)
- List of functions provided at the mitigaiton site and relative level of potential to perform each (include what methods were used to assess functions)
- Wetland Rating scores for all existing wetlands
- Description of existing buffers
- Description of any other on-site "waters of the State"
- Floodplain mapping of the site
- If applicable, any information on specific water quality impacts (sedimentation, nutrients, hydrocarbons, and toxics)

The level of detail needed for each of the above will necessarily vary by site. What information may be needed for each of the above is described in the section 6a-o (Ecological Assessment of the Impact Site) above.

d) ***Constraints of the site*** which could affect design and site development (constraints include items outside of the control of the applicant) Examples of constraints are sites where:

- The major source of water is a stream in which the hydroperiod is controlled by upstream stormwate discharges;
- The mitigation site is next to a pasture from which cattle sometimes escape and may cause damage to new plantings:
- The forest buffer is owned by someone else, and may be logged;
- The site is in a rural area, but within the urban growth boundary of a local jurisdiction.

9. PRELIMINARY SITE PLAN / DESIGN

A preliminary site plan for the mitigation site describes the mitigation strategies that will be used to achieve the goals and objectives. At this stage in the process a brief description is needed of the methods, or processes, that will be used to meet each of the objectives proposed. At this stage, detailed engineering drawings are not needed, but schematic drawings are very important. The following lists the type of information that is usually needed at preliminary (draft) stage.

a) An explanation of how adequate hydrology will be provided to support a wetland in perpetuity, and include the hydrologic data to support your proposal. Obtain a water right permit is one is needed, and provide documentation to that effect.

b) Discussion how the project was designed to provide the proposed functions (rationale and structural design features).

c) ***Schematic drawings*** of the following:

- Proposed changes in topography
- Hydrologic structures
- Soils
- Proposed vegetation distribution and structure
- Habitat structures and their location
- Existing and proposed buffers

d) ***Section drawings*** showing relationship of topography, water regime, and vegetation

10. FINAL SITE PLAN / DESIGN

Detailed site plans are crucial to the ultimate success of a project and should be developed by experience professionals. The plans should include at a minimum:

a) ***Site surveys/topography*** (by registered surveyor)

- Contours at 6 inch or 1 foot intervals of the final design. Contour intervals will depend on water level fluctuations. If seasonal water fluctuations are less than 2-3 feet then contour intervals should be 6 inches. This will provide you with 4-6 contours within the critical area for vegetation development and simplify your plans for plantings.
- Spot elevations for low points, high points and structures (such as culverts, hydraulic controls, utilities, and roads.
- Property boundaries.
- On-site wetland boundaries (existing and after mitigation).
- On-site floodplain and ordinary high water mark (OHWM) boundaries.
- Orientation and scale (1 inch = 50 feet).
- Benchmarks.
- Location and elevation of soil borings (if performed).
- Location of soils to be stockpiled, if any.
- Location and elevation of all structures, especially those controlling hydrology.

- Location of all permanent markers and sampling stations used for monitoring.
- Adjoining land uses.
- Buffer areas proposed for the site and their boundaries.

b) ***Water Regime***

- Seasonal water level information and flow through rate.
- Depth to ground water.
- Sources of water and volume, velocity, frequency of flooding.
- Groundwater and surface water source and characteristics.
- Elevation of water table and dates when measured.
- Engineering drawing of water control structures.

c) ***Soils***

- Position, thickness, and classification of each soil layer.
- Existence of any foreign materials.
- Soil characteristics (from the Natural Resource Conservation Service).

NOTE: If wetland soils are to be stockpiled they will have to be maintained in an anaerobic condition to facilitate colonization by wetland plants. This means they should be kept saturated with water to preserve the anaerobic microbe community. If soils become aerobic the possibility of colonization failure is much higher.

d) ***Landscape Plans***

Generally these need to be prepared by a landscape architect with assistance from a plant ecologist. If you are constructing or altering buffers, include the same information listed below for the buffer. Plans should include at a minimum:

- drawings of plant distribution and spacing on topographic map.
- type of plant materials (size, source of nursery stock, seed, etc.).
- other planting details as needed to assure success.
- methods for controlling exotic plants if they exist in the vicinity.
- erosion control and bank stabilization.
- proposed grading plan.
- irrigation plans until plants are established (method, frequency, amount of water).
- special maintenance and protective features such as buffers, fences, weeding schedule.
- soil amendments, including mulch sources.
- cross sectional drawings showing water levels in relation to plant distributions.
- location and distribution of plantings in buffers.
- location and type of habitat structures or habitat features.

Information from the reference site or the impacted site can be used to provide guidance in identifying which of the above are the most important. A description

of the methods for controlling invasive species, the grading plans, and the irrigation plan are critically important because invasive species are difficult to eradicate once established, the grading will reflect the water regime possible, and transplants often need irrigation to survive.

e) ***Construction Specifications***

- Landscape contractor's responsibilities;
- Sources (plant materials, soils, fertilizers, habitat structures);
- A copy of the contract outlining the landscape contractor's responsibilities, including:
  - Fertilizations and irrigation.
  - Replacing plant mortalities.
  - Replanting seeded areas with transplants.
  - Temporarily protecting vegetation from wildlife, (if needed).
  - The number of site inspections with dates.

11. MONITORING PLAN

A monitoring plan is need that outlines the methods by which data are to be collected for demonstrating that the performance standards have been met. The monitoring plan needs to include the following elements:

- Variables to be measured.
- Sampling methods for each variable.
- Schedule for sampling each variable.
- Sampling locations for each variable.
- Laboratory methods to be used (if any).
- Clearly identifiable markers on the ground to act as reference points for orientation. These may include properly surveyed roads, benchmarks, and permanent structures.
- List of individuals or groups doing the monitoring.

As mentioned previously, the methods used for monitoring specific variables need to be the same as those used in establishing baseline data at either the reference site or the wetland to be impacted.

NOTE: The objectives developed for the plan are expected to be confirmed through the monitoring program. The monitoring plan, therefore, has to be designed to assess the quantitative performance standards previously developed.

Time frames for monitoring will vary with the scope of the project and should be determined in conjunction with the lead agency. Typically, monitoring should continue for at least five years, though sampling every year may always be necessary. Monitoring beyond five years should occur on projects expected to take longer to develop (e.g. forested wetland creation), or where proposed development projects have the potential to affect on-site mitigation. Additional monitoring should be made a part of the contingency plan if the project falls short of its goals and objectives.

Monitoring will usually include the following elements of the wetland ecosystem.

a) ***Vegetation***

Vegetation monitoring is needed to measure the success of planting or recolonization both in the wetland and its buffer. It should be done using established methods such as belt or line transects. Transects should be permanently marked in the field (eg. rebar painted orange) and identified on surveyed topographic maps. Each sampling site should also be photographed at the time of monitoring. The vegetation sampling could include:

- percent cover of each plant stratum and species
- species composition (also note whether native or exotic; planted or colonizer),
- average height and survival of each species
- biomass (for certain species)
- vegetation structure in and around wetland
- type of trees (coniferous, deciduous, size)
- density and size of snags and downed woody debris
- canopy structure

b) ***Water Regime***

Monitoring the water regime is needed to determine if there is adequate water for successful plant establishment, and to maintain the necessary flows in the wetland and its watershed. *The water regime is the single most important variable in establishing or maintaining a functioning wetland*, and it is extremely important to understand how water will be provided to your mitigation site. A thorough understanding of the seasonal variability in water flows, water volumes, and residence time is needed.

Some of the methods used to monitor water regime are:

- groundwater wells
- piezometers
- surface water gauging stakes
- continuous recording flow meters
- crest gauges

c) ***Soils***

Soil monitoring is needed to track the development of hydric soils over time. The characteristics to monitor include:

- soil color (use Munsells Soil Chart)
- pH
- particle size
- redox potential
- organic content
- microbial activity
- time and duration of saturation or ponding
- alkalinity

d) ***Development of habitat structure***

Monitoring the development of habitat structure and connection is needed to determine if suitable habitat is being created. Monitoring may involve some measures of:

- Tree structure around and in wetland (deciduous, coniferous)
- Density and size of snags, downed trees, woody debris
- Canopy cover
- Number of structural levels (i.e. groundcover, shrub/scrub, trees) and distribution,
- Connection of mitigation area with aquatic and terrestrial habitats and other open lands
- Description of adjacent land uses and their impact on the mitigation site
- Presence of Priority Habitats (Department of Fisheries and Wildlife)

e) ***Water quality***

Monitoring water quality is necessary to determine the success of storm water treatment, erosion control measures, and more. Runoff from development may also need to be monitored prior to discharge into a wetland mitigation site to assure that minimum water quality standards are maintained. Baseline data should be collected prior to site work by monitoring the wetland to be impacted or reference wetlands in the same watershed. The goal is to know what the water quality is prior to mitigation, so that if a change occurs, it can be measured against a background standard. If there is a change, remedial actions should be taken. Examples of projects where water quality monitoring would be required are landfills, sewage treatment plants, and industrial facilities. Parameters that may be measured include:

- Dissolved oxygen
- Nutrients (nitrogen, phosphorus dissolved and/or particulate)
- Toxic substances
- Suspended solids
- Biological and/or chemical oxygen demand
- Bacteria
- Temperature
- pH
- Alkalinity and/or hardness
- Heavy metals

NOTE: The monitoring should be tailored to address the specific objectives for the mitigation, and needs to provide sufficient data to determine whether the performance standards have been met. The selection of sampling sites that are representative of the wetland is critical for providing an accurate assessment. Sites should be chosen by persons with experience in water quality monitoring.

f) ***Buffers***

Adequate buffers around a wetland are critical in protecting many wetland functions. The monitoring plan needs to describe how the buffers will be monitored, and whether they are protecting the wetland functions being mitigated. If a buffer is being created then the vegetation can be sampled. If a good buffer already exists at the mitigation site then the monitoring should involve some measure of its effectiveness at protecting the wetland and its functions (i.e. no visible vandalism, dumping, etc.). Monitoring should include the species and the physical structure of the vegetation in the buffer.

g) ***Timetable***

A timetable for reporting monitoring results and analyses should be included in the Final Mitigation Plan. Tie the dates of providing results to the start of construction, unless other overriding reasons are present. For example, the first year's monitoring report will be due 15 months after the start of constructions.

12. SITE PROTECTION

The mitigation plan needs to specify what measures will be taken to protect the site for the long term. Conservation easements, deed restrictions, and direct donations are a few options available for protecting the mitigation site. Regulatory agencies will require some legal proof that the site has been adequately protected. The preliminary plan should discuss the measures proposed by the applicant for protecting the site. The final mitigation plan should include copies of the conservation easements, deed restrictions, or other legal instruments.

For example, a conservation easement is a legal agreement by a property owner to restrict certain uses of their land. An easement document is drawn up between the property owner and the prospective easement holder that specifies restrictions on use that are necessary to protect the property. The recipient of the conservation easement is given the right to enforce the restrictions. Recipients may be a public agency, a land trust, or historic preservation groups. It legally binds all present and future owners of the lands to specific restrictions, thus providing long-term protection. Deed restrictions are restrictions placed on the property deed to prohibit certain uses of the land. Direct donations are donations of property that are given to a land trust, public agency, or some other entity that will assume responsibility for managing the property.

A list of reference documents which may be useful for selecting the best protection option will be provided in the final draft.

13. MAINTENANCE, MONITORING, AND CONTINGENCY PLANS

Regular site maintenance is a crucial component to ensure mitigation site success.

Describe planned maintenance activities and the maintenance schedule, including inspection of irrigation system and water structures, plant replacement, weeding, fertilization, erosion control, herbivore protection, trash removal, and/or any other such activities. The need for these activities should be determined in advance of construction from the baseline studies. The persons/entities responsible for financing and carrying out maintenance activities need to be specified; including names, titles, and phone numbers.

A contingency plan is necessary in case mitigation fails or only partially succeeds. Contingency plans indicate corrective measures that will be taken when monitoring indicates that performance standards are not being met or when construction and re-vegetation plans have not been completed. The contingency plan should outline the steps that will be taken if performance standards are not met. The following points need to be addressed in a contingency plan:

- **Initiating procedures** - If a performance standard is not met within the time specified in the mitigation plan the permittee shall prepare an analysis of the cause(s) of failure, propose corrective actions, and present a time frame for implementing these actions which need to be approved by the agencies. Minor corrective measures may be taken as part of routine maintenance, and should merely be identified in subsequent monitoring reports. Reporting "problems" in a timely manner will allow mid-course corrections and avoid possible enforcement actions.

- **Funding** - The contingency plan should also establish and describe a **Contingency Fund** for potential use in case any corrective actions are necessary. The contingency fund is separate from the performance bond. Its purpose is to assure implementation of necessary corrective actions in the event the project does not achieve its goals and objectives at the end of the monitoring period. You will need to indicate what funds will be available for planning, implementing and monitoring any contingency procedures that may be required to achieve the mitigation goals. Generally, the fund amount should equal about 20% of the total cost of mitigation associated with the project.

- **Responsible Parties** - The names, addresses, and phone numbers of the persons/entities responsible for implementing and monitoring contingency procedures need to be listed.

14. IMPLEMENTATION SCHEDULE

The implementation schedule should provide a detailed outline of the starting time and duration of the mitigation activities listed in the landscape plans and construction specifications.

a) ***Construction Schedule***

The construction schedule outlines the time at which all major earth moving, planting, and construction activities will take place. This will include:

- Construction sequence requirements for grading, water diversions, plantings, etc.
- Time schedule and completion dates (must be concurrent with or prior to construction activities that cause the impact). Delays in implementing mitigation plans may result in an increase in the mitigation required and enforcement actions.
- Any permit conditions specifying time limits.

b) ***Monitoring Schedule***

The monitoring schedule outlines the times when sampling will be done and the time by which the data will be analyzed. Sampling times for the five to 10 years of monitoring should be specified to within a two week period.

c) ***Reporting Schedule***

The reporting schedule outlines the times at which reports summarizing and analyzing the monitoring data are submitted to agencies. Initially, monitoring reports should be submitted annually, but this may be extended to every two or three years if the monitoring schedule is reduced after the first three to five years.

15. **Financial Assurances**

In certain cases regulatory agencies may require a permittee to post a performance bond before issuing permits. Bonding holds a permittee accountable for implementing the mitigation, monitoring, and contingency plans, and the bond may be split accordingly. The release of performance bonds may be contingent on:

- Completion of construction,
- Submittal of an "as-built" report on completion of initial work,
- Submittal and acceptance of monitoring reports,
- Or, implementation of corrective measures.

"As-Built" Reports

Once the construction has been completed, an "As-built" report and/or drawings should be provided to the appropriate agencies via certified mail (provides proof of submittal) within the timeframe noted in the approved permit. The "As-built" should identify the date the compensatory mitigation site construction was completed and if there were any deviations from the approved compensatory mitigation plan. An as-built report should look a lot like a final mitigation plan with any changes from the approved construction plan highlighted in some manner (see page 41, Documenting "As-built"Conditions).

An as-built report should include the following:

- Identify responsible parties (designer, construction contractors, planting contractor) and whether a qualified wetland scientist or other responsible party was on-site during construction
- Dates of construction (including completion date)

- Description of any changes to the original plan
- Description of any problems encountered during construction and what was done to correct them
- List any follow-up actions needed, with a schedule and who is responsible
- As-built plan sheets / drawings
- Photos (pan of site) to document baseline conditions

Monitoring Reports

In most cases, monitoring reports will be required and identified as special condition for every permit requiring construction of a compensatory mitigation site. Just as "as-built" reports, monitoring reports will be subject to formal compliance efforts. While monitoring reports will generally be required on an annual basis, regulatory staff may require more frequent submittals of monitoring reports for specific projects, and in some cases monitoring reports may only be required bi-annually. If a problem is identified within a monitoring report, regulatory staff can schedule a site visit to determine the extent of the problem and identify remedial measures. These shorter monitoring reports can then be made part of the official case file leading to improved regulatory documentation of permit compliance and compensatory mitigation success.

See Appendix L for a checklist of information required in a monitoring report. The agencies recognize that there may be cases where providing all of the information would not be practical (for very small projects) or where providing more information might be necessary (for large or complex compensatory mitigation projects). However, in the majority of cases, this information should be provided. Agency staff processing the application can assist the applicant to determine whether deviations are appropriate. In all cases, the completed monitoring reports should be submitted to the appropriate agencies for inclusion into the project file.

LIST OF COMMON ACRONYMS AND ABBREVIATIONS

CFR …….Code of Federal Regulations

Corps or USACE……. ..United States Army Corps of Engineers

CWA……Clean Water Act
(also known as the Federal Water Pollution Control Act)

Ecology……Washington State Department of Ecology

ESA……..Endangered Species Act

EPA or USEPA……....United States Environmental Protection Agency

FR…….Federal Register

GIS……Geographic Information Systems

HGM…….Hydrogeomorphic

MOA……Memorandum of Agreement

NAS…….National Academy of Sciences

NISC……National Invasive Species Council

NRCS……...Natural Resource Conservation Service,
US Dept. of Agriculture

RCW……Revised Code of Washington

USC……..United States Code

WAC……Washington Administrative Code

WAFAM……..Washington Function Assessment Methods

GLOSSARY

Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of actions. Related to compensatory mitigation, it involves the applicant and the regulatory agencies discussing the problems occurring on a compensation site and coming to agreement on possible solutions or alternative approaches necessary to bring the site into compliance.

Atypical wetland refers to a compensation wetland that alters the hydrogeomorphic setting of a site and, therefore, is not appropriate for its position in the landscape. For example, excavating depressions to "enhance" a slope wetland is "atypical" because depressional wetlands are not appropriate on a slope.

Buffers or buffer areas are vegetated areas adjacent to wetlands, or other aquatic resources, that can reduce impacts from adjacent land uses through various physical, chemical, and/or biological processes.

Conservation easement is a restriction placed on a piece of property to protect the resources (natural or man-made) associated with the parcel. The easement is either voluntarily sold or donated by the landowner, and constitutes a legally binding agreement that prohibits certain types of activities from taking place on the land.

Contingency plan outlines actions that would be triggered if project monitoring revealed a problem that would prevent the site from attaining its stated goals, objectives, and performance standards. Contingency plans should identify anticipated problems and the specific maintenance activity that would be implemented to rectify each problem.

Cultural Resources are any archaeological, historical, or cultural (e.g. religious significance) areas of concern (this term is a catch all term that is not defined in any Federal Statute or regulation).

Deed Restriction An imposed restriction in a deed (a signed, written instrument that conveys title to real property) that limits the use of the property.

Environmental Processes means the conditions that control long-term patterns of structures, ecosystems and functions in the landscape. These include the movement of water, sediment, nutrients, energy, plants, and animals in the landscape, and the factors that control this movement - climate, geology, soils, topography.

Hydrogeomorphic or HGM A system used to classify wetlands based on the position of the wetland in the landscape (geomorphic setting), the water source for the wetland, and the flow and fluctuation of the water once in the wetland.

Hydroperiod or water regime refers to the pattern of water level fluctuations in a wetland. Includes the depth, frequency, duration, and timing of inundation or flooding. Patterns can be daily, monthly, seasonal, annual or longer term.

Invasive Species is defined by the National Invasive Species Council (NISC) as (1) "a non-native (alien) to the ecosystem under consideration and (2) a species whose introduction is likely to cause economic or environmental harm, or harm to human health"(Executive Order 13112).

Mitigation banking has been defined as "wetland restoration, creation, enhancement, and in exceptional circumstances, preservation undertaken expressly for the purpose of compensating for unavoidable wetland losses in advance of development actions, when such compensation cannot be achieved at the development site or would not be as environmentally beneficial." 1995 Federal Guidance on Wetland Mitigation Banking

State Historic Preservation Office is the Washington State Office of Archaeology and Historic Preservation.

Tribal Historic Preservation Office includes one of 4 tribes in Washington State: the Makah Tribe; the Skokomish Indian Tribe; the Confederated Tribes of the Colville; and the Spokane Tribe.

Waters of the United States Taken from 33 CFR 328.3 means "(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
(2) All interstate waters including interstate wetlands;
(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa takes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
(i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
(ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
(iii) Which are used or could be used for industrial purpose by industries in interstate commerce;
(4) All impoundments of waters otherwise defined as waters of the United States under the definition;
(5) Tributaries of waters identified in paragraphs (a)(1)-(4) of this section;
(6) The territorial seas;
(7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a)(l)-(6) of this section. Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the United States.
(8) Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA.

Wetlands Definition taken from the *Washington State Wetlands Delineation Manual* (Ecology 1997). "The Corps of Engineers (CE) (Federal Register 1982), the Environmental Protection Agency (EPA) (Federal Register 1985), the Shoreline Management Act (SMA) and the Growth Management Act (GMA) all define wetlands as: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. In addition, the SMA and GMA definitions add: "Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands."

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Shaffer, P., M.E. Kentula, and S.E. Gwin. 1999. Characterization of wetland hydrology using hydrogeomorphic classification. *Wetlands* 19(3): 490-504.

Shaffer, P.W. and T.L. Ernst. 1999. Distribution of soil organic matter in freshwater emergent/open water wetlands in the Portland, Oregon metropolitan area. *Wetlands* 19(3): 505-516.

Stevens, M.L. and R. Vanbianchi. 1993. Restoring wetlands in Washington: A guidebook for wetland restoration planning and implementation. Washington State Department of Ecology Publication #93-17.

Turner, M. 1989. Landscape Ecology: The effect of pattern on process. Annual Review of Ecology and Systematics 20:171-97.

Wetland Mitigation Banking Guidebook for Oregon. 2000. Oregon Division of State Lands.

WEB ADDRESSES FOR HYPERLINKS[10]

Page # (s)	Referenced Document and Internet Address
I, 1	*Guidelines for Developing Freshwater Wetlands Mitigation Plans and Proposals*, Ecology Publication #94-29 http://www.ecy.wa.gov/programs/sea/pubs/94-029/94-029.html
I, 6	"Compensating For Wetland Losses under the Clean Water Act" http://www.nap.edu/books/0309074320/html/
I	National Wetlands Mitigation Action Plan http://www.mitigationactionplan.gov/index.html
I	*How Ecology Regulates Wetlands*, Ecology Publication #97-112 http://www.ecy.wa.gov/biblio/97112.html
I	*Washington State Wetland Mitigation Evaluation Study Phase 1: Compliance*. Ecology Publication # 00-06-016. http://www.ecy.wa.gov/biblio/0006016.html
I	*Washington State Wetland Mitigation Evaluation Study Phase 2: Evaluating Success*. Ecology Publication # 02-06-009. http://www.ecy.wa.gov/biblio/0206009.html
1, 37, 39, 41, 49	*Washington State Wetland Mitigation Evaluation Study* http://www.ecy.wa.gov/programs/sea/mit-study/index.html
1	Best Available Science for Freshwater Wetlands http://www.ecy.wa.gov/programs/sea/bas_wetlands/index.html
2, 49	National Wetlands Mitigation Action Plan http://www.mitigationactionplan.gov/index.html
2	Mitigation Checklist http://www.mitigationactionplan.gov/checklist.pdf
2	Draft state Wetland Banking Rule http://www.ecy.wa.gov/programs/sea/wetmitig/misc/draft%20rule%20easyread.pdf The Draft can also be found at the Ecology Wetland Mitigation Banking Home Page (see below)
2	Ecology Wetland Mitigation Banking Home Page http://www.ecy.wa.gov/programs/sea/wetmitig/index.html
9, 16	Washington Natural Resources Conservation Service (NRCS) office http://www.wa.nrcs.usda.gov/contact/fieldoffices.html
9	Washington Facility/Site Atlas http://apps.ecy.wa.gov/website/facsite/viewer.htm
13	National Invasive Species Council (on the invasivespecies.gov site, which is a gateway to federal and state invasive species activities and programs) http://www.invasivespecies.gov/

[10] For web addresses for the following types of hyperlinks refer to the On-line Resources (Government sites): USC, RCW, WAC, CFR, FR.

Page # (s)	Referenced Document and Internet Address
13	Executive Order 13112 (Invasive Species) http://www.archives.gov/federal_register/executive_orders/1999.html
13, 19	Washington State Noxious Weed List http://www.nwcb.wa.gov/weed_list/weed_listhome.html
16	Conservation District http://www.scc.wa.gov/districts/list/
23, 24	County Noxious Weed Lists and Boards http://www.nwcb.wa.gov/county_bds/county_bd_home.html
26	*Washington State Function Assessment Methods* http://www.ecy.wa.gov/programs/sea/wfap/index.html

ADDITIONAL RESOURCES

(this is a work in progress – please provide suggestions for additional on-line resources)

Government Sites

Code of Federal Regulations (CFR)
http://www.gpoaccess.gov/cfr/index.html

Federal Register
http://www.gpoaccess.gov/fr/

Revised Code of Washington (RCW)
http://www.leg.wa.gov/rcw/index.cfm

State Historic Preservation Office (Washington Office of Archaeology & Historic Preservation) http://www.oahp.wa.gov/

The Library of Congress, THOMAS, Legislative Information on the Internet. Find recent amendments to laws by searching this web site. http://thomas.loc.gov/

Tribal Historic Preservation Offices in Washington State
http://grants.cr.nps.gov/thpo/thpoaddress.cfm

United States Army Corps of Engineers – Seattle District (Regulatory)
http://www.nws.usace.army.mil/reg.html

United States Code (USC) – Office of the Law Revision Counsel
http://uscode.house.gov/uscode.htm

United States Code (USC) – Legal Information Institute
http://www4.law.cornell.edu/uscode

United States Environmental Protection Agency Headquarters Wetlands Page
http://www.epa.gov/owow/wetlands/

Washington Administrative Codes (WAC's)
http://www.leg.wa.gov/wac/

Washington Natural Resources Conservation Service (NRCS) Field Offices
http://www.wa.nrcs.usda.gov/contact/fieldoffices.html
Go directly to Soil Survey Reports:
http://www.or.nrcs.usda.gov/pnw_soil/wa_reports.html

Washington State Department of Ecology
http://www.ecy.wa.gov

WA State Department of Ecology Wetlands Mitigation Banking Home Page. You can also find a link to the draft rule (WAC 173-700). Although it has not be adopted at this time, it lays out clear criteria and requirements for wetland mitigation banks. Ecology will use the draft rule as guidance during review of bank proposals.
http://www.ecy.wa.gov/programs/sea/wetmitig/index.html

WA State Department of Ecology Facility/Site Identification System
http://www.ecy.wa.gov/services/as/iss/fsweb/fshome.html

WA State Department of Ecology On-line Public Events Calendar
http://apps.ecy.wa.gov/pubcalendar/calendar.asp

Washington State Noxious Weed Control Board (includes information on County Weed Boards)
http://www.nwcb.wa.gov/INDEX.htm

Delineation

Corps of Engineers Wetlands Delineation Manual – January 1987

Environmental Laboratory. (1987). "Corps of Engineers wetlands delineation manual," Technical Report Y-87-1, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS. NTIS[11] No. AD A176 912

Available on-line at
http://www.nws.usace.army.mil/publicmenu/DOCUMENTS/87_Manual.pdf, or
http://www.wes.army.mil/el/wetlands/pdfs/wlman87.pdf

WA State Wetlands Identification and Delineation Manual – March 1997

This manual includes clarification guidance on the 1987 manual published by the Corps (1994 Regional Guidance for Washington is available on-line at http://www.nws.usace.army.mil/publicmenu/DOCUMENTS/WASHINGTON_REGIONAL_GUIDANCE_on_87_manual.pdf).

Washington State Department of Ecology. March 1997. Washington State Wetlands Identification and Delineation Manual. Publication No. 96-94[12].
Available on-line as a "PDF" at http://www.ecy.wa.gov/biblio/9694.html

[11] National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. Telephone: (800) 553-6847. Website: http://www.ntis.gov/

[12] All Department of Ecology Publications are available by contacting the Publications Distributions Office at address: PO Box 47600, Olympia WA 98504-7600, email: jewi461@ecy.wa.gov, or phone: (360) 407-7472.

The Field Guide for Wetland Delineation prepared by the Wetland Training Institute is available on-line at http://www.wetlandtraining.com/books.html.

For a list of plants that occur in Washington's wetlands refer to:

Reed, P.B., Jr. 1988. "National List of plant species that occur in wetlands: Northwest (Region 9)". U.S. Fish and Wildlife Service, Biological Report 88 (26.9).

Reed, P.B., Jr. 1993. "1993 Supplement to list of plant species that occur in wetlands: Northwest (Region 9)." U.S. Fish and Wildlife Service, Supplement to Biological Report 88 (26.9).

Both of the above are available on-line at: http://www.nwi.fws.gov/bha/

You can also go to the USDA Natural Resources Conservation Service **PLANTS Database** to **Display USFWS wetland indicator status** for vascular plants, by genus, family, and/or wetland region.http://plants.usda.gov/cgi_bin/topics.cgi?earl=wetland.html

Hydric soil lists are available on the USDA Natural Resources Conservation Service internet site, for Washington lists by county go to: http://www.wa.nrcs.usda.gov/technical/soils/county_hydric_lists.html

USDA, NRCS. 2002 Field Indicators of Hydric Soils in the United States, Version 5.0. G.W. Hurt, P.M. Whited, and R.F. Pringle (eds.). USDA, NRCS in cooperation with the National Technical Committee for Hydric Soils, Fort Worth, TX.
Addendum Sheet
"Field Indicators of Hydric Soils in the United States—Guide for Identifying and Delineating Hydric Soils, Version 5.01, 2003."

Available on-line at: http://soils.usda.gov/use/hydric/ (links)

Functions and Assessment Methods

For descriptions of wetland functions refer to Chapter 2 of the state's best available science document.

Sheldon, D., T. Hruby, P. Johnson, K. Harper, A. McMillan, S. Stanley, E. Stockdale. August 2003. Draft Freshwater Wetlands in Washington State Volume 1: A Synthesis of the Science. Washington State Department of Ecology Publication #03-06-016. http://www.ecy.wa.gov/biblio/0306016.html, or the Best Available Science for Freshwater Wetlands Homepage http://www.ecy.wa.gov/programs/sea/bas_wetlands/index.html

Washington State Wetland Function Assessment Methods (WAFAM*)*

Volume I: Riverine and Depressional Wetlands in the Lowlands of Western WA
Hruby, T., T. Granger, K. Brunner, S. Cooke, K. Dublanica, R. Gersib, L. Reinelt, K. Richter, D. Sheldon, E. Teachout. A. Wald, and F. Weinmann. 1999. Methods for assessing wetland functions Volume I: Riverine and Depressional Wetlands in the Lowlands of Western Washington. WA State Department of Ecology Publication #99-115. http://www.ecy.wa.gov/programs/sea/wfap/index.html

Volume II: Depressional Wetlands in the Columbia Basin of Eastern Washington
Hruby, T., S. Stanley, T. Granger, T. Duebendorfer, R. Friesz, B. Lang, B. Leonard, K. March, and A. Wald. 2000. Methods for Assessing Wetland Functions Volume II: Depressional Wetlands in the Columbia Basin of Eastern Washington. WA State Department of Ecology Publication #00-06-47.
http://www.ecy.wa.gov/programs/sea/wfap/index.html

Wetland Functions Characterization Tool for Linear Projects

Null, W., G. Skinner, and W. Leonard. 2000. Wetland Functions Characterization Tool for Linear Projects. Washington State Department of Transporation Environmental Affairs Office, Olympia, WA.
http://www.wsdot.wa.gov/environment/biology/docs/bpjtool.pdf

Other Publications

Permit Handbook: Commonly Required Environmental Permits for Washington State. Ecology Publication #90-29. http://www.ecy.wa.gov/biblio/9029.html

APPENDICES

Appendix A - Multi-Agency Compensatory Mitigation Plan Checklist[1]

- ☐ Mitigation Goals and Objectives
  - ○ Describe functions lost at impact site
  - ○ Describe functions to be gained at mitigation site
  - ○ Describe overall watershed improvements to be gained

- ☐ Baseline Information for Impact and Proposed Mitigation Sites
  - ○ Provide data on physical attributes of sites (soils, vegetation, hydrology)
  - ○ Describe historic and existing land uses and resources impacted
  - ○ Describe reference site attributes if available

- ☐ Mitigation Site Selection and Justification
  - ○ Describe process of selecting proposed site
  - ○ Likelihood of success, future land use compatibility, etc.

- ☐ Mitigation Work Plan
  - ○ Location
  - ○ Construction Plan
  - ○ Describe planned hydrology, vegetation, soils, buffers, etc.

- ☐ Performance Standards
  - ○ Identify success criteria
  - ○ Compare functions lost and gained at impact and mitigation sites
  - ○ Describe soils, vegetation and hydrology parameter changes

- ☐ Site Protection and Maintenance
  - ○ List parties and responsibilities
  - ○ Provide evidence of legal protective measures
  - ○ Maintenance plan and schedule

- ☐ Monitoring Plan
  - ○ Provide monitoring schedule, identify party (ies) and responsibilities
  - ○ Specify data to be collected, including assessment tools and methodologies

- ☐ Adaptive Management Plan
  - ○ Identify party (ies) and responsibilities
  - ○ Remedial measures (financial assurances, management plan, etc.)

- ☐ Financial Assurances
  - ○ Identify party (ies) responsible for assurances
  - ○ Specify type of assurance, contents and schedule

[1] Refer to "Supplement: Compensatory Mitigation Plan Checklist" for further explanation of specific checklist items.

SUPPLEMENT: COMPENSATORY MITIGATION PLAN CHECKLIST

This document is intended as a technical guide for Clean Water Act (CWA) Section 404 permit applicants[2] preparing compensatory mitigation plans. Compensatory mitigation is required to offset impacts that cannot be avoided and minimized to the extent practicable. The purpose of this document is to identify the types and extent of information that agency personnel need to assess the likelihood of success of a mitigation proposal. Success is generally defined as: a healthy sustainable wetland/water that – to the extent practicable – compensates for the lost functions of the impacted water in an appropriate landscape/watershed position. This checklist provides a basic framework that will improve predictability and consistency in the development of mitigation plans for permit applicants. Although every mitigation plan may not need to include each specific item, applicants should address as many as possible and indicate, when appropriate, why a particular item was not included (For example, permit applicants who will be using a mitigation bank would not be expected to include detailed information regarding the proposed mitigation bank site since that information is included in the bank's enabling instrument). This checklist can be adapted to account for specific environmental conditions in different regions of the U.S.

1. Mitigation Goals and Objectives

Impact Site

a. Describe and quantify the aquatic resource type and functions that will be impacted at the proposed impact site. Include temporary and permanent impacts to the aquatic environment.

b. Describe aquatic resource concerns in the watershed (e.g. flooding, water quality, habitat) and how the impact site contributes to overall watershed/regional functions. Identify watershed or other regional plans that describe aquatic resource objectives.

Mitigation Site

c. Describe and quantify the aquatic resource type and functions for which the mitigation project is intended to compensate.

d. Describe the contribution to overall watershed/regional functions that the mitigation site(s) is intended to provide.

2. Baseline Information - for proposed impact site, proposed mitigation site & if applicable, proposed reference site(s).

a. Location

1. Coordinates (preferably using DGPS) & written location description (including block, lot, township, county, Hydrologic Unit Code (HUC) number, as appropriate and pertinent.
2. Maps (e.g., site map with delineation (verified by the Corps), map of vicinity, map identifying location within the watershed, NWI map, NRCS soils map, zoning or planning maps; indicate area of proposed fill on site map).
3. Aerial/Satellite photos.

b. Classification – Hydrogeomorphic as well as Cowardin classification, Rosgen stream type, NRCS classification, as appropriate.

c. Quantify wetland resources (acreage) or stream resources (linear feet) by type(s).

[2] The checklist may be used in other federal or state programs as well; however, additional information may be needed to satisfy specific program requirements. For example, Attachment A indicates additional information needed by the Natural Resources Conservation Service (NRCS) to satisfy the Swampbuster provisions of the Food Security Act.

d. Assessment method(s) used to quantify impacts to aquatic resource functions (e.g., HGM, IBI, WRAP, etc.); explain findings. The same method should be used at both impact and mitigation sites.

e. Existing hydrology

1. Water budget. Include water source(s) (precipitation, surface runoff, groundwater, stream) and losses(s). Provide budgets for both wet and dry years.
2. Hydroperiod (seasonal depth, duration, and timing of inundation and/or saturation), percent open water.
3. Historical hydrology of mitigation site if different than present conditions
4. Contributing drainage area (acres).
5. Results of water quality analyses (e.g., data on surface water, groundwater, and tides for such attributes as pH, redox, nutrients, organic content, suspended matter, DO, heavy metals).

f. Existing vegetation

1. List of species on site, indicating dominants.
2. Species characteristics such as densities, general age and health, and native/nonnative/ invasive status.
3. Percent vegetative cover; community structure (canopy stratification).
4. Map showing location of plant communities.

g. Existing soils

1. Soil profile description (e.g., soil survey classification and series) and/or stream substrate (locate soil samples on site map).
2. Results of standard soils analyses, including percent organic matter, structure, texture, permeability.

h. Existing wildlife usage (indicate possible threatened and endangered species habitat).

i. Historic and current land use; note prior converted cropland.

j. Current owner(s)

k. Watershed context/surrounding land use.

1. Impairment status and impairment type (e.g., 303(d) list) of aquatic resources.
2. Description of watershed land uses (percent ag, forested, wetland, developed).
3. Size/Width of natural buffers (describe, show on map).
4. Description of landscape connectivity: proximity and connectivity of existing aquatic resources and natural upland areas (show on map).
5. Relative amount of aquatic resource area that the impact site represents for the watershed and/or region (i.e., by individual type and overall resources).

3. Mitigation Site Selection & Justification

a. Site-specific objectives: Description of mitigation type(s)[3], acreage(s) and proposed compensation ratios.

b. Watershed/regional objectives: Description of how the mitigation project will compensate for the functions identified in the Mitigation Goals section 1(c).

c. Description of how the mitigation project will contribute to aquatic resource functions within the watershed or region (or sustain/protect existing watershed functions) identified in the Mitigation

[3] That is, restoration, enhancement, creation or preservation: see Regulatory Guidance Letter (RGL) 02-2, Mitigation RGL, for definitions for these terms.

Goals section 1(d). How will the planned mitigation project contribute to landscape connectivity?

d. Likely future adjacent land uses and compatibility (show on map or aerial photo).

e. Description of site selection practicability in terms of cost, existing technology, and logistics.

f. If the proposed mitigation is off-site and/or out-of-kind, explain why on-site or in-kind options4[4] are not practicable or environmentally preferable.

g. Existing and proposed mitigation site deed restrictions, easements and rights-of-way. Demonstrate how the existence of any such restriction will be addressed, particularly in the context of incompatible uses.

h. Explanation of how the design is sustainable and self-maintaining. Show by means of a water budget that there is sufficient water available to sustain long-term wetland or stream hydrology. Provide evidence that a legally defensible, adequate and reliable source of water exists.

i. USFWS and/or NOAA Fisheries Listed Species Clearance Letter or Biological Opinion.

j. SHPO Cultural Resource Clearance Letter.

4. Mitigation Work Plan

a. Maps marking boundaries of proposed mitigation types; include DGPS coordinates.

b. Timing of mitigation: before, concurrent or after authorized impacts; if mitigation is not in advance or concurrent with impacts, explain why it is not practicable and describe other measures to compensate for the consequences of temporal losses.

c. Grading plan

1. Indicate existing and proposed elevations and slopes.
2. Describe plans for establishing appropriate microtopography. Reference wetland(s) can provide design templates.

d. Description of construction methods (e.g., equipment to be used)

e. Construction schedule (expected start and end dates of each construction phase, expected date for as-built plan).

f. Planned hydrology

1. Source of water.
2. Connection(s) to existing waters.
3. Hydroperiod (seasonal depth, duration, and timing of inundation and saturation), percent open water, water velocity.
4. Potential interaction with groundwater.
5. Existing monitoring data, if applicable; indicate location of monitoring wells and tream gauges on site map.
6. Stream or other open water geomorphic features (e.g., riffles, pools, bends, deflectors).
7. Structures requiring maintenance (show on map) Explain structure maintenance in section 6(c).

g. Planned vegetation

1. Native plant species composition (e.g., list of acceptable native hydrophytic vegetation).
2. Source of native plant species (e.g. salvaged from impact site, local source, seed bank) stock type (bare root, potted, seed) and plant age(s)/size(s).
3. Plant zonation/location map (refer to grading plan to ensure plants will have an acceptable hydrological environment).

[4] See Federal Guidance on the Use of Off-Site and Out-of-Kind Compensatory Mitigation under Section 404 of the CWA.

4. Plant spatial structure – quantities/densities, % cover, community structure (e.g., canopy stratification).
5. Expected natural regeneration from existing seed bank, plantings, and natural recruitment.

h. Planned soils
1. Soil profile
2. Source of soils (e.g., existing soil, imported impact site hydric soil), target soil characteristics (organic content, structure, texture, permeability), soil amendments (e.g., organic material or topsoil).
3. Erosion and soil compaction control measures.

i. Planned habitat features (identify large woody debris, rock mounds, etc. on map).

j. Planned buffer (identify on map).
1. Evaluation of the buffer's expected contribution to aquatic resource functions.
2. Physical characteristics (location, dimensions, native plant composition, spatial and vertical structure.

k. Other planned features, such as interpretive signs, trails, fence(s), etc.

5. Performance Standards

a. Identify clear, precise, quantifiable parameters that can be used to evaluate the status of desired functions. These may include hydrological, vegetative, faunal and soil measures. (e.g., plant richness, percent exotic/invasive species, water inundation/saturation levels). Describe how performance standards will be used to verify that objectives identified in 3(b) and 3(c) have been attained.

b. Set target values or ranges for the parameters identified. Ideally, these targets should be set to mimic the trends and eventually approximate the values of a reference wetland(s).

6. Site Protection and Maintenance

a. Long-term legal protection instrument (e.g. conservation easement, deed restriction, transfer of title).

b. Party(ies) responsible and their role (e.g. site owner, easement owner, maintenance implementation). If more than one party, identify primary party.

c. Maintenance plan and schedule (e.g. measures to control predation/grazing of mitigation plantings, temporary irrigation for plant establishment, replacement planting, structure maintenance/repair, etc.).

d. Invasive species control plan (plant and animal).

7. Monitoring Plan

a. Party(ies) responsible for monitoring. If more than one, identify primary party.

b. Data to be collected and reported, how often and for what duration (identify proposed monitoring stations, including transect locations on map).

c. Assessment tools and/or methods to be used for data collection monitoring the progress towards attainment of performance standard targets.

d. Format for reporting monitoring data and assessing mitigation status.

e. Monitoring schedule

8. Adaptive Management Plan

a. Party(ies) responsible for adaptive management.

b. Identification of potential challenges (e.g., flooding, drought, invasive species, seriously degraded site, extensively developed landscape) that pose a risk to project success. Discuss how the design accommodates these challenges.
c. Discussion of potential remedial measures in the event mitigation does not meet performance standards in a timely manner.
d. Description of procedures to allow for modifications of performance standards if mitigation projects are meeting mitigation goals, but in unanticipated ways.

9. Financial Assurances

a. For each of the following, identify party(ies) responsible to establish and manage the financial assurance, the specific type of financial instrument, the method used to estimate assurance amount, the date of establishment, and the release and forfeiture conditions:
   1. Construction phase
   2. Maintenance
   3. Monitoring
   4. Remedial measures
   5. Project success

b. Types of assurances (e.g., performance bonds, irrevocable trusts, escrow accounts, casualty insurance, letters of credit, etc.).
c. Schedule by which financial assurance will be reviewed and adjusted to reflect current economic factors.

ATTACHMENT A
NATURAL RESOURCES CONSERVATION SERVICE (NRCS)
PROGRAM REQUIREMENTS5[5]

- ☐ NRCS conservation practice standards and specifications
- ☐ NRCS Environmental Evaluation
- ☐ Mitigation agreement
- ☐ Federal/State/Local required permits
- ☐ Compatible use statement:
  - ○ Allowable uses (e.g. hunting, fishing)
  - ○ Prohibited uses (e.g. grazing, silviculture)
  - ○ Uses approved by compatible use permit
- ☐ Copy of recorded easement
- ☐ Subordination waiver on any existing liens on mitigation site
- ☐ Statement of landowner's tax liability
- ☐ Copy of Warrantee Deed from landowner's attorney (no encumbrances, if so list)
- ☐ Copy of certified wetland determination:
  - ○ NRCS-CPA-026 Highly Erodible Land and Wetland Conservation Certification
  - ○ Wetland label map
- ☐ Copy of FSA Good Faith Waiver
- ☐ Copy of easement(s) ingress/egress granted to USDA employees for gaining legal access to mitigation site
- ☐ Copy of NRCS-CPA-38 Request for Certified Wetland Determination/Delineation

[5] For a complete list of the program requirements needed by NRCS to satisfy the Swampbuster provisions of the Food Security Act see the National Food Security Act Manual.

Appendix B – Agency Contacts

US Army Corps of Engineers

The Seattle District administers the Corps' permit program throughout the state of Washington. An exception is Port activities on the Washington side of the Lower Columbia River, which are processed by the Portland District. In addition, the boundaries of the Walla Walla District extend in to WA (the watershed of the Snake River, and a portion of the Columbia River Drainage between the Umatilla Bridge just below McNary Dam (River Mile 290.5) and the end of the Lake Wallula backwater that forms behind McNary Dam (River Mile 345.4), with the exception of the Yakima River Basin beyond River Mile 8.5 near Richland, Washington).

Seattle District Headquarters

Check the following website for the most current list of regulatory contacts:
http://www.nws.usace.army.mil/reg.html (Regulatory)

Mailing Address:
Seattle District Corps of Engineers
Regulatory Branch, CENWS-OD-RG
ATTN: "person's name, if applicable"
Post Office Box 3755
Seattle, Washington 98124-3755

Physical Address:
Federal Center South
4735 E. Marginal Way South
Seattle, Washington

Telephone: (206) 764-3495
Fax: (206) 764-6602

Seattle District Regional Contacts

SOUTHWEST WASHINGTON FIELD OFFICE

U.S. Army Corps of Engineers Southwest Washington Field Office 2108 Grand Boulevard Vancouver, WA 98661-4624 Fax: (360) 750-9307	***Clark, Klickitat, Skamania (south of Swift Reservoir)*** ***Cowlitz, Wahkiakum, Skamania (Swift Reservoir and north)***	Ron Klump (360)750-9046 David Martin (360)694-1171

CENTRALWASHINGTON FIELD OFFICE

Chelan, Douglas, Grant and Okanogan

Debbie Knaub
U.S. Army Corps of Engineers
Central Washington Field Office
Post Office Box 2829
Chelan, Washington 98816
Telephone: (509) 682-7010
Fax: (509) 682-7710

Kittitas and Yakima

Joe Brock
Seattle District Corps of Engineers
Regulatory Branch, CENWS-OD-RG
ATTN: Joe Brock
Post Office Box 3755
Seattle, Washington 98124
Telephone: (206) 764-6905
Fax: (206) 764-6602

EASTERN WASHINGTIN FIELD OFFICE

Adams, Asotin, Benton, Columbia, Ferry, Franklin, Garfield, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman

U.S. Army Corps of Engineers Tim Erkel (509) 238-4570
Eastern Washington Field Office
Post Office Box 273
Chattaroy, Washington 99003-0273
Fax: (509)238-4561

US Environmental Protection Agency (Region 10)

The main regional EPA function is to provide oversight of Corps projects statewide, and to write 401 certifications and provide assistance on tribal lands and national parks. Within EPA, staff responsibility is generally divided up by county, but the county responsibilities sometimes shift. For on the ground or project-specific information contact the Regional Office at 206-553-1200 or 1-800-424-4EPA(toll free number).

The following is a list of staff that can all answer questions regarding mitigation proposals:

Joan Cabreza (mitigation, mitigation banking, invasive species, 401 certifications)
Telephone: (206)553-7369

Dick Clark (regulatory/permit processes, 401 certifications)
Telephone: (206)553-6522

Krista Rave-Perlins (401 certifications)
Telephone: (206)553-6686

Ralph Rogers (regional ecologist, mitigation/restoration)
Telephone: (206)553-4012

Wetlands Helpline
For more general wetlands information you can contact the EPA Wetlands Helpline. The helpline is a national resource and may be useful for obtaining national publications, federal registers, general wetland information, etc.

Who We Are
The EPA Wetlands Helpline is a contractor-operated information and referral service which handles requests for information on wetlands regulation, legislation and policy pursuant to Section 404 of the Clean Water Act, wetlands values and functions, and wetlands agricultural issues. The Helpline acts as a first point of contact for EPA's Wetlands Division, which is part of the Office of Wetlands, Oceans and Watersheds (OWOW). As of January 1, 2002, the Helpline has been co-located within the EPA's Water Resource Center allowing both Helpline and Resource Center customers access to the full spectrum of water-related public information available from EPA.

What We Do
The Helpline is staffed by librarians providing in-depth, EPA-approved information, documents, and referrals addressing Federal and State regulatory programs, wetlands science, and educational outreach. Librarians can respond to specialized research requests using the Helpline's extensive reference library, as well as other pertinent sources including the Internet. Librarians also maintain an extensive list of contacts at regulatory agencies and other organizations to provide the most appropriate and accurate referrals.

Our Documents
The Helpline maintains a catalog of documents which can be ordered either over the phone, by E-mail or FAX, or through the Office of Water's new "Shopping Cart" online Publications Ordering System. Documents available from the Helpline will be mailed to requestors free-of-charge. An EPA Wetlands Helpline Publication List containing more than 125 publications is also available to callers upon request.
The Helpline frequently adds new documents to its inventory, including emergent regulatory guidance, technical documents, and other specialized wetlands publications. Each mail order request will include an updated publication list.

Contact Us
Hours: Monday through Friday, excluding Federal Holidays, 8:30am to 5:30pm Eastern Standard Time. Voice mail available after business hours.

Telephone: (toll free U.S.) 1-800-832-7828. International callers: (202) 566-1730.

FAX: (202) 566-1736.

E-Mail: wetlands.helpline@epa.gov. You may also use the Water Resource Center's E-Mail Form to contact us - just include the words "ATTN WETLANDS" in your message.

Website: http://www.epa.gov/OWOW/wetlands/wetline.html

Directions: Open to the public by appointment only. Call us.

Helpline Publications List: http://www.epa.gov/owow/wetlands/wetpubs.html

Mailing Address:
Wetlands Helpline
c/o EPA Water Resource Center
Mail Code RC-4100T
1200 Pennsylvania Ave NW
Washington, DC 20460

Physical Address for FedEx/UPS shipments:
Wetlands Helpline
c/o EPA Water Resource Center
1301 Constitution Ave. NW
EPA West, Room 1119
Washington DC 20460

Washington State Department Of Ecology

HEADQUARTERS PO Box 47600 Olympia, WA 98504 Fax: (360) 407-6902	***Policy & Regulation***	Andy McMillan (360) 407-7272	***Restoration(@NWRO)***	Stephen Stanley (425) 649-4210
	Senior Ecologist	Tom Hruby (360) 407-7274	***GIS***	Susan Grigsby (360) 407-7546
	Stewardship	Jane Rubey (360) 407-7258	***Mitigation Guidance Project***	Dana L. Mock (360) 407-6947 Lauren Driscoll (360)407-6861
	Best Available Science Project	Teri Granger (360) 407-6857		Patricia Johnson (360) 407-6140
			Isolated Wetlands	(800) 917-0043

Regional Contacts

EASTERN REGION
N. 4601 Monroe
Spokane, WA 99205-1295
Fax: (509) 329-3529

Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman

Chris Merker (509) 329-3528

CENTRAL REGION
15 West Yakima Avenue, Suite 200
Yakima, WA 98902-3401
FAX: (509) 575-2809

Benton, Kittitas, Klickitat, Yakima — Cathy Reed (509) 575-2616

Chelan, Douglas, Okanogan — Mark Schuppe (509) 575-2384

SOUTHWEST REGION
PO Box 47775
Olympia, WA 98504-7775
FAX: (360) 407-6305

Clallam, Jefferson, Pierce, Mason Thurston — Ann Boeholt (360) 407-6221

Grays Harbor, Pacific — Perry Lund (360) 407-7260

Wahkiakum, Skamania, Clark Cowlitz, Lewis — Brad Murphy (360) 407-7273

NORTHWEST REGION Mail Stop NB-81 3190 - 160th Avenue SE Bellevue, WA 98008-5452 FAX: (206) 649-7098	***Snohomish, King, Kitsap, San Juan***	Sarah Suggs (425) 649-7124
	Whatcom, Skagit, Island	Susan Meyer (425) 649-7168
	***Watershed Planning & Technical Assistance***	Erik Stockdale (425) 649-7061

Office of Regulatory Assistance (ORA)

Help with Environmental Permitting

Staff provide information regarding environmental permits issued by the State departments of Ecology, Fish and Wildlife, Health, and Natural Resources, and the local air authorities. Regional staff are available to coordinate permit applications for large, complex projects, and to work with applicants, agencies and regulatory authorities to develop a plan for meeting environmental and land-use requirements.

The Office is located in the Ecology Building at 300 Desmond Dr. SE, Lacey, WA. Staff are available Monday, Tuesday and Thursday from 9 a.m. to 4 p.m. Although you can drop in anytime during those hours, it is recommended that you make an appointment. You can call the Office at **360-407-7037** or **800-917-0043**, or e-mail us at **ecypac@ecy.wa.gov** or go to the website at http://www.ecy.wa.gov/programs/sea/pac/.

Local Government Contacts

Most local governments (cites and counties) maintain web sites with current contact information. The Municipal Research & Services Center of Washington maintains a current list of local government web sites (for cities and towns go to http://www.mrsc.org/byndmrsc/cities.aspx and for counties go to http://www.mrsc.org/byndmrsc/counties.aspx). This information is also accessible on the Access Washington web site, which provides Washington State Government information and services http://access.wa.gov/).

You can call the Municipal Research & Services Center of Washington to get the phone number for your local government planner at (206) 625-1300.

Appendix C –Checklist & Sample Outline for a Delineation Report

At a MINIMUM, a delineation report should include:

☐ Field data sheets (complete set that were filled out during the wetland determination and delineation). These could be added as an Appendix to the report.

☐ An accurate map of the site, which includes all wetland boundaries and the locations of all data collection points (for large and/or complex projects, a large scale (1":400' to 1":100') air photo with overlays displaying site property and wetland boundaries is helpful)

☐ A narrative that explains the delineators approach and synthesis of the data

In addition to the above, any pertinent background information should be included, such as:

☐ Topographic map of the area

☐ Site designation on a National Wetlands Inventory Map

☐ Site designation on local wetland inventories (when available)

☐ Site designation on a Soils Survey Report soils map

☐ Any previous site documentation and/or analysis (e.g. environmental checklist, Environmental Impact Statement, geotechnical report)

☐ Washington National Heritage Program data on rare plants, or high quality wetlands

☐ WA Department of Fish and Wildlife Priority Habitat and Species information

☐ Federal Emergency Management Agency (FEMA) Flood Insurance Rates maps

☐ Other site specific information: _____

The following sample outline for a wetland delineation report has been copied with permission from the *Field Guide for Wetland Delineation: 1987 Corps of Engineers Manual* prepared by the Wetland Training Institute. Additional information can be found at the end of that field guide in the section of the document entitled "Preparing a Delineation Report."

I. Introduction
   A. Who authorized the delineation
   B. Why is it being done
   C. Location of site (Map)
   D. Date of site visit (s)
   E. Identification of delineators

II. Methods
   A. Brief description of method used
   B. Any modification of methods
   C. Sources of existing information used

III. Results and Discussion
   A. Description of the site
      1. Topography
      2. Plant communities
      3. Soils mapped and found (map)
      4. Hydrology information
      5. Existing wetland mapping (e.g. NWI/state/local)

   B. Findings
      1. Types of wetlands identified (e.g., Cowardin, et al 1979)
         a. Description
         b. Locations
         c. Area
         d. Contrast with nonwetland
         e. How was boundary chosen (e.g., feature on the landscape)
      2. Types of other waters identified
         a. Description
         b. Locations
         c. Area
         d. Contrast with nonwetland
         e. How was boundary chosen (e.g., feature on the landscape)

IV. Conclusion
   A. Brief summary of total area and types of wetlands and other regulated waters
   B. Statement regarding the need for permits
   C. Caution that final authority rests with the appropriate agencies

V. Literature Cited
VI. Appendix A (Data Sheets)

Appendix D – Washington State Noxious Weed List 2004

This list, determined by the Washington State Noxious Weed Control Board, is adopted annually by rule (Chapter 16-750 WAC).

Noxious weeds are non-native plants introduced to Washington through human actions. Because of their aggressive growth and lack of natural enemies in the state, these species can be highly destructive, competitive or difficult to control. These exotic species can reduce crop yields, destroy native plant and animal habitat, damage recreational opportunities, clog water-ways, lower land values and poison humans and livestock.

To help protect the state's resources, the Washington State Noxious Weed Control Board adopts a State Noxious Weed List each year. This list categorizes weeds into three major classes - A, B & C -according to the seriousness of the threat they pose to the state or a region of the state.

Plants in bold are new to the list or have new classifications.

Class A weeds: Non-native species with a limited distribution in Washington. Preventing new infestations and eradicating existing infestations is the highest priority. **Eradication is required by law.**

Common name	Scientific name
bean-caper, Syrian	*Zygophyllum fabago*
blueweed, Texas	*Helianthus ciliaris*
broom, Spanish	*Spartium junceum*
buffalobur	*Solanum rostratum*
clary, meadow	*Salvia pratensis*
cordgrass, denseflower	*Spartina densiflora*
cordgrass, salt meadow	*Spartina patens*
crupina, common	*Crupina vulgaris*
flax, spurge	*Thymelaea passerina*
four o'clock, wild	*Mirabilis nyctaginea*
goatsrue	*Galega officinalis*
hawkweed, yellow devil	*Hieracium floribundum*
hogweed, giant	*Heracleum mantegazzianum*
hydrilla	*Hydrilla verticillata*
johnsongrass	*Sorghum halepense*
knapweed, bighead	*Centaurea macrocephala*
knapweed, Vochin	*Centaurea nigrescens*
kudzu	*Pueraria montana* var. *lobata*
lawnweed	*Soliva sessilis*
mustard, garlic	*Alliaria petiolata*
nightshade, silverleaf	*Solanum elaeagnifolium*
sage, clary	*Salvia sclarea*
sage, Mediterranean	*Salvia aethiopis*
spurge, eggleaf	*Euphorbia oblongata*
starthistle, purple	*Centaurea calcitrapa*

Class A Weeds (Continued)

thistle, Italian	*Carduus pycnocephalus*
thistle, milk	*Silybum marianum*
thistle, slenderflower	*Carduus tenuiflorus*
velvetleaf	*Abutilon theophrasti*
woad, dyers	*Isatis tinctoria*

Class B Weeds: Non-native species presently limited to portions of the state. Species are designated for control in regions where they are not yet widespread. Preventing new infestations in these areas is a high priority. In regions where a Class B species is already abundant, control is decided at the local level, with containment as the primary goal. Contact the weed board for information on Class B-designated areas at: http://www.nwcb.wa.gov

Common name	Scientific name
Alyssum, Hoary	***Berteroa incana***
blackgrass	*Alopecurus myosuroides*
blueweed	*Echium vulgare*
broom, Scotch	*Cytisus scoparius*
bryony, white	*Bryonia alba*
bugloss, annual	*Anchusa arvensis*
bugloss, common	*Anchusa officinalis*
camelthorn	*Alhagi maurorum*
carrot, wild	*Daucus carota*
catsear, common	*Hypochaeris radicata*
chervil, wild	*Anthriscus sylvestris*
cinquefoil, sulfur	*Potentilla recta*
cordgrass, common	*Spartina anglica*
cordgrass, smooth	*Spartina alterniflora*
daisy, oxeye	*Leucanthemum vulgare*
elodea, Brazilian	***Egeria densa***
fanwort	*Cabomba caroliniana*
Fieldcress, Austrian	*Rorippa austriaca*
floating heart, yellow	*Nymphoides peltata*
gorse	***Ulex europaeus***
hawkweed, mouseear	*Hieracium pilosella*
hawkweed, orange	*Hieracium aurantiacum*
hawkweed, polar	*Hieracium atratum*
hawkweed, Queen-devil	***Hieracium glomeratum***
hawkweed, smooth	*Hieracium laevigatum*
hawkweed, yellow	***Hieracium caespitosum***
hedgeparsley	*Torilis arvensis*
helmet, policeman's	*Impatiens glandulifera*
herb Robert	*Geranium robertianum*
houndstongue	*Cynoglossum officinale*
indigobush	*Amorpha fruticosa*
knapweed, black	*Centaurea nigra*
knapweeed, brown	*Centaurea jacea*

Class B Weeds (Continued)

knapweed, diffuse	*Centaurea diffusa*
knapweed, meadow	*Centaurea jacea x nigra*
knapweed, Russian	*Acroptilon repens*
knapweed, spotted	***Centaurea biebersteinii***
knotweed, giant	***Polygonum sachalinense***
knotweed, himalayan	***Polygonum polystachyum***
knotweed, Japanese	*Polygonum cuspidatum*
kochia	*Kochia scoparia*
lepyrodiclis	*Lepyrodiclis holosteoides*
loosestrife, garden	*Lysimachia vulgaris*
loosestrife, purple	*Lythrum salicaria*
loosestrife, wand	*Lythrum virgatum*
nutsedge, yellow	*Cyperus esculentus*
oxtongue, hawkweed	*Picris hieracioides*
parrotfeather	*Myriophyllum aquaticum*
pepperweed, perennial	*Lepidium latifolium*
primrose, water	*Ludwigia hexapetala*
puncturevine	*Tribulus terrestris*
ragwort, tansy	*Senecio jacobaea*
saltcedar	***Tamarix ramosissima***
sandbur, longspine	*Cenchrus longispinus*
skeletonweed, rush	*Chondrilla juncea*
sowthistle, perennial	*Sonchus arvensis ssp. arvensis*
spurge, leafy	*Euphorbia esula*
spurge, myrtle	***Eu[phorbia myrsinites***
starthistle, yellow	*Centaurea solstitialis*
swainsonpea	*Sphaerophysa salsula*
thistle, musk	*Carduus nutans*
thistle, plumeless	*Carduus acanthoides*
thistle, scotch	*Onopordum acanthium*
toadflax, dalmatian	*Linaria dalmatica ssp. dalmatica*
watermilfoil, Eurasian	*Myriophyllum spicatum*

CLASS C WEEDS: Non-native weeds found in Washington. Many of these species are widespread in the state. Long-term programs of suppression and control are a County option, depending upon local threats and the feasibility of control in local areas.

Common name	**Scientific name**
babysbreath	*Gypsophila paniculata*
bindweed, field	*Convolvulus arvensis*
canarygrass, reed	*Phalaris arundinacea*
cockle, white	*Silene latifolia ssp. alba*
cocklebur, spiny	*Xanthium spinosum*
cress, hoary	*Cardaria draba*
dodder, smoothseed alfalfa	*Cuscuta approximata*
goatgrass, jointed	*Aegilops cylindrica*
groundsel, common	***Senecio vulgaris***

Class C Weeds (Continued)

hawkweed, spp.*	*Non-native Hieracium species except those listed as Class A or Class B
henbane, black	*Hyoscyamus niger*
iris, yellow flag	*Iris pseudocorus*
ivy, English*	*4 cultivars only: *Hedera hibernica* 'Hibernica' *Hedera helix* 'Baltica' *Hedera helix* 'Pittsburgh' *Hedera helix* 'Star'
Knotweed, bohemian	***Polygonum Bohemicum***
mayweed, scentless	*Matricaria perforata*
old man's beard	*Clematis vitalba*
poison hemlock	C*onium maculatum*
reed, common	*Phragmites australis*; non-native genotypes
rye, cereal	*Secale cereale*
spikeweed	*Hemizonia pungens*
St. Johnswort, common	*Hypericum perforatum*
tansy, common	*Tanacetum vulgare*
thistle, bull	*Cirsium vulgare*
thistle, Canada	*Cirsium arvense*
toadflax, yellow	*Linaria vulgaris*
water lily, fragrant	Nymphaea odorata
whitetop, hairy	*Cardaria pubescens*
willowherb, hairy	***Epilobium hirsutum***
wormwood, absinth	*Artemisia absinthium*

To find out more about weeds and weed control in Washington, contact:

Washington State Noxious Weed Control Board
P.O. Box 42560
Olympia, WA 98504
(360) 902-1901
Web site: http://www.nwcb.wa.gov

Washington State Department of Agriculture
21 North First Avenue #103
Yakima, WA 98902
(509) 225-2604

Your local County Noxious Weed Control Board

Appendix E – Site Selection Checklist

The checklist below can be used to help you in determining whether a potential site may be appropriate for mitigation and whether it is likely to be sustainable over time. The more "yes" answers to the following questions the greater the likelihood that the site is appropriate for mitigation and will likely be sustainable over time. "No" answers, while not sufficient to remove a site from consideration, are "red flags" of potential constraints or problems which should be recognized and considered. When going through the list of questions consider whether or not the site possesses the physical, chemical, and biological characteristics to support the proposed wetland mitigation goals, objectives, and functions. Note: the site selected should obviously meet the regulatory requirements.

Yes	No	
		Source of Water
☐	☐	Does the site proposed for compensation have a natural source of water (overbank flooding, precipitation, ground water) sufficient to support the target ecosystem and functions?
☐	☐	Will the source of water be sustainable and relatively predictable?
☐	☐	If applicable, will you be able to obtain the appropriate water rights?
☐	☐	Does the site contain previous wetland areas that can be restored?
		Soils
☐	☐	Will the existing soil type be capable of sustaining the expected wetland hydroperiod (i.e., without engineered solutions requiring long-term maintenance) hydrology?
☐	☐	Does the soil have hydric indicators?
☐	☐	Does the soil have organic content?
☐	☐	Is the soil free of contamination (heavy metals, toxic organics)?
☐	☐	Are the soils loose (not compacted) enough to allow some infiltration of surface waters and support root growth and plant establishment?

Yes No

Landscape Position

☐ ☐ Are the mitigation site's size and location appropriate, given the proposed functions and regulatory requirements?

☐ ☐ Will the proposed wetland have an HGM class appropriate for its position in the landscape regardless of whether it is the same HGM class as the wetland impacts?

☐ ☐ Have the goals for the larger watershed been considered in determining the location (and type) of mitigation?

☐ ☐ Can the site contribute to the improvement of identified management problems within the basin (e.g. flooding, sedimentation, water quality etc)?

☐ ☐ Has the position of the site in relation to other wetlands, habitats, and processes occurring in the landscape been considered? (refer to Habitat Connectivity below)

Land Use

☐ ☐ Is the site history free from past land use practices that could have long term consequences that may affect mitigation success?

☐ ☐ Are the proposed mitigation goals and objectives compatible with surrounding land uses of the proposed site?

☐ ☐ Does the site location allow the site to be protected from direct, indirect and cumulative impacts from current and potential future land use?

Habitat Connectivity

☐ ☐ Is the site in close proximity to other wetlands, natural areas or aquatic sites? This is particularly important if the main goal of the mitigation is to provide wildlife habitat.

Buffers

☐ ☐ Does the site have adjacent upland or other habitats that can provide, or be developed to provide, a quality buffer to protect the target wetland functions for the long term (i.e. in other words future land uses have been considered)?

Yes No

Invasive Species

☐ ☐ Are the site and adjacent areas relatively free of invasive species?

Seed Banks

☐ ☐ Is the site likely to have an existing native seed bank?

Long Term Maintenance

☐ ☐ Can the site be self-sustaining in the near future, without continual long term maintenance?

Site Ownership

☐ ☐ Is the site free of ownership or legal constraints that would prevent its long-term protection?

Other Practical Considerations

☐ ☐ Is the site consistent with existing land use plans, zoning and other documents?

Appendix F – List and Description of Functions[18]

Functions	Description
Functions Related to Water Quality Improvement	
Removing Sediment	This function is defined in terms of the processes and characteristics that retain sediment within a wetland and prevent its downstream movement. A wetland performs this function if there is a net annual decrease of sediment load to downstream surface waters.
Removing Nutrients /Phosphorous	This function is defined in terms of the processes and characteristics within a wetland that remove phosphorus present in surface waters and prevent its movement into surface waters and groundwater.
Removing Nutrients/Nitrogen	This function is defined in terms of the processes and characteristics within a wetland that remove dissolved nitrogen present in surface waters or groundwater and prevent its further movement into surface waters or groundwater.
Removing Heavy Metals and Toxic Organics	This function is defined in terms of the processes and characteristics within a wetland that retain toxic metals and toxic organic compounds coming into the wetland and prevent their movement into surface waters and groundwater.
Functions Related to Hydrology (Water Quantity)	
Reducing Peak Flows	This function is defined in terms of the processes and characteristics within a wetland by which the peak flow in a watershed can be reduced during major storm or snowmelt, events that would otherwise cause flooding.
Decreasing Downstream Erosion	This function is defined in terms of the processes and characteristics within a wetland that detain high flows during storms and reduce the duration of erosive flows, thus decreasing downstream erosion in streams. This definition was developed for riverine and depressional wetlands. Wetlands along the shores of lakes (Jude and Pappas 1992) also protect resources from erosion but in a different way. For wetlands classed as lacustrine fringe, the function can be called Dissipation of Erosive Forces. This is defined as the processes by which wetlands reduce wave and current energies, thus decreasing erosion of shorelines.
Potential for Recharging Groundwater	This function is defined in terms of the processes and characteristics within a wetland that allow surface water to infiltrate into the groundwater system.

[18] This *List of Functions* was developed by the Statewide Technical Committee and the Assessment teams of the Washington State Wetland Function Assessment Project. This is not a comprehensive list of all functions that are performed by wetlands and not all of the functions listed below are performed by each of the different types (e.g. riverine, depressional, lacustrine) of wetlands. The description of each function was found in the Draft *Freshwater Wetlands in Washington State, Volume 1 – A Synthesis of the Science*.

Functions	Description
Functions Related to Habitat Suitability	
General Habitat	This function is defined in terms of the processes and characteristics within a wetland that indicate a general suitability and opportunity as habitat for a broad range of species. A suitable habitat for a suite of different fauna can be provided by a broad range of structures, vegetation, and interspersion of "habitat" types within the wetland and the upland habitats contiguous to a wetland. Characteristics in a wetland can be quite different and continue to provide highly suitable conditions for a range of species.
Habitat for Invertebrates	This function is defined in terms of the processes and characteristics within a wetland that help maintain a high number of invertebrate species.
Habitat for Amphibians	This function is defined in terms of the processes and characteristics within a wetland that contribute to the feeding, breeding, or refuge needs of amphibian species.
Habitat for Anadromous Fish	This function is defined in terms of the processes and characteristics within a wetland that contribute to the feeding, breeding, or refuge needs of anadromous fish species.
Habitat for Resident Fish	This function is defined in terms of the processes and characteristics within a wetland that contribute to the feeding, breeding, or refuge needs of resident native fish.
Habitat for Wetland-associated (Aquatic) Birds	This function is defined in terms of the processes and characteristics within a wetland that provide habitats or life resources for species of wetland-associated birds. Wetland-associated bird species are those that depend on aspects of the wetland ecosystem for some part of their life needs: food, shelter, breeding, or resting.
Habitat for Wetland-associated (Aquatic) Mammals	This function is defined in terms of the processes and characteristics within a wetland that support one or more life requirements of aquatic or semi-aquatic mammals.
Native Plant Richness	This function is defined in terms of the degree to which the wetland provides a habitat for many different native plant species.
Primary Production and Organic Export / Supporting Food Webs	This function is defined in terms of the processes and characteristics within a wetland that support complex food webs within the wetland and surrounding ecosystems through the export and assimilation of the primary productivity of the wetland. The function combines three major ecosystem processes: primary production, secondary production, and export of production.

Appendix G - Hiring a Qualified Wetlands Specialist

Who needs a qualified wetlands specialist?

Qualified wetlands specialists are usually hired as consultants to identify and delineate wetlands, assess the functions and values of a particular wetland, provide assistance with wetland regulations and permits, often including completion of necessary application forms, and providing advice about designing wetland compensatory mitigation projects. They are generally hired by landowners or developers who want to do something on their property that may affect a wetland. Many local governments hire consultants to provide third-party review services. Some consultants are self-employed; others work for larger environmental consulting firms. The recommendations included here are intended to assist you in locating consultants who can help you with wetland issues.

What is a qualified wetlands specialist?

There is no government sanctioned program for certifying someone as a "qualified wetland specialist". Generally, the term means a person with professional experience and comprehensive training in wetlands issues, including experience performing wetland delineations, assessing wetland functions and values, analyzing wetland impacts, and recommending and designing wetland mitigation projects.

The Society of Wetland Scientists (SWS) administers a professional certification program for wetland scientists and has two levels of certification: Professional Wetland Scientist (PWS) and Wetland Professional In-Training (WPIT). A person certified as a PWS would be considered a qualified wetlands specialist (see below for description).

If the person is not a certified PWS, there is not simple measure of determining qualification. However, the following criteria are indicators of someone who may be qualified to perform the wide range of tasks typically required of a wetlands specialist:

- At a minimum, a Bachelor of Science or Bachelor of Arts or equivalent degree in hydrology, soil science, botany, ecology, or related field. A graduate degree in one of these fields is an indication of more advanced expertise;
- At least two years of full-time work experience as a wetlands professional including delineating wetlands using the state or federal manuals, preparing wetland reports, conducting function assessments, and developing and implementing mitigation plans. Generally, the more years of experience the greater the expertise;
- Completion of additional wetland-specific training programs. This could include a more comprehensive program such as the University of Washington Wetland Certificate Program, or individual workshops on wetland delineation, function assessment, mitigation design, hydrophytic plant or hydric soil identification, etc.

Keep in mind that most people engaged in wetlands professional work have greater expertise in some aspects of the field than others. A person may have in-depth training in plant ecology or soils or hydrology but few people have all three. A person may have extensive experience in wetland delineation or function assessment and have little experience in designing and implementing mitigation projects. **Thus, it is important to be clear on what specific tasks you need completed and make sure the person or firm you hire has the specific expertise you need.** Generally, more

complex projects require multiple individuals with the collective expertise to address all aspects of the project.

How to find a wetlands consultant

There are a number of ways to find the names of wetlands consultants. Finding a qualified consultant can be difficult since "wetland consultants" are not required to be certified, licensed, or bonded. One approach is to look in the Yellow Pages of your phone directory (or the directories of the closest cities) under “Environmental and Ecological Services.” You can also contact your local government planning office and ask if they know of any local wetlands consultants. Some local governments maintain lists of wetland professionals they consider to be well qualified. Consultants may also be found by requesting the advice of associations or businesses that commonly encounter wetlands in their work, such as the Building Industry Association and Association of Washington Business. Finally, you can contact state and federal resource agencies and ask for referrals. Be aware, however, that most agencies will not be able to provide recommendations because of questions of fairness.

Selecting a wetlands consultant

There are a number of factors you should consider before hiring a wetlands consultant. When interviewing consultants, you should carefully evaluate their qualifications (see above for the minimum recommended). Be sure to ask the following questions before making your selection.

Training - Does the consultant have training or experience in the use of the 1987 federal or 1997 state wetlands delineation manuals? The consultant you select should have the ability to apply wetland identification methods used by state and federal agencies. Make sure that the consultant can identify wetlands and their boundaries consistent with regulating agencies.

Has the consultant had additional training or expertise in related fields such as hydrology, soil science, botany, or ecology?

Is the consultant knowledgeable/familiar with local, state, and federal wetland regulations?

Experience - How long has the consultant been doing wetlands work? How much experience do they have delineating wetlands in the field, assessing wetlands functions and values, or working with wetland regulations? Has the consultant worked in the part of the state where you propose to develop? Ask the consultant for examples of previous work similar to the services you are requesting. Can the consultant take you to a successful wetland mitigation project they designed and/or implemented?

Ask the consultant to describe their working relationship with the agencies that will be reviewing and/or permitting your project.

Given the complexity of some projects it is expected that a wetland consultant will team with others with experience in related fields such as water quality, wildlife, stormwater management, and hydrogeology. Ask the consultant for a list of people they have teamed with in the past.

References - Who were some of the consultant’s past clients? Were they satisfied customers? Call them and find out who they worked with from the consulting firm and how they liked working with them. Ask whether there were any problems that occurred during or after the project, how the

consultant handled those problems, and what they charged for their work. You may also want to find out what type of track record the company has with local, state, and federal agencies.

Request references that include clients who have had projects reviewed and approved by the regulatory agencies (Corps, Ecology, and Local government).

It never hurts to ask others. Ask colleagues and other businesses, such as real estate, development, homebuilding, etc. that are routinely involved in wetland concerns. Ask them about their experiences and knowledge regarding the consultant you are considering.

Make sure you check all references.

Staff - Who will be working on your project? Will it be the principal consultant with the years of experience or someone with less experience who works for them? Know who you're hiring!

Cost - How much will the consultant cost? Compare rates, but don't let cost be your sole criteria. Be sure to consider training, experience, and the other factors as well. A good consultant who charges you more may end up saving you money by reducing permit-processing delays.

Society of Wetland Scientists Professional Certification Program
Another option is to check to see if the person you are considering hiring is a **Certified Professional Wetland Scientist.** You can go to http://www.wetlandcert.org/ and search by the persons name, city, and/or state.

As explained in the *Professional Wetland Scientist Program Overview*:

> Certification is not required by any agency and has no official or legal standing. However, certification signifies that the academic and work experience of a Professional Wetland Scientist (PWS) meets the standards expected by his or her peers of a practicing wetland professional and provides acknowledgment to his or her peers of adherence to standards of professional ethics with regard to the conduct and practice of wetland science.
>
> Wetland Professional in Training (WPIT) is considered a preliminary step for persons who meet the requirements for either (but not both) education and experience. Professional Wetland Scientist (PWS) certification is awarded for those meeting both educational and experience requirements.
>
> Minimum degree requirements for WPIT and PWS are the BA or BS degrees, with course distribution of 15 semester hours each in biological and physical sciences and 6 hours in quantitative areas. For certification as a PWS, an additional 15 semester hours in wetland-related courses are required. In addition to comprehensive training in wetland science, a PWS is expected to have professional experience of at least 5 years as a wetland scientist, demonstrating the application of current technical knowledge dealing with wetland resources and activities.

Appendix H – Mitigation Plan Checklist

UNDER DEVELOPMENT

Table 1: Checklist of information to be included in the **Preliminary and Final Mitigation Plans** (Items with one asterisk* are required in all plans, items with two asterisks** are required in the **Final Mitigation Plan**).

Included	Omitted	
[ ]		**Cover / Title Page***
[ ]		Project Name
[ ]		Reference #'s (e.g. Corps application #)
[ ]		Date of publication
[ ]		Who it was prepared for and by / contact information
[ ]		**Executive Summary***
		Project Description
[ ]		Summary of project*
[ ]		Type of Development (existing and proposed land uses)
[ ]		Project Size
[ ]		Implementation Schedule
[ ]		Project location, maps*
[ ]		Responsible parties*
		Ecological Assessment of Impact Site
[ ]	**[ ]**	Impacts (acreage) and extent of disturbance to wetlands (wetland delineation)
[ ]	**[ ]**	Summary of historic and current on-site and nearby land uses (zoning designations)
[ ]	**[ ]**	Description of any known cultural resources on the site
[ ]	**[ ]**	Description of the site in context of other wetlands / "waters of the State", or other natural areas (corridors)
[ ]	**[ ]**	Description of the water regime
[ ]	**[ ]**	Description of the soils
[ ]	**[ ]**	Description of the plant communities
[ ]	**[ ]**	Description of any fauna using the site
[ ]	**[ ]**	Landscape position and geomorphology
[ ]	**[ ]**	Description of functions provided
[ ]	**[ ]**	Wetland rating
[ ]	**[ ]**	Buffers
[ ]	**[ ]**	Description of any other on-site "waters of the State"
[ ]	**[ ]**	Floodplain mapping of the site
[ ]	**[ ]**	Water quality
		Mitigation approach
[ ]		Mitigation sequencing followed*
[ ]		Goals and Objectives*

[ ]	[ ]	Performance standards to assess each objective
[ ]	[ ]	Describe where this approach previously has been done successfully (if applicable)
		Proposed Compensation Site
[ ]		Site description (location, size, maps)*
[ ]		Ownership
[ ]		Total area of mitigation site (s) (acres)
[ ]		Area of existing wetlands and uplands (acres)
[ ]		Current/past land use (also on adjacent properties)
[ ]	[ ]	Site selection rationale**
[ ]	[ ]	Existing/Baseline Ecological Conditions of the Compensation Site**
[ ]	[ ]	Acreage of existing wetlands and uplands (based on wetland delineation)
[ ]	[ ]	National Wetland Inventory or local jurisdiction wetland mapping of the site
[ ]	[ ]	Summary of historic and current on-site and nearby land uses (zoning designations)
[ ]	[ ]	Description of any known cultural resources on the site
[ ]	[ ]	Description of the site in context of other wetlands / "waters of the State", or other natural areas (corridors)
[ ]	[ ]	Description of the water regime
[ ]	[ ]	Description of the soils
[ ]	[ ]	Description of the plant communities
[ ]	[ ]	Description of any fauna using the site
[ ]	[ ]	Landscape position and geomorphology
[ ]	[ ]	Description of functions provided
[ ]	[ ]	Wetland rating of any existing wetlands
[ ]	[ ]	Buffers
[ ]	[ ]	Description of any other on-site "waters of the State"
[ ]	[ ]	Floodplain mapping of the site
[ ]	[ ]	Water quality
[ ]	[ ]	Site constraints
		Preliminary Site Plan / Design
[ ]	[ ]	Explanation of how adequate hydrology will be provided
[ ]	[ ]	Discussion of how project was designed to provide the proposed functions
[ ]	[ ]	Schematic drawings: Change in topography
[ ]	[ ]	Hydrologic structures
[ ]	[ ]	Soils
[ ]	[ ]	Vegetation distributions
[ ]	[ ]	Habitat attributes
[ ]	[ ]	Buffers
[ ]	[ ]	Section drawings showing relationship of topography to water regime and vegetation

		Final Site Plan / Design
[ ]	**[ ]**	Site survey and topography
[ ]	**[ ]**	Water regime including:*
		Engineering drawings of water control structures
		Source of water (volume, velocity, hydro period)
[ ]	**[ ]**	Soil amendments
		Landscape plans
[ ]	**[ ]**	Drawing of proposed plant distribution
[ ]	**[ ]**	Location of existing or proposed upland buffers
[ ]	**[ ]**	Section drawings showing relationship of topography to vegetation
[ ]	**[ ]**	Erosion control
[ ]	**[ ]**	Location of habitat structure
[ ]	**[ ]**	Location of upland buffers
[ ]	**[ ]**	Soil amendments
[ ]	**[ ]**	Construction specifications
		Monitoring Plan
[ ]	**[ ]**	Vegetation
[ ]	**[ ]**	Water regime
[ ]	**[ ]**	Soils
[ ]	**[ ]**	Fauna
[ ]	**[ ]**	Functions and values
[ ]	**[ ]**	Development of habitat structure
[ ]	**[ ]**	Water quality
[ ]	**[ ]**	Buffers
[ ]	**[ ]**	Timetable for reporting monitoring results (final plan only)
[ ]		**Site Protection***
[ ]	**[ ]**	Physical site protection (final plan only)
[ ]	**[ ]**	Legal protection (final plan only)
[ ]	**[ ]**	Buffers (final plan only)
		Maintenance and Contingency Plans (final plan only)
[ ]		Maintenance schedule*
[ ]	**[ ]**	Contingency plan
[ ]	**[ ]**	Initiating procedure
[ ]	**[ ]**	Funding
[ ]	**[ ]**	Responsible parties
		Implementation Schedule** (final plan only)
[ ]		Construction schedule
[ ]		Monitoring schedule
[ ]		Reporting schedule
[ ]	**[ ]**	**Financial Assurance** (final plan only)

Appendix I - Minimum Requirements for a Mitigation Package

This Appendix is currently UNDER DEVELOPMENT. We are working towards developing a list of items necessary for review by Ecology, the Corps and/or EPA agency staff. The following is a draft of what information is needed for Ecology 401 review of a **preliminary mitigation plan**[19] involving wetland resources. Following this information is a top ten list of problems that could potentially slow down wetland permit review. This list was developed by Ecology staff involved in wetland permit review.

Wetland Delineation Report – performed according to Ecology's (*Washington State Wetlands Delineation and Identification Manual*) 1997 Manual; report should include:

- data sheets
- site maps with data plots and delineated wetland areas; photographs, topographic and aerial site maps are very helpful

Wetland Impact and Mitigation Plan – should include:
for wetlands to be impacted-

- qualitative description of wetland(s), ownership
- total size of wetland(s) and area(s) to be impacted
- wetland categories, utilizing the *Washington State Wetlands Rating System Western Washington* (Rating System). 1993[20]
- function assessment analysis – such as WSDOT's Linear method, Ecology's WAFAM, or Rating System; include the hydrogeomorphic type of wetland (i.e. depressional closed, riverine flow-through)
- condition of existing wetland buffer
- site plan drawings- clear, showing all impact areas
- discussion on what measures were taken to avoid, then minimize impacts to wetlands

for compensatory mitigation wetlands-

- qualitative description of mitigation area, ownership
- total size of mitigation site and the size of areas to be used for restoration, creation, enhancement and/or preservation
- unless compensatory mitigation action involves only planting vegetation, or is preservation, will need hydrologic information for the site – i.e. duration, frequency and depth of inundation and/or saturation for mitigation site, gathered from hydrologic monitoring – *Note: this is key to giving Ecology more reasonable assurance that the plan will work*
- if compensatory mitigation action is wetland enhancement, need clear wetland function assessment analysis and wetland rating so that the ecological 'lift' can be measured at the end of the monitoring period.
- condition of existing buffer for mitigation area(s)

[19] At the conceptual planning stage you will not need as much detailed information. See page 48 for a description of what might be required at that stage.
[20] Currently being revised

- description of compensatory mitigation activity, what actions will be taken and in what order, implementation schedule
- monitoring plan with goals, objectives and clear, reasonable and measurable performance standards for both vegetation and hydrology (unless no hydrologic alterations are performed). Note: Length of monitoring needed, in general, for replacing a forested or scrub-shrub wetland will be 10 years.
- contingency plan- Ecology must approve of this if performance standards are not met
- site plan drawings- clear, showing all mitigation areas; planting and grading plans, show habitat structures (i.e. LWD, brush piles) and any site protection features (i.e. fencing)

Other

- stormwater plan (if relevant), NPDES permit #
- completed Coastal Zone Consistency (CZM) form
- copy of Public Notice

TOP TEN PROBLEMS THAT SLOW DOWN WETLAND PERMIT REVIEW:

10. Wetland delineation has not been done

9. Site plans are unclear, no legend

8. Wetland plan does not explain sequencing steps taken (i.e. avoidance, minimization)

7. Wetland compensatory mitigation is enhancement only (may not be appropriate to replace certain functions, such as water quality improvement)

6. Stormwater plan not designed to recent Ecology stormwater manual or equivalent* (i.e. may not meet state 401 certification conditions under NWP 27)

5. Indirect wetland impacts from project are not clarified (i.e. hydrology changes to adjacent wetlands)

4. Project is “restoration”, but contains significant adverse wetland impacts

3. Little or no hydrology data is provided for the mitigation/restoration site.

2. Project would create an atypical wetland in the landscape (i.e. depressional wetland on a slope)

1. Inadequate compensatory mitigation (to replace lost wetland functions)

Appendix J – Mitigation Plan Word Template

UNDER DEVELOPMENT

Appendix K – Executive Summary Data Sheet

Executive Summary

Location Information	Wetland impact site (s)				Compensation site (s)			
Site Name								
County								
City								
Section (¼, ¼), Township, Range								
Latitude, Longitude (GIS verified?)								
Watershed								
WRIA								
Tax Parcel #								
Is the Compensation site (s) off of the project development site? Yes or No								

Construction schedule (development site and compensation site(s)):

Summary of project, including proposed type and location of work, discussion of avoidance and minimization measures, goals and objectives, wetland functions impacted and mitigated (note assessment method used), and the general design concept (include where it has been done before)

Wetland Impact Sites

Wetland Name	Size (acres)	Does the wetland extend off the project site? (Y/N)	Type of Wetland (404, Isolated, PCC)	Wetland Rating / Total Score (Ecology)	Water Quality Improvement Score	Hydrologic Score	Habitat Score	Local Rating	Landscape Position (Floodplain, Terrace, Slope)	HGM Class (Depressional, Riverine, Slope, etc.) (Atypical?)
Total acres of wetland impact:										
Total wetland acres on-site:										

Acres of wetland impacts and mitigation (Cowardin classification)[21]

Wetland Type	Acres Impacted	Restoration (acres)	Creation (acres)	Enhancement (acres)	Preservation (acres)	Total acres of mitigation	Replacement ratios	*Other Mitigation Provided
Forested								
Scrub-shrub								
Emergent								
Open water								
Aquatic bed								
***Other**								
Total								

*Describe other impacts (streams, lakes, estuaries, coastal waters) and/or other mitigation activities:

Describe the Buffers being provided for the mitigation site, including minimum and maximum width, total buffer area, and description of surrounding land uses.

Describe the water regime at the mitigation site (s), including source of water, expected water depth, average outflow (winter, spring, summer), and ownership of water rights

Provide a list of performance standards and the estimated time to reach each (if too numerous reference the page number where they can be found)

[21] The information provided in the tables should also be provided for the pre-existing conditions at the mitigation site, especially if the site is being enhanced. This will provide baseline from which the effectiveness of mitigation activities can be determined.

Appendix L – Monitoring Report Checklist

☐ Project Information
- Project Name
- Applicant name, address, and phone number
- Consultant name, address, and phone number
- Permit number (Corps, Ecology, and/or Local government assigned)
- Acres of impact and type(s) of habitat impacted
- Date project construction commenced
- Location of the development project and directions to the site
- Date of the report, including the time period for which the monitoring occurred
- Copies of any records of long-term protection (e.g. conservation easement, deed restriction)

☐ Compensatory Mitigation Site Information
- Location and directions to the mitigation site
- Size an type(s) of habitats existing at the site and proposed for restoration, creation (establishment), enhancement, and/or preservation (this could be from the executive summary of the mitigation plan)
- Goals and objectives for the compensatory mitigation site
- Date mitigation site construction was completed. Specify dates for completion of different activities as they occurred at the site (e.g. excavation, planting, installation of irrigation system)
- Dates of previous maintenance and monitoring visits
- Name, address, and contact number of responsible parties of the site

☐ Brief Summary of Remedial Actions(s) and Maintenance of the Compensatory Mitigation Site

☐ Map of the compensatory mitigation site
- 8 ½" x 11 diagram of the site including:
  - Habitat types (as constructed)
  - Locations of photographic record stations
  - Landmarks
  - Inset defining location of the site

☐ List of performance standards

☐ Table of results from the monitoring visits versus performance standards for specified target dates

☐ Photographic record of the site during the most recent monitoring visit at record stations (photo pans are required in addition to along transect lines)

☐ Summary of field data taken to determine compliance with performance standards

☐ Summary of any significant events that occurred on the site that may affect ultimate compensatory mitigation success

☐ Summary of any lessons learned

Appendix M –Formats for Drawings and Maps

UNDER DEVELOPMENT

For Corps instructions for preparing project drawings go to the Seattle District Regulatory page at http://www.nws.usace.army.mil/reg.html. Scroll down and double click on "Permit and Applicant Information. Go to "Project Drawings."

Notes