

Washington State Wetland Mitigation Evaluation Study

Phase 1: Compliance



June 2000
Publication No. 00-06-016

Washington State Wetland Mitigation Evaluation Study

Phase 1: Compliance

Patricia A. Johnson¹, Dana L. Mock², Emily J. Teachout³, and Andy McMillan¹.

¹Washington State Department of Ecology
Shorelands & Environmental Assistance Program, Lacey, WA.

²Americorps/Washington Conservation Corps, Lacey, WA.

³US Fish and Wildlife Service, Lacey, WA.

June 2000

Publication No. 00-06-016



Printed on recycled paper

For additional copies of this document, contact:

Department of Ecology
Publications Distribution Center
P.O. Box 47600
Olympia, WA 98504-7600
(360) 407-7472
jewi461@ecy.wa.gov

This document is available on the World Wide Web at <http://www.wa.gov/ecology/>
Under the “Shorelands and Wetlands” section.

Table of Contents

TABLE OF CONTENTS	I
ACKNOWLEDGEMENTS	III
FUNDING.....	III
EXECUTIVE SUMMARY	V
INTRODUCTION	1
METHODS.....	2
ADVISORY COMMITTEE	2
STUDY SITE SELECTION	2
<i>Site Selection Criteria</i>	3
<i>Site Selection Process</i>	4
GATHERING BACKGROUND INFORMATION	4
OBTAINING ACCESS TO SELECTED STUDY SITES	5
SITE ASSESSMENT.....	5
<i>Site Assessment Methods</i>	5
<i>Compliance Evaluation</i>	6
RESULTS	9
COMPLIANCE QUESTIONS	9
WAS IT IMPLEMENTED?	10
WAS IT IMPLEMENTED TO PLAN?	10
<i>Overall</i>	10
<i>Westside</i>	13
<i>Eastside</i>	13
<i>Implementation of Plan Elements</i>	14
WAS IT MEETING PERFORMANCE STANDARDS?	14
<i>Overall</i>	14
<i>Westside</i>	15
<i>Eastside</i>	15
OTHER QUESTIONS	15
<i>What Types of Performance Standards Were Encountered, Assessed, and Met?</i>	16
<i>What Is the Age Distribution of Projects Evaluated?</i>	18
<i>What Types of Compensatory Mitigation Activities Were Encountered?</i>	19
<i>What Was the Level of Compliance for Each Activity?</i>	20
<i>What Was the Distribution of Project Impact Sizes?</i>	22
<i>What Was the Distribution of Compensatory Wetland Mitigation Size?</i>	23
<i>What Was the Adjusted Compensatory Wetland Mitigation Acreage?</i>	25
DISCUSSION	27
COMPLIANCE	27
SITE SELECTION, INFORMATION COLLECTION, AND SITE ACCESS	27
<i>Database problems</i>	27
<i>Project File Problems</i>	28
<i>Obtaining Access</i>	29
IMPLEMENTATION OF PLAN ELEMENTS.....	29
PERFORMANCE STANDARDS	30
<i>Problems Assessing Performance Standards</i>	30

<i>Performance Standards Met</i>	31
RECOMMENDATIONS	32
APPLICANTS.....	32
<i>Implement the Plan</i>	32
<i>Wetland Biologist On-Site</i>	32
<i>Submit As-builts</i>	32
<i>Performance Standard Structure and Content</i>	33
<i>Submit Monitoring Reports</i>	33
PERMITTING AGENCIES.....	33
<i>Prioritize Permit Follow-up</i>	33
<i>Require the Submission of As-builts and Monitoring Reports</i>	34
<i>Develop a Permit/Compensatory Mitigation Tracking System</i>	34
<i>Create a Comprehensive Filing System</i>	35
<i>Maintain the Files</i>	35
<i>Commit to Enforcing Permit Compliance</i>	36
FURTHER STUDIES.....	36
<i>Implementation of Phase 1 Recommendations</i>	36
<i>Cumulative Wetland Acreage Loss</i>	36
<i>Phase 2</i>	37
REFERENCES	39
APPENDIX A	41
DESCRIPTION OF MITIGATION PROJECTS EVALUATED.....	41
<i>East Sites</i>	41
<i>West Sites</i>	44
APPENDIX B	57
TABLES.....	57
<i>Phase 1 Raw Results - Table 1</i>	58
<i>Phase 1 Raw Results-Table 1 cont.</i>	59
<i>Table 2. Implementation of Plan Elements</i>	60
<i>Table 2</i>	61
APPENDIX C	62
PERFORMANCE STANDARD DISCUSSION.....	62
APPENDIX D	64
A LIST OF PERFORMANCE STANDARDS ENCOUNTERED.....	64
<i>Vegetation Survival</i>	64
<i>Vegetation Cover</i>	66
<i>Survival/Cover</i>	71
<i>Vegetation Diversity</i>	73
<i>Invasive/Non-native species</i>	73
<i>Cover/Invasives</i>	75
<i>Water Regime</i>	75
<i>Wildlife Use/Diversity</i>	76
<i>Wildlife Habitat</i>	77
<i>Other</i>	79
APPENDIX E	82
HYPOTHESIZED HYDROGEOMORPHIC CLASSIFICATIONS.....	82
APPENDIX F	84
ADVISORY TEAM.....	84

Acknowledgements

The authors gratefully acknowledge the cooperation of the project applicants and landowners that agreed to allow their compensatory wetland mitigation projects to be a part of this study. We also wish to thank the consultants who assisted us by providing background information, site drawings, and reports.

Thanks to the advisory team for their critical review and technical expertise:

Brent Haddaway	Arvid Lindstrum
Chris McAuliffe	Anna Mockler
Linda Storm	Michelle Walker
Bob Zeigler	

Additionally we would like to thank the US Army Corps of Engineers, particularly Michelle Walker for her assistance and cooperation during site selection and background information collection. Without the use of Corps files, this study would not have been possible.

Finally, we acknowledge the support and assistance of Ecology staff:

Lauren Driscoll	Susan Grigsby
Tom Hruby	Tom Luster
Mary Lynum	The Wetlands Technical Advisory Group
Shellyne Grisham	Tim Gates

And special thanks to Aaron Barna, Jenny Brown, Erik Neatherlin, and Lin Sierra.

Funding

Funding for this study was provided through the Environmental Protection Agency's (EPA) State Wetland Grants Program with matching funds from the Washington State Department of Ecology. Additional funding was provided by the Corporation for National Service.

Executive Summary

The Washington State Wetland Mitigation Evaluation Study assessed the effectiveness of compensatory wetland mitigation statewide. This study was initiated in response to a 1998 King County study (Mockler et al. 1998) which found that over three-quarters of the wetland mitigation sites evaluated in King County were unsuccessful according to their performance standards. The Wetland Mitigation Evaluation Study is a two-phase study to investigate the level of permit compliance and ecological functioning of a representative random sample of compensatory wetland mitigation projects in Washington.

The Phase 1 report describes the results from the first phase of the Wetland Mitigation Evaluation Study, which focused on the degree of compliance with permit requirements for compensatory wetland mitigation projects. Forty-five compensatory wetland mitigation sites were randomly selected from the US Army Corps of Engineer's Section 404 database and the Department of Ecology's Section 401 database. Background information was collected from the Corps' files, Ecology's files, and from project applicants or their consultants. Site conditions were evaluated against what was specified in Section 404 permits, Water Quality Certifications, Wetland Mitigation Plans, and/or Monitoring Reports.

Permit compliance for each of the 45 compensatory wetland mitigation projects was evaluated in three parts:

- Was the compensatory mitigation project implemented?
- Was it implemented to plan? and
- Was it meeting its performance standards (those assessable by the methods of this study)?

Overall, 13 projects (29%) were in full compliance with all three questions. Forty-two projects (93%) were implemented, and of those, 23 projects (55%) were implemented to plan. Thirty-four projects had performance standards that could be evaluated, and of those, 12 projects (35%) were meeting all performance standards assessable by this study.

A number of problems were encountered while conducting this study. Primarily, Ecology's 401 database contained numerous incomplete or inaccurate entries and project files were often either missing or lacking critical information. In addition, the methods and timing of site visits (fall of 1999) for Phase 1 did not allow assessment of all performance standards.

Recommendations for improving permit compliance are directed at applicants and permitting agencies. If followed, the recommendations should promote greater compliance. The recommendations for permitting agencies, specifically Ecology, are:

- Make permit follow-up and enforcement a higher priority;
- Consistently require project applicants to submit as-built and monitoring reports;
- Develop an effective permit/compensatory mitigation tracking system; and
- Create and maintain a comprehensive project filing system.

Introduction

Wetlands are important aquatic resources that have begun to be appreciated by society only within the past thirty years. Historically, wetlands were viewed as useless wastelands that must be “reclaimed” through draining and filling in order to farm or build upon them and, thus, make them useful. As scientific studies in the 1960s and 1970s began to demonstrate the many valuable functions that they provide, wetlands became the subject of increased governmental protection. Today, federal law protects most wetlands to some degree and many state and local laws provide additional protection. With each of these laws, the emphasis is on protecting and maintaining the valuable ecological and social functions that wetlands perform. Federal and state permitting processes use mitigation “sequencing” as the primary mechanism to ensure that wetland functions are protected or replaced.

The Department of Ecology defines wetland mitigation as a sequential process used to address proposed wetland impacts to ensure that the total adverse impact of a project is reduced to an acceptable level (McMillan 1998). When impacts to wetlands are permitted, the creation, restoration or enhancement of other wetlands (see step 5 below) is generally required. Ecology’s mitigation process is applied in the following sequential order:

1. Avoiding the impact by changing the location or the design of the project to eliminate wetland impacts.
2. Minimizing the impact by changing the design of a project to reduce the extent of the impact.
3. Rectifying the impact by restoring the impacted area after the development has taken place.
4. Reducing the impact to the wetland over time, for example by using buffer areas and storm water treatment facilities.
5. Compensating for the impact by replacing the impacted area and/or functions through wetland creation, restoration, enhancement, and/or preservation.
6. Monitoring the impact over time and taking corrective measures to minimize additional impacts.

On the federal level, discharges into wetlands and the associated wetland impacts are regulated by the US Army Corps of Engineers (Corps) through Section 404 of the Federal Water Pollution Control Act (Clean Water Act)(33 USC 1251 et seq.). The Corps authorizes wetland fill through the issuance of a permit. In the State of Washington, the Department of Ecology (Ecology) regulates projects that affect wetlands under the Washington State Water Pollution Control Act, Chapter 90.48 RCW. Typically, this is done through the issuance of a Water Quality Certification (WQC) under Section 401 of the Clean Water Act. This certification verifies that the wetland impact will meet state water quality standards and provisions of all state aquatic protection laws. The Corps permit and Ecology’s WQC authorizing a wetland impact frequently require implementation of compensatory wetland mitigation.

Recent studies of the effectiveness of wetland regulatory programs (Gwin and Kentula 1990, Castelle et al. 1992, Storm and Stellini 1994, Allen and Feddema 1996, and Mockler et al. 1998) have raised questions regarding the success of compensatory wetland mitigation projects. These studies have indicated that a net loss of wetland area and functions frequently occurs despite requirements for compensatory mitigation. The most recent study, conducted in 1998, evaluated compensatory wetland mitigation projects in King County (Mockler et al. 1998). This study found that the majority of projects were not meeting their performance standards and were, in fact, resulting in a net loss of wetland functions in King County.

In light of the King County study, Ecology initiated a two-phased study to determine the effectiveness of compensatory wetland mitigation statewide. The first phase of the Wetland Mitigation Evaluation Study was designed to determine compensatory wetland mitigation projects' level of compliance with permit requirements. The second phase will attempt to determine the level of ecological functioning in compensatory wetland mitigation projects.

The goal of Phase 1 was to examine a representative sample of wetland mitigation projects permitted by the Corps and/or Ecology in Washington, to determine whether the projects were: 1) being implemented; 2) being implemented to plan; and 3) meeting the required performance standards. Phase 2 of this study will examine a subset of the same wetland mitigation projects to determine: 1) how well they function ecologically (including a determination of established wetland area); 2) how this compares to what was lost as a result of the impacts; and 3) the primary factors that correlate with success or failure.

Methods

Advisory Committee

Prior to implementing this study, an advisory team of wetland professionals from private business and a variety of federal, state, and local agencies was assembled to provide guidance on the study methods used. The methods for this study were reviewed and influenced by the recommendations of this advisory team. For a list of advisory team members refer to Appendix F.

Study Site Selection

To facilitate objective evaluation of permit compliance for compensatory wetland mitigation projects, study sites were randomly selected from agency databases. A list of permitted projects from the US Army Corps of Engineer's Section 404 database and the Department of Ecology's Section 401 database was compiled. Site selection criteria were developed and applied to eliminate projects that were either irrelevant to the study or which would be unproductive to evaluate. A new database was then generated from the remaining projects. These projects were randomly sorted, and final study sites were then selected for consideration in Phase 1 of this study.

Site Selection Criteria

The following criteria were applied to the Section 404 and Section 401 databases to search for projects that were relevant for this study:

Table 1. Summary of criteria used to eliminate projects irrelevant to the study or unproductive to evaluate.	
<u>Database field criteria</u>	<u>Reason for eliminating</u>
1) a. Permit application date	“Prior to 1992”
b. Permit application date	“Post 1997”
2) Ecology Decision	“Denied,” “Expired,” or “Withdrawn”
3) Applicant	“WSDOT”
4) a. Permit Type	“NWP 03” (maintenance)
b. Permit Type	“NWP 13” (bank stabilization)
c. Permit Type	“NWP 19” (minor dredging)
5) a. Wetland impact	“Wetland impact 0”
b. Wetland impact	“No wetland impact indicated”
c. Mitigation	“Mitigation not required”
<u>Other criteria</u>	
6) Tidal Wetlands	Lacked methodology to effectively evaluate
7) 401 Thresholds on NWP 26	a. Wetland impact <1 acre prior to 2/1996 b. Wetland impact <0.33 acre after 2/1996

1) Permit application date.

The study used projects with permit applications submitted between 1992 and 1997. Projects with permit applications submitted after 1997 were not included, because it was likely that mitigation site construction had not yet been completed. Applications submitted prior to 1992 were excluded, since both the Corps’ and Ecology’s databases were incomplete and inconsistent prior to 1992.

2) Permit decision.

This criterion eliminated projects that the databases described as denied, withdrawn, or expired.

3) Washington State Department of Transportation (WSDOT) projects.

This criterion eliminated WSDOT projects. WSDOT is a high profile public agency that frequently impacts wetlands through its road building and maintenance activities, and therefore, must perform numerous compensatory wetland mitigation actions. As a result, WSDOT has developed and implemented its own monitoring program to study its overall compensatory mitigation success and compliance. Also, WSDOT submits annual monitoring reports to the permitting agencies documenting conditions at its mitigation sites. Overall, this study wanted to focus on how successful other public and private entities were at complying with compensatory wetland mitigation permit requirements.

4) Permit type.

This criterion eliminated projects authorized under certain types of Nationwide Permits (NWPs) that typically do not require compensatory mitigation. These included NWP 3 (maintenance), NWP 13 (bank stabilization), and NWP 19 (minor dredging). While it is possible that a project authorized under one of these Nationwide

Permits might have required compensatory wetland mitigation, the time required to individually review each permit to determine this was too great.

5) Wetland impact or mitigation.

This criterion eliminated projects that the database indicated as having no wetland impacts and no compensatory mitigation requirements.

6) Tidal wetlands.

This criterion eliminated projects known to be tidal. Tidally influenced sites function differently than non-tidal sites and a separate approach would have been necessary to evaluate these sites.

7) 401 Thresholds for NWP 26.

This criterion eliminated projects authorized under NWP 26 that had wetland impacts less than one acre prior to February of 1996 and less than 0.33 acre after February of 1996, because these permits typically did not require compensatory mitigation. This criterion was only applicable if no wetland mitigation was indicated in the database for these projects.

Site Selection Process

After applying the site selection criteria, the remaining projects were compiled into a single database. This database was stratified into two groups: sites west of the Cascade range and sites east of the Cascade range. For each of the two subsets, projects were randomly sorted and numbered.

Starting with #1, database entries for the randomly sorted projects were examined to verify that the project met the study criteria and to obtain adequate information to locate project files. Additional projects were then eliminated based on information obtained from file review or telephone conversations with Corps staff, applicants, or consultants. Projects were eliminated for reasons, such as:

- Projects revised to sufficiently reduce impacts such that no compensatory mitigation was required;
- Cranberry conversions of less 10 acres requiring no compensatory mitigation;
- Violations requiring the removal of fill and no compensatory mitigation;
- Projects still pending or currently under construction;
- Projects involving pipelines or transmission lines requiring “restoration to prior conditions” after the impact;
- Wetland impacts not completed;
- Projects with inaccurate database entries; and
- Projects determined to be tidal that did not appear as such in the initial database queries.

Gathering Background Information

Background information that was used to evaluate sites included:

- The Corps permit,
- Section 401 Water Quality Certification,

- A final wetland mitigation plan, and site maps
- Public notices,
- As-builts,
- Monitoring reports,
- Site photos,
- Deed restriction/conservation easement documentation,
- Decision documents,
- Correspondences and memorandums,
- SEPA documents, and
- Agency and public comments.

When available, this information was obtained from the Corps' Section 404 files and Ecology's Section 401 files. Some additional information was obtained from Ecology's regional wetland staff files.

In several cases, vital or pertinent information was lacking from the files. When critical information such as a mitigation plan, site maps, or design drawings, was not found in the files, the consultant or the applicant was contacted and asked to supply it. Information that was missing from a file was noted as "not found" in the event that it had been submitted by an applicant, but not properly filed.

Obtaining Access to Selected Study Sites

Study sites were not visited unless permission to gain access was granted by the landowners or their representatives. To obtain access, the permit applicant was contacted, and the nature of the Phase 1 Study was explained. Permission to make a site visit on a designated day and time was then requested.

In a few instances attempts to gain access were unsuccessful. One applicant denied access, four applicants never responded to the request for permission to gain access to the property, and one applicant granted access after the field portion of this study had been completed. These sites were dropped from the study.

Site Assessment

Upon obtaining sufficient background information and permission to gain access to the property, 46 compensatory mitigation sites were visited by the site assessment team. Site visits were conducted in October 1999 for 7 eastside sites and in October and November 1999 for 39 westside sites.

Site Assessment Methods

- 1) Site visits were conducted by two to three site assessment team members with backgrounds in wetland science, plant identification, data collection and/or mitigation design and construction.
- 2) Site orientation and as-built verification (if available).

- The site was traversed to orient to available project plans. Consistency with grading, required habitat features, and signage was checked.
- 3) Monitoring report verification.
- When available, a recent monitoring report was field verified. Monitoring points or transects were randomly selected and re-located to determine if reported results were consistent with on-the-ground-conditions. If it was determined that monitoring stations were inconsistent with conditions on the site then independent sample locations were chosen and the vegetation characterized as described below.
- 4) Vegetation assessment and data collection.
- Observed plant species were recorded, including wetland indicator status (FAC, OBL, etc.), and native vs non-native. Where applicable, it was recorded whether plant species were existing, planted, or dominant across the site or in particular locations. Consistency with planting plans was verified.
 - Vegetation sample locations were established by placing two or more points, depending on the size of the site, on the site drawings. Each point on the drawing was located on the ground. Relative areal cover was estimated within a five-foot radius for canopy, shrub/sapling, and herbaceous layers. Cover classes that were used to reduce observer bias and improve consistency were as follows:
 - >0 to <5%
 - >5 to <25%
 - >25 to <50%
 - >50 to <75%
 - >75 to <95%
 - >95 to 100%
- 5) Additional data collection and site photographs.
- Description of water regime in terms of area, extent, and depth of ponding, inundation, and/or saturation; presence of weirs or other water control structures; direction of flow if evident; and presence and location of culverts.
 - Evidence and/or observations of wildlife.
 - Surrounding land uses.
 - A handheld GPS unit was used to identify a latitude/longitude for the site.
 - Photos were taken, recording the general location and direction of the photo. If established photo points or monitoring points were found, photos were taken from these locations.

Compliance Evaluation

Compliance at each site was evaluated in three parts:

1. Was the compensatory mitigation project implemented (e.g. built)?
2. Was the compensatory mitigation project implemented according to plan (e.g. as-built specifications, grading plan, planting plan, etc.)?
3. Was the compensatory mitigation project meeting its performance standards?

Was the compensatory wetland mitigation project implemented?

This question was assessed based on whether it was evident that the work described in the plan had been carried out. If the site assessment team observed any evidence that compensatory wetland mitigation activity had been executed, then it was determined that the project had been implemented.

For compensatory mitigation projects that involved preservation either as a sole mitigation activity or in conjunction with another activity, “implementation” was assessed through a site visit to determine whether the preservation area was intact (e.g. there was no obvious development visible). However, two preservation only projects additionally required restoring areas of unauthorized fill. For these projects implementation was also based on whether the unauthorized fill was removed (e.g. site restored).

Compensatory wetland mitigation projects were evaluated and categorized as either:

- 1) “Yes,” implemented.
- 2) “No,” not implemented.

Compensatory mitigation projects that were not implemented were not evaluated further. Projects not implemented were categorized as “not applicable” (NA) for the implemented to plan question and for the meeting performance standards question.

Was the wetland mitigation project implemented according to plan?

Answering this question entailed assessing several elements of the compensatory wetland mitigation plan, including planting, grading, water regime, deed restrictions or conservation easements, signs, and habitat features. Signs, habitat features, deed restrictions/conservation easements, and other miscellaneous plan requirements were collectively included in an “other” category.

If an as-built document was available, it was used as the basis for evaluating sites. Otherwise, on-the-ground-conditions were compared to the most recent version of grading and/or planting plans or drawings (if available) or written descriptions in a final mitigation plan.

Grading components assessed were on-site topography and the presence of soil amendments, if required. Water regime components, such as presence of water flow or control structures and extent of open water or inundation were assessed as part of the grading, when applicable. Planting was assessed based on consistency with the planting plan regarding presence of vegetation species, and relative numbers and planting locations.

Other elements of a mitigation plan that were assessed included habitat features (such as snags, stumps, brush piles, etc.), wetland demarcation signs, and other site variables. If required, these elements were assessed based on relative numbers and locations consistent with what was called for in the mitigation plan.

Presence of a deed restriction or conservation easement was verified for compensatory mitigation projects involving preservation.

Plan element compliance was categorized as:

- 1) “Yes,” implemented to plan.
- 2) “No,” not implemented to plan.
- 3) “CND,” could not determine if implemented to plan. For example, if extensive flooding occurred after plants had been installed, the site assessment team could not determine if the site was planted to plan.
- 4) “NA,” not applicable. Not all plan elements were applicable to all mitigation projects. For example, grading was not applicable for many enhancement projects.

If one element was evaluated as “no,” then the overall evaluation of whether the project was implemented to plan was “no”.

Was the wetland mitigation project meeting performance standards?

This study defined performance standards as:

- 1) The performance standards identified in a project’s wetland mitigation plan.
- 2) Any Corps permit requirement and/or WQC conditions.
- 3) Performance standards identified in the monitoring section of a mitigation plan.

Performance standards were assessed based on field conditions observed during the site visit. If a monitoring report was available, then on-the-ground-conditions were compared to the results of the most recent monitoring event.

Some projects did not have performance standards identified in their mitigation plans, nor did they have any applicable Corps or Ecology permit conditions to assess. Also, many projects had performance standards that this study was unable to assess, due to the timeframe of site visits and/or the study methods used. Performance standards that this study could not assess included:

- Establishment of a specified area of wetland and wetland types (delineations were not conducted);
- Water regime performance standards that required evidence of inundation or saturation during the growing season; and
- Year-based standards that were outside the timeframe of the site visit.

Performance standard attainment was categorized as:

- 1) “Yes,” meeting performance standard.
- 2) “No,” not meeting performance standard.
- 3) “CND,” could not determine if the performance standard was met. This was used for standards that were not measurable or ambiguous, and also for projects that had no performance standards which this study could assess.
- 4) “NA,” not applicable. This was applied to projects with no performance standards such as preservation-only projects or projects that only had goals.

If one of the assessed performance standards was evaluated as “no”, then the overall evaluation of whether the project was meeting performance standards was no.

Results

Phase 1 compiled a master database of projects for initial consideration, which was stratified into 831 projects west of the Cascades and 53 projects east of the Cascades. A review of the first 400 randomly numbered westside projects in the database resulted in the initial selection of 45 projects. Permission to visit the property was granted for 39 projects. Of the six projects for which site access was not obtained, one applicant denied access, four did not respond when contacted, and one did not respond prior to the end of the field portion of the study. All 53 eastside projects listed in the database were reviewed. Seven projects met all the selection criteria, and permission to visit the property was granted for all seven projects.

When applicants were contacted they were informed that this study was academic in nature and that no enforcement actions would result from this study’s evaluation of the compensatory mitigation projects. Therefore, results of this study are reported anonymously. Individual sites are identified by their randomly selected number and by the county in which they are located.

For the westside, 38 projects were ultimately assessed. One project (#219) was dropped after it was visited, because the wetland impact had not occurred.

Refer to Figure 1 for approximate locations of the 45 compensatory mitigation projects evaluated for phase 1.

Compliance Questions

All 45 compensatory mitigation projects were evaluated for compliance with the following three questions:

- 1) Was it implemented?
- 2) Was it implemented to plan?
- 3) Was it meeting performance standards?

Thirteen projects (29%) were in full compliance with all three questions. However, four of the projects (9%) determined to be in full compliance involved solely preservation (except for some restoration acreage - removal of unauthorized fill). Therefore, nine projects (20%) that involved some construction or planting were in full compliance with all three questions. One project (#243) (2%) was in compliance for the first two questions, but none of the performance standards could be assessed, and therefore overall compliance could not be evaluated (refer to Appendix A for project specific information). The remaining 31 projects (69%) were out of compliance for one of the three questions.

For a review of the results of each of the three questions see Table 2. For a review of the results of each question for each project, refer to Table 1 in Appendix B.

Was It Implemented?

This study determined that 42 projects (93%), out of the 45 projects evaluated, were implemented. The three projects that were not implemented were located on the westside. The following is a description of how it was determined that these projects were not implemented (refer to Appendix A for project specific information):

- For one project (#299), the agent indicated that it had not been implemented.
- A Corps staff person indicated that a second project (#218) had not been implemented.
- During a site visit the site assessment team observed no evidence of any site work for the third project (#398). It was therefore determined that the project was not implemented. Follow-up conversations with the applicant confirmed this determination.

On the eastside, all seven projects were implemented.

Was It Implemented to Plan?

This study evaluated several elements to determine whether a project was implemented to plan, including planting and grading, signage, and habitat features. Presence of a deed restriction or conservation easement was required in order for preservation projects to be considered implemented to plan. When a project was not implemented to plan, often more than one element was not implemented accurately.

Overall

- 23 projects (55%), out of the 42 implemented, were implemented to plan.
- 3 could not be determined.
- 16 projects were not implemented to plan, of these:
 - 8 had not implemented any of the applicable elements to plan.
 - 8 projects had properly implemented at least one element of the plan.

An as-built was found for 17 projects. Of these:

- 15 projects (88%) had an as-built which reflected the on-the-ground conditions. These projects were considered implemented to plan.
- 2 projects (12%) had an as-built that did not reflect the on-the-ground conditions. Of these:
 - One submitted the original plan with an as-built stamp (#232) which indicated that an additional area should have been graded and planted. This area was located, but no grading or planted material was observed. This project was therefore not implemented to plan.
 - One submitted a vague sketch of grading (#289) and a list of planted material. The grading was roughly accurate, but much of the listed plant material could not be located during the site visit. This project was not implemented to plan (the site was one-year post implementation and planted material should have been evident).

Figure 1. Relative Locations of Wetland Compensatory Mitigation Sites

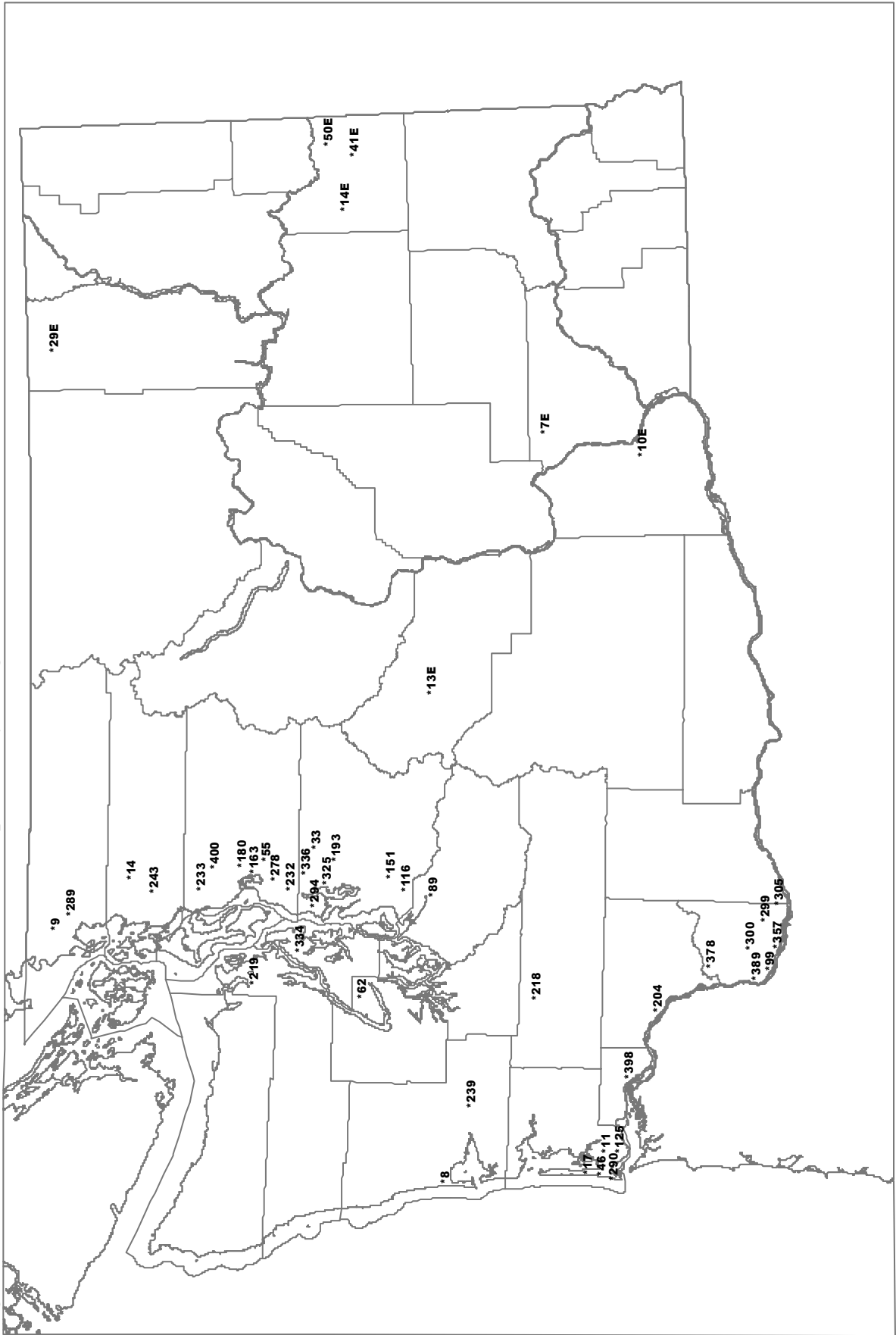


Table 2. Compliance Attainment

Overall	Westside	Eastside
<p>1) Was it Implemented? <u>45 total projects considered</u> <u>42 implemented = 93%</u> <u>3 not implemented = 7%</u></p>	<p>1) Was it Implemented? <u>38 projects considered</u> <u>35 were implemented = 92%</u> <u>3 were not implemented = 8%</u></p>	<p>1) Was it Implemented? <u>7 projects considered</u> <u>7 were implemented = 100%</u></p>
<p>2) Was it Implemented to Plan? <u>42 projects implemented</u> <u>23 implemented to plan = 55%</u> <u>3 could not be determined = 7%</u> <u>16 not implemented to plan = 38%</u></p>	<p>2) Was it Implemented to Plan? <u>35 projects implemented</u> <u>22 implemented to plan = 63%</u> <u>2 could not be determined = 6%</u> <u>11 not implemented to plan = 31%</u></p>	<p>2) Was it Implemented to Plan? <u>7 projects implemented</u> <u>1 implemented to plan = 14%</u> <u>1 could not be determined = 14%</u> <u>5 not implemented to plan = 71%</u></p>
<p>3) Was it meeting Performance Standards (P.S.)? <u>42 projects implemented</u> <u>4 preservation with no P.S.</u> <u>2 with no P.S., only goals</u> <u>2 with no assessable P.S.</u> <u>34 projects with P.S. that were assessed</u> <u>12 met all assessed P.S. = 35%</u> <u>6 met at least 1 assessed P.S. = 18%</u> <u>16 met no assessed P.S. = 47%</u></p>	<p>3) Was it Meeting Performance Standards (P.S.)? <u>35 projects implemented</u> <u>4 preservation with no P.S.</u> <u>1 with no P.S. only goals</u> <u>2 with no assessable P.S.</u> <u>28 projects with P.S. that were assessed</u> <u>11 met all assessed P.S. = 39%</u> <u>5 met at least 1 assessed P.S. = 18%</u> <u>12 met no assessed P.S. = 43%</u></p>	<p>3) Was it Meeting Performance Standards (P.S.)? <u>7 projects implemented</u> <u>1 with no P.S. only goals</u> <u>6 projects with P.S. that were assessed</u> <u>1 met all assessed P.S. = 17%</u> <u>1 met at least 1 assessed P.S. = 17%</u> <u>4 met no assessed P.S. = 67%</u></p>

Westside

- 22 projects (63%), of the 35 implemented on the westside, were implemented to plan. This number includes 4 preservation only projects.
- 2 projects could not be determined. This included:
 - One project (#99) was required to do only buffer enhancement for a wetland created under a related permit. City maintenance staff had repeatedly mowed most of the enhancement plantings; therefore, the site assessment team could not determine if the plant material listed in the compensatory mitigation plan had been planted. Refer to Appendix A for more information.
 - One project (#239) involved enhancement of an existing wetland area with supplemental plantings. The site assessment team did not observe two of the plant species indicated on the planting plan. Since the project was over five years old and neither an as-built nor monitoring reports could be found, this study could not determine whether the required species were planted and then died, or whether the required species were never planted. Refer to Appendix A for more information.
- 11 projects did not accurately implement one or more elements of the mitigation plan.
 - 2 projects did not implement the planting according to plan.
 - 5 projects did not implement the planting and grading to plan.
 - 1 project did not implement the planting according to plan and the grading could not be determined.
 - 1 project did not implement the planting and the “other” category according to plan.
 - 1 project did not implement the “other” category according to plan, and the planting could not be determined.
 - 1 project did not implement the grading and the “other” category to plan.

Eastside

- 1 project (14%), out of the 7 that were implemented, was implemented to plan.
- 1 project (14%) could not be determined if implemented to plan. This project (#29E) involved enhancing a reed canarygrass (*Phalaris arundinacea*) dominated floodplain. The site assessment team located some plantings, however, it could not be determined whether plantings were implemented according to the plan. Refer to site description in Appendix A for more information.
- 5 projects (71%) were not implemented to plan.
 - 2 projects did not implement the planting according to plan.
 - 1 project did not implement the planting and grading to plan.
 - 1 project did not implement the planting and the “other” category according to plan and the grading could not be determined.
 - 1 project did not implement the grading according to plan and the planting could not be determined.

Note: A westside project (#278), which was considered implemented to plan, did not complete grading and no material was planted. However, correspondence between the applicant and the Corps described the situation with the project, and the Corps accepted this notification of circumstances as an as-built. Based on this accepted as-built,

modification from the mitigation plan was also accepted, therefore the project was determined to have been implemented to plan. Refer to site description in Appendix A for more information.

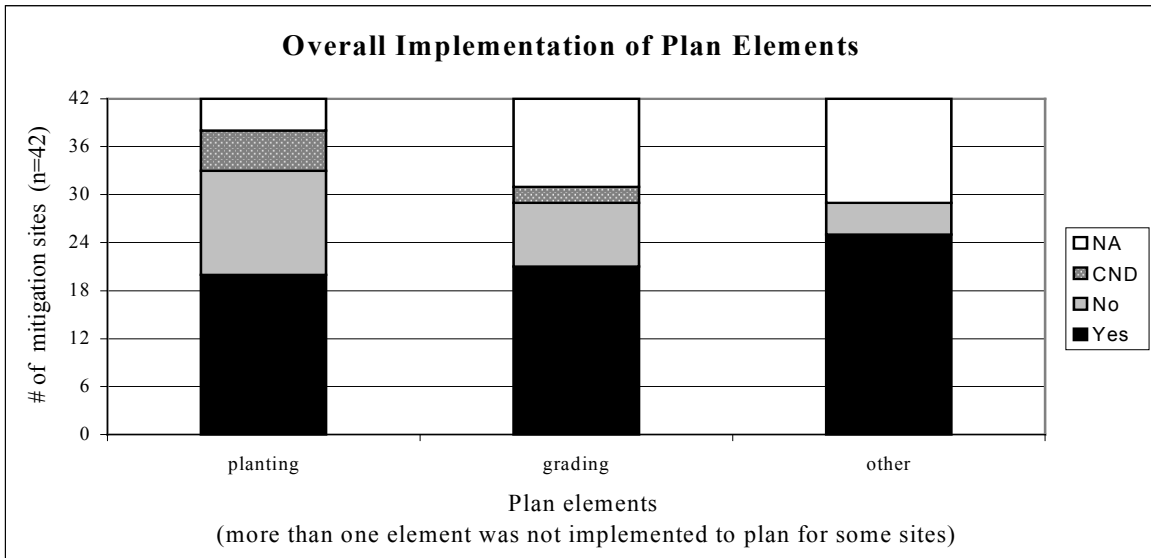
Implementation of Plan Elements

The mitigation plan elements most often implemented incorrectly were determined based on the number of projects for which: 1) a plan element was applicable; 2) information was available on a plan element; and 3) it could be determined if the element was done to plan.

For project specific information on implementation of plan elements refer to Table 2 in Appendix B.

Overall

- 16 projects were not implemented to plan (refer to Graph 1). Of these:
 - 13 projects (81%) did not implement planting according to plan.
 - 8 projects (50%) did not implement grading according to plan.
 - 4 projects (25%) did not implement the “other” element according to what was indicated in the mitigation plan.



Graph 1. Yes=implemented to plan; No=not implemented to plan; CND=could not determine if implemented to plan; NA=not applicable plan element.

Was It Meeting Performance Standards?

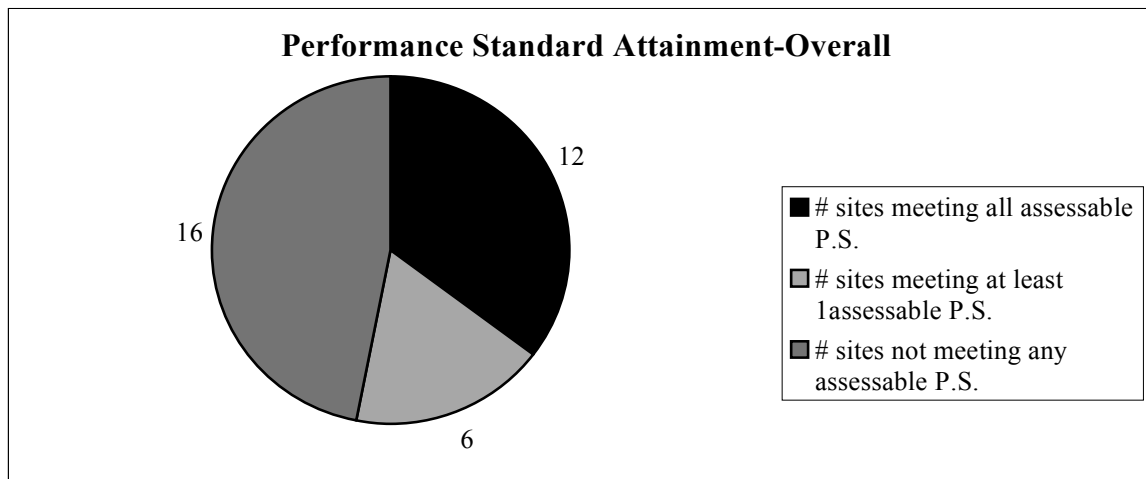
Overall

- 34 projects, out of the 45 projects evaluated for this study, had assessable performance standards (refer to Graph 2). The following projects were not considered:
 - 3 projects were not implemented.
 - 4 projects involved solely preservation and did not have performance standards.
 - 2 projects only had goals which could not be assessed.

- 2 projects had performance standards which could not be assessed within the parameters of this study.
- 12 projects (35%) met all assessable performance standards.
- 22 projects (65%) failed to meet one or more of the assessable performance standards.

Westside

- 28 projects had performance standards that could be assessed. The following projects were not considered:
 - 4 preservation-only projects (two had small restoration acreage for removal of unauthorized fill) which had no performance standards.
 - 1 project only had goals that could not be assessed.
 - 2 projects had performance standards which could not be assessed within the parameters of this study.
- 11 projects (39%) were meeting all assessable performance standards.
- 17 projects (61%) failed to meet one or more of the assessable performance standards.



Graph 2. 34 projects with assessable performance standards were considered for this evaluation

Eastside

- 6 projects had performance standards that could be assessed and 1 project only had goals which could not be assessed.
- 1 project (17%) met all assessable performance standards.
- 5 projects (83%) failed to meet at least one of the assessable performance standards.

Other Questions

In addition to answering the three primary compliance questions discussed previously, this study analyzed the data collected to answer a number of other important questions. These include:

- What types of performance standards were encountered, assessed, and met?
- What was the age distribution of projects evaluated?
- What were the most commonly used compensatory mitigation activities?
- What was the level of compliance by activity?
- What was the distribution of wetland impact size?

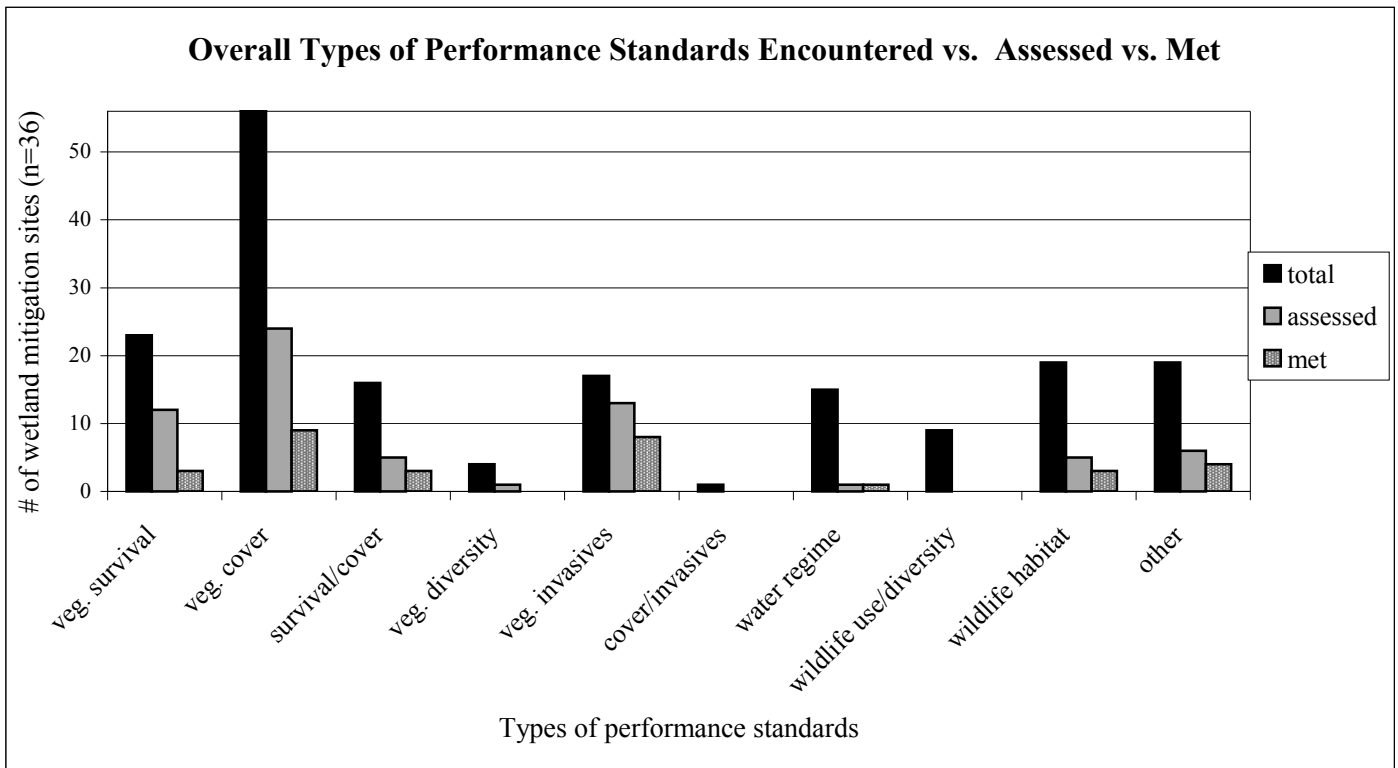
- What was the distribution of compensatory mitigation size?
- What was the adjusted compensatory mitigation ratio?

What Types of Performance Standards Were Encountered, Assessed, and Met?

The performance standards encountered in this study were assigned to one of the following categories:

- Vegetation
 - % survival
 - % cover
 - % survival/cover
 - diversity
 - invasive
 - invasive/% cover
- Water Regime
- Wildlife
 - use/diversity
 - habitat
- Other (wetland area, signs, etc.)

Refer to Graph 3 and Table 3 for more information.



Graph 3. Depicts the variation between the total number of performance standards encountered, the number that this study was able to assess, and the number that were met. 36 projects were considered for this evaluation (this excludes: 3 projects not implemented; 4 preservation-only projects; and 2 projects with no performance standards, only goals).

Table 3. Overall Types of Performance Standards Encountered, Assessed, and Met

	Vegetation Survival	Veg. Cover	Veg. Survival/Cover	Veg. Diversity	Veg. Invasiv.	Veg. Cover/Invasiv.	Water Regime	Wildlife Use/Diversity	Wildlife Habitat	Other	Total # of P.S.
Encountered	23	56	16	4	17	1	15	9	19	19	179
Assessed	12	24	5	1	13	0	1	0	5	6	67
Met	3	9	3	0	8	0	1	0	3	4	31
Not Met	9	15	2	1	5	0	0	0	2	2	36

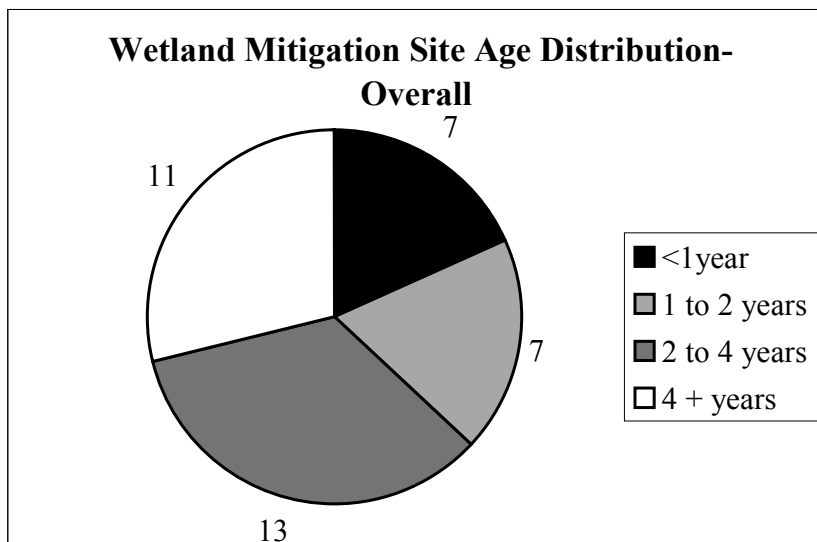
*Does not include the 3 projects not implemented, the 4 preservation-only projects, or the 2 projects which only had goals (n=36).

What Is the Age Distribution of Projects Evaluated?

Overall

The wetland mitigation sites visited for this study ranged in age from less than one-year post implementation to nearly seven years post implementation. There were 38 projects considered (refer to Graph 4). This excludes the preservation only projects and the projects that were not implemented.

- 7 projects (18%) were less than one-year post implementation.
- 7 projects (18%) were at least one year but less than 2 years post implementation.
- 13 projects (34%) were at least 2 years but less than 4 years post implementation.
- 11 projects (29%) were at least 4 years post implementation or older.



Graph 4. 38 projects considered for this evaluation.

Westside

- 31 projects.
 - 7 projects (23%) were less than one-year post implementation.
 - 7 projects (23%) were at least one year but less than 2 years post implementation.
 - 10 projects (31%) were at least 2 years but less than 4 years post implementation.
 - 7 projects (23%) were at least 4 years post implementation or older.
- Projects 2 years old or more comprised over half (55%) of the study sites.
- The oldest site was just under 7 years post implementation at the time of the site visit.

Eastside

- 7 projects.
 - 3 projects (43%) were at least 2 years but less than 4 years post implementation.
 - 4 projects (57%) were at least 4 years post implementation or older.
- All (100%) of the study sites were at least 2 years post implementation.
- The oldest project was over 6 years post implementation.

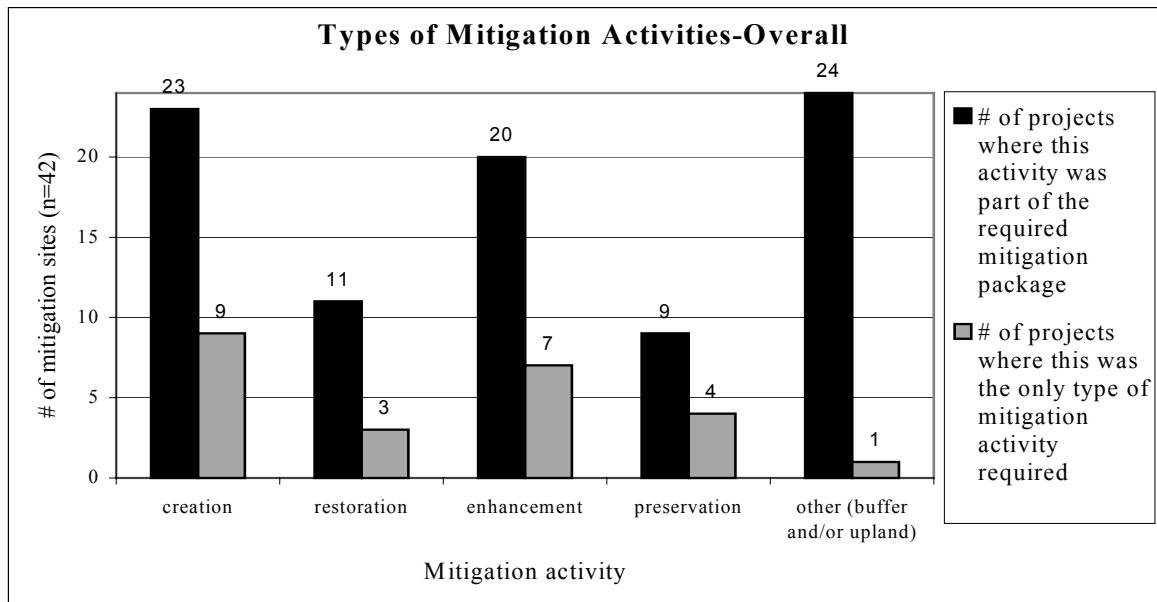
For project specific information refer to Table 1 in Appendix B.

What Types of Compensatory Mitigation Activities Were Encountered?

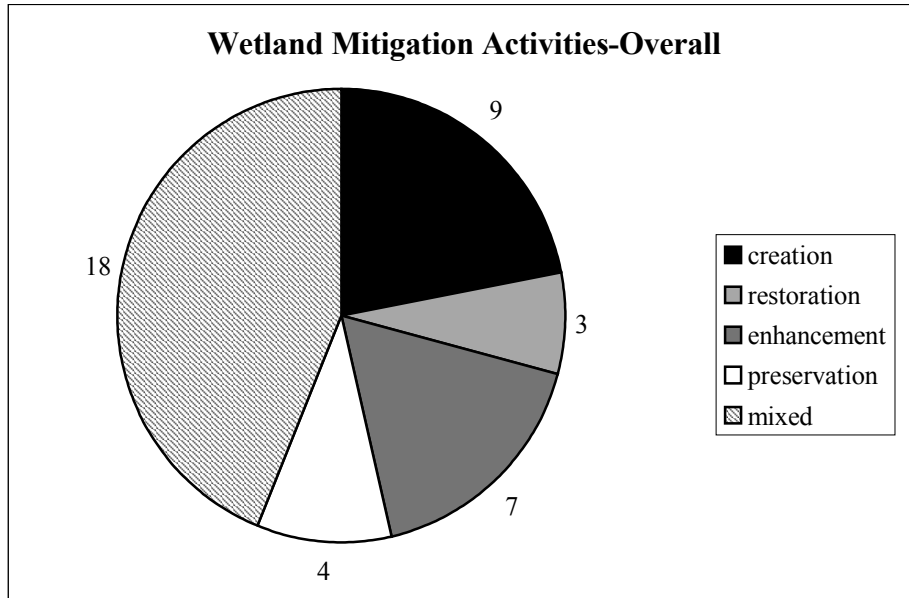
The types of mitigation activities encountered for the projects evaluated in this study included wetland creation, restoration, enhancement, and preservation; buffer and upland enhancement; and riparian enhancement. Projects were evaluated as either mixed activity projects (e.g. the project performed more than one wetland activity) or single activity projects. If a project implemented one type of wetland activity along with some buffer work, the project was evaluated as a single activity. Project #99 involved solely buffer enhancement and was evaluated as a single activity. The two projects involving preservation as compensation for unauthorized fill also required removal of some or all of that fill (restoration acreage), but were considered as preservation only projects. This evaluation excludes the three projects which were not implemented.

Overall

- 42 projects considered (refer to Graphs 5 and 6).
 - 23 projects (55%) involved creation.
 - 11 projects (31%) involved restoration.
 - 20 projects (48%) involved enhancement.
 - 9 projects (21%) involved preservation.
- 24 projects (60%) involved a single type of mitigation activity, such as creation.
- 18 projects (43%) proposed to perform a mixture of mitigation activities. For example, creation and enhancement.
- Over half (24) of the projects involved a buffer/upland and/or riparian component. All but one of these (#99) involved at least one other mitigation activity.



Graph 5. Number of sites implementing each type of mitigation activity. Black bars indicate the total number of sites that implemented a given mitigation activity, while the gray bars indicate the number of sites that implemented just the particular single mitigation activity.



Graph 6. This pie chart shows the percentage of projects that implemented each individual type of wetland mitigation activity and the percentage of projects that implemented a combination of wetland mitigation activities. 41 projects considered (this excludes the buffer-only enhancement).

Westside

- 35 projects considered.
 - 18 (51%) projects involved creation.
 - 20 (57%) projects involved enhancement.
 - 9 (26%) projects involved restoration.
 - 9 (26%) projects involved preservation.
- 19 projects (54%) involved a buffer/upland and/or riparian component. All but one of these (#99) involved at least one other mitigation activity.
- 17 (49%) projects involved a single mitigation activity.

Eastside

- 7 projects considered.
 - 5 (71%) projects involved creation.
 - 2 (29%) projects involved restoration.
 - 1 (14%) project involved enhancement.
- 5 (57%) projects involved a buffer/upland and/or riparian component.
- 6 (57%) projects involved a single mitigation activity.

For project specific information refer to Table 1 in Appendix B.

What Was the Level of Compliance for Each Activity?

The three compliance questions evaluated in this study were compared with type of wetland mitigation activity. This evaluation does not include project #99 which involved solely buffer enhancement and therefore did not implement a wetland mitigation activity. Also, the two unauthorized fill projects (#11 and #125) were considered as preservation-only projects. Refer to Table 4.

Table 4. Wetland Mitigation Compliance vs. Wetland Mitigation Activity						
Overall	Creation (n=10)	Restor. (n=3)	Enhance. (n=8)	Preserv. (n=4)	Mix (n=19)	
number of projects implemented	9	3	7	4	18	
number of projects implemented to plan	1	1	3	4	14	
number of projects meeting performance standards	3	1	1	NA	7	
Westside	creation (n=6)	restor (n=2)	enhance (n=7)	preserv (n=4)	mix (n=18)	
number of projects implemented	5	2	6	4	17	
number of projects implemented to plan	1	1	3	4	13	
number of projects meeting performance standards	3	1	1	NA	6	
Eastside	creation (n=4)	restor (n=1)	enhance (n=1)	preserv (n=0)	mix (n=1)	
number of projects implemented	4	1	1	0	1	
number of projects implemented to plan	0	0	0	0	1	
number of projects meeting performance standards	0	0	0	0	1	

*This table does not include the project that involved solely upland buffer enhancement (n=44).

Overall

44 projects considered.

- Implemented.
 - 8 out of 10 creation projects (80%) were implemented.
 - 3 out of 3 restoration projects (100%) were implemented.
 - 7 out of 8 enhancement projects (88%) were implemented.
 - 4 out of 4 preservation projects (100%) were implemented.
 - 18 out of 19 mixed activity projects (95%) were implemented.

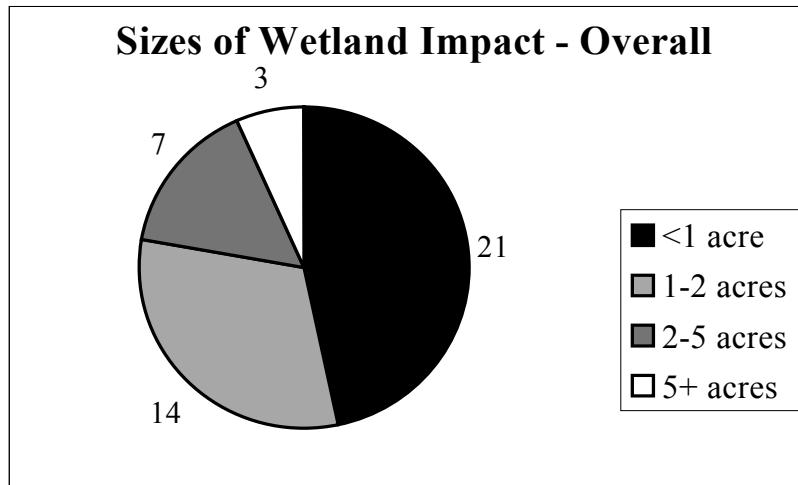
- Implemented to Plan.
 - 1 out of 10 creation projects (10%) was implemented to plan.
 - 1 out of 3 restoration projects (33%) was implemented to plan.
 - 3 out of 8 enhancement projects (38%) were implemented to plan.
 - 4 out of 4 preservation projects (100%) were implemented to plan.
 - 14 out of 19 mixed activity projects (74%) were implemented to plan.

- Meeting Performance Standards.
 - 3 out of 10 creation projects (30%) met assessed performance standards.
 - 1 out of 3 restoration projects (33%) met assessed performance standards.
 - 1 out 8 enhancement projects (13%) met assessed performance standards.
 - Preservation projects had no performance standards to assess.
 - 7 out of 19 mixed projects (37%) met assessed performance standards.

For project specific information refer to Table 1 in Appendix B.

What Was the Distribution of Project Impact Sizes?

All 45 projects were considered for this analysis as all projects had completed the permitted wetland impact. The wetland impacts, which triggered the compensatory mitigation actions evaluated for this study, ranged in size from less than a tenth of an acre to 21 acres. Refer to Graph 7.



Graph 7. All 45 projects considered for this evaluation.

Overall

- All 45 projects evaluated for this study were considered.
 - 21 (46%) projects had wetland impacts less than one acre. Totaling 10.2 acres.
 - 14 (31%) projects had wetland impacts at least one acre but less than 2 acres. Totaling 23.3 acres.
 - 7 (16%) projects had wetland impacts at least 2 acres but less than 5 acres. Totaling 20.0 acres.
 - 3 (7%) projects had wetland impacts at least 5 acres or greater. Totaling 45.1 acres.
- 35 (78%) projects had wetland impacts less than 2 acres.

Westside

- 38 projects considered.
 - 15 (40%) projects had wetland impacts less than one acre.
 - 13 (34%) projects had wetland impacts at least one acre but less than 2 acres.
 - 7 (18%) projects had wetland impacts at least 2 acres but less than 5 acres.
 - 3 (8%) projects had wetland impacts at least 5 acres or more.
- 28 (74%) projects had impacts less than 2 acres.
- Wetland impacts equal to or greater than 2 acres comprised 26% (10) of the westside projects evaluated. Of those:
 - 30% (3) were greater than 5 acres.

Eastside

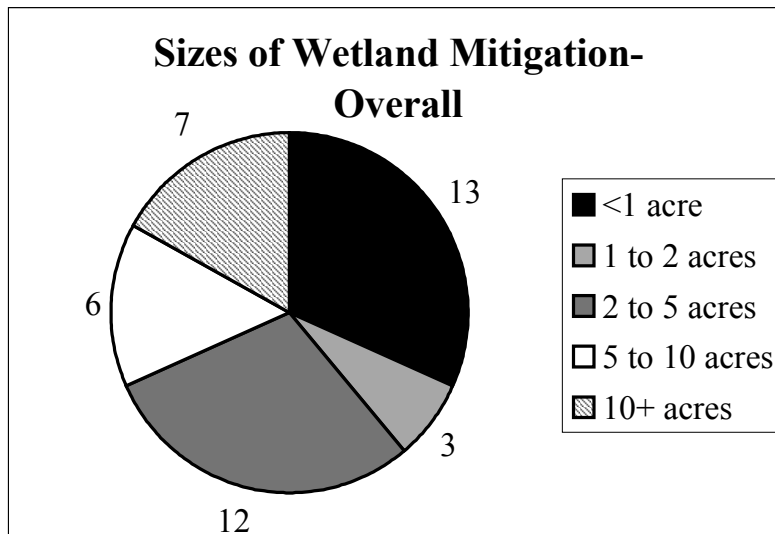
- 7 projects considered.
 - 6 (86%) projects had wetland impacts less than one acre.
 - 1 (14%) project had wetland impacts at least one acre but less than 2 acres.
- All impacts were less than 2 acres.

Refer to Table 1 in Appendix B for more information.

What Was the Distribution of Compensatory Wetland Mitigation Size?

The wetland mitigation projects evaluated for this study varied considerably in size of wetland impact, types of mitigation activities, and size of compensatory mitigation. It should be noted that in regard to size of mitigation acreage, several (11) projects mentioned buffer and or riparian mitigation, but acreage was either not mentioned or was provided in a form that could not be converted to acreage. In particular, one westside project (#99) involved solely buffer enhancement, but no mitigation acreage was identified in the permit or in the mitigation plan. This project was therefore not included in the analysis of mitigation size. Additionally, the three compensatory wetland mitigation projects that were not implemented were excluded from this evaluation. The 41 remaining wetland mitigation sites visited ranged in estimated or proposed size from less than a fifth of an acre to 205 acres.

Refer to Graph 8.



Graph 8. 41 projects considered for this evaluation. This excludes the projects that were not implemented and a buffer-only enhancement which specified no acreage.

Overall-

- 41 mitigation sites, ranging in estimated or proposed size from less than a fifth of an acre to 205 acres.
 - 13 projects (32%) were less than one acre. Totaling 5.1 acres.
 - 3 projects (7%) were at least one acre but less than 2 acres. Totaling 2.92 acres.
 - 12 projects (29%) were at least 2 acres but less than 5 acres. Totaling 42.69 acres.
 - 6 projects (15%) were at least 5 acres but less than 10 acres. Totaling 43.55 acres.
 - 7 projects (17%) were at least 10 acres or more. Totaling 478.63 acres
- Two thirds (68%) of the projects were less than 5 acres.

Westside

- 34 projects were considered. This excludes the 3 projects that were not implemented. It does not include a project that required buffered enhancement, because no specific acreage was identified in either the permit or the mitigation plan.
 - 8 (24%) compensatory wetland mitigation projects were less than one acre.
 - 2 (6%) compensatory wetland mitigation projects were at least one acre but less than 2 acres.
 - 10 (29%) compensatory wetland mitigation projects were at least 2 acres but less than 5 acres.
 - 5 (15%) compensatory wetland mitigation projects were at least 5 acres but less than 10 acres.
 - 9 (26%) compensatory wetland mitigation projects were at least 10 acres or more.
- All sites greater than 10 acres occurred on the westside.
- The three mitigation projects that were not implemented were to have established a total of 5 acres.

Eastside

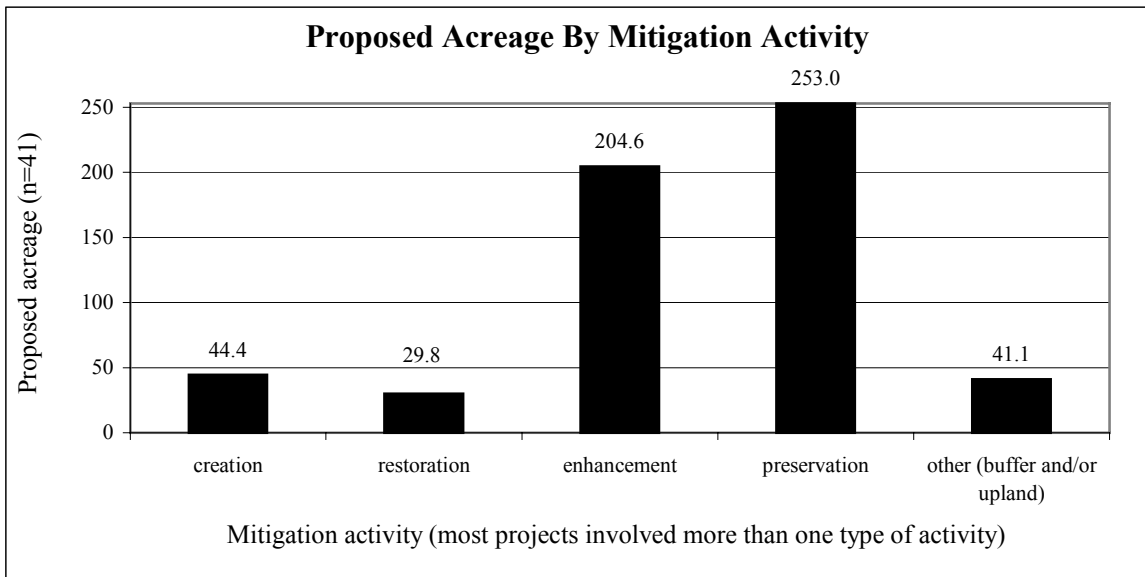
- 7 projects considered.
 - 4 (57%) projects were less than one acre.
 - No projects were at least one acre but less than 2 acres.

- 2 (33%) projects were at least 2 acres but less than 5 acres.
- 1 (17%) project was at least 5 acres but less than 10 acres.
- No projects were greater than 10 acres.

For project specific information refer to Table 1 in Appendix B.

Mitigation Acreage by Mitigation Activity

This evaluation did not include the three projects that were not implemented. Refer to Graph 9.



Graph 9. Numbers at top of bars indicate the proposed mitigation acreage for each activity. 41 projects were considered for this evaluation. This excludes the 3 projects not implemented and the buffer-only enhancement which specified no acreage.

What Was the Adjusted Compensatory Wetland Mitigation Acreage?

The estimated mitigation acreage for all of the proposed mitigation activities for the 45 projects evaluated adds up to 577.94 acres. When comparing to the 98.5 acres of permitted impact for these projects, it appears that wetland mitigation projects are resulting in a significant gain in wetland area. However, several adjustments must be made to provide a reasonable comparison between impact acreage and compensatory mitigation acreage.

First, the 3 compensatory mitigation projects (5.01 acres) that were not implemented must be subtracted, resulting in 572.93 acres of total compensatory mitigation area.

Of the implemented projects, one (#8) amounted to over a third of this total. It accounted for 205 acres of mitigation in compensation for 4.92 acres of impact. Over half of this (112 acres) was preservation and another 84 acres were enhancement resulting from the installation of a culvert under a road to restore hydrologic connectivity. Refer to Appendix A and Table 1 in Appendix B for more information.

Second, the mitigation total includes some acreage generated by upland buffer mitigation activities. Currently, impacts to wetland buffers are not regulated on the federal or state level, and the total impact acreage (98.5 acres) does not include any buffer impacts. Upland buffers,

though invaluable for protecting the functions of the wetland, do not provide direct compensation for losses of wetland area, therefore, for this analysis buffer acreage was subtracted from the total mitigation acreage (572.9 – 41.1) resulting in a total of 531.8 acres of wetland mitigation.

Third, the compensatory mitigation projects involved several types of mitigation activities which provide varying levels of gain in area or function. For example, creation and restoration of wetlands results in a gain in wetland area whereas enhancement of existing wetlands does not. In addition, creation, restoration and most enhancement activities do not provide an immediate gain in wetland functions. New wetland areas take anywhere from several years to decades to develop the physical structure and chemical and biological processes that underlie the performance of wetland functions (Josselyn et al. 1990, Kusler & Kentula 1990). Additionally, wetland creation and restoration projects frequently fail and often end up with less acreage of wetland area than was planned (Kusler & Kentula 1990, Kunz et al. 1988, Mockler et al. 1998).

Thus, regulatory agencies have developed mitigation replacement ratios to “discount” the different mitigation activities to account for the risk of failure and the temporal loss of function associated with mitigation activities. Ecology has developed replacement ratios for the various mitigation activities which consider the level of risk and length of time necessary to establish a functioning wetland. The ratios in Table 5 below are used as general guidelines and are adjusted on a case-by-case basis to fit site-specific situations.

Table 5. Ecology Replacement Ratios			
Wetland Type Impacted (based on Ecology’s wetland rating system)	Creation or Restoration	Enhancement	Wetland Preservation
Category I	6:1	12:1	10:1 –20:1
Category II/III			
-Forested	3:1	6:1	10:1 –20:1
-Scrub/shrub or emergent	2:1	4:1	
Category IV	1.5:1	3:1	10:1 –20:1

The permit files on the impacted wetlands in this study did not consistently include information on the wetland category, so it is not possible to select the appropriate ratio for each project. Instead, we applied a “mid-range” ratio to the totals for each mitigation activity as follows:

- 2:1 for Restoration/creation
- 4:1 for Enhancement
- 15:1 for Wetland Preservation

Creation/restoration	74.1 acres/2 =	37.1
Enhancement	204.6 acres/4 =	51.6
Preservation	253.0 acres/15 =	16.9
Total		105.6 acres

Applying these ratios to the mitigation acreage for each mitigation activity results in an “adjusted” total wetland mitigation acreage of 105.6 acres. Comparing this to the 98.5 acres of wetland impact results in about 1.07 acres of mitigation to compensate for every 1 acre of impact.

Finally, it is important to remember that the total wetland mitigation acreage is based on permit requirements to establish this amount of area. The Phase 1 methods of this study did not evaluate the establishment of wetland area; therefore, the total wetland mitigation acreage was not verified. Actual mitigation acreage often ends up being less than what was required (Kusler & Kentula 1990, Kunz et al. 1988). Phase 2 will attempt to evaluate the wetland area of the mitigation sites.

Discussion

Compliance

Forty-five projects were visited and evaluated for Phase 1 of this study. The three questions assessed for this study (implemented; implemented to plan; and meeting performance standards) were aimed at determining whether a wetland mitigation project was in compliance with permit requirements and conditions. In regards to the three compliance questions evaluated, the site assessment team generally gave the applicants the benefit of the doubt if there was any uncertainty.

It should be stressed that Phase 1 of this study did not attempt to assess the ecological functioning or ecological “success” of the mitigation projects visited. It is quite possible that projects failing to meet performance standards could still be providing significant ecological functions. Likewise, it is possible that projects meeting all performance standards could be failing to provide significant ecological functions. The level of ecological functioning at the site, how this compares to the impact site, as well as the design, implementation, and maintenance factors that contribute to a successful project will be evaluated in Phase 2 of this study.

Phase 1 found compensatory mitigation projects to have 29% compliance rate based on the 3 questions evaluated. This is a slightly higher rate of compliance rate than was found in the King County wetland and stream mitigation study (Mockler et al. 1998), which determined a 21% compliance rate (79% failure rate). Stellini and Storm (1994) determined a lower compliance rate – 18%, while other studies have found permit compliance rates between 42% and 50%(Allen and Feddema 1996, Castelle et al. 1992).

Site Selection, Information Collection, and Site Access

Database problems

Due to inaccurate or incomplete data entry in the 401 database, it is possible that projects requiring compensatory mitigation were eliminated during the initial site selection process. Reviewing each file to verify database entries, however, would have required too much time to pursue.

A more common database problem encountered as a result of inaccurate or incomplete data entry, was the number of projects that should have been eliminated by initial study site selection and were not. For example, the 401 database entry for several NWP 26 projects indicated an acre of wetland impact prior to February of 1996, which should have required compensatory mitigation. The files for these projects were reviewed and it was discovered that no compensatory mitigation was required since the impact was actually 0.9 acre. The time required to review these files could have been used to assess additional compensatory mitigation projects.

A final database problem involved tidal projects, which were originally going to be stratified from freshwater projects and evaluated separately. However, the 401 database was unable to identify or stratify tidal projects. Therefore, tidal projects were dropped from consideration for this study. It was later discovered that two and possibly three of the sites evaluated (#8, #278, & possibly #239) were, at least in part, tidally influenced. These projects were included in the phase 1 results. It is uncertain whether these projects will be included in the phase 2 evaluation.

Project File Problems

Problems encountered when reviewing project files were: 1) incomplete files, particularly the absence of as-built documents and monitoring reports; and 2) multiple versions of mitigation plans.

- 1) In general, there was a general lack of consistent information in the files. Few of the Ecology files were complete, and it was unclear whether the missing information had not been submitted to the permitting agencies, or whether the information had been submitted but never made it into the project file. Misplacement or mis-filing appeared to be particularly common for as-builts and monitoring reports, because consultants often send these documents to the regional wetland Ecology staff involved with a given project. Apparently as-builts and monitoring reports often end up in that staff person's office or personal project file rather than in the central 401 file. This is problematic since an individual staff person may file this information and forget about it or it may get misplaced. Regardless, the information may not be available if required by other staff.

It should be noted that several of the as-built and monitoring reports ultimately obtained were provided by consultants when contacted about this study. For example, a consultant that was contacted to supply a planting plan supplied an as-built planting and grading plan instead. Neither the Ecology file nor the Corps' file contained this as-built.

Receiving such information from the consultants was helpful in facilitating the evaluation of a site. However, not all consultants or applicants were contacted for information due to the tight timeframe under which this study was conducted. As a result of this inconsistency and a lack of time necessary to pursue every avenue toward obtaining the most complete information possible, it did not seem appropriate to evaluate compliance on whether as-built documents, monitoring reports, and/or deed restrictions or conservation easements were submitted. This information was reported, either as "found" or "not found." Therefore, presence or absence of as-built documents, monitoring reports, or deed restrictions/conservation easements did not influence the attainment of the three main

compliance questions. The exception was preservation-only sites which had to have a deed restriction or conservation easement on the parcel in order for the project to be determined “implemented to plan”.

- 2) Another difficulty encountered in finding and reviewing files and background information was the presence of multiple versions of mitigation plans. In a few cases, multiple consultants were involved in planning, designing, implementing, or monitoring a wetland mitigation project. This made it difficult to track down the most accurate and recent plans.

The permits for a few projects required the implementation of a certain version of a mitigation plan, but occasionally, a more recent version of the mitigation plan was present in the file. In these cases project evaluations were based on the most recent mitigation plan.

Obtaining Access

A few problems were encountered while attempting to gain access to compensatory mitigation sites. In some instances the applicant listed on the Corps permit no longer owned the project site or the company had changed its name. In these cases, an attempt was made to locate a new contact name and number. However, there were two cases where several messages were left for individuals believed to be the applicants and no responses were ever received.

In other cases, permission to gain access to the site was never granted. One applicant denied access. Another two applicants were subsidiaries of larger corporations, and the corporate headquarters needed to grant access to visit the property. In both cases, access was not granted prior to completion of the field visits. One has since granted access, while the other has not issued a decision.

Projects for which access was not obtained were not evaluated. These projects were dropped from consideration for phase 1. Dropping projects because site access was not granted has the potential to bias the results of this study toward those projects that are in compliance, and therefore, have nothing to hide. The possibility of this study being biased as a result of the sites ultimately evaluated is acknowledged. However, this study was constrained by the legal necessity of obtaining permission to gain access to the compensatory mitigation sites, prior to performing all site visits.

Implementation of Plan Elements

Determining whether a project was “implemented to plan?” was generally straightforward. However, assessing water regime was difficult due to the time of site visits and the lack of information. In addition, few plans included any detailed information on the proposed water regime for the compensatory wetland mitigation project. Eight (18%) of the 45 projects evaluated for this study did not identify any hydrologic information. Gwin and Kentula (1990) identified an identical problem in an EPA report examining compensatory wetland mitigation project design and compliance.

When water regime was mentioned in a mitigation plan, it was often a vague description of the existing hydrologic conditions of the site. Since many of the site visits performed for this study occurred during the driest time of the year (fall), it was difficult to verify the existence

of a wetland water regime, particularly in younger sites. Therefore, hydrologic conditions were not specifically assessed for Phase 1.

Planting to plan could not be determined in five (11%) of the 45 projects evaluated. This generally resulted from not being able to locate certain plants from the planting plan on-site. If the project was more than two years old, the missing plants could have been planted but died and were either removed or replaced with another species. Such changes were usually not documented in the project file. One project (#99) had been mowed repeatedly by maintenance staff, and planted material could not be identified. Another project (#29E) suffered extensive flooding and erosion in the mitigation area, and therefore, the study could not determine whether material was planted and then lost or was never planted. Documentation of such occurrences, in an as-built document, monitoring report, or correspondence, would have allowed better evaluation of this element of the plan.

Performance Standards

Problems Assessing Performance Standards

Compliance results for performance standards reflect only those standards that this study was able to assess. Overall, this study was able to assess little more than a third (37%) of the total number of performance standards listed in the mitigation plans and permits.

A number of factors contributed to the inability of this study to assess all performance standards. Timing of the site visits, timing of the site visit in relation to the age of the compensatory mitigation project, confusing or ambiguous standards, and multiple assessments lumped into one standard were the main reasons for performance standards not being assessed.

1. The site visits occurred during a time of year that prevented assessment of certain performance standards. For example, one out of 15 (7%) hydrologic performance standards were assessed. This was mostly due to the fact that site visits occurred during late fall when the water regime could not be accurately verified. Hydrologic standards would need to be evaluated early in the growing season to verify attainment of wetland hydrology.
2. Several performance standards were age-specific such that a performance standard could not be assessed until the site had reached that particular year post- implementation. For example, many projects had different performance standards for each year's monitoring event. If the site visit occurred in the second year then performance standards for year 3 or year 5 could not be assessed. However, for numerous sites, it was unclear when the project was implemented (e.g. the age of the site), since post implementation information was often lacking from project files. Ages of the sites were later determined from conversations with applicants or consultants.
3. The performance standard itself was confusing or difficult to assess during a single site visit. None of the wildlife use/diversity performance standards were assessed. This was due to the fact that these standards generally involved documenting species use of the site over time.

An example of a performance standard that was difficult to assess is:

After 3 years wildlife habitat support will be measured by documentation of the areal cover of woody vegetation. This measurement will be used as an indicator of an increase in habitat structure and complexity. The initial establishment and survival of either planted or colonizing tree and shrub species should begin to determine the future habitat structure of the wetland and decisions on possible restructuring of the installed plant community, if needed.

This standard is confusing. The performance standard is trying to determine the level of wildlife habitat support through a measurement of percent areal cover of woody vegetation. If a certain level of habitat support is to be achieved and areal coverage is to be the measurement of this, then why not provide a performance standard to attain a set percent areal cover of woody vegetation? As written, this performance standard could be met by documenting 0% cover of woody vegetation, because the standard does not provide a minimum percentage of areal coverage necessary to meet the objective of wetland wildlife habitat support. Furthermore, a field of Scot's broom (*Cytisus scoparius*), an invasive upland shrub which generates woody coverage, is not precluded from resulting in successful attainment of this performance standard.

For a further discussion of specific performance standards that were easy to attain, difficult to assess, unattainable, or in some other way noteworthy, refer to Appendix C. For a complete list of all performance standards encountered, refer to Appendix D.

Performance Standards Met

Of the types of assessed performance standards that were most often attained, a couple were relatively easy to attain and did not require any specific site development or wetland conditions. These performance standard types were “wildlife habitat”, which generally included placement of woody debris and nest boxes, and “other” standards, which included wetland area and signage. Since wetland area was not assessed for this study, the standards that were assessed in this category primarily involved the placement of signs.

Performance standards directed at the placement of woody debris and wetland signage, though not reflecting ecological site development, do provide an important role to ensure that a compensatory mitigation project is implemented in compliance with the authorized mitigation plan. If a performance standard did not require a site to have the number of snags, stumps, and downed logs indicated in a mitigation plan, then this woody debris might not be placed on-site. This project could still be in compliance with permit requirements, but it would not have the necessary habitat features agreed upon in the mitigation proposal.

Wildlife habitat and “other” types of performance standards were always accompanied by other performance standards, particularly vegetation, that were directed at ecological development of the site. However, for some projects the wildlife habitat and/or “other” performance standards were the only standards that this study was able to assess. For the purposes of evaluating permit compliance, one standard was considered to be equal to another, regardless of whether it was easy to attain, or whether it focused on site development. Therefore a project meeting its only assessable performance standard for placement of 20 snags and 15 downed logs would be evaluated to be in compliance. Meanwhile another project (#9) which met four of its five assessable performance standards, did not meet one to

“establish a permanent interpretive sign on [street adjacent to] Mitigation Area C.” This project was not in full compliance with permit requirements, because the site assessment team did not locate the sign during the site visit. Therefore, for Phase 1, permit compliance does not necessarily indicate ecological success; likewise, non-compliance does not necessarily indicate ecological failure.

Recommendations

The general goals of the Wetland Mitigation Evaluation Study are to determine the relative success of compensatory wetland mitigation in the state of Washington and to develop new approaches to ensure greater success in the future. Phase 1 of this study focused on compliance success; therefore, the recommendations from this phase of the study focus on ensuring greater compliance success in the future. The recommendations are of two types: 1) those directed at applicants; and 2) those directed at the permitting agencies.

Applicants

There are four main factors that an applicant could focus upon to achieve improved permit compliance. These recommendations include: 1) implement the plan; 2) submit as-builts; 3) performance standard structure and content; and 4) submit monitoring reports.

Implement the Plan

Obviously, the main factor within an applicant’s control that would facilitate mitigation compliance is to follow the requirements specified in the permit(s). Actually implementing the approved mitigation plan is the first step toward compliance success. When circumstances beyond an applicant’s control forestall implementation, the applicant or consultant should inform all of the applicable permitting agencies in writing.

Wetland Biologist On-Site

The applicant should retain a qualified wetland 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 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.

Submit As-builts

An as-built documents what actually occurred on-site and serves as a baseline from which monitoring and follow-up can take place. All but 2 of the 17 projects that submitted as-builts were also determined to have implemented the mitigation to plan. 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 original plans. As-builts should be developed with the assistance of a biologist or wetland specialist that was on-site during implementation. As-builts should be sent to all applicable permitting agencies via certified mail so that the applicant has proof of submittal.

Performance Standard Structure and Content

Performance standards should be clearly written, ecologically sensible, measurable, and should relate to the identified goals and objectives of the compensatory mitigation project. These performance standards should be listed in one clearly identified section of the mitigation plan. Performance standards should neither be too easy to attain nor completely unattainable (Hruby et al. 1994 and Ossinger 1998). Performance standards should set specific benchmarks that the site should be meeting if it is developing successfully. Year-based performance standards are useful, but to determine how well a site is progressing, it is helpful to also have performance standard that can be assessed each year monitoring is conducted. For example:

Areal cover in planted emergent areas:	
Years after planting	Minimum % cover
1	60%
2	70%
5	80%

Submit Monitoring Reports

Monitoring reports 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. 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 persuade permitting agencies that the site has significantly improved and that 15% invasive cover is acceptable.

Permitting Agencies

Permit compliance for compensatory mitigation projects could be improved if permitting agencies, specifically Ecology, implemented the following recommendations:

- 1) Prioritize permit follow-up;
- 2) Consistently require project applicants to submit as-builts and monitoring reports;
- 3) Develop an effective permit/compensatory mitigation tracking system;
- 4) Create a comprehensive project filing system;
- 5) Maintain the files; and
- 6) Commit to enforcing permit compliance.

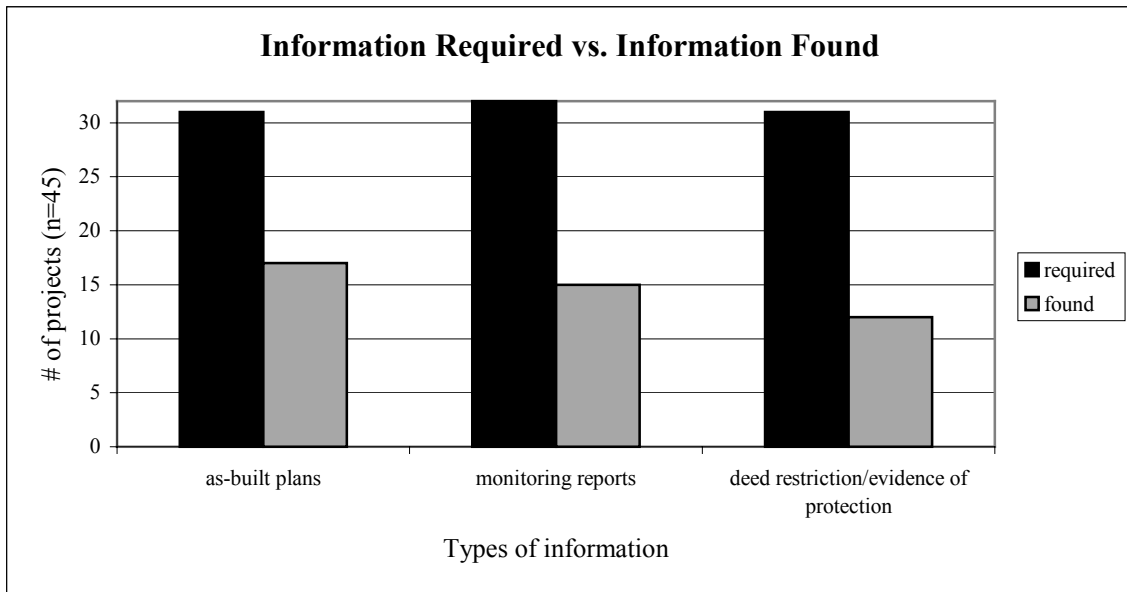
Prioritize Permit Follow-up

Permitting agency staff should make following-up on compensatory wetland mitigation projects a priority. This may require either additional staff or a reallocation of existing staff time. Agencies should seek additional funding to implement compliance tracking and

enforcement. If no new funding can be obtained, agencies should consider shifting existing staff time from new project review to permit compliance tasks. This would increase new project and permit review timelines but improve compliance of projects that have already been approved.

Require the Submission of As-builts and Monitoring Reports

Agencies should require all applicants to submit an as-built document and periodic monitoring reports. Phase 1 found eight projects for which as-builts were not required and 7 projects for which monitoring reports were not required. When permits required the submission of these documents, about half of the projects were in compliance with these requirements. See Graph 10.



Graph 10. Number of projects requiring that as-builts, monitoring reports, and deed restrictions be submitted compared to the number of projects for which this information was found.

When an as-built is not submitted within the required timeframe specified in the permit, agency staff should contact the applicant to check the status of the project. A letter or phone call might provide the impetus for an applicant to perform the actions necessary to get a project into permit compliance. Periodic site visits should be conducted by permitting staff to verify as-builts or monitoring reports, and also to provide feedback or technical expertise on projects that are struggling to meet performance standards.

Develop a Permit/Compensatory Mitigation Tracking System

To improve project follow-up and compliance success, permitting agencies need to develop a comprehensive project filing and tracking system. A project file checklist should be developed to include at a minimum the following elements:

- All permit applications required for the particular project, including all federal, state, and local permits or approvals.
- All applicable SEPA and NEPA documents.
- Copies of the Public Notice and all comments received.
- Final Mitigation Plan and Drawings.
- Final Wetland Delineation Report describing the wetland(s) to be impacted.

- Copies of all permits issued, federal, state, and local. This would facilitate a review of all the permit requirements for a compliance check.
- As-built drawings and reports.
- Monitoring reports.
- Copies of any necessary deed restrictions, conservation easements, or other protective land agreements.
- Copies of all decision documents, memoranda, and correspondence between agencies and between the agencies and the applicant.
- A letter or some documentation indicating the date the compensatory mitigation project completed implementation.
- Other information pertinent to the specific project.

It is acknowledged that this is a lot of information and requires an extensive amount of time to collect and review. However, without such requirements for complete information and a checklist to determine its presence, it is highly possible to miss or lose information that would be necessary to understand what the project entailed and what was required for compliance. A good way to think about keeping a complete file is that it provides a complete project history. The file should be established such that a person knowing nothing of the project could decipher from the file what was required, by whom, and how well the applicant is complying with those requirements.

Create a Comprehensive Filing System

To establish an effective filing and tracking system files need to be kept in a specified location accessible to all staff people who have a need or desire to review the information. While collecting background information on the study sites, it was observed that several Ecology Section 401 project files were missing. If Ecology plans or desires to continue tracking compliance of wetland mitigation projects, it needs to establish a more complete and efficient filing and tracking system.

With advancing technology it is logical to not only maintain a hard copy file but also a complete electronic file. Applicants or their consultants could submit electronic copies of all plans and drawings, permit applications, monitoring reports, as-builts, etc. Hard copies of the permits would be mailed to the applicant and placed in the hard copy project file, but electronic versions of the permits could also be maintained in the electronic file.

If the electronic file was linked to a database, such as the ones used or developed for this study, then a particular project from the database could be selected and its file could be reviewed simultaneously. Such an option would facilitate random compliance checks. A staff person could randomly select a project, review the information currently in the electronic file and determine if follow-up was necessary.

Maintain the Files

Maintaining and updating files is critical to sustaining an effective filing and tracking system. When monitoring reports are submitted, one copy should be promptly placed in the official project file, and any additional copies could go in an individual staff person's files. An electronic file would be beneficial and efficient for maintenance purposes as well. An applicant or consultant could email an electronic version of a monitoring report and whatever staff person received it could promptly forward it on to the electronic project file.

Commit to Enforcing Permit Compliance

Finally, follow-up efforts would be ineffectual without an agency commitment to enforce permit compliance. Agency staff should work with project applicants to help them comply with permit conditions. However, when applicants do not respond to agency requests, enforcement actions should be taken.

Further Studies

Implementation of Phase 1 Recommendations

It is important to note that many of the recommendations made in this report have been made in previous compensatory wetland mitigation compliance studies. Both Gwin and Kentula (1990) and Storm and Stellini (1994) encountered difficulties similar to those encountered for this study, and both previous studies made similar recommendations to those made in this report.

A study similar to the Phase 1 study should be conducted in five to ten years to determine if Phase 1 recommendations were implemented and to determine whether mitigation compliance has improved. The Phase 1 study can serve as a baseline for comparison of future permit compliance success.

Cumulative Wetland Acreage Loss

Though compensatory wetland mitigation permit compliance is essential to preventing a loss of wetland acreage, it is equally critical to understand how much acreage is lost due to small wetland impacts that are not required to perform compensatory mitigation. During study site selection for phase 1, there were a large number of projects that met the initial database query (correct range of years, wetland impact identified, etc.), but many of these projects did not have compensatory wetland mitigation required due to the small size of the impact.

The primary reason that compensatory mitigation was not required is because each wetland impact was below the threshold level established by the permitting agency(ies). Thresholds (e.g. less than one-acre prior to February of 1996 and less than 1/3 acre after February of 1996) are used to reduce the amount of staff time spent reviewing small impacts, thus allowing staff to focus time on reviewing and influencing the projects that have larger impacts. The cumulative effect of this policy decision on wetland acreage loss is unknown. It is therefore recommended that a study be initiated to investigate: 1) how many of the permitted “below threshold” impacts occurred 2) how many “below threshold” impacts were required to perform compensatory wetland mitigation by local governments? and 3) how much acreage is being lost as a result of unmitigated “below threshold” wetland impacts? and 4) whether certain wetland types or certain wetland functions are disproportionately affected by “below threshold” impacts?

Phase 2

The second phase of this study will be conducted in May through September of 2000. Evaluating a subset of the projects considered in Phase 1, Phase 2 will focus on:

- 1) How the compensatory mitigation project functions ecologically (including a delineation of wetland area);
- 2) How that compares to what was lost (e.g. the impact site); and
- 3) What factors correlate with success or failure of compensatory mitigation projects?

References

- Allen, A.O., and J.J. Feddema. 1996. Environmental Auditing: Wetland Loss and Substitution by the Section 404 Permit Program in Southern California, USA. *Environmental Management* 20(2):263-274.
- Braddock, T. and L.R. Huppman. 1995. *Wetlands: An Introduction to Ecology, the Law, and Permitting*. Government Institutes, Inc., Rockville, MD.
- Castelle, A.J., C. Conolly, M. Emers, E.D. Metz, S. Meyer, M. Witter, S. Mauermann, M. Bentley, D. Sheldon, and D. Dole. 1992. *Wetland Mitigation Replacement Ratios: Defining Equivalency*. Adolphson Associates, Inc. for Shorelands and Coastal Zone Managements Program, Washington Department of Ecology, Olympia, Publication #92-08.
- Gwin, S.E. and M.E. Kentula. 1990. *Evaluating Design and Verifying Compliance of Wetlands Created Under Section 404 of the Clean Water Act in Oregon*. Environmental Protection Agency. EPA/600/3-90/061.
- Hruby, T., C. Brower, D. Knaub, J. Stellini, L. Storm, and R. Zeigler. 1994. *Guidelines for Developing Freshwater Wetlands Mitigation Plans and Proposals*. Washington Department of Ecology. Publication No.94-29.
- Josselyn, M., J. Zedler, and T. Griswold. 1990. *Wetland Mitigation Along the Pacific Coast of the United States*. In J.A. Kusler and M.E. Kentula (eds.), *Wetland Creation and Restoration: The Status of the Science*. Island Press, Washington D.C.
- Kunz, K., M. Rylko, and E. Somers. 1988. *An Assessment of Wetland Mitigation Practices in Washington State*. *National Wetlands Newsletter* 10(3):2-5.
- Kusler, J.A., and M.E. Kentula (eds.). 1990. *Wetland Creation and Restoration: The Status of the Science*. Island Press, Washington D.C.
- McMillan, A. 1998. *How Ecology Regulates Wetlands, An Introduction to: Regulatory authority, Wetland definitions and delineation, Wetland characterization and function assessment, Wetland mitigation, Buffers, and more*. Washington State Department of Ecology, Olympia, WA. Publication No.97-112.
- Mitsch, W.J. and J.G. Gosselink. 1986. *Wetlands*. Van Nostrand Reinhold Co., New York, NY.
- Mockler, A., L. Casey, M. Bowles, N. Gillen, and J. Hansen. 1998. *Results of Monitoring King County Wetland and Stream Mitigations*. King County Department of Development and Environmental Services, King County, WA.
- National Wetlands Policy Forum. 1988. *Protecting America's Wetlands: An Action Agenda*. The Conservation Foundation, Washington, D.C.

- Ossinger, M. 1998. Success Standards for Wetland Mitigation Projects – A Guideline (Third Review Draft). Washington State Department of Transportation Environmental Affairs Office.
- Storm, L., and J. Stellini. 1994. Interagency Follow-through Investigation of Compensatory Wetland Mitigation Sites. EPA and USFWS, WA.
- Thomas, J.G. 1994. Wetlands Protection at the Local Level: What SEPA and GMA Can and Cannot Do. Thesis (M.E.S.), The Evergreen State College, Olympia, WA.
- Washington State Department of Ecology. 1994. Wetland Regulations Guidebook. Department of Ecology, Olympia, WA. Publication No. 88-5.

Appendix A

Description of Mitigation Projects Evaluated

East Sites

#7. This project, located in Franklin County, entailed the filling of 0.27 acres of wetlands for the construction of a dike to replace a failed irrigation mainline pipe. Required mitigation included the creation of 0.54 acres of wetlands developed adjacent to existing wetlands by excavating material for the dikes. Also, three isolation dikes were to be constructed to create fish-free ponds. The dike was constructed five years ago and the plan had called for natural colonization of the excavated sites by common cattail (*Typha latifolia*). Common cattail was present and the excavated areas were indistinguishable from the already existing cattail marsh. Plans also indicated that all existing Russian olive (*Elaeagnus angustifolia*) trees would be removed, whereas Russian olive trees were abundant in the periphery of the common cattail plant community. The plan specified that chain link fence would be installed on the faces of all dikes in contact with water. No evidence of chain link fence installed on the dikes was observed. There were no specific performance standards listed in the mitigation plan, therefore the permit condition of the Water Quality Certification (WQC) was evaluated. The (WQC) condition stated that the mitigation site would be maintained from invasive and noxious weeds including, but not limited to, purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites spp.*). Purple loosestrife, thistle spp., and other weeds were observed, especially along the perimeter of the site and on the dike. The buffer consisted of 25-50% vegetative cover dominated by Russian thistle (*Salsola kali*). The emergent areas had permanent inundation and 75-95% cover dominated by common cattail. Russian olive dominated the scrub-shrub area along the edge of the wetland. Overall invasive vegetation was abundant with >10% cover.

#10. This project, located in Benton County, entailed the filling of 0.13 acres of wetlands for the extension of a road. Required mitigation included the restoration of 0.137 acres of degraded wetlands adjacent to the project site. There was not a detailed mitigation plan for this project, therefore the mitigation plan drawing that was included as part of the Public Notice was utilized in the site evaluation. The project was implemented and was approximately three years old at the time of the site visit, however it was not implemented according to plan. Planted plants that were not specified in the planting plan were observed and plants that were specified in the plans were not located. Grading was completed as planned and the resulting water regime did not include the indicated open water component. Finally, the site was not meeting the WQC condition, which specified 80% site coverage of planted species after two years. Intended species did not constitute 80% areal coverage. Russian olive (*Elaeagnus angustifolia*) dominated the shrub layer. There was >80% site coverage when invasive plants, grasses and other non-planted species were included in the estimate. The emergent area with permanent inundation was 95-100% dominated by common cattail (*Typha latifolia*), while the emergent area with permanent saturation ranged from 75-95% to 95-100% cover dominated by common cattail and hard-stemmed bulrush (*Scirpus acutus*). The scrub-shrub areas along the edge of the wetland and in the buffer had patchy cover ranging from 5-25% to 95-100% and was mostly dominated by red-osier dogwood (*Cornus sericea*) and Russian olive.

#13. This project, located in Kittitas County, entailed the filling of 0.9 acres of wetlands. Required mitigation included the creation of 1.92 acres (0.72 acres emergent/scrub-shrub and 1.2 acres of open water) and the restoration of 0.55 acres (0.07 acres emergent and 0.48 acres of open water). The WQC required a 75-foot buffer with buffer averaging allowed. The mitigation was implemented and was approximately two years old at the time of the site visit. There were three mitigation areas throughout a 500 acre site, with a majority of the site preserved as wildlife habitat. Several changes were made to the original plan, all of which were indicated in the as-built plans. The mitigation plan included the construction of winter-summer refugia for Sharp-tailed snake (*Contia tenuis*). One area had been severely impacted by flooding, and was so noted in the monitoring report. Another area was eroding due to flows from a creek. Buffer plantings had a low survival rate. The Corps indicated in a letter to the consultant that it was too early to implement any contingency measures. Of six performance standards, only one could be assessed: maintenance of water level at 0-6 inches over the emergent wetlands and 1-2 feet in the constructed channel. This standard was being met. The remaining performance standards were written for years subsequent to year two and could not be evaluated since the site visit occurred during the second year.

#14. This project, located in Spokane County, entailed the filling of 0.141 acres of wetlands for the construction of an elementary school. Required mitigation included the creation of 0.144 acres on-site, as well as buffer plantings. The WQC was waived (Ecology did not respond in time) and the Corps permit stated that mitigation shall be conducted in accordance with the Special Use Permit issued by the City. The mitigation was implemented and was approximately 4 years old at the time of the visit. The mitigation was not implemented according to plan. In certain parts of the mitigation area, specifically the buffer area, there was no evidence of plantings. The mitigation plan for this project had no performance standards. The site overall had 95-100% vegetative cover except an area of ponding which had 50-75% bare ground. This area of ponding was being colonized by common cattail (*Typha latifolia*) and bulrush (*Scirpus* spp.), which constituted 25-50% cover. The wetland area had been fenced off from the school grounds, however it was open to surrounding residences and there was evidence of human disturbance, including livestock grazing (horses).

#29. This project, located in Ferry County, entailed the filling of 0.935 acres of wetlands for the construction and expansion of roads. Required mitigation included: 1) the restoration of the riparian zone along approximately 2 miles of river by replanting native species, constructing fencing, and enhancing wildlife habitat; 2) the enhancement of a former forested wetland of approximately 9.5 acres by replanting native species; and, the promotion of environmental awareness by constructing an interpretive trail. The project was implemented approximately six years ago. It could not be determined if the project was implemented according to plan. There was no way of determining if they followed the original planting plan due to impacts from flooding, which had scoured the area. Presently, at Site 1, there is no interpretive trail and no evidence of planted plants. The available monitoring reports were verified, which described the problems with flooding mentioned above. Monitoring was required for five years from the date of construction completion. In talks with the county engineers, the last monitoring was conducted in year 4 and was very brief. The person who had originally worked on the project was no longer with the county and details of the project had not been passed on to the new project manager. At Site 2, the riparian restoration, trenches that had been dug and planted with willow stakes, were severely eroded. Also, the

willow stakes were often found planted upside down and were planted above the water table where they would be unable to obtain adequate moisture. The plan outlined one performance measure, which required greater than or equal to 75% cover of planted or colonizing native vegetation. Vegetation coverage was measured based on five randomly selected plots, all of which were dominated by reed canarygrass (*Phalaris arundinacea*). Therefore, the site was not meeting its performance standards.

#41. This project, located in Spokane County, entailed the filling of 1.87 acres of emergent and scrub-shrub wetlands for the excavation of a creek channel. Required mitigation included the creation of 3.53 acres of wetlands (2.03 acres emergent wetland in the creek channel and 1.26 of acres scrub-shrub wetlands on the banks). The purpose of the project was to excavate sediment from the creek bottom to enlarge the water conveyance capacity of the creek channel, thereby controlling overbank flooding in storm events. Mitigation was implemented approximately two years ago, however mitigation was not completed according to plan. Bank slopes appeared to be steeper than the required 3:1 slope. The channel banks, which were to support scrub-shrub wetlands, do not appear to receive adequate moisture. Also, it was unclear what, if anything, had been planted and there was not a specific planting plan to compare on the ground conditions with. What was or was not done could not be determined. Monitoring results were field verified at all transect locations. Three performance standards were identified to evaluate the success of the mitigation, two of which were assessed during the site reconnaissance. Wetland vegetation dominance was 30% FAC or wetter, however vegetation percent cover was less than the required 75%. Cover varied from 95-100% to bare gravel and cobbles. Slopes generally had good cover of weedy grasses. The creek channel had extensive but sporadic cover of water plantain (*Alisma spp.*).

#50. This project, located in Spokane County, entailed the filling of 0.09 acres of palustrine, forested and scrub-shrub, seasonally saturated wetland, and the temporary fill of 0.34 acres of palustrine, emergent marsh, seasonally saturated to be removed and restored after construction was completed for a slide stabilization project. Required mitigation included the creation of 0.46 acres of scrub-shrub/forested wetland and the restoration of a berm by planting native trees and shrubs and of the construction permit area by hydroseeding with erosion control native grasses. The mitigation was implemented approximately four years prior to the site visit, however it was not implemented to plan. Only two apparently planted shrubs were observed out of 300+ plants specified on the planting plan. Also, a 3:1 slope was to be excavated along the periphery of the mitigation area and gradually taper in to the center to the maximum depth required to reach seasonal groundwater. The center of the mitigation area appeared to be at a higher elevation than the surrounding periphery. Four performance standards were assessed out of a total of six, none of which were being met. There was not 75% survivorship of plantings, 70% ground cover of native vegetation, the establishment of 4 native tree species, 4 native shrub species and 2 native groundcover species, nor did the site provide habitat for waterfowl through the creation of wetland communities. The ground was essentially bare. The site was dominated by upland, herbaceous weeds, including common tansy (*Tanacetum vulgare*) and thistle (*Cirsium spp.*).

West Sites

#8. This project, located in Grays Harbor County, entailed the filling of 4.92 acres of wetlands for the construction of a resort complex. Required mitigation included the creation of 0.32 acres of wetlands on-site, the restoration of 3.31 acres on-site and 4.91 acres off-site, the enhancement of 84.47 acres of wetlands through re-establishing hydrologic connectivity to existing wetlands, and the preservation of 110 acres on-site and 2.02 acres off-site. The amount of impact was minimized from the originally proposed 8.51 acres to the 4.9 acres listed in the Corps permit, a 40% minimization. The mitigation was implemented, including documentation of the preservation area. There were five on-site areas and they appeared to be less than a year old at the time of the site visit. The mitigation was not implemented according to plan. A couple of the on-site areas were not planted to plan. Areas indicated as scrub-shrub were not planted with shrubs and were dominated by emergent plants. Also, grading and the resulting hydrology in some areas did not appear to be implemented to plan. The off-site area had a breach in a dike, which was not in the mitigation plan. The water source, which was to be groundwater, was actually coming from escaped water through the breach in the dike. Without an as-built indicating any changes to the original plan, it was determined that the mitigation was not implemented to plan. Though the mitigation was not implemented to plan, the sites were meeting the assessable performance standards outlined in the mitigation plan. Only one of the five performance standards was assessed due to timing and limitations of the scope of the study. Habitat features had been installed; thus the assessed performance standard were being met. In general, herbaceous cover was <50%, in some cases, <25%. Planted trees and shrubs were observed to have 50-75% survival and 0-5% cover.

#9. This project, located in Whatcom County, entailed the filling of 21.1 acres of emergent wetland for the expansion of a transportation facility. Required mitigation included the creation of 16.1 acres of emergent and scrub-shrub wetland, the enhancement of a 5-acre detention pond, and the preservation of 75 acres of forested wetland with some stream enhancement. Originally, mitigation included off-site mitigation. However, this site was dropped due to contamination and replaced by preservation of 75 acres on-site. Conservation easements were provided for all mitigation areas. The creation component was divided among two areas (A and B), while a third area, Area C, consisted of enhancement. All three areas were implemented according to plan. The year four monitoring report was verified and appeared consistent with what was observed on the ground during the site reconnaissance. Five of their eleven performance standards were assessed during the site visit, four of which were being met, one of which was not. Establishment of a permanent interpretive sign for Area C was required and was not present at the time of the visit. Herbaceous cover and survival of planted species throughout the mitigation areas was 75-95%. Area B remains a mowed wet meadow due to federal safety regulations.

#11. This project, located in Pacific County, was originally a violation for unauthorized placement of fill in 0.37 acres of wetlands. The applicant applied for an after-the-fact individual permit for the additional fill of 1.57 acres of wetlands for the expansion of an existing construction company site for the storage of construction materials. Required mitigation included the removal of fill and the restoration of the 0.37 acres and preservation of 10.99 acres (5.92 acres on-site forested and scrub-shrub wetlands and 5.07 acres off-site forested and scrub-shrub bog). The unauthorized fill was removed to implement the

restoration of 0.37 acres and the 5.92 acres of on-site and 5.07 acres off-site forested wetlands were preserved and protected in a statutory warranty deed.

#14. This project, located in Skagit County, entailed the filling of 1.76 acres of wetlands for the construction of a maintenance facility. Required mitigation included the enhancement of 2.21 acres of wetlands and 2 acres of upland as well as some creek enhancement. The mitigation was implemented on former pasture and cropland approximately two years prior to our site visit. The mitigation was implemented according to plan, which involved mostly planting. Plant substitutions were made as indicated in the as-built plan. The monitoring report was verified by randomly selecting three of the sample plots. Three of their nine performance standards were assessed on the date of the site visit. The site had 80% survival OR 10-15% cover after 3 growing seasons. Invasive non-native plants did not exceed 10% cover within the enhancement areas. In addition the Corps required 35% shrub and tree cover OR 80% survival. They were not meeting 35% shrub and tree cover, however they had achieved 80% survival. Therefore, the assessed performance standards were being met. The site was dominated by bentgrass (*Agrostis spp.*) and soft rush (*Juncus effusus*) with overall 25-50% tree and shrub cover, which was concentrated along irrigation lines and in sample plots.

#17. This project, located in Pacific County, was a violation resulting in an after-the-fact individual permit for retaining fill in 1.21 acres of wetlands with an additional impact of 0.22 acres to a forested wetland for the expansion of a recycling and sanitation facility. Required mitigation included the off-site preservation of 8.3 acres of bog-dominated high-quality wetlands and 1.7 acres of combined upland buffer as well as the on-site restoration of an area around the stormwater facility. The preservation area consists of: an open water/emergent pond; a scrub-shrub bog dominated by Pacific crab apple (*Malus fusca*); a scrub-shrub bog dominated by cascara (*Rhamnus purshiana*), Pacific crabapple (*Pyrus fusca*) and salal (*Gaultheria shallon*); a scrub-shrub bog meadow dominated by Labrador tea (*Ledum groenlandicum*), bracken fern (*Pteridium aquilinum*), sphagnum moss (*Sphagnum spp.*), and Sitka spruce (*Picea sitchensis*); a scrub-shrub wetland dominated by cascara, Pacific crab apple, slough sedge (*Carex obnupta*); and a forested wetland/upland dominated by sitka spruce, red alder (*Alnus rubra*), and western hemlock (*Tsuga heterophylla*). The preservation area has been recorded on a statutory warranty deed and therefore the mitigation was determined to be implemented according to plan.

#33. This project, located in King County, entailed the filling of 0.07 acres for the construction of a junior high school. Required mitigation included the creation of 0.14 acres of wetlands. Obtaining access to and locating this site was very difficult. The County had the lead on mitigation for this project and tracking down the right person to talk to was difficult. Attempts were made to contact the school, which upon contact indicated that they were unaware of any wetland mitigation sites on the property. Eventually the needed information was located and it was determined that the mitigation was implemented approximately two years prior to our site visit. The project was not implemented according to plan, which included excavating around areas of existing upland vegetation within a forested community and planting native vegetation. The areas indicated on the mitigation plan drawings were not excavated as planned and the numbers of planted plants located in the mitigation area were significantly less than indicated on the planting plan drawings. Also, an interpretive, which was to be developed along the perimeter of the wetland, was not completed. The one performance standard that could be assessed was being met; minimum canopy cover of trees

and shrubs shall be 20-30%. When already existing canopy is included in the figure, overall cover is 75-95%, while planted trees and shrubs provide 5-25% of overall site coverage.

#46. This project, located in Pacific County, was a violation resulting in the filling of 0.24 acres of wetlands for the construction of a road crossing, motel and parking lot. The applicant requested that the fill be retained and it was accepted with the mitigation requirement including creation of 0.3 acres of dunal wetlands. The motel, parking lot, and road crossing were originally considered one project and submitted under one application. The access road had been constructed prior to Corps approval because the applicant thought it was covered under NWP 26, therefore the project was authorized with an “after-the fact” permit. It was determined that the road fill would be a separate permit from the motel and parking lot, though both impacts were mitigated together. The mitigation is a part of an additionally excavated area that will be used for future mitigation banking. No plantings were found during the site visit, however the applicant explained that the site was naturally re-vegetating. No record of approval of this change to plan was found and therefore it was concluded that the mitigation was not implemented to plan. Similarly, the wooden walkway that was to be built was built in a different location than indicated in the original plans. This mitigation plan had no performance standards. The mitigation site was dominated by slough sedge (*Carex obnupta*), Pacific silverweed (*Potentilla anserina*) with some willow (*Salix spp.*) and Douglas spiraea (*Spiraea douglasii*), which was similar in composition and % cover to existing adjacent wetlands.

#55. This project, located in Snohomish County, entailed the filling of 0.94 acres of wetlands for a residential development. Required mitigation included the creation of 0.12 acres of wetlands, the enhancement of 3.09 acres of wetlands, the enhancement of 3.99 acres of stream and buffer and the restoration of 0.34 acres of wetland buffer. The mitigation was implemented less than a year prior to our site visit and was implemented according to plan, which included planting and grading out areas in an existing forested wetland. The site was also meeting its performance standards. Two of the standards were not assessable at the time of the site visit. The one standard that was assessed indicated that exotic and invasive plant species would be maintained at levels below 20%. Reed canarygrass (*Phalaris arundinacea*) was observed in one part of the mitigation area, however it occupied <20% over the mitigation area. A trail meandered through a large part of the mitigation area with barbecue grills and picnic tables in some of the buffer areas and much evidence of domestic pet (primarily cat) use of the mitigation area.

#62. This project, located in Mason County, entailed the filling of 0.31 acres of seasonally flooded palustrine scrub-shrub wetlands for a road realignment project. Required mitigation included the creation of 0.18 acres of wetlands at Site 1 and the restoration of 0.44 acres of wetlands at Site 2. It appeared that an effort had been made to implement the mitigation project approximately one year prior to our site visit, however it had not been implemented according to plan. There were very few planted plants and little to no natural vegetation resulting in very sparse vegetation cover. Slopes did not match the existing terrain, which was what was planned and soils were compacted and essentially gravel. Recent tire tracks were evident through both sites. It appeared as though the pavement of the old road had just been removed and plants were expected to colonize this. A Corps permit condition stated that cover of native emergent species would be at least 80% in the transplanted areas. Both sites

were dominated by bare ground, 80% cover of vegetation was not observed. Site 2 had 0-5% overall cover and was essentially a gravel road.

#89. This project, located in Pierce County, entailed the filling of 2.2 acres of wetlands. Required mitigation included the creation of 0.98 acres of wetlands, the restoration of 0.96 acres of wetlands and the enhancement of 1.66 acres of buffer on-site. There was little information available for the evaluation of this project. The last correspondence in the Corps file suggested that a revision to the mitigation was going to be made and that there was a discrepancy in the acreage of impact based on the 1987 and 1989 delineation manuals. Also, the applicant had applied for a Section 404 Only Condition 4 (Mitigation) permit in order to complete off-site mitigation required by the County. The only information available to evaluate the site was a planting /grading plan drawing and recent monitoring reports. The mitigation was implemented according to the planting/grading plan and habitat features were present as indicated. Also, of the four performance standards described in the monitoring report, three were assessed, all of which were being met. These included 80% survival, <10% total cover of non-natives, and presence of habitat features.

#99. This project, located in Clark County, entailed the filling of 1.84 acres of wetlands for the development of a business park. The original permit application included filling 4.4 acres of wetlands, which required the creation of 4.45 acres of wetlands on-site. The applicant filled 2.56 acres and completed the mitigation. Later the applicant requested to be able to fill the remaining 1.84 acres of wetlands. Since the permit for the original fill had expired, the applicant had to reapply. The Corps permitted the fill and required that the buffer around the original wetland mitigation project be enhanced as mitigation. For this study, we only looked at the buffer enhancement in our evaluation. The buffer was planted approximately two years ago and since then has had to be replanted twice. This was because county maintenance staff had mowed it for aesthetic purposes. It could not be determined whether the plantings had been completed to plan because there were very few planted plants remaining. The project was not meeting its performance standard of 80% success of planted species at the time of the site visit.

#116. This project, located in King County, entailed the filling of 17.4 acres (17.1 emergent, 0.3 scrub-shrub) of wetlands for the construction of a recreational/sport facility. Required mitigation included the creation of 1.5 acres restoration of 9.2 acres and enhancement of 45.8 acres. The mitigation was implemented approximately two years ago. The as-built plan was verified and it was determined that the mitigation was implemented to plan. Planting is being done in phases, and due to changing site conditions, the planting plans are being revised. The Phase II plantings have been completed, with Phase III and IV still to be planted. The third year monitoring report was field verified by randomly choosing four transects and verifying the data collected at each of the sample plots located along them. The mitigation plan had an extensive list of 26 performance standards, of which four were assessed during the site reconnaissance. All four were related to cover in different community types, none of which were being met. Reed canary grass (*Phalaris arundinacea*) was dominant in some areas, but overall the site seems to be progressing. Monitoring is to take place over 15 years.

#125. This project, located in Pacific County, was a violation for the unauthorized fill of 0.62 acres for a commercial crab pot expansion. Required mitigation involved the removal of the unauthorized fill from 0.15 acres of wetlands, which resulted in total wetland fill of 0.47

acres. In addition, the applicant was required to preserve 3.5 acres of forested wetlands off-site. The unauthorized fill was removed, as confirmed by the Corps, to implement the restoration of 0.15 acres, and the 3.5 acres of forested wetlands were preserved and protected in a statutory warranty deed.

#151. This project, located in King County, entailed the filling of 0.98 acres of wetlands for the installation of a water transmission main line. Required mitigation included the restoration of 1.4 acres of forested, scrub-shrub, and emergent wetlands and the enhancement of 0.2 acres of wetlands. The mitigation plan and permits indicated that 1.4 acres of creation was required, however during grading hydric soils were discovered and therefore the mitigation was more appropriately restoration and the as-built report reflected this. The mitigation site was 7 years old at the time of the site visit, and therefore the as-built report was verified to the extent possible, and it was determined that the mitigation was completed to plan. All of the performance standards listed in the mitigation plan were year based. The site was evaluated based on sixth (final) year requirements, which included 35-50% coverage of forested habitat, 40-70% coverage of shrub habitat and 100% cover for the herbaceous layer. The site was virtually impenetrable due to extensive cover and growth, including 50-75% coverage by shrubs, however none of the sample plots evaluated had 100% herbaceous cover. Though the site was densely covered with a diversity of plant species, the performance standards were not met.

#163. This project, located in Snohomish County, entailed the filling of 0.92 acres as well as retaining 0.92 acres of unauthorized fill for a dike stabilization project. Required mitigation included the restoration of 0.92 acres (plus 1.05 acres for the unauthorized fill) of open water, emergent, scrub-shrub and forested wetlands and the enhancement of 0.33 acres (plus 3.45 acres for the unauthorized fill) of emergent wetlands as well as 1.25 acres of enhancement of the adjacent upland. The mitigation area actually covers two Corps permits. Mitigation was done together approximately two years ago and is indistinguishable in the field, therefore both areas were considered. A Corps letter indicated that upon inspection they had observed a herbaceous plant community, whereas the plan had called for the establishment of a shrub or tree community. The Corps requested that additional trees and shrubs be planted in the mitigation area. The as-built plan was verified and it was determined that the mitigation was implemented according to the plan, which included planting, grading, and the placement of woody debris. However, the site was not meeting its performance standards, which had to do with the lack of established scrub-shrub vegetation within both the restoration and enhancement areas. The other 8 performance standards could not be evaluated generally due to the timing of our visit. The site had 75-95% emergent coverage, including soft rush (*Juncus effusus*), common cattail (*Typha latifolia*), and reed canarygrass (*Phalaris arundinacea*). Dominant species in the scrub-shrub area included, reed canarygrass and 25-50% shrub/sapling cover of red alder (*Alnus rubra*) in some areas. Reed canarygrass comprised >20% of site coverage.

#180. This project, located in Snohomish County, entailed the filling of 2.53 acres of forested, scrub-shrub and emergent wetlands for the construction of a commercial plaza. Required mitigation included the creation of 2.63 acres of wetlands, the restoration of 0.19 acres of wetlands and 0.4 acres of buffer enhancement. There were many revisions to the mitigation plan for this project as well as discrepancies in the acreage impacted and required. The mitigation, which consisted of several small areas adjacent to existing wetlands, was

completed approximately one year prior to the site visit. According to the available information this mitigation was not completed to plan. Several mitigation areas were not located. One area was highly disturbed, and potentially vandalized. Some plants were planted while still in their plastic pots and some had been pulled out of the ground. Human refuse, as well as bicycle and motorcycle tracks were found throughout some of the mitigation areas. Hydrology for most areas was lacking since proposed hydrology assumed the surrounding development project would be impervious surface. The wetland impact had occurred, however the development project, including parking lots and buildings, had not been constructed yet, thereby altering the proposed hydrology. All performance standards were to be assessed at the end of the monitoring period and therefore could not be assessed at the time of site reconnaissance.

#193. This project, located in King County, entailed the filling of 1.59 acres of wetlands for the construction of a corporate office park. Originally the application called for the filling of 1.26 acres. Later, the applicant requested approval of an additional 0.33 acres of fill. Initially the required mitigation included creation of 1.27 acres of wetlands, enhancement of 1.37 acres of wetlands and enhancement of 2.5 acres of buffer. The as-built plan for the initial mitigation was verified and it was determined that the mitigation was implemented according to plan. Additional mitigation for the additional 0.33 acres of fill was later completed and included 0.5 acres of creation and 0.2 acres of enhancement. The additional mitigation areas were also completed according to plan. The plan included planting, grading, providing hydrologic support and connectivity between several different wetland areas and the installation of woody habitat features. Of the six performance standards described in the mitigation plan five were assessed, four of which were being met. They were meeting % survival for the initial mitigation area, however they were not meeting the invasive cover standard. Area C was dominated by reed canarygrass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus discolor*) even though a fairly dense stand of willow (*Salix spp.*) and red alder (*Alnus rubra*) provided canopy cover. The additional mitigation area was meeting all described performance standards, which included cover/survival, cover, and invasive cover.

#204. This project, located in Cowlitz County, entailed the filling of 2.68 acres of wetlands for the construction of an industrial park. Required mitigation included the restoration of 4.28 acres and re-vegetation of the buffer zones on-site. There was a question of Corps jurisdiction throughout the permitting process because the NRCS had determined that the entire site was prior converted cropland. The ditches, were determined to have been excavated in hydric soils and wetlands, and therefore would be considered waters of the state and subject to Section 404 jurisdiction. Because the mitigation site occurred on prior converted cropland it was considered restoration and not creation. The mitigation was implemented according to plan less than a year prior to our site visit, which included planting, grading, and the installation of woody debris. An as-built was submitted with no changes from the original mitigation plan. Because the site visit occurred prior to the end of the first year only one of the six performance standards outlined in the mitigation plan were assessed. They provided the minimum number and size of woody debris throughout the mitigation area, successfully meeting the performance standard. Other performance standards dealt with water regime, % survival, % cover, and wildlife use. Survival appeared to be good, while percent cover was 75-95% emergent and 5-25% scrub-shrub/forested. The buffer area appeared to be continually mowed.

#218. This project, located in Lewis County, entailed the filling of 1.17 acres of emergent wetlands for the construction of a service station and convenience store. Required mitigation included the creation of 0.55 acres (0.2 emergent and 0.35 scrub-shrub), the enhancement of 1.2 acres (0.8 emergent, 0.2 scrub-shrub, and 0.2 forested), and 310 feet of stream creation or enhancement. The mitigation was to be located off-site on city owned property as part of a large area set aside for mitigation and habitat restoration projects. The mitigation was not implemented. The project impact and development were sold to a new owner. The new owner claimed that they were not aware of the mitigation requirements. When they found out about the requirements they insisted that they do not have the money to complete the mitigation. The Corps is in the process of determining what if any enforcement actions will be taken.

#219. This project, located in Jefferson County, entailed the filling of 0.34 acres of wetlands for the construction of two homestead access roads. This project was dropped from the study after more detailed information was gathered concerning the requirements of mitigation. The site visit determined that the impact had never occurred and the Corps permit had expired.

#232. This project, located in Snohomish County, entailed the filling of 0.79 acres of wetlands for the construction of a housing development. Required mitigation included the creation of 0.79 acres of wetlands off-site as well as buffer restoration and enhancement. According to the mitigation plan, much of the mitigation occurred off-site because the wetland areas on and immediately off-site are a single system, so all mitigation efforts were focused on maintaining the large area, rather than creating smaller, less valuable, or lower functioning wetlands throughout the property. An as-built report was provided, however it did not reflect the on the ground condition. There were seven areas that were to be planted and graded, of those only five were planted, which was indicated on the as-built map. However, of those areas that were planted, the planted plants located on the ground significantly differed from those indicated on the plan in Areas 2 and 3. All areas appeared graded except the eastern portion of Area 3. Also, it appeared Areas 4 and 5 may have been over-excavated. Finally, there was no indication that open water should be provided in Area 5. Of the four performance standards found in the mitigation plan, one could not be assessed: whether the site was meeting wetland hydrologic criterion. None of the remaining three performance standards were being met, which included 100% survival after the first year, at least 50% cover of native vegetation after the first year and no more than 10% non-native and/or invasive plant coverage. The site visit occurred at the end of the first year. Dead vegetation was present, however it appeared that replanting was in progress. Area 3 had 25-50% bare ground, the remaining 50-75% was not 50% native cover. Areas 1, 4 and 5 were dominated by non-native species.

#233. This project, located in Snohomish County, entailed the filling of 0.41 acres of riparian wetlands for a bridge replacement project. Required mitigation included the restoration of 0.82 acres of riparian wetlands by removing the existing bridge and approaches. The mitigation was implemented approximately three years prior to the site visit, however it was not implemented according to plan. The planting plan indicated that about 12 different species of plants were to be planted. Only two different planted species were observed in Mitigation Area 3. Also, about ¼ of the area was gravel and the area did not seem as large as indicated on the drawings. However, this area was adjacent to the river and appeared to have eroded. Therefore it could not be determined whether the area had been graded to plan.

Also, it appeared as if they added rock fill in the river to prevent the erosion, which may have been approved under a subsequent permit. Area 1 had extensive existing native canopy cover (generally 75-95%) with an understory dominated by Himalayan blackberry (*Rubus discolor*) and reed canarygrass (*Phalaris arundinacea*). A few conifers appeared to be planted and surviving. Area 2 consisted of a very steep bank/buffer with the wetland area at the tow of the slope. This area had approximately 100% cover of herbaceous hydroseed species, including bentgrass (*Agrostis spp.*), fescue (*Festuca spp.*) and clover (*Trifolium spp.*). Shrub and tree cover in this area was 0-5%. Of ten performance standards outlined in the mitigation plan, two could be assessed, neither of which were being met.

#239. This project, located in Grays Harbor County, entailed the filling of 0.14 acres of wetlands for the expansion of an entrance road. Required mitigation included the creation of 0.09 acres of wetlands and the enhancement of 0.12 acres of wetlands. The mitigation was implemented approximately five years prior to the site visit, with grading completed according to plan. It could not be determined if the mitigation area was planted to plan due to the age of the site. Several of the plant species that were to be present could not be located, including vine maple (*Acer circinatum*) and slough sedge (*Juncus effusus*). A special condition of the Corps permit indicated that there shall be 80% survival of all plantings. The site visit occurred several years after the mitigation had been completed and there was no slough sedge or vine maple, therefore they were not attaining 80% survival. Overall site coverage was 50-75%.

#243. This project, located in Skagit County, entailed the filling of 1.99 acres of wetlands for the construction of an apartment complex. Required mitigation for impacts included the enhancement of 4 acres of wetlands within a 6.08 acre site. Mitigation was implemented approximately three years prior to the site visit. An as-built was submitted indicating changes to the original plan, which included leaving the inundated area around the weir unplanted in order that it may be naturally colonized by emergent species. The site visit confirmed that the mitigation had been planted according to plan with the accepted changes as indicated in the as-built. Performance standards could not be assessed for the site because the site visit occurred prior to the fifth year after construction and did not occur during the growing season. The monitoring report was confirmed by selecting three of their monitoring plots and confirming their results to the extent possible. Vegetation coverage within the sample plots was determined to be 20%, which appeared to be accurate. Vandalism and refuse dumping is a problem on this site.

#278. This project, located in Snohomish County, entailed the filling of 0.06 acres of palustrine forested, scrub-shrub, and emergent wetland for the development of a park and boat launch along the Snohomish River. Required mitigation included the creation of 0.28 acres of wetlands and restoration and enhancement of the buffer. Mitigation was not completed due to the discovery of creosote during excavation. The area was excavated nearly to design grade before the discovery of the creosote. Native vegetation present at the site had naturally colonized. Two-thirds of the site was dominated by reed canarygrass (*Phalaris arundinacea*), while the remaining 1/3rd of the site had a diversity of emergent wetland species. Despite the fact that planting was not implemented, the site was meeting the two performance standards that could be assessed. Aerial coverage was at least 50% in the wetland and buffers. This applied to both planted and volunteer species, although this was mostly due to reed canarygrass coverage. According to a Corp memorandum, the mitigation

as-is would not meet the Corps requirements for successful mitigation, however, the permit conditions do not have requirements for contingency or monitoring plans, therefore, they could not direct the City to plant and monitor the area. They encouraged the City to work with Ecology on the Voluntary Cleanup Plan for the creosote.

#289. This project, located in Whatcom County, entailed the filling of 0.6 acres of palustrine emergent wetlands and 1.23 acres of scrub-shrub/forested wetlands for a commercial development. Required mitigation included the creation of 6 acres of wetlands and 4 acres of upland buffer. The mitigation site is located 3 miles northwest of the project at an operating gravel pit. Because the applicant mitigated for wetland impacts in another watershed, the stormwater detention pond was required to emulate a wetland to the extent possible. This mitigation was implemented approximately 1 year prior to our site visit, however it was not created according to plan. Many of the plants that were identified on the planting list could not be located, including Douglas fir (*Pseudotsuga menziesii*), which may have been substituted for grand fir (*Abies grandis*). Also, there were variances in the water regime (probably due to grading), with a larger open water area and smaller emergent area, than planned. Of the 13 performance standards described in the mitigation plan to evaluate success, one was assessed during our site visit. Nine of the performance standards were to be evaluated after the fifth year and the site visit occurred prior to that. The one assessed performance standard had to do with the presence of woody debris, which was observed throughout the mitigation area. This mitigation site had many indications of human disturbance, including tracks from off-road vehicles, animal tracks from people walking their dogs, and trash. Estimated coverage of naturalized and native trees, shrubs and herbaceous species was 50%.

#290. This project, located in Pacific County, was originally a violation and entailed retaining 0.7 acres of wetland fill for the construction of roads and berms to service an expanded cranberry operation. According to the WQC, the minimum acceptable mitigation consisted of protecting, in perpetuity, the habitat and wetland functions and values associated with a contiguous parcel of 0.7 acres of high quality emergent wetlands. A deed restriction was provided for the 0.7-acre parcel. The area is an emergent wetland dominated by slough sedge (*Juncus effusus*).

#294. This project, located in King County, entailed the filling of 0.22 acres of wetlands for the construction of a fire station. Required mitigation included the creation of 0.21 acres of wetlands on-site and the preservation of 2.5 acres of wetlands off-site. There were significant delays in this project as a result of determining appropriate mitigation measures, which led to the above mentioned mitigation acreage. The mitigation was approximately 5 years old on the date of the site visit and was implemented according to plan, which included planting, grading and installation of habitat features. According to a Corps letter, dated September 29, 1999, after receipt of the final mitigation report, dated September 21, 1999, the mitigation was successfully completed in compliance with all of the conditions of the permit. Two of their performance standards related to survival were not assessable. The third performance standard stated that by the end of the fifth year, there will be 95-100% coverage, which they were meeting. There was a dense stand of red alder (*Alnus rubra*) in the drier areas and common cattail (*Typha latifolia*) in the wetter areas.

#299. This project, located in Clark County, entailed the filling of 0.83 acres of wetlands for the construction of a road for a condominium complex. Required mitigation included the

enhancement of 0.56 acres of emergent wetland, which was to be primarily attempted through reed canarygrass (*Phalaris arundinacea*) control. The project had not been implemented. The only portion of the mitigation completed to date was the initial reed canarygrass excavation in one small section. The City placed a two year moratorium on development due to lack of funding. This information was provided by the consultant, as there was no record of this in the files.

#300. This project, located in Clark County, entailed the filling of 1.31 acres of wetlands for the construction of a fire station. Required mitigation included the enhancement of 3.49 acres of wetlands and 0.05 acres of upland as well as the excavation of biofiltration swales along the parking lot. The mitigation was implemented and was approximately five years old on the date of the site visit. Implementation, which included planting native tree and shrub plantings in a clumped pattern, was completed according to plan. Monitoring reports were available for the first four years and were field verified. The site was meeting the performance standard for 75% survival, however it was not meeting the performance standard for 80% cover of native wetland species. Reed canarygrass (*Phalaris arundinacea*) constituted >25-50% cover over the site. There has been substantial expansion of reed canarygrass since the last monitoring period. A reed canarygrass control program was initiated in mid-summer 1996 with what appears to be little success.

#305. This project, located in Clark County, entailed the filling of 2.15 acres of emergent wetlands for the expansion of a wastewater treatment facility. Mitigation included the enhancement of 10.9 acres of low-quality emergent wetlands, including excavation of a 1.3-acre pond. The wetlands associated with this site are part of a larger wetland complex that extends to the east and south onto City property and a U.S. Fish and Wildlife Service National Wildlife Refuge. The mitigation was completed in early 1999, however it was not completed according to plan. Woody debris was to be placed throughout the site to provide additional habitat, which was not found during the site visit. Also, it could not be determined if the area had been planted according to plan. Due to the extensive reed canarygrass (*Phalaris arundinacea*) coverage over the site, many of the plants could not be located. Of the three performance standards, two could be assessed, both of which the site was not meeting. The vegetated portions of the site did not have a minimum of 80% cover of native wetland species and the invasive, non-native species did not comprise less than 10% of total cover for any monitoring event. The site is dominated by non-native grass species, which constituted 75-95% of site coverage. The overall goal of the plan was to create a more diverse wetland plant community that would provide increased wildlife habitat, particularly for waterfowl.

325. This project, located in King County, entailed the filling of 0.86 acres of wetlands for a commercial development. Required mitigation included the creation of 0.88 acres of wetlands and the enhancement of 0.44 acres of wetlands. The mitigation was implemented less than a year prior to our site visit therefore there were no monitoring reports available. An as-built was located and verified and it was determined that the mitigation was implemented according to plan, which consisted of a series of depressions in a slope with log weirs and connecting channels. It appeared that one of the primary functions of this site was to store stormwater and prevent runoff from impacting the development site. Because the site visit occurred prior to the end of the first monitoring period, only one of the three performance standards could be assessed, which was no more than 20% coverage of invasives. Though

Himalayan blackberry (*Rubus discolor*), and Scot's broom (*Cytisus scoparius*) were present on the mitigation site, they did not have 20% overall coverage of the site.

#334. This project, located in Kitsap County, entailed the filling of 0.67 acres for the expansion of a wastewater treatment plant. Required mitigation included restoration/enhancement of 0.9 acres of wetland and 1.96 acres of buffer. The mitigation was implemented and was approximately three years old on the date of the site visit. However, the mitigation was not implemented according to plan. Certain areas were not planted according to plan, for example there was no evidence that hardstem bulrush (*Scirpus acutus*) or burreed (*Sparganium emersum*) were planted around the ponded area. Also, there was no evidence of willow (*Salix spp.*) planted in some areas. No as-built or monitoring reports were available and a copy of the WQC could not be located. The mitigation site was not meeting either of its two performance standards, which were 90% survival and 90% cover by the third year. Overall survival was <50% and overall cover was <90%. This area seems questionable as a wetland with existing large Douglas fir (*Pseudotsuga menziesii*) with a Himalayan blackberry (*Rubus discolor*), bracken fern (*Pteridium aquilinum var. pubescens*), and bentgrass (*Agrostis spp.*) understory. There were some areas of ponding and saturation with a dominance of wetland species but overall the site was dry. It was very difficult to distinguish the wetland from the "buffer" areas.

#336. This project, located in King County, entailed the filling of 2.83 acres for the creation of a waterfront park. Required mitigation included the restoration of 2.06 acres of "vested" non-wetland to forested wetland habitat, the enhancement of 4.01 acres of degraded emergent wetland to 3.8 acres of forested and 0.21 acres emergent, and the enhancement of 0.15 acres of lacustrine and 0.61 acres of upland buffer. The mitigation was implemented and was approximately 1 year old on the date of the site visit. The as-built was verified and it was determined that planting, grading of two emergent ponds, and installation of wildlife features, interpretive signs, and a split-rail fence were implemented as planned. Of the nine performance standards one of them could be assessed and was not being met. This performance standard was a Corps permit condition, which required a survival rate of 100% for all plantings at the end of year one. A survival rate of 75-95% was found and replanting will most likely be required. All of the other performance standards could only be evaluated after years 3 and 5.

#357. This project, located in Clark County, entailed the filling of 6.55 acres of emergent and Category 1 forested wetland for the extension of a road. Required mitigation included the creation of 3.55 acres of wetland, the enhancement of 9.02 acres of wetland and the preservation of 19 acres of wetland and 3.38 acres of forested upland. The mitigation was implemented and was approximately one year old at the time of the site visit. Documentation of the permanent protection of the preservation areas was provided. The as-built was verified and it was determined that planting, grading, and the placement of woody debris and snags were implemented as planned. However, the performance standards were not being obtained. Of four performance standards two could be assessed, both of which were not being met. These included 100% survival of planted species and no more than 10% non-native species. The monitoring report indicated that the survival rate was 91% and that planting would be required. Also, plants listed in Appendix A of the mitigation plan ("Invasive, Exotic and Prohibited Plant Species") constituted >10% of the site. The other two standards, related to percent cover, were to be assessed at the end of the monitoring period and therefore could not

be assessed during our site visit. This was a young creation site where grasses in general dominated. There was evidence of vehicle intrusion into one of the mitigation areas. The preservation area was a mature Oregon ash (*Fraxinus latifolia*)/slough sedge (*Juncus effusus*) wetland adjacent to the new road.

#378. This project, located in Clark County, entailed the filling of 1.6 acres of palustrine, emergent temporarily flooded to seasonally saturated wetlands for the construction of a housing development. Required mitigation included the enhancement of 6.86 acres of agriculturally impacted emergent wetlands and the excavation of 2 ponds, a connecting channel, and riparian plantings as well as providing a 37.5-foot buffer. The mitigation was implemented and was approximately 2 years old on the date of the site visit. However, during the site visit, it was noted that some mitigation construction was still underway. Grading, which included the excavation of two ponds and a connecting channel was not implemented completely to plan. The permanent ponds were larger than depicted on the plan and contained islands that were not indicated on the plan. Also, habitat features, which included bat boxes and raptor perch poles, were not installed as planned. The perch poles that were indicated in Figure 5 of the mitigation plan were not located. The monitoring report was verified and it was determined that the site was not meeting its performance standards. There were two standards, both of which could be assessed and both of which were not being met. According to the sample plots, greater than 20% of the site was dominated by non-native species and the survival rate of planted species was 52%, which is less than the required 75% survival rate. Also, an area at the northwest end of the site was being impacted by ongoing construction of the housing development.

#389. This project, located in Clark County, entailed the filling of 1.97 acres of wetlands for an industrial development. Required mitigation included the enhancement of 8 acres of scrub-shrub/forested wetlands and the preservation of 21 acres of wetland and 14.82 acres of upland forest buffer. The mitigation was implemented and was approximately one year old on the date of the site visit. It was planned that 32 separate enhancement “plots”, each ¼ acre in size, would be selectively located throughout the site and undesirable vegetation would be removed and replaced with site specific native plantings. Later, field assessments determined that it would be more beneficial to have some plots be larger, resulting in a total of 19 plots varying in size. This change to the plan was indicated in the submitted as-built plan. Also, three of their enhancement plots were randomly selected and the monitoring results were confirmed. Three of the four performance standards outlined in their mitigation plan could be assessed. All three, which included survival, invasive cover and buffer width maintenance, were being met. Due to the timing of our site visit, the fourth standard could not be assessed, which was for percent cover after years 5, 7, and 10. There appears to be good follow-up and on-going maintenance of this site.

#398. This project, located in Wahkiakum County, entailed the filling of 2.7 acres of palustrine, temporarily flooded wetland for a levee stabilization project on federally owned lands. Required mitigation included the creation of 2.7 acres of diverse palustrine wetland and re-vegetation of the new dike. The new dike had been re-vegetated and an as-built submitted, however the 2.7 acres of created wetlands had not been created. An as-built was required by December 31, 1997 and the Corps had sent a letter to the applicant requesting the document as it had not been submitted as of April 9, 1999. Attempts were made to locate the mitigation site where it was indicated on a map provided in the file, however it could not be located. When access was obtained the contact did not indicate that the mitigation had not

been completed. In a follow-up phone call to the manager of the site, he explained that they did not complete mitigation in the particular area that had been planned. There was no documentation of approval of this change to plan, therefore it was determined that the mitigation had not been implemented.

#400. This project, located in Snohomish County, entailed the filling of 1.54 acres of palustrine emergent wetlands for the construction of a housing development. Required mitigation included the creation of 2.03 acres of wetlands, and the enhancement of 0.32 acres of wetlands and 2.27 acres of associated buffers. Area A of this mitigation was completed approximately two years prior to the site visit and Area B was completed approximately one year prior to the site visit. Both mitigation areas were implemented according to plan and were meeting performance standards. There were a total of three performance standards and two of them were assessed, which were percent cover of herbaceous species and percent cover of shrubs and trees. Area A consisted of 25-50% open water with vegetated islands throughout and a dense canopy of red alder (*Alnus rubra*) in the surrounding areas. Area B was a long rectangular mitigation area that was observed to have been receiving and settling sediment laden storm-waters and consequently, the water level had been maintained about a foot above the targeted level. Himalayan blackberry (*Rubus discolor*) dominated the western berm area limiting access to that side of the site.

Appendix B

Tables

Phase I Raw Results - Table 1

site #	County	impact size (acres)	mitigation size (acres)	creation acreage	restor. acreage	enhanc. acreage	preserv. acreage	buffer/ upland acreage	age of mitigation	built?	built to plan?
Westside Sites											
8	Grays Harbor	4.92	205.05	0.32	8.22	84.47	112.04	0	<1	Y	N
9	Whatcom	21.1	96.1	16.1	0	5	75	riparian	5 & 4	Y	Y
11	Pacific	1.57	11.36	0	0.37	0	10.99	0	NA	Y	Y
14	Skagit	1.76	4.21	0	0	2.21	0	2	2+	Y	Y
17	Pacific	1.43	10	0	0	0	8.3	1.7	NA	Y	Y
33	King	0.07	0.14	0.14	0	0	0	0	2+	Y	N
46	Pacific	0.24	0.3	0.3	0	0	0	0	6	Y	N
55	Snohomish	0.94	7.54	0.12	0	3.09	0	4.33	<1	Y	Y
62	Mason	0.31	0.62	0.18	0.44	0	0	0	1+	Y	N
89	Pierce	2.2	3.6	0.98	0	0.96	0	1.66	4+	Y	Y
99	Clark	1.84	0	0	0	0	0	yes	2+	Y	CND
116	King	17.4	56.5	1.5	9.2	45.8	0	0	2+	Y	Y
125	Pacific	0.47	3.65	0	0.15	0	3.5	0	NA	Y	Y
151	King	0.98	1.6	0	1.4	0.2	0	0	<7	Y	Y
163	Snohomish	1.84	7	0	1.97	3.78	0	1.25	2+	Y	Y
180	Snohomish	2.53	3.22	2.63	0.19	0	0	0.4	<1	Y	N
193	King	1.59	5.82	1.75	0	1.57	0	2.5	2+	Y	Y
204	Cowlitz	2.68	4.28	0	4.28	0	0	yes	<1	Y	Y
218	Lewis	1.17	1.75	0.55	0	1.2	0	riparian	NA	N	NA
232	Snohomish	0.79	0.79	0.79	0	0	0	yes	<1	Y	N
233	Snohomish	0.41	0.82	0	0.82	0	0	0	<3	Y	N
239	Grays Harbor	0.14	0.21	0.09	0	0.12	0	0	5+	Y	CND
243	Skagit	1.99	4	0	0	4	0	0	3	Y	Y
278	Snohomish	0.06	0.28	0.28	0	0	0	yes	3+	Y	Y
289	Whatcom	1.83	10	6	0	0	0	4	1+	Y	N
290	Pacific	0.7	0.7	0	0	0	0.7	0	NA	Y	Y
294	King	0.22	2.71	0.21	0	0	2.5	0	4+	Y	Y
299	Clark	0.83	0.56	0	0	0.56	0	0	NA	N	NA
300	Clark	1.31	3.54	0	0	3.49	0	0.05	5+	Y	Y
305	Clark	2.15	10.9	0	0	10.9	0	0	1+	Y	N
325	King	0.86	1.32	0.88	0	0.44	0	0	<1	Y	Y
334	Kitsap	0.67	2.86	0	0	0.9	0	1.96	3	Y	N
336	King	2.83	6.83	0	2.06	4.01	0	0.76	1+	Y	Y
357	Clark	6.55	34.9	3.5	0	9.02	19	3.38	<1	Y	Y
378	Clark	1.6	6.86	0	0	6.86	0	yes	1+	Y	N
389	Clark	1.97	43.82	0	0	8	21	14.82	1+	Y	Y
398	Wahkiakum	2.7	2.7	2.7	0	0	0	yes	NA	N	NA
400	Snohomish	1.54	4.62	2.03	0	0.32	0	2.27	2 & 1	Y	Y
Westside Total		94.19	561.16	41.05	29.1	196.9	253.03	41.08		35	22
Eastside Sites											
7	Franklin	0.27	0.54	0.54	0	0	0	yes	5+	Y	N
10	Benton	0.13	0.137	0	0.137	0	0	0	<3	Y	N
13	Kittitas	0.9	2.47	1.92	0.55	0	0	yes	2+	Y	Y
14	Spokane	0.141	0.144	0.144	0	0	0	yes	4+	Y	N
29	Ferry	0.935	9.5	0	0	9.5	0	riparian	6+	Y	CND
41	Spokane	1.87	3.53	3.53	0	0	0	0	2+	Y	N
50	Spokane	0.09	0.46	0.46	0	0	0	yes	4+	Y	N
Eastside Total		4.336	16.781	6.594	0.687	9.5	0	0		6	1
Statewide Total		98.526	577.941	47.644	29.787	206.4	253.03	41.08		42	23

Phase I Raw Results-Table 1 cont.

Site #	total # of performance standards	# of P.S. assessed	# of P.S. met of those assessed	P.S. met?	as-built required?	as-built found?	monitoring required?	monitoring found?	deed restriction required?	deed restriction found?
Westside Sites										
8	5	1	1	Y	Y	N	Y	N	Y	Y
9	11	5	4	N	Y	Y	Y	Y	Y	Y
11	NA	NA	NA	NA	NA	NA	NA	NA	Y	Y
14	9	3	3	Y	Y	Y	Y	Y	Y	N
17	NA	NA	NA	NA	NA	NA	NA	NA	Y	Y
33	3	1	1	Y	N	NA	N	NA	N	NA
46	0	0	0	NA	Y	N	Y	N	Y	N
55	3	1	1	Y	N	NA	N	NA	N	NA
62	1	1	0	N	Y	N	Y	N	N	NA
89	4	3	1	N	N	NA	N	Y (NA)	N	NA
99	1	1	0	N	Y	N	Y	N	Y	N
116	26	4	0	N	Y	Y	Y	Y	Y	Y
125	NA	NA	NA	NA	NA	NA	NA	NA	Y	Y
151	4	3	2	N	Y	Y	Y	Y	N	N
163	9	1	0	N	Y	Y	Y	N	Y	Y
180	3	0	0	CND	Y	N	Y	N	Y	N
193	6	5	4	N	Y	Y	Y	N	Y	N
204	6	1	1	Y	Y	Y	Y	N	Y	N
218	NA	NA	NA	NA	Y (NA)	NA	Y (NA)	NA	Y (NA)	NA
232	4	3	0	N	N	Y (NA)	N	NA	N	NA
233	10	2	0	N	N	NA	N	NA	N	NA
239	1	1	0	N	Y	N	Y	N	N	NA
243	2	0	0	CND	Y	Y	Y	Y	Y	N
278	4	2	2	Y	Y	Y	N	NA	Y	N
289	14	1	1	Y	Y	Y	Y	N	Y	Y
290	NA	NA	NA	NA	NA	NA	NA	NA	Y	Y
294	3	1	1	Y	Y	N	Y	Y	Y	Y
299	NA	NA	NA	NA	Y	NA	Y	NA	Y	NA
300	2	2	1	N	N	NA	Y	Y	N	NA
305	3	2	0	N	Y	N	Y	N	Y	N
325	3	1	1	Y	CND	Y	CND	N	CND	N
334	2	2	0	N	CND	N	CND	N	CND	N
336	9	1	0	N	Y	Y	Y	N	Y	N
357	4	2	0	N	Y	Y	Y	Y	Y	Y
378	2	2	0	N	Y	N	Y	Y	Y	N
389	4	3	3	Y	Y	Y	Y	Y	Y	Y
398	NA	NA	NA	NA	Y	NA	Y	NA	N	NA
400	3	2	2	Y	Y	Y	Y	Y	Y	N
W.Total	161	57	29	11	26	16	26	12	26	12
Eastside Sites										
7	1	1	0	N	N	NA	Y	N	N	NA
10	1	1	0	N	Y	N	Y	N	Y	N
13	6	1	1	Y	Y	Y	Y	Y	Y	N
14	0	0	0	NA	N	NA	N	NA	Y	N
29	1	1	0	N	Y	N	Y	Y	Y	N
41	3	2	1	N	Y	N	Y	Y	N	NA
50	6	4	0	N	Y	N	Y	N	Y	N
E. Total	18	10	2	1	5	1	6	3	5	0
Total	179	67	31	12	31	17	32	15	31	12

Table 2. Implementation of Plan Elements

Westside				
Site #	Planting	Grading	Other	Implemented to Plan?
8	No	No	Yes	No
9	Yes	Yes	Yes	Yes
11	NA	NA	Yes	Yes
14	Yes	NA	Yes	Yes
17	NA	NA	Yes	Yes
33	No	No	NA	No
46	No	Yes	No	No
55	Yes	Yes	Yes	Yes
62	No	No	NA	No
89	Yes	Yes	Yes	Yes
99	CND	NA	NA	CND
116	Yes	Yes	Yes	Yes
125	NA	NA	Yes	Yes
151	Yes	Yes	Yes	Yes
163	Yes	Yes	Yes	Yes
180	No	No	NA	No
193	Yes	Yes	Yes	Yes
204	Yes	Yes	Yes	Yes
218	NA	NA	NA	NA
232	No	No	Yes	No
233	No	CND	NA	No
239	CND	Yes	NA	CND
243	Yes	NA	NA	Yes
278	Yes	Yes	Yes	Yes
289	No	Yes	Yes	No
290	NA	NA	Yes	Yes
294	Yes	Yes	Yes	Yes
299	NA	NA	NA	NA
300	Yes	NA	Yes	Yes
305	CND	Yes	No	No
325	Yes	Yes	Yes	Yes
334	No	NA	NA	No
336	Yes	Yes	Yes	Yes
357	Yes	Yes	Yes	Yes
378	Yes	No	No	No
389	Yes	NA	Yes	Yes
398	NA	NA	NA	NA
400	Yes	Yes	NA	Yes
Totals				
Yes	19	18	23	22
No	9	6	3	11
CND	3	1	0	2
NA	7	13	12	3

Table 2.... continued

Eastside				
Site #	Planting	Grading	Other	Implemented to Plan?
7E	No	CND	No	No
10E	No	Yes	NA	No
13E	Yes	Yes	Yes	Yes
14E	No	Yes	Yes	No
29E	CND	NA	NA	CND
41E	CND	No	NA	No
50E	No	No	NA	No
Totals				
Yes	1	3	2	1
No	4	2	1	5
CND	2	1	0	1
NA	0	1	4	0

Overall				
Totals	Planting	Grading	Other	Implemented to Plan?
Yes	20	21	25	23
No	13	8	4	16
CND	5	2	0	3
NA	7	14	15	3

Appendix C

Performance Standard Discussion

The following is a list of performance standards that stood out as being: 1) easy to attain; 2) difficult to assess; and 3) good.

- 1) Easy to Attain (e.g. requiring little or no site development):
 - *“The wetland mitigation area will be used for cover by at least 2 species of passerine birds common to the area within 10 years of completion of wetland restoration and enhancement.”* This standard was probably met the day construction was completed. A European starling and a house sparrow, both non-native passerine species, are common to nearly all urban areas, and cover could be met by having each of these birds briefly perch in a Douglas fir (*Pseudotsuga menziesii*). This standard requires no site development and does not even require the site to be wetland in order for it to be met.
 - *“Two interpretive signs will be installed and be readable after five years.”* This standard does require some monitoring and maintenance to make sure that the signs are still present and readable. However, this performance standard does not indicate anything about the development of the site.

- 2) Difficult to Assess (e.g. not measurable, confusing, ambiguous, or unattainable):
 - *“The mitigation area will not be monopolized by invasive or non-native weeds if such vegetation could threaten planted material during the monitoring period.”* How is monopolization to be determined? Is monopolization by invasive or non-native vegetation okay so long as planted material is not threatened? This performance standard is very subjective and provides no measurable level of % cover under which invasive vegetation must be maintained.
 - *“For the herbaceous layer: minimum 100% of ground area coverage in which plants are massed by year 6.”* This standard has confusing language. It is unclear what is meant by “in which plants are massed.” It was assumed that this was referring to a requirement to have 100% herbaceous cover in emergent areas by year 6.
 - *Target wildlife use of the site and vegetation characteristics of the wetland creation areas to determine if habitat types and functional performance match those of the wetlands that are to be impacted. Use the functional evaluation recorded for the wetlands to be impacted and compare the functional evaluation of the created wetland (at the end of the project) to determine if the same or approximate functional performance has been attained.* This standard focuses on functions, however, it assumes that there was quantitative baseline information available with which to compare current conditions and performance of functions in a measurable way. In addition, the methodology to perform the required functional evaluation was not described or referenced in the mitigation plan. The monitoring section of the document only indicated that quadrats and transects

- would be used to sample vegetation characteristics. A performance standard focusing on functional performance of the compensatory mitigation must identify a quantitative baseline and a clearly described methodology that provides quantitative results such that a measurable comparison could be made. The baseline information and the methodology should be clearly outlined or referenced in the mitigation plan so that permitting staff performing a routine compliance check could assess attainment of this performance standard.
- *“No more than 10% of the vegetation shall be non-native species for all monitoring periods.”* It is unclear whether this standard is referring to 10% cover of non-native species or whether no more than 10% of the vegetation species present on the site should be non-native. If the standard is meant to get at native species diversity then it should be rewritten to reflect this focus. If it is getting at avoiding potentially detrimental vegetation species then it should be worded as invasive non-native species.
 - *“After 5 years, wetland has about 50% cover of scrub–shrub species.”* How close to 50% does scrub-shrub cover have to be to qualify as “about 50%”? Is 30% cover about 50% cover? Is 45% cover about 50% cover? This standard may have meant that the wetland has an average of 50% cover of scrub-shrub species.
 - *“80% cover of desirable herbaceous plant species by the end of year 5.”* What does desirable mean? Desirable to whom? The applicant? The landscape architect? Ornamental species, such as Scot’ s broom and purple loosestrife are desirable to many people, but most wetland regulators would agree that neither of these species are desirable for compensatory wetland mitigation. This standard should be more specific about what desirable is, such as 80% cover of native or non-invasive herbaceous plant species.
 - *“By the end of the fifth year, there will be 95-100% coverage.”* This performance standard gives no indication of what the 95-100% coverage should be. It could be 95-100% coverage by bare soil, woody debris, open water, hooded mergansers, or reed canary grass. This standard needs to be much more specific. It should at least indicate coverage by vegetation, if that is what is intended.

3) Good (e.g. measurable, understandable).

- *“For planted and non-noxious volunteer shrubs and trees, percent cover will be as follows: 25% cover after the first year, 30% after the second year, 40% after the third year, 50% after the fourth year and 60% after the fifth year.”*
This standard is measurable and provides a range of years over which attainment may be assessed. The standard also allows that cover contributions could be made by volunteer species, but it requires that those volunteers be non-noxious. This standard could, however, be improved by requiring that planted and volunteer species in wetland areas be native and FAC or wetter.

Appendix D

A List of Performance Standards Encountered

Bolded Standards Were Assessed During the Phase I Study
The One *Italicized* Standard Could Not Be Determined

Vegetation Survival

1. Establish at the end of the first year a 100% viability of the number of planted trees and shrubs.
2. 80% of the materials planted to enhance plant community diversity in the headwater areas along the stream channel will be alive and established by the completion of the monitoring program.
3. Survival of 85% of all plantings after 1 growing season. This will be calculated through a direct count of all dead rooted and severely stressed stock plantings within the permanent sample plots.
- 4. Throughout the monitoring period, planted trees and shrubs must maintain 80% survival.**
- 5. 80% of planted trees and shrubs should be living at the end of the three year monitoring period for the project to be determined a success (Corp condition and in consultant letter describing monitoring).**
6. 80% of planted material must be surviving after 3 years.
- 7. 85% survival of planted woody species for each monitoring event.**
8. At the end of the first year following initial (phase 1) planting 100% of the planted trees and shrubs will be alive.
9. Achieve a 100% survival of all species at the end of the first growing season.
10. Achieve an 80% survival of deciduous trees and shrub species in year 3 and maintain through year 5.
11. Achieve a 90% survival of emergent marsh species by the end of year 3 and maintain through year 5.
12. 100% survival of the planted trees, shrubs, and herbaceous species within the created wetland and buffer after the first year.

13. At least 80% survival of all plantings. The mitigation shall be replanted until 80% survival is attained (Corps permit special condition).
14. 100% survival of planted species is expected one year after planting.
15. Mitigation shall be considered successful if there is 80% survival of planted species one year after planting, and if after 2 years, the revegetated area is thoroughly healthy and vigorous. Additional plantings shall be made necessary to ensure success of the mitigation area (WQC condition).
16. 80% survival of planted trees and shrubs in mitigation area by the end of year 3.
- 17. There must be at least 75% survival of individual cultivars, transplants, or of native naturally colonizing woody plant species. If planted stock do not survive, but are replaced by native naturally colonizing wetland plant species, the project will be judged to meet the threshold for successful enhancement with respect to the vegetative component (WQC condition and found in the mitigation plan supplement).** **This standard was encountered for three projects and assessed for two of them.*
18. By the third year, a minimum of 90% survival rate of the individual planted species, determined within the sample plots by counting the number of dead individuals and comparing that number with the total number of plants in the sample plot, as shown on the as-built design.
- 19. A survival rate of 100% is required for all plantings at the end of year 1 and a survival rate of 80% of all plantings at the end of year 2 (Corp condition).**
- 20. For the first four monitoring periods, 100% of planted tree and shrub or appropriate volunteers must be present and viable. Replant to 100% of the As-built plan, if required.**
- 21. The survival of planted trees and shrubs will average 80% or greater for each of the specified monitoring events (monitored in years 1, 2, and 3). Survival will be at a minimum 80% at the end of the 7-year monitoring period.**
22. The willow plantings will have an 80% survival rate.
23. 90% survival of woody species after the first season of growth.
24. After 3 years, the riparian fringe and tree/shrub zone has 80% survival of each planted species.
25. Establish at the end of the first year, a 100% survivorship of trees and shrubs.

26. Establish at the end of three years, a 75% survivorship of all initial large trees and shrub plantings; and 50% survivorship of all small tree and shrub plantings.

Vegetation Cover

- 1. The areal areas of trees will be 25% after 20 years, shrubs 25% after 10 years, and emergent 50% after 10 years. Measurements will be accomplished by aerial photography or by actual field measurements.**
- 2. The bank area is to have overhanging shrub vegetation over 25% of the shoreline after 3 years, 35% after 5 years, and 75% after 10 years.**
- 3. After five growing seasons, there shall be at least 65% combined cover for trees and shrubs (Corp condition).**
- 4. The wetland mitigation and buffer areas should have 80% overall coverage of self-sustaining native wetland vegetation at the end of the five year monitoring program.**
5. The minimum canopy cover of trees and shrubs shall be as follows:

<u>Years After Planting</u>	<u>Minimum Tree and Shrub Cover</u>
One	10-20%
Two	20-30%
Five	>45%

6. Success for herbaceous species will be based on an 80% cover or desirable plant species by the end of year 5. Areal cover in planted emergent areas:

<u>Years After Planting</u>	<u>Minimum % Cover</u>
One	60%
Two	70%
Five	80%

7. Cover of native emergent species will be at least 80% in the transplanted areas (Corp condition).

8. Yellow pond lily (*Nuphar*), pondweed (*Potamogeton*), and other species in the Nuphar community type (area C in planting plan) growing on shallow margins of back channels after 2 years; increased cover after 5 years.

9. 1-1.5 acres dominated by native emergent wetland plants in the *Carex rostrata* community type (area A) in swales and depressions; 0.5-1 acre dominated by plants other than *Typha* in the *Typha latifolia* community type (area B)/ Planted areas with 30% cover of desirable native wetland species after 1 year and beyond as measured by

quadrats in permanent plots. Standard deviation of mean cover value in plots will be less than $\frac{1}{4}$ of the mean value.

10. 10-12 acres dominated by native scrub/shrub wetland vegetation in the *Salix spp.* community types (areas 4, 5, 7, 8); 30% cover in scrub/shrub areas after 1 year, 50% after 3 years, 70% after 5 years, as measured along permanent transects using line intercept method. Standard deviation of mean cover value along transects will be less than $\frac{1}{4}$ of the mean value.

11. 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 (areas 1, 2, 3); 15% canopy cover in forested areas after 1 year, 30% after 3 years, >45% after 5 years, as measured along permanent transects using line intercept method. Standard deviation of mean cover value along transects will be less than $\frac{1}{4}$ of the mean value.

12. *Nuphar* or *Potamogeton* growing on shallow margins of both ponds after 2 years; increased cover after 5 years.

13. 11-13 acres dominated by native emergent wetland plants in the *Carex rostrata* and *Carex vesicaria* community types (areas A,D). Planted areas with 30% over of desirable native wetland species after 1 year, 50% after 2 years, 65% after 3 years, >80% after 5 years, seeded areas >80% cover after 1 year and beyond, as measured by quadrats in permanent plots. Standard deviation of mean cover value in plots will be less than $\frac{1}{4}$ of the mean value.

14. 10-12 acres dominated by native scrub/shrub and forested wetland plants in the *Alnus rubra/Rubus spectabilis*, *Alnus rubra/Lysichitum americanum*, *Fraxinus latifolia/Carex obnupta*, and *Salix spp.* community types (areas 1, 2, 3, 6). 30% cover in scrub/shrub areas after 1 year, 50% after 3 years, 70% after 5 years; 15% canopy cover in forested areas after 1 year, 30% after 3 years, > 45% after 5 years; as measured along permanent transects using line intercept method. Standard deviation of mean cover along transects will be less than $\frac{1}{4}$ of the mean value.

15. For the forested habitat: at least 35-50% of ground area coverage in which plants are massed by year 6.

16. For the shrub habitat: at least 40-70% of ground area coverage in which plants are massed by year 6.

17. For the herbaceous layer: minimum 100% of ground area coverage in which plants are massed by year 6.

18. For the total mitigation area, after 3 and 5 years: the emergent vegetation will cover at least 0.65 acres of the wetland and native emergent species will have at least 80% cover in this area.

19. For the total mitigation area, after 3 and 5 years: scrub-shrub vegetation will cover at least 4.63 acres of the wetland (with 1.25 acres of enhanced upland), and cover of native species will be at least 40% in the restoration area and 20% in the enhancement area.

20. At the end of year 5, success of the total revegetation effort in wetland or riparian areas shall be based on a minimum of 80% cover of species representative of the area prior to pipeline construction (WQC condition).

21. 80% cover of desirable herbaceous plant species by the end of year 5.

22. Areal Cover in Planted Emergent Areas

<u>Years After Planting</u>	<u>Minimum % Cover</u>
One	60%
Two	70%
Five	80%

23. As defined by the canopy coverage method sampling (0.25 meter square plot frame) the emergent plant community within the 4.28 acres of the mitigation area will exhibit an 80% coverage within 10 years following initial planting.

24. As defined by the line intercept method sampling the scrub/shrub and sapling vegetation class will exhibit 75% aerial coverage within 10 years following initial planting in those areas not identified as open water.

<u>Years After Planting</u>	<u>Minimum % Cover</u>
One	10%
Two	15%
Three	25%
Four	35%
Six	45%
Eight	55%
Ten	75%

25. Achieve an 80% ground cover of grasses by the end of year 3 and maintain through year 5.

26. Minimum emergent cover will be 90% after 3 years.

27. Minimum shrub cover will be 20-30% after 1 year, 30-45% after 3 years, and 45% after 5 years.

28. At least 50% native vegetation cover of created wetland area after the first year, 75% after the second year, and at 90% cover after the third year. The percent cover includes naturally recruited native vegetation.

- 29. After 5 years, wetland has about 50% cover of scrub-shrub species.
- 30. After 5 years, wetland has about 50% cover of forest species.
- 31. After 5 years, at least 90% of the total cumulative cover is native species.
- 32. After 5 years, buffer has about 50% cover of shrub species.
- 33. After 5 years, buffer has about 50% cover of tree species.
- 34. After 5 years, at least 90% of the cover is native species.
- 35. In wetland areas aerial coverage of canopy, subcanopy, and understory shall be at least 50% by year 2 and 90% by year 5 (this applies to both planted and volunteer species).
- 36. In upland buffer areas, aerial coverage of canopy, subcanopy, and understory shall be at least 50% by year 2 and 90% by year 5 (this applies to both planted and volunteer species).
- 37. Emergent vegetation will cover at least 2.3 acres of the wetland after five years, and the cover of native emergent plant species will be at least 80% measured along permanent transects in random 20 X 50 cm rectangular plots.
- 38. Scrub-shrub vegetation will cover at least 0.8 acres within five years, and the cover of native shrub species will be at least 80% measured along permanent transects in random 10 meter circle plots.
- 39. Native forest vegetation will cover at least 1.3 acres within five years, and canopy closure will be at least 70% within five years.
- 40. By the end of the fifth year, there will be 95-100% coverage.
- 41. The vegetated portions of the site shall have a minimum of 80% average cover of native wetland species appropriate to the site and to its hydrologic regime (WQC condition and found in the mitigation plan supplement). **This standard was encountered and assessed for three projects.*
- 42. 80% cover of desirable herbaceous plant species at the end of year 5.

<u>Years After Planting Minimum % Cover</u>	
One	60%
Two	70%
Five	80%

43. By the third year, a minimum of 90% cover by the planted species, as determined by estimating % cover within the individual sample plots.

44. Total cover of emergent vegetation in the emergent wetland marsh areas will be 50% in year 3 and 80% after year 5.

45. Total cover of emergent vegetation in the lacustrine habitat area will be 50% in year 3 and 80% after year 5.

46. Total cover of all planted trees and shrubs in the forested upland buffer will be 50% in year 3 and 75% after year 5.

47. 80% vegetation cover of plant species specified in the planting plan. Volunteer species are acceptable so long as they are not considered nuisance species and they contribute to the overall goals of the wetland mitigation. This is by the end of the monitoring period.

48. Total percent cover of the forested and scrub-shrub communities will average 15%, 30%, and 50% or greater in years 5, 7, and 10 respectively.

49. Plant coverage in the temporarily flooded to intermittently exposed zone will be 40% after the first year, 75% after the second year, and 90% after the third year.

50. In the permanently flooded zone, coverage will be 20% after the first year, 30% after the second year and 45% after the third year.

51. For planted and non-noxious volunteer shrubs and trees, percent cover will be as follows: 25% cover after the first year, 30% after the second year, 40% after the third year, 50% after the fourth year and 60% after the fifth year.

52. For herbaceous planted and non-noxious volunteers, percent cover will be as follows: 30% cover after the first year, 50% after the second year, 60% after the third year, 70% after the fourth year and 85% after the fifth year.

53. If, after two years, plant success is less than 80% of site coverage, additional plantings may be required (WQC condition).

54. After 5 years (excluding reed canary grass), the emergent wetland had aerial vegetative coverage of at least 85%.

55. After 5 years (excluding reed canary grass), the emergent zone has >60% coverage by FACW or OBL species.

56. After 10 years, no decrease in vegetative cover in the emergent wetland.

57. The plantings will be considered a success if the riparian area has achieved a 75% or greater areal coverage of planted or colonizing native vegetation as quantified by the monitoring plots.

58. Vegetative percent cover by growing season: 1st=50%, 2nd=75%, 3rd=80%, 4th=85%, 5th=90%.

59. Establish 70% ground cover of native vegetation within the wetland creation area.

Survival/Cover

- 1. Establish at the end of the monitoring period a 75% survivorship of all tree and shrub plantings and 75% ground cover within the emergent wetland mitigation areas.**
- 2. Survival of 80% of all plantings after 2 growing seasons OR a minimum combined tree and shrub cover of 5-10% within a representative sample plot.**
3. A minimum % survival OR minimum combined tree and shrub cover of planted stock within a representative permanent sample plot as follows: 80% survival OR 10-15% cover after 3 growing seasons, 80% survival OR 15-25% cover after 4 growing seasons, 80% survival OR 25-40% cover after 5 growing seasons.
- 4. After two growing seasons, at least 80% of all plantings (average of about 800 stems per acre throughout all planting areas) shall survive OR there shall be at least 25% combined cover for trees and shrubs (Corp condition).**
5. After three growing seasons, at least 80% of all plantings (average of about 800 stems per acre throughout all planting areas) shall survive OR shall be at least 35% combined cover for trees and shrubs (Corp condition).
- 6. After four growing seasons, at least 80% of all plantings (average of about 800 stems per acre throughout all planting areas) shall survive OR there shall be at least 50% combined cover for trees and shrubs (Corp condition).**
- 7. For woody plant species, success will be based on at least an 85% survival rate of all planted trees and shrubs, or at least 80% cover of equivalent recolonized native species, by the end of year 5.**

Areal cover and percent survival in planted tree and shrub areas:

<u>Years After Planting</u>	<u>Minimum % Cover</u>	<u>% Survival</u>
One	20%	85%
Two	30%	85%
Three	45%	85%
Five	80%	85%

8. Areal cover and percent survival in planted tree and shrub areas:

<u>Years After Planting</u>	<u>Minimum % Cover</u>	<u>% Survival</u>
One	20%	85%
Two	30%	85%
Three	45%	85%
Five	80%	85%

9. Monitor the development of the planted vegetation each year monitoring is required, and compare results at the end of the monitoring period. The following criteria will be used to determine the success of the planted material: Either 60% of the planted material will have survived after year 5 OR the site has at least 85% cover after year 5 and not more than 15% cover of exotic invasive species.

10. After 3 years, wetland has 80% survival of facultative species, or is supplemented or replaced by a native plant community regenerating a 80% or greater tree, shrub, and forb cover.

11. After 3 years, buffer has 80% survival of planted species, or is supplemented or replaced by a native plant community regenerating a 80% or greater cumulative plant cover.

12. Survival of 80% of all plantings within the four-acre wetland enhancement planting area OR minimum combined tree and shrub cover of the planted stock of 30% after five years.

13. Mitigation success will be considered to be 80% cover survival or 50% cover of native and/or non-invasive species within the first year of monitoring and 100% cover by the fifth year. A 50% total canopy cover by 3 years and 100% by the end of five years within the forested and shrub zones (This was found in the monitoring section of the mitigation plan).

14. At least 85% survival of trees and shrubs or at least 80% cover of equivalent recolonized native species by the end of year 5.

<u>Years After Planting</u>	<u>Minimum % Cover</u>	<u>% Survival</u>
One	20%	85%
Two	30%	85%
Three	45%	85%
Five	80%	85%

15. Total cover of pioneering and planted trees and shrubs in the forested wetland will be 50% in year 3 and 75% after year 5. If 75% tree and shrub cover is not attained at the end of the five-year monitoring program, the Corps has authorized the measurement of percentage survival of trees and shrubs as an alternative

methodology to measure success. If 75% of trees and shrubs have survived, this parameter shall be considered successful.

16. By the end of the fifth monitoring period, 75% vegetation cover of planted vegetation or appropriate volunteers, and 80% planted tree and shrub survival. No more than 10% of the vegetation shall be non-native species.

Vegetation Diversity

1. 5 years after Phase 3 plantings, mean Shannon diversity index (H')>2.0 for all species in plots in emergent communities and along transects in scrub/shrub and forested communities. 5 years after phase 3 plantings, average increase in richness >100% in plots in emergent communities and along transects in scrub/shrub and forested communities. *This standard was used twice for two different areas of the same project.

2. A total of 10 species of deciduous trees, 2 coniferous trees, 11 species of shrubs, and 8 species of emergent marsh will be planted.

3. A diverse palustrine wetland with at least 10 species of native emergent and submergent plants will be created.

4. After 3 years, the emergent wetland has >30% coverage of at least 2 FACW or OBL species (excluding reed canary grass).

5. Establish a minimum of four native tree species; four native shrub species; and two native groundcover species.

Invasive/Non-native species

1. Establish plant communities in the mitigation areas, which are composed of woody and herbaceous plant species native or naturalized to western Whatcom County.

2. The mitigation area will not be monopolized by invasive or non-native weeds as such vegetation could threaten planted material during the monitoring period.

3. Invasive non-native plants (*Phalaris arundinacea*) will not exceed 10% cover within the enhancement areas.

4. Exotic and invasive plant species will be maintained at levels below 20% total cover in all wetland mitigation areas. Species include: Scot's broom, Himalayan and evergreen blackberry, reed canary grass, purple loosestrife, morning glory, Japanese knotweed, and creeping nightshade. ***This standard was encountered for four projects.**

5. Non-native blackberries, reed canary grass, and purple loosestrife may not account for more than 10% of total cover at any monitoring occasion.

6. 10 years after Phase 1 planting, no single area >100 square feet dominated by reed canary grass; total cover of reed canary grass on this portion reduced from existing cover of approximately 16 acres to < 1 acre after 10 years and for the remainder of the 15 year monitoring period.

7. 10 years after Phase 1 planting, no single area > 100 square feet dominated by reed canary grass; total cover of reed canary grass on this portion reduced from existing cover of approximately 1.5 acres to < 0.25 acres after 10 years and for the remainder of the 15 year monitoring period.

8. Phalaris arundinacea (reed canary grass) shall comprise no more than 20% of total stand composition at the end of the monitoring period.

9. Maintain less than 10% noxious weeds by the end of year 3 and maintain through year 5.

10. No more than 10% non-native and/or invasive plant coverage.

11. If an area includes more than 50% exotic species at the end of year 5 then the restoration will not be considered successful for that area and a contingency plan will be required.

12. Invasive, non-native species shall comprise no more than 10% of total cover for any monitoring event. If this standard is exceeded, contingency actions shall be taken (Corp condition).

13. No more than 10% of the vegetation shall be non-native species for all monitoring events.

14. None of the following, Scot's broom, Himalayan blackberry, thistles, Japanese knotweed, and reed canary grass, will be a dominant species within their vegetative stratum for each monitoring event. Total percent cover of the listed species shall be no more than 20% for each monitoring event (monitored in years 1, 2, 3, 5, and 7).

15. Not more than 20% of the area will be occupied by invasive species such as canary grass or iris (*Iris pseudacorus*).

16. Mitigation sites will be maintained from invasive and noxious weed species including, but not limited to purple loosestrife and phragmites (WQC performance criteria).

Cover/Invasives

1. Planting success shall be defined as 80% coverage with native species and < 5% coverage with invasive species (*Phalaris arundinacea* and *Rubus discolor*) three years after revegetation.

Water Regime

1. Soils are to be continually saturated at or near the surface for a minimum of 5 to 12.5% of the growing season (approximately 5-30 days) during years of normal rainfall. Upper transitional areas = 5%, lower areas = 12.5%.
2. Presence of ground water within 6 inches of the surface or standing water for at least 14 consecutive days between March 1 and October 31 of a normal rainfall year within enhanced wetland areas.
3. The wetland area must contain inundated or saturated soils in a similar manner to adjacent existing wetland areas during the growing season.
4. Except on northwest and extreme southwestern boundaries, where meeting grades of adjacent property, surface grades no higher than 59.5 ft. This is < 1.1 ft above average April 1994 water surface elevation of 58.4 ft., as monitored at wells 1 and 10 near existing uplands. At a minimum, inundation or saturation within 12" of surface throughout site beyond April 1 in years of normal rainfall.
5. > 24" depth of water year-round in deepest part of the creek channel; overtopping of banks during 1-year and larger flood events.
6. Except on southeastern boundaries, where meeting grades of adjacent property, surface grades no higher than 59 ft. This is < 1 ft. above average April 1994 water surface elevation of 58 ft. as monitored at wells 16, 20, 24 in existing uplands. At a minimum, inundation or saturation within 12" of surface throughout site beyond April 1 in years of normal rainfall.
7. 2 summer ponds, 1-1.5 acres and 2-2.5 acres. Winter flooding of isthmus between ponds to create one winter pond, 6-9 acres. Maximum winter depth 6 ft.; minimum summer depth 1 ft.
8. 3.5-4 acres of shallow water, 2-4' deep in winter with rooted, vascular aquatic plants growing at margins.
9. 5-7 acres of seasonally saturated wetland in higher portions of emergent area A, becoming dry in summer as indicated by monitoring-well data.

- 10. 4.28 acres of compensatory wetland mitigation wetland area will exhibit an early growing season (March-April) water regime of at least 6” of standing water of 80% of the wetland. During the summer season (June-August) saturated soil conditions within the upper 12” of soil will be present over 80% of the wetland.**
- 11. Deep pond will have open water between December 15 and June 15.**
- 12. Hydrology in the mitigation sites shall meet wetland hydrologic criterion.**
- 13. Presence of groundwater within 12 inches of the surface or standing water for at least 14 consecutive days between March 1 and October 31 of a normal rainfall year (shall be observed and recorded at all four of the hydrology monitoring stations, which includes the 2 staff gauges and 2 shallow monitoring wells—this was added on in the WQC).**
- 14. If hydrology in the emergent, scrub/shrub, and forested components consists of saturated soil or standing water from depths of 1 inch to 4 feet by year 5 the creation of proper hydrology will be considered successful.**
- 15. Hatchery effluent flow and the log weirs will maintain the level at 0 to 6 inches over the emergent wetlands and at 1 to 2 feet in the constructed channel.**
- 16. Adequacy of water reaching the associated wetlands: continuous presence of saturated soil within 12 inches of the soil surface for 12.5 % of the growing season (121 days) to be measured at 22 locations along 5 transects. Failure determination will be based on the finding that soil saturation is not present high enough in the soil profile for a long enough time for two years in a row.**

Wildlife Use/Diversity

- 1. Use of amphibians, waterfowl and other avian species will be documented by periodic observations and reported by a count of actual species and numbers. The proposed mudminnow habitat will be sampled during each monitoring year to determine use by mudminnows, and the creek will be monitored for the presence of coho salmon.**
- 2. For the total wetland mitigation area: use of the wetland by one species of amphibians will be documented by observation of egg masses during the breeding season.**
- 3. The use of the site by at least three species of water birds will be documented with a photographic record.**

4. The wetland mitigation area will be used for cover by at least 2 species of passerine birds common to the area within 10 years of completion of wetland restoration and enhancement.
5. Show an increase in the number of species over what occurs under existing conditions (bird list provided).
6. Show year round waterfowl use through bird counts during monitoring.
7. The use of the wetland by a minimum of four of the following amphibian species will be documented by live trapping, and/or observation of adult, larva, or egg masses during the breeding season within five years: Pacific chorus frog, red-legged frog, rough-skinned newt, long-toed salamander, ensatina, and/or northwest salamander.
8. The use of the wetland by a minimum of one aquatic insect species from each of the following orders will be documented by net collection within five years: Coleoptera, Diptera, Trichoptera, Ephemeroptera, Odonata, and Hemiptera.
9. Use of the wetland by a minimum of three of the following waterfowl species will be documented by providing a record of observation within five years: great blue heron, Canada goose, mallard, wood duck, hooded merganser, bufflehead, American widgeon, and/or ring-neck duck.
10. Use of the area by at least two of the following mammal species will be documented by providing a record of observation of animals, footprints, or scat within five years: coyote, raccoon, bat, muskrat, and/or black-tailed deer.
11. Use of the wetland by a minimum of three of the following passerine species will be documented by providing a record of observation within five years: violet-green swallow, tree swallow, red-winged blackbird, common yellowthroat, marsh wren, song sparrow, and/or belted kingfisher.
12. The mitigation area will provide foraging habitat for great blue herons, at least five species of ducks, and common snipe.
13. The willows will provide cover (during the growing season) for at least two Columbian white-tailed deer.

Wildlife Habitat

1. Documentation is to be provided that the habitat features, such as large woody debris, has been installed.

- 2. Areas designed to provide spawning habitat will be established and stable by the end of the monitoring period.**
3. All nest boxes and platforms shown on the as-built drawings must be in place and useable at each monitoring occasion.
- 4. Two back channels off the creek, roughly parallel to creek, deep and narrow at confluence, broader and shallower upstream. Bottom elevation of channels 53 ft. at confluence, rising at < 1.5% maximum slope to 56 ft. within 400 lineal ft. of confluence. Channels 20-40 ft. wide for first 400 lineal ft. upstream of confluence to allow for closure of scrub/shrub and forested canopy.**
- 5. 16 logs and root wads still in place in new channel and its banks after 5 years, at intervals of 15-50 ft. Material will be 10-24 inches in diameter, 10-15 ft. long, and will provide shade over portions of the stream channel and aquatic habitat diversity.**
- 6. 7 logs, 5 snags, and 5 brush piles in place 5 years after installation in year 1. Logs and snags > 24" in diameter and 10-20 ft. long; brush piles at installation 3-5 ft. high, 60-100 sq. ft. At base, composed of logs and branches 2-8" in diameter, with smaller twigs attached. Woody debris elements to be installed at > 8 widely scattered locations; average distance between locations > 200 ft.**
- 7. Island with an area of 0.2-0.3 acre and 3 peninsular lobes, 0.4-1.0 acre each, more than 75% surrounded by open water and aquatic bed habitat.**
- 8. Natural decline of water table during the dry season to expose > 3 acres of unvegetated, previously inundated areas, < 30 ft. wide, at edges of ponds during first years (these will be colonized by emergent vegetation in 1-3 years).**
- 9. Ponds with 8-24" of water in February and March, in or adjacent to emergent areas that contain stems of plants with diameters < 0.25 inches (e.g. *Eleocharis*, *Sparganium*, *Scirpus*).**
- 10. The ratio of actual water edge to average circumference of the open water is greater than 2.**
11. A minimum of 10 stumps (minimum of 10 feet in length, minimum of 20" diameter at the top, minimum 10 foot diameter at the bottom of the rootball) and a minimum of 20 downed logs (minimum 20 ft. length, minimum 20" diameter at 10 ft. above the root collar, minimum 10 ft. diameter at the bottom of rootball) will be placed within the mitigation area to provide habitat for passerine birds and other wildlife common to the area.
- 12. Show potential habitat for salmonids, i.e., gravel beds and structures are still present over 5 years of monitoring.**

13. After 3 years, wildlife habitat support will be measured by documentation of the areal cover or woody vegetation. This measurement will be used as an indicator of an increase in habitat structure and complexity. The initial establishment and survival of either planted or colonizing tree and shrub species should begin to determine the future habitat structure of the wetland and decisions on possible restructuring of the installed plant community, if needed.

14. After 5 years, habitat support measurements as indicated by aerial tree and shrub coverage should increase over time. Habitat structure is predicted to change from a single layer of vegetation to multiple layers over time as trees and shrubs become better established and continue to mature.

15. The ratio of water edge to average circumference of pond is greater than 2. (e.g. [actual water edge]/[average circumference of pond ellipsoid] > 2).

16. A minimum of 15 snags and 30 floating logs will be randomly placed throughout the wetland. Wood material will be > 12 inches in diameter and > 15 feet long.

17. Nest boxes will be provided in 15 dead trees and 5 live trees in the forested wetlands and will still be present after 5 years.

18. Ten loafing logs will be provided in the emergent marsh areas and will still be present after 5 years.

19. Five root wads will be provided in the emergent marsh areas, and will still be present after 5 years.

20. Provide habitat for waterfowl and other wetland dependent birds through the creation of wetland communities.

Other

1. Provide 2.0 acres of palustrine emergent wetland and 1.4 acres of palustrine scrub-shrub wetland in Area A; provide 12.7 acres of palustrine emergent wetland in Area B; provide 5.0 acres palustrine scrub-shrub wetland in Area C.

2. Establish a vegetated buffer composed of trees and shrubs in the upland berm around Area C.

3. Establish a permanent interpretive sign on X drive for Mitigation Area C.

4. No installed structure or habitat feature will cause any excessive stream bank erosion or negatively impact the natural conditions of the existing headwater wetlands.

- 5. At the end of the monitoring period all installed stream structures will be secure and in place and integrated into the existing stream system.**
- 6. Monitoring reports will be submitted to the County after each monitoring period.**
- 7. To increase flood storage capacity: Grades of 60-61+feet on existing upland areas reduced by 0.5-1.5 ft., except for minimum area needed on northwestern boundaries to meet grades of adjacent property.**
- 8. In the creek, average values for temperature, dissolved oxygen, pH, conductivity, fecal coliform bacteria, total suspended solids, turbidity, ammonia, nitrogen, and phosphorous equal to better than baseline conditions, as measured by difference between upstream and downstream sampling stations, and using standard statistical analysis.**
- 9. Grades of 60-61 + feet on existing upland areas reduced by > 1 ft., except for minimum area needed on southeastern boundaries to meet grades of adjacent property. All existing structures, impermeable surfaces, and fill removed.**
- 10. For total mitigation area: open water will be 0.47 acres during the dry season with a minimum depth of 12 inches. Saturated wetland area will be 0.65 acres during the dry season. Saturated wetland area will be 5.28 acres during the spring growing season (excluding open water).**
11. For total mitigation area: the wetland areas around open water will have 0.65 acres of emergent vegetation and 0.85 acres of scrub-shrub vegetation within the restoration area and 3.78 acres of scrub-shrub vegetation within the enhancement area.
- 12. Target wildlife use of the site and vegetation characteristics of the wetland creation areas to determine if habitat types and functional performance match those of the wetlands that are to be impacted. Use the functional evaluation recorded for the wetlands to be impacted and compare the functional evaluation of the created wetland (at the end of the project) to determine if the same or approximate functional performance has been attained.**
- 13. All slopes will be 3:1 or greater per the mitigation/enhancement plan.**
- 14. The periphery of the open water/deep water wetland portion of the wetland will be scalloped per the plan.**
- 15. Planting procedures are per the planting guide (Sheet 1 of the Mitigation/Enhancement Plan).**
- 16. Area of seasonally flooded and saturated wetlands will be a minimum of 4.4 acres for at least 21 days during the growing season.**

17. The area of open water will be 1.6 acres divided into three basins with a maximum depth of 10 feet during the wet season and minimum depth of 6 feet during the growing season.

18. Upland forest vegetation, which may include vegetation with wetland indicator status (including upland, facultative upland, facultative, and facultative wetland), will provide an upland buffer of at least 50 feet surrounding the entire wetland and shall consist of shrubs and trees with an average height of 15 feet within five years.

19. Two interpretive signs will be installed and readable after five years.

20. There shall be a minimum 100-foot buffer between all developed areas and the mitigation site for each specified monitoring event. Buffer width will be verified and photo-documented as part of monitoring (monitored in years 1, 2, 3, 5, 7, and 10).

21. Wetland vegetation dominance by growing season: 1st=20% FAC or wetter, 2nd=30% FAC or wetter, 3rd=40% FAC or wetter, 4th=55% FAC or wetter, 5th=75% FAC or wetter.

22. Create 0.46 acres of forested/scrub-shrub and emergent marsh wetland habitat.

Appendix E

Hypothesized Hydrogeomorphic Classifications

site #	HGM class
8	<u>Depressional closed</u> for most of the on-site areas, <u>Tidal</u> for one of the on-site areas. <u>Tidal</u> for the off-site area. Multiple sites to consider.
9	<u>Depressional</u> 2 of 3 on-site areas. Third on-site area a <u>Flat</u>
11	Preservation. We did not walk through the entire area.
14	<u>Depressional</u> (Flat?) – site was on an elevated plateau.
17	Preservation - a bog. We did not observe the hydrology.
33	<u>Depressional closed</u>
46	<u>Depressional closed</u>
55	<u>Depressional outflow</u> or <u>Riverine impounding</u> - enhancement in multiple areas. Grading plans appeared to show that flow drained into the on-site creek.
62	<u>Depressional outflow</u> – site 1 had a perched culvert believed to be the outflow. Site 2 had an adjacent dry streambed and existing wetland. It also had a perched culvert which appeared more like an inflow. The mitigation site itself looked like a gravel road.
89	<u>Depressional closed</u>
99	We just looked at the buffer. *We could probably do F.A. on the wetland which is about 10-11 years old, probably depressional closed or outflow.
116	<u>Riverine impounding</u> - for both east and west areas
125	Preservation
151	<u>Depressional</u>
163	<u>Depressional outflow</u> – Ebbey Slough adjacent to site in diked area
180	<u>Depressional closed</u> - multiple sites excavated along existing wetlands
193	<u>Depressions in slope</u> – flow was moving down gradient from one pond into another
204	<u>Depressional</u>
218	NOT DONE
232	<u>Depressional</u> - multiple sites most of which were dry, except for one that looked like a channel but came out of nowhere and appeared to end in a pond.
233	<u>Riverine flow-through</u> – along Pilchuck Creek
239	<u>Depressional outflow</u> or <u>Riverine impounding</u> - depending on elevation of outflow culvert. Site was a ditch we did not look at the inflow or the outflow.
243	<u>Depressional outflow</u> – there was a flow going out of the wetland site over a weir and into a ditch that ran along the edge of the site.
278	<u>Tidal</u> - site was immediately adjacent to Snohomish River (N of Hwy 2)
289	<u>Depressional closed</u> - site was a gravel pit
290	Preservation
294	<u>Depressional closed</u>
299	NOT DONE

- 300 Depressional closed – there were swales adjacent to the wetland to catch stormwater off the parking lot.
- 305 Riverine impounding or Depressional outflow - very wet reed canarygrass area with a deep channel running through it. Also duck doughnut - Depressional closed
- 325 Depressions in slope – water appeared to come from upland seeps as well as surface flow. It flowed down gradient in rivulets into a series of ponds each with a weir outflow.
- 334 ? - there was a ditch at one of the site that had flowing water. Except for a few small depressions in the mitigation area, it seemed quite dry with many FACU species dominating some areas.
- 336 Riverine, Depressional, and Lacustrine fringe - adjacent to Cottage Lake some hydrology appeared to come from its low elevation in proximity to the lake, however there was also a stream running through the site.
- 357 Depressional outflow – there was swale running through the site, but this did not appear to supply hydrology.
- 378 Depressional outflow
- 389 Depressional - swale running through part of site which probably provided hydrology for parts of the site, but not sure where hydrology for remainder of site comes from or goes to.
- 398 NOT DONE
- 400 Depressional outflow – flow comes from surface flow off impervious surfaces upslope into a depression then out a culvert into another depression and out another culvert.

Appendix F

Advisory Team

Brent Haddaway
Washington Department of Transportation

Arvid Lindstrom
Formerly of the Washington Department of Transportation

Chris McAuliffe
US Army Corp of Engineers

Anna Mockler
Cooke Scientific Services, Inc.

Linda Storm
Environmental Protection Agency

Michelle Walker
US Army Corp of Engineers

Bob Zeigler
Washington Department of Fish and Wildlife