Evaluation of Wetland Assessment Methods and Credit-Debit Systems for In-Lieu Fee Mitigation of Coastal Aquatic Resources in Southeast Alaska

October 27, 2010

Prepared for

Southeast Alaska Land Trust
Juneau, Alaska

Funded by

U.S. Fish and Wildlife Service
Juneau Field Office

Prepared by

CH2MHILL
949 E. 36th Avenue, Suite 500
Anchorage, AK 99508

CH2MHILL
1100 112th Avenue NE, Suite 400
Bellevue, WA 98004
425/453-5000

Contents

Tables

Figure

Photo

Attachments

CH2M HILL Project No. 403452.01.02

Acronyms and Abbreviations

ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation & Public Facilities
AKWAM	Alaska Wetland Assessment Method
BPJ	Best Professional Judgment
CBJ	City and Borough of Juneau
CIAP	Coastal Impact Assistance Program
ESA	Endangered Species Act
HGM	Hydrogeomorphic Method
HUC	hydrologic unit code
ILF	In-Lieu Fee
IRT	Interagency Review Team
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
ORWAP	Oregon Rapid Wetland Assessment Protocol
PNW	Pacific Northwest
RGL	Regulatory Guidance Letter
SEAL Trust	Southeast Alaska Land Trust
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WESPUS	Wetland Ecosystem Services Protocol United States
WSDOT	Washington State Department of Transportation

1.0 Summary

CH2M HILL conducted a study in 2010 to evaluate wetland assessment methods and credit-debit systems for in-lieu fee mitigation[1] of coastal aquatic resources in Southeast Alaska. This study was conducted for the Southeast Alaska Land Trust (SEAL Trust) in support of their In-Lieu Fee (ILF) Program that is being revised to comply with the Final Rule for *Compensatory Mitigation for Losses of Aquatic Resources*, which was published in the Federal Register on April 10, 2008 (hereafter referred to at the *2008 Federal Mitigation Rule*). The Juneau Field Office of the U.S. Fish and Wildlife Service (USFWS) funded this study under a Coastal grant to SEAL Trust.

1.1 Wetland Assessment Methods Evaluation

Seventeen existing available wetland assessment methods were evaluated as part of this study and are described in Chapter 3 and in Attachments A and B of this report. The methods evaluated were developed for Southeast Alaska, for other parts of Alaska, and for the Pacific Northwest (PNW) and other regions. An Interagency Review Team (IRT) based mostly in Juneau suggested several methods to be evaluated. The IRT also provided input to develop a list of essential characteristics that were used to evaluate the methods. The characteristics identified as being essential for a wetland assessment method for Southeast Alaska include:

- Be applicable to tidal and non-tidal wetlands.
- Assess wetland functions (such as, hydrologic, water quality, and fish/wildlife habitat).
- Result in an overall functional rating or categorization (such as, High, Moderate, Low).
- Require one-half day or less for assessment of each wetland (i.e., "rapid").
- Be repeatable and objective (results in consistent ratings) and minimizes reliance on Best Professional Judgment (BPJ).
- Be supported by recent available documented science. (Recent was defined as occurring after the year 2000).
- Be watershed-based by considering a wetland's watershed and surrounding land uses.
- Identify "Red Flag" Habitats – Elevate high quality/value ecological conditions (such as, habitat for Endangered Species Act (ESA) Listed species, rare/sensitive species, rare wetland types, areas including or adjacent to essential fish habitat).
- Include a data form to record field observations and notes.

[1] In-lieu fee mitigation is a type of compensatory mitigation that is required after an applicant has avoided and minimized impacts to a wetland.

The wetland assessment methods evaluated generally fell into several general groups related to their original authors:

- New England Highway Methodology Workbook-based methods
- Hydrogeomorphic (HGM)-based methods
- Washington-based methods
- ADOT&PF method (adapted from Montana Department of Transportation).
- Adamus-based methods

Of the seventeen methods evaluated, the one method that may have the greatest potential for being applied to Southeast Alaska is based on a method developed by Paul Adamus for Oregon. Based on the Oregon method, Adamus has created a generic beta version called *Wetland Ecosystem Services Protocol United States* (WESPUS). The WESPUS method satisfies most of the essential characteristics and has many of the desirable characteristics compared to all the other methods evaluated. Also, Adamus began a preliminary experimental test of WESPUS in Juneau in June 2010 (See Appendix C in Bosworth and Adamus, 2010). As a result of this evaluation of wetland assessment methods, WESPUS is being recommended to SEAL Trust and the IRT for preliminary testing and calibration for Southeast Alaska.

1.2 Credit-Debit Systems

A limited number of credit-debit systems are currently in use, particularly in Alaska. The one credit-debit system from Alaska that was available for review included the Sample Ratios for Compensatory Mitigation that were provided as Appendix B in the 2009 U.S. Army Corps of Engineers (USACE) *Alaska District Regulatory Guidance Letter* (RGL) (USACE 2009), which incidentally was adapted from guidance developed in Washington State. The table from Appendix B of the *2009 Alaska District RGL* (USACE 2009) is presented in Table 1-1 below. For convenience, the *2009 Alaska District RGL* is included as Attachment C of this report. This table provides sample ratios for three categories (Low, Moderate, and High) of impacted wetlands or other waters of the United States, and two types of compensatory mitigation (preservation and restoration/enhancement). For SEAL Trust (and Alaska in general), the primary form of compensatory mitigation provided is wetland preservation.

A number of other credit-debit systems were evaluated and are described in Chapter 4. A credit-debit framework being recommended for SEAL Trust and the IRT to consider combines the *2009 Alaska District RGL* with approaches that are being implemented in Washington and Oregon. Considerations for addressing in-kind mitigation are discussed. Also, an example approach is proposed to adjust for different levels of function and provide better equivalency between impact acreage (debits) and preservation acreage (credits).

TABLE 1-1
Sample Ratios for Compensatory Mitigation in Alaska—USACE Alaska District

	Type of Compensatory Mitigation	
Impacted Wetland or Other Waters of the U.S.	**Preservation**	**Restoration and /or Enhancement**
LOW Category III or IV	1.5:1	1:1
MODERATE Category II or III	2:1	1:1
HIGH Category I or II	3:1	2:1

From Appendix B in the *2009 Alaska District Regulatory Guidance Letter* (USACE 2009)

1.3 Organization of the Report

Chapter 2 summarizes the purpose, goals, and objectives of the project; background information; evaluation methods and input from the Interagency Review Team; and characteristics for a Southeast Alaska assessment method.

Chapter 3 summarizes the wetland assessment methods that were evaluated.

Chapter 4 summarizes the credit-debit systems that were evaluated.

Chapter 5 summarizes the recommendations, next steps, and data gaps.

Chapter 6 lists authors, reviewers, and contributors.

Chapter 7 lists the references used and other relevant references.

2.0 Introduction

This chapter summarizes the purpose, goals, and objectives of the project; background information; evaluation methods and input from the Interagency Review Team (IRT); and characteristics for a Southeast Alaska assessment method.

2.1 Study Purpose, Goals, and Objectives

In collaboration with the IRT consisting of the USACE, USFWS, National Oceanic and Atmospheric Administration (NOAA), U.S. Environmental Protection Agency (USEPA), Alaska Department of Fish and Game (ADF&G), Alaska Department of Natural Resources (ADNR), and CBJ, CH2M HILL evaluated existing coastal and Pacific Northwest wetland assessment methods and credit-debit systems to identify and describe critical elements that would be useful to develop or customize a method for Southeast Alaska.

The goals of the study were to:

1) Identify an existing assessment method that meets the essential characteristics, could readily be adapted to Southeast Alaska, and results in a general rating or categorization of overall wetland function.

2) Evaluate credit-debit systems and recommend a credit-debit framework that could be used by SEAL Trust as part of their ILF instrument.

The objectives of the study were to provide:

1) Comparative information on assessment methods from which SEAL Trust and the IRT could extract components that they agree are workable and sufficient to reasonably translate to Southeast Alaska coastal aquatic resources, including estuarine wetlands.

2) Recommendations on elements critical to a region-specific aquatic resources assessment tool and credit-debit system (SEAL Trust would seek to develop this assessment tool and credit-debit system as a subsequent future task not included in this scope of work).

3) Enhanced knowledge gained by the USACE, SEAL Trust, IRT, and other regional resource and lands professionals that will result in more informed and consistent implementation of the *2008 Federal Mitigation Rule* to Southeast Alaska coastal aquatic resources.

2.2 Background

Southeast Alaska Land Trust

Under a legal partnership with USACE, SEAL Trust accepts fees from permitees in lieu of mitigation for project impacts to waters of the United States. SEAL Trust is then obligated to acquire or otherwise protect wetlands for conservation purposes that offset the losses from the permitted developments. Proposed mitigation projects are reviewed by the IRT.

Currently, SEAL Trust uses real estate value, transaction costs, survey, appraisal, and other professional fees and stewardship costs to determine the amount of in-lieu fees for impacted sites. The funds are used to protect sensitive areas through conservation easements, fee-simple title acquisition, or other legal instruments to mitigate for permitted impacts. The current system, however, lacks rigorous parity between impacted and mitigation sites now required by regulation. Recent Federal regulations require in-lieu fee programs to use wetland assessment methods and credit-debit legers to ensure that mitigation efforts offset functions lost at impacted sites.

The IRT agencies and developers struggle with variable and often subjective approaches to evaluating wetland impacts and determining the appropriate permit mitigation requirements. Southeast Alaska lacks a region-specific methodology for assessing wetlands, for assigning debits to the permitted impacts, and assigning credits for wetland preservation.

ADOT&PF Synthesis Report

In 2005, the Alaska Department of Transportation and Public Facilities (ADOT&PF) completed a *Synthesis of Practice for Rapid Wetland Assessment in Alaska* (ADOT&PF 2005). The ADOT&PF report recommended that "The Montana Wetland Assessment Method, prepared for the Montana Department of Transportation, is one that could incrementally and relatively easily be adapted for use in Alaska. With few modifications, it could be tested in Alaska immediately. ADOT&PF should adopt certain concepts from other methods as well." Since 2005, ADOT&PF has been working to develop a method for Alaska based on the *Montana Wetland Assessment Method* (Berglund 1999; Berglund and McEldowney 2008). In July 2010, ADOT&PF issued version 1.0 of their *Alaska Wetland Assessment Method* (AKWAM). The evaluation currently being conducted for SEAL Trust builds on the previous synthesis prepared by ADOT&PF (2005), and identifies recent advances in wetland assessment science.

2.3 Evaluation Methods and IRT Input

SEAL Trust invited members of the IRT to a kickoff meeting that was held in Juneau on March 31, 2010. Representatives that attended the kickoff meeting from participating organizations are summarized in Table 2-1.

At the kickoff meeting, SEAL Trust and the IRT drafted a list of characteristics that were identified as being essential for any assessment method developed for Southeast Alaska. In early April, immediately following the kickoff meeting, the list of essential characteristics was refined and sent to the IRT and SEAL Trust for review and comment. Comments received were incorporated into a refined list of essential characteristics that was used to evaluate the wetland assessment methods.

SEAL Trust invited members of the IRT to a second meeting that was held in Juneau on August 31, 2010. The purpose of this meeting was to discuss and provide comments on a draft version of this report.

In April and May 2010, the various methods were obtained and evaluated. By late May, SEAL Trust distributed to the IRT a summary of the evaluation of wetland assessment

methods, along with a link to an FTP library that gave access to the IRT to all the methods that were evaluated. A conference call was held on June 8, 2010, with SEAL Trust and IRT members. Hans Ehlert from CH2M HILL provided a preliminary summary of findings and recommendations from the evaluation of wetland assessment methods. In early August 2010, a draft report was submitted to IRT members for their review and comments. SEAL Trust met with the IRT on August 31, 2010, in Juneau to discuss comments on the report and recommendations. At that time, next steps for implementing the recommendations of this report were also discussed for implementing a wetland assessment method and credit-debit system for Southeast Alaska. Comments received were incorporated into a final report that in late October 2010 was submitted along with a compact disk that included an electronic library of the documents evaluated, thus completing this project.

TABLE 2-1
Summary of Attendees at the Interagency Review Team Meetings for the SEAL Trust Project

Participating Organizations	Attendees at Kickoff Meeting in Juneau on March 31, 2010	Attendees at Review Meeting in Juneau on August 31, 2010
NMFS, Juneau	Chiska Derr, Cindy Hartman-Moore	Chiska Derr, Cindy Hartman-Moore
USFWS, Juneau	Steve Brockmann, Richard Enriquez, Bill Hanson, Neil Stichert	Steve Brockmann, Richard Enriquez
ADOT&PF	Ben White	-
ADF&G	Katie Eaton	Katie Eaton
CBJ	Teri Camery	Teri Camery
USACE, Juneau	Marcia Heer	Marcia Heer
USEPA, Anchorage	Matt LaCroix, Mark Jen (via teleconference)	Tracy DeGering, Gail Martin (via teleconference)
ADNR	-	Carrie Bohan
SEAL Trust	Diane Mayer, Gretchen Kaiser	Diane Mayer, Gretchen Kaiser
CH2M HILL	Hans Ehlert	Hans Ehlert

2.4 Characteristics for a Southeast Alaska Assessment Method

Essential Characteristics

Characteristics were identified that were considered essential for any assessment method developed for Southeast Alaska. The IRT provided input to develop an initial list of essential characteristics that was refined to evaluate the methods. The assessment method must be capable of the following essential characteristics:

- Be applicable to tidal and non-tidal wetlands.
- Assess wetland functions (such as, hydrologic, water quality, and fish/wildlife habitat).
- Result in an overall functional rating or categorization (such as, High, Moderate, Low).

- Require one-half day or less for assessment of each wetland (i.e., "rapid").
- Be repeatable and objective (results in consistent ratings) and minimizes reliance on Best Professional Judgment.
- Be supported by recent available documented science. (Recent was defined as occurring after the year 2000).
- Be watershed-based by considering a wetland's watershed and surrounding land uses.
- Identify "Red Flag Habitats" – Elevate high quality/value ecological conditions (such as, habitat for ESA-listed species, rare/sensitive species, rare wetland types, areas including or adjacent to essential fish habitat).
- Include a data form to record field observations and notes.

Other Desirable Characteristics

Other characteristics were also identified that would be desirable, but that are not essential. It would be desirable if the assessment method were capable of the following additional characteristics:

- Uses models to estimate wetland functions (not rely solely on BPJ).
- Is relatively easy to learn and apply (requires minimal training for a qualified natural resources professional).
- Emphasize use of available spatial information (such as, National Wetlands Inventory, online aerial photos, and Shorezone mapping).
- Incorporate concepts of HGM.
- Designed or modified for use in Southeast Alaska, or for similar habitat elsewhere in Alaska or in the Pacific Northwestern United States (such as, Washington or Oregon).

3.0 Evaluation of Wetland Assessment Methods

This chapter includes a summary of the wetland assessment methods that were evaluated and a recommended assessment method.

3.1 Overview of Wetland Assessment Methods Evaluated

Seventeen wetland assessment methods were evaluated. These methods represented three broad geographic categories: existing methods developed for and/or used in Southeast Alaska, methods used elsewhere in Alaska, and methods being used in the Pacific Northwestern United States (including other potentially interesting methods from other regions).

Details for each method evaluated are summarized in Attachments A and B of this report. Attachment A identifies the characteristics that correspond to each assessment method. Attachment B summarizes for each assessment method a description, advantages, disadvantages, and suggested improvements.

The wetland assessment methods evaluated generally fell into several general groups related to their original authors, as summarized in the text that follows.

New England Highway Methodology Workbook – A series of subjective assessment methods were developed approximately 10 years ago that were based on the original Highway Methodology Workbook prepared by the New England District of the U.S. Army Corps of Engineers (USACE 1999). These methods include the *Southeast Alaska Freshwater Wetland Assessment Method* (USACE 2000), *Wetland Functions Characterization Tool for Linear Projects* prepared by the Washington State Department of Transportation (WSDOT 2000), and more recently the functional assessment information and tools that were provided as Appendix A in the *2009 Alaska District RGL* (USACE 2009), which incidentally was adapted directly from the WSDOT (2000) tool. The major drawback of these tools is that they rely on subjective rating and professional judgment, which may have variable results and low repeatability. It is important to note that though a version of this method was developed for Southeast Alaska (USACE 2000), it is not currently being implemented.

Hydrogeomorphic Methods (HGM) – The Alaska Department of Environmental Conservation (ADEC) (with other cooperating state and federal agencies and organizations) conducted a broad-based, statewide effort to develop a Hydrogeomorphic (HGM) functional assessment for Alaska's wetlands. This was in response to there being no widely accepted evaluation methods for Alaska's wetlands that were available to accurately and consistently evaluate changes in gains and losses of ecosystem functions. HGM was selected by ADEC and several other cooperating agencies and organizations because it offered a relatively rapid, efficient, and reference-based method of assessment that allowed users to recognize human-induced changes in the functions of wetlands ecosystems. This resulted in the development of wetland functional assessment guidebooks for riverine and slope river proximal wetlands by Powell et al. (2003) and for slope/flat wetland complexes by Hall et

al. (2003), for Southeast Alaska and Cook Inlet Basin Ecoregion, respectively. It is important to note that though the former method was developed specifically for Southeast Alaska (Powell et al. 2003), it is not routinely being implemented.

Washington-based methods – In Washington State, Tom Hruby has led the development of three different functional assessment tools over the last decade. In particular the *Washington State Wetland Rating System for Western Washington* (Hruby 2004) could be directly applicable to Southeast Alaska and would result in grouping the wetlands into four categories (I, II, III, and IV). However, it does not address tidal wetlands in any detail. More recently, in support of an in-lieu fee program that is being developed for King County, Washington (Seattle area), Hruby et al. (2010) have developed a draft method for "Rating Wetland Functions and Values for Compensatory Mitigation." This method is still currently draft, is undergoing field testing, and so far has unproven effectiveness.

ADOT&PF Method – In July 2010, ADOT&PF issued version 1.0 of their *Alaska Wetland Assessment Method* (AKWAM). This method is based on the Montana Department of Transportation's *Montana Wetland Assessment Method* (Berglund and McEldowney 2008). AKWAM assessments result in a relative rating for up to ten wetland functions and services. The method also results in assigning an overall rating of the assessment area into one of four categories, which are consistent with and defined in Appendix A of the *2009 Alaska District RGL*. The overall rating may be used to help determine appropriate compensation ratios specific to each category. According to Ben White with ADOT&PF, AKWAM may initially be applied to smaller routine projects being conducted by ADOT&PF with an emphasis on interior Alaska (Personal Communication on 8/31/10). However, AKWAM has not been developed for application in coastal areas, such as Southeast Alaska. This first version of AKWAM is a first approximation and does not represent a comprehensive, fully Alaska-adapted, and final assessment method.

Adamus-based methods – In 1987, Paul Adamus prepared the original *Juneau Wetlands: Functions and Values* for the CBJ, which was adopted and continues to date to be the basis of the Juneau *Wetland Management Plan* (CBJ 2005). Since Adamus developed his original *Wetland Evaluation Technique* in 1983, he has continued to refine his methods for wetland function assessment. In 2009, he co-authored the *Oregon Rapid Wetland Assessment Protocol* (ORWAP), which applies to wetlands of any type anywhere in Oregon (Adamus et al. 2009). ORWAP is one of few assessment methods that also addresses tidal wetlands and is based on the *Hydrogeomorphic (HGM) Assessment Guidebook for Tidal Wetlands of the Oregon Coast* previously developed by Adamus (2006). Also, ORWAP is being used as the basis for an ecosystem accounting system that is being developed in Oregon.

Of all the methods evaluated, ORWAP may have the greatest potential for being applied to Southeast Alaska, particularly because Adamus (2010) has created a generic beta version of his method called *Wetland Ecosystem Services Protocol United States* (WESPUS). Also, Adamus began several preliminary experimental tests of WESPUS in Juneau in June 2010 (See Appendix C in Bosworth and Adamus, 2010). See Attachment B of this report for an evaluation of each method.

The other methods evaluated met fewer of the essential characteristics. The other methods generally fell short because most of them:

- Do not assess tidal wetlands.
- Do not assign an overall rating category.
- Have low repeatability because they are based on BPJ.
- Do not identify "red flag" habitats.

3.2 Assessment Method Not Available for Evaluation

In summer 2010, NatureServe was developing and testing a method in Juneau for USEPA, but their method was not available for review at the time that this evaluation for SEAL Trust was prepared. A report from NatureServe is expected in late 2010 or early 2011.

3.3 Recommended Wetland Assessment Method for Southeast Alaska

Based on the methods evaluated for SEAL Trust, the wetland assessment method being recommended to SEAL Trust and the IRT for preliminary use for testing and calibration for Southeast Alaska is the *Wetland Ecological Services Protocol United States* or WESPUS, which is a beta version adapted by Paul Adamus directly from the recent method developed for Oregon called ORWAP (Adamus et al. 2009). Table 3-1 summarizes the grouped service functions and aggregated functions assessed by ORWAP/WESPUS.

The ORWAP/WESPUS method satisfies most of the essential characteristics and has many of the desirable characteristics compared to all the other methods evaluated. Key advantages of the ORWAP/WESPUS method are:

- Applicable to wetlands of any type anywhere in Oregon. Can be used to compare wetlands of very different types. Does not require the user to fill out different data forms for different wetland types or regions of the state. A single three-part data form can be used for all Oregon wetlands.
- Relatively rapid. Extensive testing showed that a typical application of ORWAP requires 3 to 6 hours to complete (once the method is learned).
- Among independent users, repeatability of the scores for most functions and values was found to be within ± 0.7 point or less on a 0-to-10 scoring scale.
- Uses an electronic spreadsheet that automatically calculates scores.
- User training is available for applying this method.
- ORWAP is one of few assessment methods that also addresses tidal wetlands. It is based on the *Hydrogeomorphic (HGM) Assessment Guidebook for Tidal Wetlands of the Oregon Coast* previously developed by Adamus (2006).
- While in Juneau in June 2010, Adamus conducted limited testing of this method on several wetlands. A meeting was arranged for Adamus to introduce his method to the IRT.

TABLE 3-1
Grouped Service Functions and Aggregated Functions Assessed by ORWAP/WESPUS

Grouped Service Functions	Aggregated Functions Within Each Grouped Service
Hydrologic Function (WS)	Water storage & delay (WS)
Water Quality Functions (WQ)	Sediment retention & stabilization (SR) Phosphorus retention (PR) Nitrate removal & retention (NR) Thermoregulation (TR)
Fish Support (FISH)	Anadromous fish habitat (FA) Non-anadromous fish habitat (FR)
Aquatic Support (AQ)	Aquatic invertebrate habitat (INV) Amphibian & reptile habitat (AM) Waterbird feeding habitat (WBF) Waterbird nesting habitat (WBN) Organic matter export (OE)
Terrestrial Support (TERR)	Songbird, raptor & mammal habitat (SBM) Native plant diversity (PD) Pollinator habitat (POL)
Carbon Sequestration (CS)	Carbon Sequestration (CS)

Key improvements that could be performed to customize ORWAP/WESPUS for Southeast Alaska are:

- The beta version of this method (WESPUS) is available for immediate use in Southeast Alaska (http://people.oregonstate.edu/~adamusp/WESPUS/). The following next steps are recommended:
  - Conduct a review literature on Southeast Alaska wetlands and adjust WESPUS using scientific research for Southeast Alaska wetlands (i.e., regional adjustment).
  - Calibrate the method to local conditions and the range of scores in Southeast Alaska region (i.e., regional calibration).
  - Test repeatability among individual users in Southeast Alaska.
  - Develop a user's manual (similar to ORWAP) with instructions and documentation that is customized for the data sources and wetland types of Southeast Alaska.
  - Conduct training for users of the method.
- For specific use by SEAL Trust, the average overall score resulting from WESPUS could be calculated (which is an overall average of the five grouped service functions), see Table 3-2.
- Data gathered from calibration and testing of WESPUS in Southeast Alaska could be grouped into thirds to achieve High, Moderate, and Low groups (see example Figure 3-1). Therefore, once a wetland is scored, the overall average could directly translate to a High, Moderate, or Low category/rating. Then the mitigation ratios which are based on High, Moderate, and Low could be applied to determine the debit. The

data form would need to be adjusted data form to automatically calculate this overall average.

- Similarly, WESPUS could also be used to assess SEAL Trust's ILF preservation sites to determine the category/rating to ensure that mitigation credits offset wetland functions lost at impacted sites.

Unique opportunities for implementing ORWAP/WESPUS in Southeast Alaska include:

- The CBJ expects to receive approximately $1.2 million from Coastal Impact Assistance Program (CIAP) that the CBJ intends to use to update the method and approach used to manage wetlands in Juneau.
- ADOT&PF is in the process of developing wetland assessment methods for Alaska.
- SEAL Trust could work collaboratively with CBJ, ADOT&PF, and the IRT to customize WESPUS and develop a wetland assessment method and corresponding credit-debit framework that could work for Southeast Alaska.
- Depending on how WESPUS performs in Southeast Alaska, organizations such as USACE, USEPA, and ADOT&PF could consider applying WESPUS in other regions of Alaska beyond Southeast.

Photo 3-1. Visit to Juneau area wetlands with SEAL Trust and USFWS on March 31, 2010.

Conceptual Approach to Generate an Average Overall WESPUS Score and Category Rating

The following describes a conceptual approach to generate an average overall WESPUS score and category rating that could be used to assign a mitigation ratio as part of a credit-debit framework. Table 3-2 shows a hypothetical example of output scores from WESPUS for each of five grouped service functions that can be averaged to yield an average overall score (4.9 in the hypothetical example). This is based on a wetland crediting procedure developed by Adamus and Cochran (2009) as part of the Willamette Partnership's *Ecosystem Credit Accounting System*.

In this hypothetical example, the average overall wetland score of 4.9 falls within the lower one-third of the ORWAP scores (based on sample size for Oregon). In this case, the wetland would be rated low-function.

TABLE 3-2
Hypothetical Example of Wetland Functional Assessment using ORWAP/WESPUS

Grouped Service Functions	Baseline Effectiveness Score
Hydrologic Function (WS)	2.38
Water Quality Functions (WQ)	4.10
Fish Support (FISH)	5.33
Aquatic Support (AQ)	7.01
Terrestrial Support (TERR)	5.51
Average Overall ORWAP/WESPUS Score	**4.9**

Based on a crediting procedure developed by Adamus and Cochran (2009) as part of the Willamette Partnership's *Ecosystem Credit Accounting System*.

The field calibration for ORWAP involved assessment of 221 sites. To demonstrate how WESPUS scores could be applied in Southeast Alaska, an average overall score was derived from the grouped service function scores for each of the 221 sites used to calibrate ORWAP. Figure 3-1 is a scatter plot of the average overall scores for the ORWAP sites. Microsoft Excel was used to calculate the 33rd and 66th percentiles to establish approximate thresholds for high, moderate, and low function. Approximately 74 sites fall into each function level (high, moderate, low). Please note that this is a very preliminary conceptual approach for possibly using WESPUS scores to assign a mitigation ratio as part of a credit-debit framework for SEAL Trust. The actual method to be used would depend on calibrating an actual assessment method for Southeast Alaska (such as WESPUS) and developing appropriate use of the scores and establishing policy for implementation.

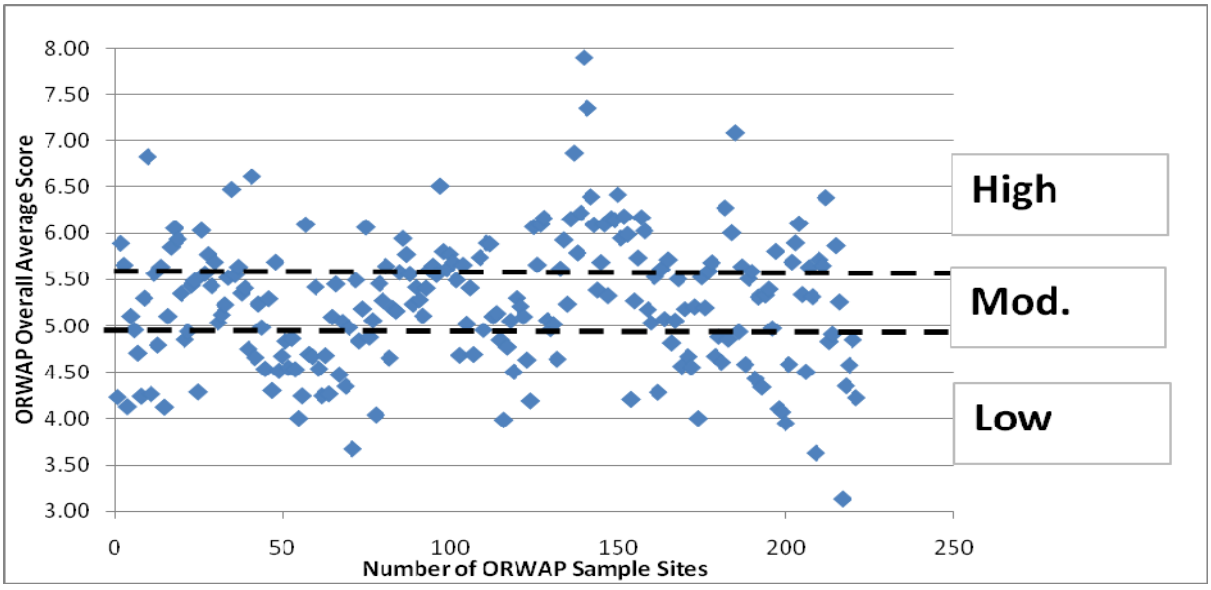

Figure 3-1. Distribution of average overall scores for sites sampled for ORWAP (sample size n=221). Shows upper, middle, and lower percentile breaks representing low, moderate, and high function.

A possible alternative to using high, moderate, low function levels could be instead to use the overall average scores from an assessment method such as WESPUS to incrementally correspond to a continuum of mitigation ratios. Such a system would require development of a wetland assessment method that is sufficiently reliable and accurate for Southeast Alaska. Table 3-3 shows a hypothetical example of using WESPUS scores to incrementally correspond to a continuum of mitigation ratios. Again, please note that this is a very preliminary conceptual approach for possibly using WESPUS scores to assign a mitigation ratio as part of a credit-debit framework for SEAL Trust. The actual method to be used would depend on calibrating an actual assessment method for Southeast Alaska (such as WESPUS) and developing appropriate use of the scores and establishing policy for implementation.

TABLE 3-3
Hypothetical Example of Using Average Overall WESPUS Scores to Incrementally Correspond to a Continuum of Mitigation Ratios

Hypothetical Increments based on Average Overall WESPUS Score	Corresponding Preservation Ratio	Approximate Function Level
3.0 – 3.5	1.5 : 1	Low
3.5 – 4.0	1.7 : 1	Low
4.0 – 4.5	1.8 :1	Low
4.5 – 5.0	1.9 : 1	Low
5.0 – 5.5	2.0 : 1	Moderate
5.5 – 6.0	2.2 : 1	High
6.0 – 6.5	2.4 : 1	High
6.5 – 7.0	2.6 : 1	High
7.0 – 7.5	2.8 : 1	High
7.5 – 8.0	3.0 : 1	High

Other approaches are also possible. An example suggested by Paul Adamus (personal communication on 9/9/10) might be to use Value scores as well as scores for their respective Functions (Effectiveness) when determining the three categories (but not by averaging Value and Function scores together). Rather, a wetland might go into the highest category if ANY of its regionally-scaled Function Effectiveness scores is High (>66th percentile) AND the Value score associated with that Function is also High. Likewise, a wetland might go into the lowest category if ANY of its regionally-scaled Function Effectiveness scores is Low (<33rd percentile) AND the Value score associated with that Function is also Low. Everything else would fall into the moderate category. The percentile thresholds could be adjusted if that overloads the moderate category. Or deviate from using just three categories, using more or even the continuous ratio approach suggested above.

Another option could be to still compute an average (not a maximum as implied above) of all functions, and do percentiles for both the Functions and the Values, then combine them

logically (as above) rather than mathematically. The approaches are best decided by participating agencies after reviewing some initial results of various options.

4.0 Evaluation of Credit-Debit Systems

This chapter includes a summary of the credit-debit systems that were evaluated and a recommended credit-debit framework and sample ledger.

4.1 Overview of Credit-Debit Systems

A limited number of credit-debit systems are currently in use, particularly in Alaska.

2009 USACE Alaska District Regulatory Guidance Letter

The main credit-debit system from Alaska that was available for review included the Sample Ratios for Compensatory Mitigation that were provided as Appendix B in the *2009 Alaska District RGL* (USACE 2009), which incidentally was adapted from guidance developed in Washington State. The table from Appendix B of *2009 Alaska District RGL* (USACE 2009) is presented in Table 4-1 below. This table provides sample ratios for three categories (Low, Moderate, and High) of impacted wetlands or other waters of the United States, and two types of compensatory mitigation (preservation and restoration/ enhancement). For SEAL Trust (and Alaska in general), the primary method for mitigation is to provide wetland preservation. Table 4-1 provides a credit-debit framework that is simple and predictable to use, particularly when preservation is the primary mitigation type. This framework is currently being implemented in Alaska. For convenience, the *2009 Alaska District RGL* is included in Attachment C of this report.

TABLE 4-1
Sample Ratios for Compensatory Mitigation in Alaska – USACE Alaska District

	Type of Compensatory Mitigation	
Impacted Wetland or Other Waters of the U.S.	**Preservation**	**Restoration and /or Enhancement**
LOW Category III or IV	1.5:1	1:1
MODERATE Category II or III	2:1	1:1
HIGH Category I or II	3:1	2:1

From Appendix B in the *2009 Alaska District Regulatory Guidance Letter* (USACE 2009)

Assumptions and/or considerations when determining ratios:

- Impacts to ponds, lakes, rivers and streams should be mitigated for in the HIGH category due to their inherent high level of functions and services.

  Compensatory mitigation for tidal and (inter)tidal waters associated with special aquatic sites would be compensated for in the HIGH category. Deviations from this should be well reasoned and documented (e.g., document existing site degradation and lack of specific functions/services). [Special aquatic sites include: sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs, and riffle and pool complexes.]

- Watershed position—the compensatory mitigation site should be located in areas where the compensation can contribute to ecosystem functioning at a large scale (e.g., part of river corridors and green belt space).
- Most ratios will be greater than 1:1 because there is a risk of failure associated with many forms of compensation, there is usually a temporal loss (it may take years for a compensation to develop wetland functions and/or structure equivalent to the impacted wetland), and preservation and enhancement activities result in net loss of wetland acreage and/or function.
- Ratios shown represent a compensatory project that is constructed or protected in perpetuity concurrent with aquatic resource impacts. If there is a time delay in constructing or securing a preservation site, the ratios will increase due to temporal loss.
- Preservation sites selected for compensatory mitigation will be moderate to high functioning systems that meet the criteria of 33 CFR 332.3(h).
- If using a mitigation bank, rules and ratios applicable to the individual bank should be used.
- Consider indirect and/or secondary impacts. For example, impacting a small portion of the wetland (<25% on the edge) is less impact than bisecting a wetland in the middle or impacting >70% of a wetland.

Anchorage Credit-Debit Method

The Anchorage Credit-Debit Method (ACDM) has been developed specifically for Anchorage. It is a complicated method and is not recommended for broad application in Southeast Alaska. The recent development of a glossary and other guidance by USEPA are an important improvement to this method. Documentation of any credit-debit method developed for Southeast Alaska will be critical for consistency of use and implementation.

Su-Knik Mitigation Bank, South-Central Alaska

A credit determination methodology was developed for the Su-Knik Mitigation Bank in MatSu Borough in South Central Alaska. Credits are the currency used for this bank and are a measure of the wetland functional capacity. Credits will be calculated and tracked on an individual function basis for each wetland type. The function index scores for individual wetland functions may also be combined and averaged for each of three major functional groups: Hydrologic, Biogeochemical, and Habitat. This will allow the bank to trade mitigation credits under all possible mitigation scenarios: by individual wetland function (i.e., stormwater retention), by functional group (i.e., Hydrologic), or even by acreage of wetland type if a functional assessment has not been conducted for a project site.

Mitigation Reserves ILF Program, King County Washington

King County (Seattle Area) in Washington State has been developing an ILF program called Mitigation Reserves Program or MRP. They are working to get their ILF instrument certified in 2010. This ILF program is one of the most advanced and sophisticated in the country. SEAL Trust has already been provided a copy of their draft instrument. Aspects of their credit-debit method are applicable to Southeast Alaska. However, their method focuses on wetland restoration and enhancement as the primary forms of compensatory mitigation, rather than preservation.

The April 2010 draft instrument for the MRP included a determination of debits and credits that was described as:

> After in-lieu fee offsite mitigation through the MRP is determined to be a suitable mitigation option by agencies with regulatory authority over a permitted impact, a King County permit reviewer will assess the development project's impacts to the aquatic resource and/or regulatory buffer using an IRT-approved mitigation assessment method ("the tool"), that considers the existing condition of the aquatic resource and/or buffer relative to potential project effects. Application of this method will result in the quantification of units of functional loss, or "debits," associated with the project. Once the number of debits has been determined, then the permittee can purchase a commensurate number of "credits" from the MRP to offset the debits.
>
> The version of the tool currently under development is intended to quantify functional losses or lift (i.e., debits or credits) related to wetlands and wetland buffers. At this point, the assessment method is not designed for use in quantifying impacts or lift related to functions and values of streams or rivers, or other aquatic bed environments.
>
> The tool also accounts for temporal losses by using a temporal loss factor to increase the number of credits required to offset an impact.

Ecosystem Credit Accounting System, Willamette Partnership, Oregon

The Willamette Partnership in Oregon has developed a procedure to translate outputs from functional assessments into functional acres to be used as tradable wetland credits and debits. The procedure relies on the ORWAP Manual (Adamus et al. 2009) and other guidance for producing functional assessment scores. ORWAP was not developed explicitly as a crediting metric. The Oregon Department of State Lands and the Army Corps of Engineers approved ORWAP for use as a functional assessment. The project involved convening a wetlands focus group to assign rules for converting ORWAP scores into quantities of functional acres as tradable credits.

ORWAP computes a score for each of 16 wetland functions and their societal value. Ecosystem services are considered to be the combination of a site's functional capacity and its value. However, ORWAP currently does not specify a process for combining the function and value score into an "ecosystem service" score based on each pairing. These 16 functions are aggregated into five grouped service functions with scores between 0 and 10.

Washington State Department of Transportation, Alternative Mitigation Program

The Washington State Department of Transportation (WSDOT) has been managing an Alternative Mitigation Program for many years and has established three certified mitigation banks and has permitted multiple advance mitigation sites. WSDOT has worked with the IRT in Washington to develop and refine the concepts for mitigation accounting and tracking that can translate directly to a credit-debit framework for SEAL Trust in Southeast Alaska. CH2M HILL has worked extensively with WSDOT to develop mitigation strategies and credit-debit systems that have been successfully implemented in Washington.

4.2 Recommendations and Example Credit-Debit Framework for SEAL Trust

Until SEAL Trust and the IRT can recommend that applicants for USACE permits use a specific wetland assessment method for Southeast Alaska, any credit-debit framework for now will likely depend on an existing wetland assessment methods based on best professional judgment.

Eventually, if a system such as ORWAP/WESPUS were adopted and implemented, SEAL Trust and the IRT could begin to establish consistency in the assessment and accounting of wetland impacts (or debits) that could translate to standardized crediting of preservation.

A credit-debit framework being recommended for SEAL Trust and the IRT to consider combines the *2009 Alaska District RGL* with approaches that are being implemented in Washington and Oregon. Examples of a conceptual framework are described in the text that follows.

The following examples use ratios for wetland preservation because that is the form of mitigation available through SEAL Trust's In-Lieu Fee Program.

Example 1—Credit-Debit Framework for ILF Sponsor

This section proposes an example for a conceptual credit-debit framework.

Hypothetical Project A
An applicant proposes to impact 5 acres of moderate-function wetlands and it is determined that compensatory mitigation is required. The applicant wants to use an ILF for preservation. The applicant would be required to provide mitigation at a 2:1 ratio (using Table 3-1), which would result in 10 credits (acres) as preservation through the ILF sponsor. The debits related to Project A are shown in Table 4-2A.

TABLE 4-2A
Project A – Proposed Project Impact ("Debit") and Mitigation Calculation

Column 1A	Column 2A	Column 3A	Column 4A
Wetland Rating of Impacts	**Wetland Impact Debit (acres)**	**Preservation Mitigation Ratio**	**Required Preservation (acres)**
High	-	3:1	-
Moderate	5	2:1	10
Low	-	1.5:1	-
Total	**5**		**10**

Hypothetical Project B
An applicant proposes to impact 5 acres of high-function wetlands and it is determined that compensatory mitigation is required. The applicant wants to use an ILF for preservation. The applicant would be required to provide mitigation at a 3:1 ratio (using Table 3-1), which would result in 15 credits (acres) as preservation through the ILF sponsor. The debits related to Project B are shown in Table 4-2B.

TABLE 4-2B
Project B – Proposed Project Impact ("Debit") and Mitigation Calculation

Column 1A	Column 2A	Column 3A	Column 4A
Wetland Rating of Impacts	**Wetland Impact Debit (acres)**	**Preservation Mitigation Ratio**	**Required Preservation (acres)**
High	5	3:1	15
Moderate	-	2:1	-
Low	-	1.5:1	-
Total	**5**		**15**

The ILF sponsor has acquired the 30-acre Preservation Site X and has established (by using an IRT-approved wetland assessment method, such as WESPUS) that the site includes 15 acres of high-function wetlands and 15 acres of moderate-function wetlands, as shown in Table 4-3. A map of Preservation Site X would be provided as part of the documented wetland assessment of the Preservation Site X.

TABLE 4-3
Proposed Preservation Site X from In-Lieu Fee Sponsor ("Credits")

Column 1B	Column 2B
Wetland Rating of Mitigation Wetlands	**Wetland Preservation Site Area (acres)**
High	15
Moderate	15
Low	-
Total	**30**

Impacts related to Projects A and B would be mitigated at the 30-acre Preservation Site X, as shown in the sample proposed credit-debit ledger in Table 4-4. Impacts from Project A are first debited, yielding 20 remaining credits. Then impacts from Project B are debited, yielding 5 remaining credits, which would be available for another future project. Each preservation site would have a consistent set of site summary information such as basin or watershed name, hydrologic unit code (HUC).

TABLE 4-4
Sample Proposed Credit-Debit Framework Ledger

Column A	Column B	Column C	Column D	Column E	Column F	Column G
Preservation "Credit" Available at ILF Receiving Site X	**Name/Date of Impact Project**	**USACE Permit #**	**Impact Acreage**	**Wetland Function /Ratio H = x3 M = x2 L = x1.5**	**Wetland Impact "Debit" (HFUAs) [=CxD]**	**Remaining Mitigation Credit at ILF Preservation Site X (Credit minus Debit) [=A-E]**
30	Project A, 1/7/2010	xxxx	5	2	10	20
20	Project B 5/8/2010	xxxx	5	3	15	5
5						

ILF Receiving Site X Summary Information:
Basin Name: ____
8-digit Hydrologic Unit Code (Southeast Alaska HUC): ____
Biogeographical Province: ____

4.3 Considerations for Addressing In-Kind Mitigation

In-kind mitigation can mean many things. As in Example 1, it could simply mean that the wetland impacts are replaced by an appropriate amount of wetland preservation.

However, the quality of the preservation may be an important consideration for mitigating certain wetlands. A basic assumption could be that impacts to moderate-function wetlands should be mitigated with moderate-function preservation wetlands (assuming there is a reliable and accepted method available to assess functions). Or likewise, impacts to high-function wetlands should be mitigated with high-function preservation wetlands.

For impacts to wetlands with unique functions, it may be desirable to consider having some amount of the preservation wetlands be mitigated with the same kind of HGM class impacted. In Example 1, if the 5 acres of impact were to moderate-function tidal wetlands, and 10 acres will be preserved, it might be desirable to require that some amount of preservation also be tidal (such as, 1 acre of equivalent moderate–function tidal preservation for each acre of moderate-function estuarine impact, which is 1:1 in-kind preservation for the HGM class), and the remaining 5 acres of preservation being any other kind of HGM class wetland with moderate-function wetland.

Using a wetland assessment method such as ORWAP/WESPUS would provide detailed information for a variety of functions/values or function groups. In some cases, it may be beneficial to ensure that wetlands providing high performance in certain function groups be replaced in-kind with similarly performing function groups.

Example 2—Debit-Credit Framework Adjusted to High-Function Unit Acres (HFUAs)

It may be desirable to consider converting all the wetlands to a standard unit, such as high- or moderate-function. In a system that uses three function levels (i.e., High, Moderate, Low), a 33 percent conversion factor could be applied to adjust from one function-level to the next. For example, 1 acre of moderate-function wetland could be converted to high-function wetland by multiplying by 0.66 to yield 0.66 acre of high-function wetland. Table 4-5 shows examples of basic conversions. Allowing adjustments from different levels of function provides better equivalency between impact acreage and preservation acreage. Adjusting between function levels is an accepted approach in Washington State.

TABLE 4-5
Example Conversion Factors to Adjust for Functional Equivalency

Beginning with	Conversion Factor	Ending with
1 acre of moderate-function wetland	multiply by 0.66	0.66 acre of high-function wetland
1 acre of low-function wetland	multiply by 0.66	0.66 acre of moderate-function wetland
1 acre of low-function wetland	multiply by 0.33	0.33 acre of high-function wetland
0.66 acre of high-function wetland	divide by 0.66	1 acre of moderate-function wetland
0.66 acre of moderate-function wetland	divide by 0.66	1 acre of low-function wetland
0.33 acre of high-function wetland	divide by 0.33	1 acre of low-function wetland

TABLE 4-6
Project A—Proposed Project Impacts Adjusted to "High-Function Unit Acres"

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Wetland Rating of Impacts	**Wetland Impact Area (acres)**	**Preservation Mitigation Ratio**	**Required Preservation (acres)**	**Adjustment Factor to Convert Impact Acreage to High-Function Unit[a]**	**Wetland Impact "Debit" (High-Function Unit Acres)[b]**	**HGM Class**
High	-	3:1	-	1	-	
Moderate	5	2:1	10	0.67	6.7	?
Low	-	1.5:1	-	0.33	-	
Total	**5**		**10**		**6.7**	

[a] Conversion between rating categories assumes a 33% adjustment factor.

[b] HFUA = High-Function Unit Acres.

TABLE 4-7
Project B—Proposed Project Impacts Adjusted to "High-Function Unit Acres"

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Wetland Rating of Impacts	**Wetland Impact Area (acres)**	**Preservation Mitigation Ratio**	**Required Preservation (acres)**	**Adjustment Factor to Convert Impact Acreage to High-Function Unit[a]**	**Wetland Impact "Debit" (High-Function Unit Acres)[b]**	**HGM Class**
High	5	3:1	15	1	15	?
Moderate	-	2:1	-	0.67	-	
Low	-	1.5:1	-	0.33	-	
Total	**5**		**15**		**15**	

[a] Conversion between rating categories assumes a 33% adjustment factor.

[b] HFUA = High-Function Unit Acres.

TABLE 4-8
ILF Receiving Site X - Proposed Preservation Credit Adjusted to "High-Function Unit Acres"

Column 1	Column 2	Column 3	Column 4	Column 5
Wetland Rating of Mitigation Wetlands	**Wetland Mitigation Site Area (acres)**	**Adjustment Factor to Convert Impact Acreage to High-Function Unit[a]**	**Preservation "Credit" Available at ILF Mitigation Site (HFUAs)[a]**	**HGM Class**
High	15	1	15	?
Moderate	15	0.67	10	?
Low	-	0.33	-	
Total	**30**		**25**	

[a] HFUA = High-Function Unit Acres.

TABLE 4-9
Sample Proposed Credit-Debit Framework Ledger Using "High-Function Unit Acres"

Column A	Column B	Column C	Column D	Column E	Column F	Column G
Preservation "Credit" Available at ILF Receiving Site X (HFUAs)	**Name/Date of Impact Project**	**Impact Acreage**	**Wetland Function /Ratio H = x3 M = x2 L = x1.5**	**Adjustment Multiplier H = x1 M = x0.67 L = x0.33**	**Wetland Impact "Debit" (HFUAs) [=CxDxE]**	**Remaining Mitigation Credit at ILF Mitigation Site (Credit minus Debit) (HFUAs)[a] [=A-F]**
25	Project A, 1/7/2010	5	2	0.67	6.7	18.3
18.3	Project B 5/8/2010	5	3	1	15	3.3
3.3						

[a] HFUA = High-Function Unit Acres.

5.0 Recommended Next Steps

The potential next steps recommended for SEAL Trust and the IRT to develop a wetland assessment method and credit-debit system for Southeast Alaska are briefly summarized in this chapter.

5.1 Develop a Project Workplan

An initial project workplan should be developed to address management and coordination of an integrated effort to adopt and revise a wetland assessment method and develop a debit-credit system for Southeast Alaska. Key elements would include:

- Team— project leader, members, commitment
- Goals and objectives
- Scope
- Schedule
- Budget
- Data needs and gaps
- Priorities

5.2 Adopt and Revise Wetland Assessment Method for Southeast Alaska

The following is a suggested outline from Paul Adamus for regional refinement of ORWAP/WESPUS, but could generally apply to any assessment method that is selected:

- Conduct a review literature on Southeast Alaska wetlands and adjust WESPUS using scientific research for Southeast Alaska wetlands (i.e., regional adjustment).
- Calibrate the method to local conditions and the range of scores in Southeast Alaska region (i.e., regional calibration).
- Test repeatability among individual users in Southeast Alaska.
- Develop a user's manual (similar to ORWAP) with instructions and documentation that is customized for the data sources and wetland types of Southeast Alaska.
- Conduct training for users of the method.

5.3 Develop and Implement a Credit-Debit Framework for SEAL Trust

The following are several suggested steps to develop a credit-debit framework for the ILF instrument for SEAL Trust:

- Work with the IRT to develop and refine a credit-debit framework.
- Initially test the conceptual credit-debit framework using actual ILF preservation sites as applied to existing and proposed projects. Develop several examples for critical review and input by the IRT.
- Coordinate regularly with the development of the wetland assessment method (WESPUS) to ensure seamless integration into the credit-debit framework.
- Incorporate the credit-debit framework into Seal Trust's ILF instrument.
- Identify data gaps and information needed to support and sustain the credit-debit system.
- SEAL Trust and IRT implement a consistent and reliable credit-debit system.

6.0 Authors and Contributors

Principal Evaluator, Author, and Project Manager

Hans Ehlert/CH2M HILL, Seattle—Professional Wetland Scientist (PWS#1165)
office: 425-233-3167
mobile: 425-922-8238
hans.ehlert@ch2m.com

Southeast Alaska Land Trust, Juneau

Diane Mayer, Executive Director

Gretchen Keiser, Conservation Specialist

Juneau Interagency Review Team (IRT)

Chiska Derr/NMFS, Juneau

Cindy Hartman-Moore/NMFS, Juneau

Neil Stichert/USFWS, Juneau

Steve Brockmann/USFWS, Juneau

Richard Enriquez/USFWS, Juneau

Bill Hanson/USFWS, Juneau

Ben White/ADOT&PF, Juneau

Katie Eaton/ADF&G, Juneau

Carrie Bohan/ADNR, Juneau

Teri Camery/CBJ, Juneau

Marcia Heer/USACE, Juneau

Matt LaCroix/USEPA, Anchorage

Mark Jen/USEPA, Anchorage

Tracy DeGering/USEPA, Anchorage

Gail Martin/USEPA, Anchorage

Other Contributors and Reviewers

Heidi Firstencel/USACE

Randy Vigil/USACE

Susan Walker/NOAA

Jackie Timothy/ADF&G

Personal Communications

Dr. Paul Adamus, Adamus Resource Assessments

Dr. Tom Hruby/Washington State Department of Ecology

Michael Murphy/King County Mitigation Reserves Project Manager

Gail Terzi/USACE, Seattle District

Ben White/ADOT&PF, Statewide Environmental Office

7.0 References

WETLAND ASSESSMENT METHODS EVALUATED FROM SOUTHEAST ALASKA

Adamus, P. 1987. Juneau Wetlands: Functions and Values. http://people.oregonstate.edu/~adamusp/Juneau/Juneau_Wetlands.pdf

Bosworth, K., and P. Adamus. 2007. Delineation and Function Rating of Jurisdictional Wetlands on Potentially Developable City-owned Parcels in Juneau, Alaska. Prepared for Community Development Department, Juneau, Alaska. January 2010. http://www.juneau.org/cddftp/documents/DelineationandFunctionRatingofJurisdictionalWetlandsonPotentiallyDevelopableCity-ownedParcel.pdf

Bosworth, K., and P. Adamus. 2010. Delineation and Function Rating of Jurisdictional Wetlands on CBJ Parcels in the Industrial Blvd and Hill 560 Areas Juneau, Alaska. Prepared for Community Development Department, City and Borough of Juneau, Alaska. September 2010.

Powell et al. 2003. Wetland Functional Assessment Guidebook—Riverine and Slope River Proximal Wetlands in Coastal SE and Southcentral Alaska using HGM. http://www.dec.state.ak.us/water/wnpspc/wetlands/southeastcentralhgm.htm

SWCA Environmental Consultants. 2006. Sitka Rocky Gutierrez Airport, 2005 Summer Biological Resources Surveys, Vegetation and Wetlands. Prepared for Federal Aviation Administration and Alaska Department of Transportation. February 15, 2006.

SWCA Environmental Consultants. 2007. Juneau International Airport, Final Environmental Impact Statement, Appendix E, Wetland Functional Assessment Technical Report. http://www.juneau.org/airport/documents.php

U.S. Army Corps of Engineers (USACE). 2000. Southeast Alaska Freshwater Wetland Assessment Method.

OTHER WETLAND REFERENCES FOR SOUTHEAST ALASKA

City and Borough of Juneau (CBJ). 2008. Juneau Wetlands Management Plan.

NatureServe. 2010. Juneau Pilot Study. [in progress]

Southeast Alaska Land Trust (SEAL Trust). http://www.southeastalaskalandtrust.org/

Siegel, D.I. 1988. The Recharge-Discharge Function of Wetlands Near Juneau, Alaska: Part I. Hydrological Investigations. Ground Water, Vol. 26, No.:4, p.427-434 [July-August]

Siegel, D.I. 1988. The Recharge-Discharge Function of Wetlands Near Juneau, Alaska: Part II. Geochemical Studies. Ground Water. Ground Water, Vol. 26, No.:5, p.580-586 [Sept.-Oct.]

WETLAND ASSESSMENT METHODS EVALUATED FROM ALASKA

City of Homer, Alaska. 2006. 2006 Functional Assessment of Wetlands within the City of Homer and the Bridge Creek Watershed Protection District.

Hall et al. 2003. Wetland Functional Assessment Guidebook: Operational Draft Guidebook for Assessing the Functions of Slope/Flat Wetland Complexes in the Cook Inlet Basin Ecoregion, Alaska, using the HGM Approach. http://www.dec.state.ak.us/water/wnpspc/wetlands/cookinlethgm.htm

U.S. Army Corps of Engineers (USACE). 2009. Regulatory Guidance Letter (RGL) #09-01. Alaska District, Anchorage, AK. February 25, 2009.

Alaska Department of Transportation & Public Facilities (ADOT&PF). 2010. ADOT&PF Alaska Wetland Assessment Method. Research and Technology Transfer Division and Statewide Environmental Office, Fairbanks and Juneau, Alaska. July 2010. http://www.dot.state.ak.us/stwddes/research/assets/documents/research_projects/akwam1.exe

OTHER WETLAND REFERENCES FOR ALASKA

Alaska Department of Transportation & Public Facilities (ADOT&PF). 2005. Synthesis of Practice for Rapid Wetland Assessment in Alaska. Prepared by HDR Alaska, Inc. for Alaska Department of Transportation Statewide Research Office. FHWA-AK-RD-05-09.

Alaska ShoreZone Viewer. http://mapping.fakr.noaa.gov/Website/ShoreZone/viewer.htm

Cook Inlet Wetlands. http://cookinletwetlands.info/

Municipality of Anchorage. 1996. Anchorage Wetlands Plan.

WETLAND ASSESSMENT METHODS EVALUATED FROM PACIFIC NORTHWEST AND OTHER REGIONS

Hruby et al. 2010. Rating Wetland Functions and Values for Compensatory Mitigation. Prepared for King County Mitigation Reserves Program. [Draft]

Adamus, P. 2006. Hydrogeomorphic (HGM) Assessment Guidebook for Tidal Wetlands of the Oregon Coast, Part 1. Rapid Assessment Method. Produced for the Coos Watershed Association, Oregon Department of State Lands, and USEPA-Region 10. Charleston, OR: Coos Watershed Association. http://www.oregonstatelands.us/DSL/WETLAND/docs/tidal_HGM_pt1.pdf

Part 2. http://www.oregonstatelands.us/DSL/WETLAND/docs/tidal_HGM_pt2.pdf

Part 3. http://www.oregonstatelands.us/DSL/WETLAND/docs/tidal_HGM_pt3.pdf

Excel Spreadsheet. http://www.oregon.gov/DSL/WETLAND/docs/tidalwet_cal_hgm_oregon_fixed_jan09.xls

Adamus, P., J. Morlan, and K. Verble. 2009. Manual for the Oregon Rapid Wetland Assessment Protocol (ORWAP). Version 2.0. Oregon Dept. of State Lands, Salem, OR. http://www.oregon.gov/DSL/WETLAND/docs/orwap_manual_v2.pdf

Adamus, P., J. Morlan, and K. Verble. 2009. Oregon Rapid Wetland Assessment Protocol (ORWAP): calculator spreadsheet, databases, and data forms. Oregon Department of State Lands, Salem, OR. http://www.oregonstatelands.us/DSL/WETLAND/technical_resources.shtml

Supplemental Information: http://www.oregonstatelands.us/DSL/WETLAND/docs/orwap_suppinfo_v2.0.2_042010.xls

Data Forms: http://www.oregon.gov/DSL/WETLAND/docs/orwap_dataforms.pdf

Spreadsheet Calculator: http://www.oregon.gov/DSL/WETLAND/docs/orwap_calculator_v2.0.2_apr26_2010.xls

Adamus, P. 2010. Wetland Ecosystem Services Protocol United States (WESPUS beta v1). Adamus Resource Assessment, Inc. Corvallis, OR. Version Accessed on 7/26/10. http://people.oregonstate.edu/~adamusp/WESPUS/

Berglund, J. 1999. MDT Montana Wetland Assessment Method. Prepared for Montana Department of Transportation and Morrison-Maierle, Inc. May 25th. Western EcoTech, Helena, Montana.

Berglund, J. and R. McEldowney. 2008. MDT Montana wetland assessment method. Prepared for: Montana Department of Transportation. Post, Buckley, Schuh & Jernigan. Helena, Montana.

Hruby, T. 2004. Washington State Wetland Rating System for Western Washington – Revised. Washington State Department of Ecology Publication # 04-06-025. Olympia, WA. Accessed at: http://www.ecy.wa.gov/pubs/0406025.pdf.

Magee and Hollands. 1998. A Rapid Procedure for Assessing Wetland Functional Capacity.

Washington State Department of Transportation (WSDOT). 2000. Wetland Functions Characterization Tool for Linear Projects. Washington State Department of Transportation, Environmental Affairs Office, Olympia, WA. Accessed at: http://www.wsdot.wa.gov/NR/rdonlyres/B92BE0D4-9078-4EFC-99DA-3C0EA4805E2F/0/bpjtool.pdf.

U.S. Army Corps of Engineers. 1999. The Highway Methodology Workbook Supplement. U.S. Army Corps of Engineers, New England District. NAEEP-360-1-30a. September 1999.

CREDIT-DEBIT SYSTEMS EVALUATED FROM ALASKA

Su-Knik Mitigation Bank South-Central Alaska
http://www.su-knikmitigationbank.com/#

U.S. Army Corps of Engineers (USACE). 2009. Regulatory Guidance Letter (RGL) #09-01. Alaska District, Anchorage, AK.

U.S. Environmental Protection Agency (USEPA). 2010. Revised Anchorage Credit-Debit Method.

CREDIT-DEBIT SYSTEMS EVALUATED FROM PACIFIC NORTHWEST AND OTHER REGIONS

Adamus, P. and B. Cochrane. 2009. Wetland Crediting Procedure: Translating Functional Scores to Credits Accounting. http://willamettepartnership.org/ecosystem-credit-accounting/wetlands

King County. 2010. Mitigation Reserves Program. http://www.kingcounty.gov/environment/waterandland/wetlands/mitigation-reserves-program.aspx

Willamette Partnership. 2009. Ecosystem Credit Accounting System. http://willamettepartnership.org/ecosystem-credit-accounting

OTHERS WETLAND REFERENCES FROM PACIFIC NORTHWEST AND OTHER REGIONS

Adamus, P.R., E.J. Clairain, R.D. Smith, and R.E. Young. 1987. Wetland Evaluation Technique (WET). Volume II. Methodology. US Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Brennan, J.S., and H. Culverwell. 2004. Marine Riparian: An Assessment of Riparian Functions in Marine Ecosystems. Published by Washington Sea Grant Program Copyright 2005, UW Board of Regents. Seattle, WA. 34 p. www.wsg.washington.edu/research/pdfs/brennan.pdf

Hruby, T., K. Harper, and S. Stanley. 2009. Selecting Wetland Mitigation Sites Using a Watershed Approach. Washington State Department of Ecology Publication #09-06-032. December 2009. http://www.ecy.wa.gov/pubs/0906032.pdf

Kusler, J. 2006. Recommendations for Reconciling Wetland Assessment Techniques. Final Report. Association of State Wetland Managers, Inc. April 2006. http://www.aswm.org/propub/reconciling.pdf

North Carolina Ecosystem Enhancement Program. http://www.nceep.net/

Rempel, M., P. Adamus, and J. Kagan. 2009. Oregon Wetlands Explorer: an internet tool for ORWAP wetland assessment support and data archiving. Oregon State University

Library and Institute for Natural Resources, Oregon State University, Corvallis, OR. Internet: http://oregonexplorer.info/wetlands/orwap/

U.S. Army Corps of Engineers (USACE). 2008. Final Rule for Compensatory Mitigation for Losses of Aquatic Resources, which was published in the Federal Register on April 10, 2008. http://www.epa.gov/owow/wetlands/pdf/wetlands_mitigation_final_rule_4_10_08.pdf

Washington State Department of Ecology. 1999. Washington State Wetland Function Assessment Methods (WFAM). http://www.ecy.wa.gov/programs/sea/wetlands/wfap/index.html

Attachments

Attachment A. Summary of Characteristics for Wetland Assessment Methods

Attachment B. Wetland Assessment Methods Evaluation

Attachment C. U.S. Army Corps of Engineers Alaska District Regulatory Guidance Letter #09-01

Attachment A.

Summary of Characteristics for Wetland Assessment Methods

ATTACHMENT A. SUMMARY OF CHARACTERISTICS FOR WETLAND ASSESSMENT METHODS

Method	Essential Characteristics for a Southeast Alaska Assessment Method											Other Desirable Characteristics								Notes
	Assesses Tidal Wetlands	Assesses Non-Tidal Wetlands	Assesses Wetland Functions	Assigns Overall Rating Category	Rapid Assessment (half day or less)	High Repeatability (minimal BPJ)	Based on Recent Science (post 2000)	Watershed Based	"Red-Flag" Habitats	Form to Record Field Observations/Notes		Uses Models to Estimate Function (not BPJ)	Requires Qualified Professional to Apply	Emphasizes Use of Available Spatial Info	Incorporates HGM Concepts	Designed/Modified for use in Alaska	Designed/Modified for use in Southeast Alaska	Designed for Similar Habitat in PNW		*See Attachment B - Wetland Assessment Methods Evaluation Table*
EXISTING SOUTHEAST ALASKA METHODS																				
Juneau Wetlands: Functions and Values (Adamus 1987)	-	X	X	-	-	-	-	X	-	-		-	X	-	-	X	X	-		
Sitka Airport – 2006 (Adapted from Adamus 1987)	-	X	X	-	X	-	-	-	-	-		-	X	-	-	X	X	-		Adapted from Adamus 1987
Juneau Airport – 2007 (Adapted from Adamus 1987)	X	X	X	-	X	-	-	-	-	-		-	X	-	-	X	X	-		Adapted from Adamus 1987
Delineation and Function Rating of Jurisdictional Wetlands on Potentially Developable City-owned Parcels in Juneau, Alaska (Bosworth and Adamus 2007)	-	X	X	-	X	-	X	-	-	-		-	X	X	-	X	X	-		Adapted from Adamus 1987
Southeast Alaska Freshwater Wetland Assessment Method (USACE 2000)	-	X	X	-	X	-	X	X	-	X		-	X	X	-	X	X	-		Adapted from USACE New England District Highway Methodology 1999
Wetland Functional Assessment Guidebook: Riverine and Slope River Proximal Wetlands in Coastal SE and Southcentral Alaska using HGM (Powell et al. 2003)	-	X	X	-	-	X	X	X	-	X		X	X	X	X	X	X	-		
OTHER METHODS USED IN ALASKA																				
Alaska Corps District Regulatory Guidance Letter (RGL) #09-01 – Appendix A (USACE 2009)	-	X	X	-	X	-	-	X	-	X		-	X	X	-	X	-	-		
2006 Functional Assessment of Wetlands within the City of Homer and the Bridge Creek Watershed Protection District (City of Homer 2006)	-	X	X	X	X	-	-	X	-	X		-	X	X	-	X	-	-		
Wetland Functional Assessment Guidebook: Operational Draft Guidebook for Assessing the Functions of Slope/Flat Wetland Complexes in the Cook Inlet Basin Ecoregion, Alaska, using the HGM Approach (Hall et al. 2003)	-	X	X	-	-	X	X	X	-	X		X	-	X	X	X	-	-		
ADOT&PF Alaska Wetland Assessment Method (ADOT&PF 2010)	-	X	X	X	X	P	X	X	X	X		-	X	-	X	X	-	-		Adapted from Montana Department of Transportation

ATTACHMENT A. SUMMARY OF CHARACTERISTICS FOR WETLAND ASSESSMENT METHODS

Method	Essential Characteristics for a Southeast Alaska Assessment Method											Other Desirable Characteristics								Notes
	Assesses Tidal Wetlands	Assesses Non-Tidal Wetlands	Assesses Wetland Functions	Assigns Overall Rating Category	Rapid Assessment (half day or less)	High Repeatability (minimal BPJ)	Based on Recent Science (post 2000)	Watershed Based	"Red-Flag" Habitats	Form to Record Field Observations/Notes		Uses Models to Estimate Function (not BPJ)	Requires Qualified Professional to Apply	Emphasizes Use of Available Spatial Info	Incorporates HGM Concepts	Designed/Modified for use in Alaska	Designed/Modified for use in Southeast Alaska	Designed for Similar Habitat in PNW		*See Attachment B - Wetland Assessment Methods Evaluation Table*
METHODS FROM PACIFIC NORTHWEST OR OTHER REGIONS																				
Oregon Rapid Wetland Assessment Protocol (ORWAP) (Adamus et al. 2009) [a generic draft beta version of this method is available for use in Alaska called: Wetland Ecosystem Services Protocol United States (WESPUS) (Adamus et al. 2010)]	X	X	X	-	X	X	X	X	X	X		X	X	X	X	-	-	X		*Recommend using **WESPUS** in Southeast Alaska and possibly in other areas of Alaska. Regional calibration and adjustment are likely needed.*
Hydrogeomorphic Assessment Guidebook for Tidal Wetlands of the Oregon Coast (Adamus 2006)	X	-	X	-	-	X	X	X	-	-		X	X	X	X	-	-	X		
Mitigation Assessment Method for the King County Mitigation Reserves Program, Seattle Area Washington (Hruby, Richter, and Fuerstenberg 2010)	-	X	X	X	X	P	X	X	X	X		-	X	X	X	-	-	X		
Washington State Wetland Rating System for Western Washington (Washington Department of Ecology 2004)	-	X	X	X	X	-	X	X	X	X		-	X	X	X	-	-	X		
Wetland Functions Characterization Tool for Linear Projects, Washington State (WSDOT 2000)	-	X	X	-	X	-	-	X	-	X		-	X	X	-	-	-	X		Adapted from USACE New England District Highway Methodology 1999
Highway Methodology Workbook (USACE – New England District 1999)	-	X	X	-	X	-	-	X	-	X		-	X	X	-	-	-	-		
A Rapid Procedure for Assessing Wetland Functional Capacity (Magee and Hollands 1998)	-	X	X	-	X	X	-	X	-	X		X	X	-	X	-	-	-		

Notes:

"X" = Yes

"-" = No

P = Preliminary, no results available yet.

Attachment B.

Wetland Assessment Methods Evaluation

Assessment Method	Description	Advantages	Disadvantages	Suggested Improvements to the Method	
EXISTING SOUTHEAST ALASKA METHODS					
Juneau Wetlands: Functions and Values (Adamus 1987)	• The City and Borough of Juneau (CBJ) conducted a detailed study to assess functions and values of non-tidal wetlands in Juneau. • Assesses 13 functions and values: Groundwater Recharge and Discharge, Surface Hydrologic Control, Sediment/Toxicant Retention, Nutrient Transformation/Export, Riparian Support, Salmonid Habitat, Disturbance-Sensitive Wildlife, Regional Ecological Diversity, Erosion Sensitivity, Recreational Use (Potential, Actual), and Downslope Beneficiary Sites. • Included Appendix D: Rapid Assessment Method for Southeast Alaska, which provided useful general assessment criteria but lacked specificity for scoring.	• Method was developed for assessing non-tidal wetlands in Juneau area. • This is the only method that has been calibrated for a narrowly defined area within Southeast Alaska and is generally accepted by resource and regulatory agencies.	• Method relies on best professional judgment. • Method did not address tidal wetlands because most of Juneau's intertidal wetlands were already granted a special level of protection through Federal and state law (e.g., the CZM program, and Mendenhall State Game Refuge), and the tidal Airport wetlands were being addressed by a separate study. • Method does not incorporate HGM (which had not yet been developed at that time). • Field testing of the method on wetlands beyond Juneau area did not occur. • This method is outdated and does not reflect the available wetland science that has become available over the last 23 years. • Method is not rapid—it involves expensive time consuming data collection.	• According to Appendix D of this method, "more research on wetlands elsewhere in Southeast Alaska is needed to improve the accuracy of rapid assessment methods for wetland functions in the region." • Incorporate latest scientific understanding since method was developed in 1987. • Provide better basis of functional rating. • Produce an overall score to rate wetland into 3 categories: High, Moderate, or Low. • Incorporate HGM. • Test repeatability. • Produce a guidebook to describe conditions, including representative pictures of wetland types. • Allow broad application throughout Southeast Alaska. • Develop and provide training.	
Sitka Airport – 2006 (adapted from Adamus 1987)	• Assessed freshwater wetland functions for the Sitka Rocky Gutierrez Airport (SWCA 2006). • Wetland functions assessment methods were adapted from Juneau Wetlands: Functions and Values (Adamus 1987) and the Southeast Alaska Freshwater Wetland Assessment (USACE 2000). • Assessed 12 functions: Groundwater Recharge, Groundwater Discharge and Lateral Flow, Surface Hydrologic Control, Sediment/Toxicant Retention, Nutrient Transformation/Export, Riparian Support, Fish Habitat, Wildlife, Regional Ecological Diversity, Erosion Sensitivity, Ecological Replacement Costs, and Downslope Beneficiary Sites.	• The original method was developed for freshwater wetlands in Southeast Alaska.	• Basis of functional rating not well established. Relies on subjective rating and professional judgment (scale of 7 ratings from "Very Low" to "Very High"), which may have variable results. • Does not assign wetland to an overall rating category based on function or value. • May result in variable repeatability.	• Incorporate latest scientific understanding since method was developed in 1987. • Provide better basis of functional rating. • Produce an overall score to rate wetland into 3 categories: High, Moderate, or Low. • Incorporate HGM. • Test repeatability. • Produce a guidebook to describe conditions, including representative pictures of wetland types. • Allow broad application throughout Southeast Alaska. • Develop and provide training.	
Juneau Airport – 2007 (adapted from Adamus 1987)	• Recently used to assess impacts for the Juneau International Airport (2007). • The project team for Juneau Airport applied the original Adamus 1987 Juneau Wetlands method to both tidal and non-tidal wetlands (with some adjustments). The methods to assess wetland functions and values were modified using information from the Southeast Alaska Freshwater Wetland Assessment (USACE 2000) and input from resource specialists from the cooperating agencies. • Assessed 11 functions, which were grouped into 3 functional categories: Aquatic Support – Groundwater Discharge	• The original method was developed for freshwater wetlands in Southeast Alaska. • This version of the method was used to address estuarine wetlands that were not the primary focus of the original 1987 Juneau Wetland Method.	• Basis of functional rating not well established. Relies on subjective rating and professional judgment (scale of 7 ratings from "Very Low" to "Very High"), which may have variable results. • May have incorrectly assumed that criteria for non-tidal wetlands could be directly applied to tidal wetlands without testing or calibration. • Does not assign wetland to an overall rating category based on function or value. • May result in variable repeatability.	• Incorporate latest scientific understanding since method was developed in 1987. • Provide better basis of functional rating. • Produce an overall score to rate wetland into 3 categories: High, Moderate, or Low. • Incorporate HGM. • Test repeatability. • Produce a guidebook to describe conditions, including representative pictures of wetland types. • Allow broad application throughout Southeast Alaska. • Develop and provide training.	

Assessment Method	Description	Advantages	Disadvantages	Suggested Improvements to the Method	
	and Lateral Flow, Sediment/Toxicant Retention, Nutrient Export, Riparian Support, Fish Habitat, Erosion Sensitivity. Human Use Support – Groundwater Recharge, Surface Hydrologic Control, Downslope Beneficiary Sites. Terrestrial Support – Wildlife, Regional Ecological Diversity. • A similar method was also applied to assessing wetlands at Sitka Rocky Gutierrez Airport (SWCA 2006).				
Delineation and Function Rating of Jurisdictional Wetlands on Potentially Developable City-owned Parcels in Juneau, Alaska (Bosworth and Adamus 2007)	• The City and Borough of Juneau (CBJ) conducted a study of City-owned undeveloped land. • The CBJ requested that the "Adamus Method" for assessing functions of wetlands in Southeast Alaska be used, because that was the supporting document for the Juneau Wetlands Management Plan (CBJ 1997/2005). • Assessed same original 12 functions: Groundwater Discharge, Sediment/Toxicant Retention, Nutrient Export, Riparian Support, Salmonid Habitat, Erosion Sensitivity, Groundwater Recharge, Hydrologic Control, Detention Value, Recreation Potential, Recreation Actual, and Wildlife Habitat. • No tidal wetlands were assessed in this study.	• **Modified Rapid Adamus Method**. For this study, the 1987Adamus Method was not used verbatim, because using that fully would have required equipment and time not available for this study. Only the parts of the 1987 Method that could be applied rapidly were used. In addition, it became apparent that scientific knowledge of wetlands – and specifically, an understanding of which wetland characteristics are most indicative of levels of each function – had advanced considerably in the 20 years since the original study was done in 1987. This growth of knowledge has not invalidated any of the criteria originally used, but rather suggested a need for their refinement and expansion. Accordingly, some additions and minor adjustments of the criteria were made, their extent being limited mainly by this study's schedule. These criteria are mostly supported by peer-reviewed literature in professional journals, but it was not feasible within the constraints of this study to cite the supporting documents. The authors retained from the original wetland study the number of function categories available for each function (e.g., 3 levels for functions assigned High, Moderate, or Low; though some functions potentially have 4 or 5 levels).	• Basis of functional rating not well established. Relies on subjective rating and professional judgment (scale of 3 ratings from "Low" to "High"), which may have variable results. • Wetlands are assigned to a Management Category specific to the Juneau Wetlands Management Plan, rather than an overall rating category based on function or value. • May result in variable repeatability.	• Incorporate latest scientific understanding since method was developed in 1987. • Provide better basis of functional rating. • Produce an overall score to rate wetland into 3 categories: High, Moderate, or Low. • Incorporate HGM. • Test repeatability. • Produce a guidebook to describe conditions, including representative pictures of wetland types. • Allow broad application throughout Southeast Alaska. • Develop and provide training.	
Southeast Alaska Freshwater Wetland Assessment Method (USACE 2000)	• This is a best professional judgment-based method for assessing 8 wetland functions: Floodflow Alteration (storage and desynchronization), Groundwater Interchange (discharge/recharge), Sediment/Toxicant Retention, Sediment/Shoreline Stabilization, Nutrient Cycling, Carbon/Detrital Export, Wildlife Habitat, and Fish Habitat. • This method appears to have been adapted directly from the New England Highway Methodology Workbook (USACE 1995, revised in 2000). The USEPA is evaluating the New England Method for adaptation and potential use in South Central Alaska.	• The USACE developed this method by conducting a literature review and by calibrating indicators from a number of existing wetland settings in Southeast Alaska. • This method provides research on wetland characteristics and functions specific to Southeast Alaska. • Could be used to develop narrative or qualitative descriptions of the functions of freshwater wetlands.	• Basis of functional rating not well established. Relies on subjective rating and professional judgment (scale of 7 ratings from "Very Low" to "Very High"), which may have variable results. • Does not assign wetland to an overall rating category based on function or value. • May result in variable repeatability. • Though this method was developed specifically for Southeast Alaska and has been available for 10 years, it has not become generally accepted by resource and regulatory agencies.		

Assessment Method	Description	Advantages	Disadvantages	Suggested Improvements to the Method	
Wetland Functional Assessment Guidebook: Riverine and Slope River Proximal Wetlands in Coastal Southeast and Southcentral Alaska using HGM (Powell et al. 2003)	• Provides information about applying the HGM approach to the functional assessment of riverine wetlands and slope river proximal wetlands, on low permeability deposits and bedrock in Coastal Southeastern and Southcentral Alaska. • No widely accepted evaluation methods for Alaska's wetlands accurately and consistently are available to evaluate changes in gains and losses of ecosystem functions. In response, the Alaska Department of Environmental Conservation (ADEC) (with other cooperating state and federal agencies and organizations) conducted a broad-based, statewide effort to develop a Hydrogeomorphic (HGM) functional assessment for Alaska's wetlands. HGM was selected by ADEC and several other cooperating agencies and organizations because it offers a relatively rapid, efficient, and reference-based method of assessment that allows users to recognize human-induced changes in the functions of wetlands ecosystems.	• The HGM method departs from other functional assessment approaches because it is based on: (1) recognition of differences among wetlands (i.e. classification), (2) identification of functions performed by classes and subclasses of wetlands, and (3) regionally developed reference systems. • This method provides research on wetland characteristics and functions specific to Southeast Alaska.	• This method is limited to riverine wetlands and slope river proximal wetlands. Its utility can be expanded by combining it with the companion HGM method for slope/flat wetland complexes in the Cook Inlet Basin Ecoregion (Hall et al. 2003). • This method (like most HGM-methods) is not rapid—it involves expensive time consuming data collection that would not be appropriate for routine functional assessments used for regulatory permit decisions.	• Provides excellent source of scientific information on riverine wetlands that can be used to develop or calibrate other rapid assessment methods for Southeast Alaska.	
OTHER RECENT ALASKA METHODS					
Alaska Corps District Regulatory Guidance Letter (RGL) #09-01 – Appendix A (USACE 2009)	• Appendix A of the Corps RGL provides example functional assessment information and tools, which have been directly adapted from the *Washington State Wetland Functions Characterization Tool for Linear Projects* (WSDOT 2000). • This is a best professional judgment-based method for assessing 10 wetland functions and values: Flood Flow Alteration, Sediment Removal, Nutrient/Toxicant Removal, Erosion Control /Shoreline Stabilization, Production of Organic Matter and its Export, General Habitat Suitability, General Fish Habitat, Native Plant Richness, Education or Scientific Value, and Uniqueness and Heritage.	• May be best used to develop narrative or qualitative description of wetland functions and values.	• Relies on subjective professional judgment, which may have variable results. • Does not assign wetland to an overall rating category based on function or value, making it difficult to make consistent management decisions (such as, assigning mitigation ratios). • May result in variable repeatability.	• Instead of indicating whether functions are likely or not likely being provided, some users have proposed to add a subjective rating of functions (H,M,L) to identify the relative magnitude of each function/value being provided.	
2006 Functional Assessment of Wetlands within the City of Homer and the Bridge Creek Watershed Protection District (City of Homer 2006)	• Relatively rapid using best professional judgment. • Adapted the functional assessment method developed for Anchorage, but with some changes to reflect local geography, topography, and natural resources in Homer. • Functions for 3 categories (Hydrology, Habitat, and Species Occurrence) were scored qualitatively (H,M,L), then grouped by value (H,M,L).	• Satisfies the needs of the City of Homer.	• Does not accurately assess functions (rather, assesses functions identified as valuable to the community). • Results in static assessment of functions (rather than assess current functions) that is incorporated into the City's wetland management plan (i.e., pre-determined value). • Does not incorporate HGM. • Does not assess estuarine wetlands.		

Assessment Method	Description	Advantages	Disadvantages	Suggested Improvements to the Method	
Wetland Functional Assessment Guidebook: Operational Draft Guidebook for Assessing the Functions of Slope/Flat Wetland Complexes in the Cook Inlet Basin Ecoregion, Alaska, using the HGM Approach (Hall et al. 2003)	• Provides information about applying the HGM approach to the functional assessment of slope/flat wetland complexes in the Cook Inlet Basin Ecoregion.	• Similar to the HGM method developed by Powell et al. (2003) for riverine wetlands, this HGM method departs from other functional assessment approaches because it is based on: (1) recognition of differences among wetlands (i.e. classification), (2) identification of functions performed by classes and subclasses of wetlands, and (3) regionally developed reference systems. • This method provides research on wetland characteristics and functions specific to Cook Inlet Basin that could be extrapolated to Southeast Alaska.	• This method is limited to slope/flat wetland complexes in the Cook Inlet Basin Ecoregion. Its utility can be expanded by combining it with the companion HGM method for riverine wetlands and slope river proximal wetlands (Powell et al. (2003). • This method (like most HGM-methods) is not rapid—it involves expensive time consuming data collection that would not be appropriate for routine functional assessments used for regulatory permit decisions.	• Provides excellent source of scientific information on slope/flat wetland complexes that could be used to develop or calibrate other rapid assessment methods for Southeast Alaska.	
ADOT&PF Alaska Wetland Assessment Method (AKWAM) (ADOT&PF 2010)	• Results in the relative rating of up to 10 wetland functions or services: Habitat for species of concern; General wildlife support; General fish support; Water storage; Sediment/nutrient/toxicant retention and removal; Sediment/shoreline stabilization; Production export/terrestrial and aquatic food chain support; Groundwater discharge/recharge; Uniqueness; Recreation/educational potential. • This first version of AKWAM is a first approximation and does not represent a comprehensive, fully Alaska-adapted, and final assessment method.	• Incorporates current and relevant information on wetland functions; • Meets the needs of ADOT&PF, the Corps of Engineers, and other concerned agencies for rating the functions and services of wetlands and categorizing wetlands and waterbodies potentially affected by ADOT&PF's routine projects; • Minimizes subjectivity and variability among evaluators; • Allows for the comparison of different wetland types and different waterbody types; • Rates wetlands and waterbodies in a way that helps prioritize impact avoidance and minimization measures; • Categorizes wetlands and waterbodies in a way that promotes consistent and predictable application of compensatory mitigation requirements. • Results in an overall rating for the assessment area. • Offers a standard method that could be used consistently on projects for Interior Alaska.	• This method is newly developed and does not appear to have been field tested for use in Alaska. • This method does not characterize the functions of tidal wetlands found in Southeast and other coastal regions in Alaska. • This method results in an overall rating of Category 1, 2, 3 or 4, which leads to ambiguity regarding assignment of regulatory mitigation ratios that are based on High, Moderate, and Low. • May result in variable repeatability. • Does not emphasize use of available spatial data.	• Conduct field testing: - Pilot testing to calibrate method to the range of scores in Alaska (i.e., regional calibration for Interior Alaska). - Adjust method using scientific research for Alaska wetlands (i.e., regional adjustment for Interior Alaska). - Develop a user's manual (similar to ORWAP) that is customized to the data sources and wetland types of Alaska. - Repeatability testing with individual users in Alaska. • Train users on the method. • Emphasize use of available spatial data in Alaska. • Adjust method based on results of field testing and user input.	

Assessment Method	Description	Advantages	Disadvantages	Suggested Improvements to the Method	
METHODS FROM PACIFIC NORTHWEST OR OTHER REGIONS					
Oregon Rapid Wetland Assessment Protocol (ORWAP) (Adamus et al. 2009) [a generic draft beta version of this method is available for use in Alaska called: Wetland Ecosystem Services Protocol United States (WESPUS) (Adamus et al. 2010)]	• ORWAP is a standardized protocol for rapidly assessing the functions and values of wetlands in Oregon. • After data from the three-part form are entered into an Excel spreadsheet, ORWAP automatically generates scores intended to reflect a wetland's ability to support the following 16 functions: Water Storage and Delay; Sediment Retention and Stabilization; Phosphorus Retention; Nitrate Removal and Retention; Thermoregulation; Anadromous Fish Habitat; Non-anadromous Fish Habitat; Aquatic Invertebrate Habitat; Amphibian and Reptile Habitat; Waterbird Feeding Habitat; Waterbird Nesting Habitat; Organic Matter Export; Songbird, Raptor and Mammal Habitat; Native Plant Diversity; Pollinator Habitat; Pollinator Habitat; and Carbon Sequestration. • For all but two of these functions, scores are given for both components of an ecosystem service: function and value. • The functions are also condensed into thematic groups, called "grouped services." • In addition, wetland Ecological Condition (Integrity), Provisioning Services, Public Use and Recognition, Sensitivity, and Stressors are scored.	• Applicable to wetlands of any type anywhere in Oregon. Can be used to compare wetlands of very different types. Does not require the user to fill out different data forms for different wetland types or regions of the state. A single three-part data form can be used for all Oregon wetlands. • Rapid—Extensive testing showed that a typical application of ORWAP requires 3 to 6 hours to complete (once the method is learned). • Among independent users, repeatability of the scores for most functions and values was found to be within ± 0.7 point or less on a 0-to-10 scoring scale. • Uses an electronic spreadsheet that automatically calculates scores. • User training is available for applying this method. • A generic draft beta version of this method is available for use in Alaska called *Wetland Ecosystem Services Protocol United States* (WESPUS). Adamus will conduct limited testing of this method in Juneau in June 2010. • In response to our recommendation, Adamus added a column to the electronic data forms to to allow recording field notes/observations and for providing rationale for responses to questions. However, this column does not show up on the printed forms that are used for office/field assessments, or as documentation with assessment reports. Perhaps the Adamus can make this possible for a custom version for Southeast Alaska.	• ORWAP results in scores for individual functions and values, and for grouped services, but does not directly result in a general overall rating (such as High, Moderate, Low). • Will require some regional calibration and regional customization for use in Southeast Alaska. •	• The beta version of this method (WESPUS) is available for immediate use in Southeast Alaska. The following next steps are recommended: - Pilot testing to calibrate method to the range of scores in Southeast Alaska region (i.e., regional calibration). - Adjust method using scientific research for Southeast Alaska wetlands (i.e., regional adjustment). - Develop a user's manual (similar to ORWAP) that is customized to the data sources and wetland types of Southeast Alaska. - Repeatability testing with individual users in Southeast Alaska. - Train users on the method. • For specific use by SEAL Trust, the average baseline Effectiveness Score could be calculated (which is an overall average of the average for the 5 functional groups). • Data gathered from calibration and testing of WESPUS in Southeast Alaska could be grouped into thirds to achieve High, Moderate, and Low groups. Therefore, once a wetland is scored, the overall average could directly translate to a high, moderate, or low category/rating. Then the mitigation ratios which are based on High, Moderate, and Low could be applied to determine the debit. Would need to adjust data form to automatically calculate this overall average. • WESPUS could similarly be applied to SEAL Trust's ILF preservation sites to determine the credit to establish relative ecological equivalency.	**Recommended Method**
Hydrogeomorphic Assessment Guidebook for Tidal Wetlands of the Oregon Coast (Adamus 2006)	• Uses a hydrogeomorphic approach to assign scores to 12 functions of tidal wetlands.	• Though this method is developed for use in Oregon, it synthesizes current research on tidal wetland functions that could apply directly to Southeast Alaska. • Incorporates HGM. • Repeatable method. • Includes a helpful guidebook that describes conditions, including representative pictures of wetland types.	• Does not assign wetland to an overall rating category based on function or value, making it difficult to make consistent management decisions (such as, assigning mitigation ratios). • Intended for use by trained natural resource professionals, this method can involve a day-long visit to a wetland to generate usable results.	• Use to generate an overall score to rate wetland into 3 categories: High, Moderate, or Low. • Develop a similar guidebook to describe conditions, including representative pictures of wetland types in Southeast Alaska.	
Mitigation Assessment Method for the King County Mitigation Reserves Program, Seattle Area Washington (Hruby, Richter, and Fuerstenberg 2010)	• This method is used to calculate the acreage of mitigation required based on the functions and values of the site impacted and the functions and values of the proposed mitigation. • This method was developed specifically for this ILF Program being implemented in King County, Washington (Seattle Area).	• This method has similar aspects to the Washington Rating System (both are developed by the same authors), but this method incorporates elements for: 1) Potential of the site to provide the function, 2) Potential of the landscape to support the function at the site, and 3) Value of the function to society. • Each is assessed for 3 function groups: Improving water quality, hydrologic, and habitat.	• This method is newly developed and is currently being field tested for use in King County. [However, this method will likely be applied more broadly in Washington because in a prospectus for another ILF Program in Washington, the Puget Sound Partnership has proposed using the same method]. Therefore, it may take some time before this method is fully tested and working in Washington.	• Await development of a manual to describe this method. The Draft version of this method that was evaluated did not yet include a manual describing the method. • Await field testing and implementation of this method.	

Assessment Method	Description	Advantages	Disadvantages	Suggested Improvements to the Method	
Washington State Wetland Rating System for Western Washington (Washington Department of Ecology 2004)	• The Washington State Rating System is used to categorize wetlands based on their sensitivity to disturbance, their significance, their rarity, ability to replace them, and the functions they provide. • Threes general function groups are assessed: - Water Quality - Hydrologic - Habitat • This Method results in categorizing wetlands into one of 4 categories. • Resource and regulatory agencies in Washington State accept this method as the basis for wetland management. Mitigation ratios and buffer widths are determined by wetland category.	• A trained user can apply this method rapidly. • This assessment method varies by HGM class. • Wetland functions are scored by their "potential" to provide a function (capability to perform a function) and "opportunity" to provide a function (i.e., based wetland position in the landscape). • This method identifies and rates wetlands with special characteristics that have importance or value the may supersede their functions: - Estuarine Wetlands - Natural Heritage Wetlands - Bogs - Forested Wetlands - Wetlands in Coastal Lagoons - Interdunal Wetlands • User training is available for applying this method.	• This method does not characterize the functions of estuarine tidal wetlands. • This method cannot be used to calculate functional units by multiplying the score times the impact acreage because the score reflects the potential and opportunity to provide wetland functions.	• This method could potentially be applied with minimal calibration to categorize wetlands in Alaska. The method could be re-calibrated to categorize wetlands into 3 categories (H,M,L) instead of 4 categories. • A new HGM class for estuarine tidal wetlands would need to be developed. The *Hydrogeomorphic Assessment Guidebook for Tidal Wetlands of the Oregon Coast* (Adamus 2006) could provide the basis for this, which should be supplemented with literature and field calibration in Southeast Alaska.	
Wetland Functions Characterization Tool for Linear Projects, Washington State (WSDOT 2000)	• This is a best professional judgment-based method for assessing 14 wetland functions and values: Flood Flow Alteration, Sediment Removal, Nutrient/Toxicant Removal, Erosion Control /Shoreline Stabilization, Production of Organic Matter and its Export, General Habitat Suitability, Habitat for Aquatic Invertebrates, Habitat for Amphibians, Habitat for Wetland-Associated Mammals, Habitat for Wetland Associated Birds, General Fish Habitat, Native Plant Richness, Education or Scientific Value, and Uniqueness and Heritage. • The evaluator considers whether a suite of qualifiers is present or absent and then, using best professional judgment, determines whether or not a particular function is likely to be provided. The tool also permits the user to characterize the relative importance of functions. • This method appears to have been adapted directly from the New England Highway Methodology Workbook (USACE 1995, revised in 2000).	• May be best used to develop narrative or qualitative description of wetland functions and values.	• Relies on subjective professional judgment, which may have variable results. • Does not assign wetland to an overall rating category based on function or value. • May result in variable repeatability.	• Instead of indicating whether functions are likely or not likely being provided, some users have proposed to add a subjective rating of functions (H,M,L) to identify the relative magnitude of each function/value being provided.	
Highway Methodology Workbook (USACE – New England District 1999)	• This is a best professional judgment-based method for assessing 8 functions and 5 values. The 8 functions include: Groundwater Recharge/Discharge, Flood Flow Alteration, Sediment/Toxicant/Pathogen Retention, Nutrient Removal/Retention/Transformation, Sediment/Shoreline Stabilization, Production Export, Wildlife Habitat, Fish and Shellfish Habitat. The 5 values include: Recreation, Educational/Scientific Value, Uniqueness/ Heritage, Visual Quality/Aesthetics, Threatened or Endangered Species Habitat.	• May be best used to develop narrative or qualitative description of wetland functions and values.	• Relies on subjective professional judgment, which may have variable results. • Does not assign wetland to an overall rating category based on function or value. • May result in variable repeatability.		

Assessment Method	Description	Advantages	Disadvantages	Suggested Improvements to the Method	
	• The evaluator considers whether a suite of qualifiers is present or absent and then, using best professional judgment, determines whether or not a particular function is likely to be provided. The tool also permits the user to characterize the relative importance of functions. • This method is the basis for variety of similar methods also evaluated herein (WSDOT 2000; USACE 2000, USACE 2010).				
A Rapid Procedure for Assessing Wetland Functional Capacity (Magee and Hollands 1998)	• This procedure is not HGM (though some informally refer to it as "HGM light"). • This procedure was developed to provide a rapid functional assessment tool based on HGM classification for use in situations where time and cost prohibit the establishment of reference wetlands but where a rapid functional assessment is needed. • It can be modified to make it applicable to other regions in the continental U.S. or refined for specific subregions by adding, deleting, or modifying the functions, variables and variable conditions, or by making other changes appropriate for the location. • It can provide a template for building regional HGM models. • It can be used for conducting rapid wetland functional assessments in the glaciated Northeastern and Midwestern U.S.	• Allows user to build a reference data set as the assessment is conducted. • Useful to develop comparative values. • According to EPA, this method is apparently being used on several projects in Alaska (such as on North Slope).	• This procedure was developed for the glaciated Northeastern and Midwestern U.S. Assumed use would be for continental U.S. only. • This method does not address tidal wetland HGM class. • Substantial upfront effort needed to develop functional model and calibrate for new regions, particularly Southeast Alaska. • Weak for peatland assessments (such as in Southcentral Alaska). • Requires considerable scientific input.	• Obtain and review examples where this method has previously been used in Alaska. • Would require substantial regional calibration and regional customization for use in Southeast Alaska. • Would require development of a new model for the tidal wetland HGM class (which potentially could be adapted from Adamus 2006).	

Attachment C.

U.S. Army Corps of Engineers Alaska District Regulatory Guidance Letter #09-01

U.S. Army Corps
of Engineers
Alaska District

Alaska District Regulatory Guidance Letter

RGL ID No. 09-01

CEPOA-RD 2009

SUBJECT: Alaska District implementation of the Federal Rule on Compensatory Mitigation: Compensatory Mitigation for Losses of Aquatic Resources; Final Rule (33 CFR Parts 325 and 332), dated April 10, 2008.

BACKGROUND: The Corps and EPA published a new rule to clarify how to provide compensatory mitigation for unavoidable impacts to the nation's wetlands and streams resulting from authorized activities. The rule is intended to enable the agencies to promote greater consistency, predictability, and ecological success of mitigation projects under the Clean Water Act.

The rule preserves the requirement for applicants to first avoid and/or minimize impacts to aquatic resources before proposing compensatory mitigation to offset project impacts. The rule establishes performance standards, sets timeframes for decision making, and to the extent possible, establishes equivalent requirements and standards for the three sources of compensatory mitigation: mitigation banks, in-lieu-fee (ILF) programs, and permittee-responsible mitigation.

PURPOSE: The purpose of this Regulatory Guidance Letter (RGL) is to define the Alaska District's review procedure for compensatory mitigation with respect to the requirements of the rule. This RGL outlines the steps necessary to implement the rule when evaluating project proposals, and identifies the necessary documentation to be included in the administrative record for a permit decision.

APPLICABILITY: This guidance applies to all permit applications submitted for approval.

IMPACTS, COMPENSATION AND WATERSHEDS: Regulations require appropriate and practicable compensatory mitigation to replace functional losses to aquatic resources. The Alaska District will determine what level of mitigation is "appropriate" based upon the functions lost or adversely affected by permitted activities. When determining "practicability", the District will consider the availability of suitable locations, constructability, overall costs, technical requirements, and logistics.

The rule includes flexibility concerning regional variations in aquatic resources, determination of watershed size and limits, in-lieu-fee and mitigation bank service areas, and the types of wetland projects. For reference, Table 1 provides cited portions from the rule that are particularly relevant to aquatic resource impacts and compensatory mitigation in Alaska.

PROCEDURES: The following are flow chart procedures for evaluating mitigation proposals that accompany permit requests.

A. Receipt of Application

1. Review permit request (applies to all permit requests)

   a. The application does not contain any information pertaining to mitigation sequencing and compensation for impacts (incomplete application or Pre-Construction Notification). Request this information from the applicant.

   OR

b. The application contains the required mitigation statement, documents mitigation sequencing (avoidance, minimization, then compensation), and has a conceptual mitigation plan, if necessary. Proceed to Section B.

B. Determination of Mitigation Requirements for all Permit Requests

Mitigation requirements are determined by following 33 CFR 320.4(r). It is critical to document your evaluation process, whether you require compensatory mitigation or not, by following the sequencing outlined in the regulations above and taking into consideration the nation's "no net loss" goal (see Executive Order 11990 and the February 6, 1990, Memorandum of Agreement between the Department of the Army and the Environmental Protection Agency). See Table 2 for examples of projects that ***will*** *require compensatory mitigation and* ***may*** *or* ***may not*** *require compensatory mitigation.*

1. The proposed project does not require compensatory mitigation beyond avoidance and minimization:

   a. The applicant must document avoidance and minimization measures;
   b. The applicant must provide rationale as to why they are not proposing compensatory mitigation for their proposed project; and
   c. In the decision document (i.e., memorandum for record (MFR), combined decision document, etc.), regulator must document acceptance of avoidance and minimization measures and rationale for not requiring compensatory mitigation.

OR

2. The proposed project requires compensatory mitigation, but the applicant does not think so, nor propose any:

   a. The applicant must document avoidance and minimization measures; and
   b. The Public Notice (PN) or General Permit Agency Coordination (GPAC) mitigation statement will state that no compensatory mitigation has been proposed and the applicant's rationale for not proposing any. Items the regulator should discuss with the applicant during the review period would be: Is there opportunity on-site for compensatory mitigation? If so, is it ecologically preferable and practicable (e.g. will it be self-sustaining, low risk, temporal losses, etc.). Is the proposed project within a service area for an established bank or ILF program? Are there compensatory mitigation opportunities within the impacting project's watershed/ecoregion, which might be applicable and/or of which the applicant is unaware?
   c. Proceed to Section C.

OR

3. The proposed project is submitted with a compensatory mitigation plan:

   a. The applicant must document avoidance and minimization measures;
   b. Review the plan for adequacy, as outlined in Section C;
   c. If inadequate, work with the applicant to get the plan refined until it is adequate; and
   d. Proceed to Section C.

C. Reviewing Compensatory Mitigation Plans and General Considerations

If compensatory mitigation is required for general permits (regional or nationwide permits), you may approve a conceptual or detailed compensatory mitigation plan to meet required time frames for general permit verifications, but a final mitigation plan (as described in Section D) must be approved before work commences in waters of the U.S. Alternatively, components of a mitigation plan may be addressed through permit conditions (see 33 CFR § 332.4(c)(ii)). Do not forget to ensure project is in compliance with NWP general condition 20, if applicable.

1. Is the mitigation site located on private or public lands? Credits for compensatory mitigation projects on public land must be based solely on aquatic resource functions provided by the compensatory mitigation project, over and above those provided by public programs already planned or in place.

2. Is mitigation proposed in-kind or out-of-kind? On-site or off-site? The decision document needs to include ecological rationale for out-of-kind. Very rarely can you justify a marine impact being compensated at a fresh-

water site but the opposite may be able to easily justify. If off-site, can all impacted functions be mitigated at an off-site location? If not, how is the applicant addressing water quality and quantity functions on-site?

3. What option has the applicant determined would be environmentally preferable and why (e.g. in-kind, out-of kind, temporal concerns, etc.)?

   a. If mitigation bank credits – go to item (i) below
   b. If ILF program credits – go to item (ii) below
   c. If permittee-responsible mitigation – go to item (iii) below

      i. Mitigation bank credits
         1) The applicant must provide a rationale for using a mitigation bank (why the bank is an environmentally preferable compensation choice);
         2) Confirm that the impact occurs in the service area of the mitigation bank and that credits are available;
         3) Baseline information and determination of credits as described in D. 4. and D. 5. below; and
         4) In the decision document (i.e., MFR, combined decision document, etc.), Regulator must document acceptance of avoidance and minimization measures and rationale for compensatory mitigation requirements.

      ii. In-lieu fee program credits
         1) The applicant must provide a rationale for using an in-lieu fee (why the in-lieu fee is an environmentally preferable compensation choice);
         2) Confirm that the impact occurs in the Service Area of the in-lieu fee sponsor's program;
         3) Baseline Information and Determination of Credits as described in D. 4. and D. 5. below; and
         4) In decision document (i.e., MFR, Combined Decision Document, etc.), the regulator must document acceptance of avoidance and minimization measures and rationale for compensatory mitigation requirements.

      iii. Permittee-responsible mitigation
         1) Type of compensatory mitigation
            a) Preservation only (go to Section E)
            b) Restoration, establishment, enhancement (go to Section D)
            c) Stream compensatory mitigation projects (go to Section D)
         2) Was a functional assessment provided for the impacted area, and was it related to the proposed compensatory mitigation? See Appendix A (Wetland Functions Information and Tools)
         3) Was the functional assessment an approved methodology or is it based upon best professional judgment? See item 4.
         4) Does the functional assessment adequately describe the impacts to all wetland functions – water quantity; water quality; habitat? Do you agree with the conclusions of the assessment?
         5) Overall, is the wetland being impacted of high, medium, or low functions and services (Category I – IV – see Appendix A)?
         6) Has the applicant or consultant included wetland and upland buffer impacts?
         7) Are there indirect and/or secondary adverse affects from the project?
         8) The regulator must document findings and rationale of items 2-7 above to support their conclusions.

D. Final Mitigation Plan Requirements for Permittee-Responsible Mitigation (33 CFR 332.4(c)(2) through (c)(14))

1. Objectives:
   a. method of compensation (restoration, establishment, enhancement and/or preservation);
   b. description of resource types (i.e., U.S. Fish and Wildlife Service Cowardin Class – PFO, PSS, PEM, riverine, lacustrine, etc. and/or Hydrogeomorphic (HGM) Class: Depressional, Riverine, Slope, or Flats) provided by plan (see Appendix A);

c. the amount of each resource type provided by plan; and
d. does the compensation project address the needs of the watershed, ecoregion, or other geographic area of interest?

2. Site Selection:
   a. will the compensation project be self-sustaining;
   b. did the applicant consider on-site alternatives where practicable; and
   c. were watershed needs considered by applicant?

3. Site Protection Instrument:
   a. what legal arrangements and instrument is the applicant proposing to ensure long-term protection of the mitigation site:
      i. Conservation Easement
      ii. Restrictive Covenant/Deed Restriction – See examples in O:\RD\Private\Library\Mitigation

4. Baseline Information:
For applicants planning on securing credits from an ILF program or mitigation bank, baseline information only needs to be submitted for the impact site, not the ILF or mitigation bank project site.

Baseline information includes the following for both the impact site and the mitigation project site (if applicable). The list may not be inclusive of other information that may be needed on a case-by-case basis.

   a. descriptions of historic and existing plant communities and hydrology (including any monitoring well data);
   b. soil conditions (including any soil boring data);
   c. a map showing the locations of the impact and mitigation site(s) or the geographic coordinates; and
   d. delineation of waters of the U.S. (in accordance with the 1987 wetland delineation manual and the 2007 Alaska Regional Supplement) for both the impact and mitigation project site

5. Determination of Credits (See Appendix B):

A description of the number of credits to be provided, including a brief explanation of the rationale for this determination. (See Section 332.3(f).)

   a. For permittee-responsible mitigation, this should include an explanation of how the compensatory mitigation project will provide the required compensation for unavoidable impacts to aquatic resources resulting from the permitted activity; and
   b. For permittees intending to secure credits from an approved mitigation bank or in-lieu fee program, it should include the number and resource type of credits to be secured and how these were determined.

Example – DO NOT USE MONETARY CONVERSIONS – that is between the ILF or bank sponsor and the applicant!!! Using Appendix B: If the impact is 5 acres of moderate functioning wetland (Category II or III) and the applicant proposes preservation (either as an ILF or Mitigation Bank) as their compensatory mitigation type, then according to the ratio table, the applicant would need to compensate at a 2:1 ratio, which would translate to 10 credits (or acres) of preservation. The price for purchasing 10 credits from an ILF or bank sponsor will be determined by the sponsor, NOT by the Corps.

6. Mitigation Work Plan:
The applicant needs to include the following details (using all available information, but not limited to):

For Wetland Projects
   a. geographic boundaries of the project;
   b. construction methods, timing, and sequence;
   c. source(s) of water, including connections to existing waters and uplands;
   d. methods for establishing the desired plant community (including plant species, number of individuals and spacing – e.g. trees will be planted 10-foot on center);
   e. plans to control invasive plant species; proposed grading plan, including elevations and slopes of substrate;
   f. soil management; and
   g. erosion control measures

For Stream Projects - includes the above list, plus:

h. planform geometry;
i. channel form (e.g. typical channel cross-sections);
j. watershed size;
k. design discharge; and
l. riparian area planting plan (including species, number of individuals, and spacing)

7. Maintenance Plan:
   a. description and schedule of maintenance requirements once initial construction is completed

8. Performance Standards (See Appendix C for examples):
   a. used to determine whether the project is achieving objectives – must be meaningful, measurable and achievable, as well as enforceable;
   b. must be objective and verifiable;
   c. may be based on variables or measures of functional capacity described in functional assessment methodologies, measurements of hydrology or other aquatic resource characteristics, and/or comparisons to reference aquatic resources of similar type and landscape position.

9. Monitoring Requirements:
   a. applicant should submit a description of parameters to be monitored in order to determine if the mitigation project is on track to meet performance standards and if adaptive management is needed – includes parameters to be monitored, the length of the monitoring period, party responsible for monitoring and submittal of reports, the frequency for submittal of reports; and
   b. content and detail is commensurate with scale and scope of mitigation project

10. Long-term Management Plan:
   a. how will mitigation project be managed to ensure long-term sustainability of the resource;
   b. party responsible for ownership and all long-term management of the mitigation project;
   c. long-term management responsibilities can be transferred to another entity, such as a public agency, non-governmental organization, or private land manager (District Engineer (DE) must approve);
   d. should include description of long-term management needs, annual cost estimates for these needs, and funding mechanism that will be used to meet those needs;
   e. financing mechanisms include: non-wasting endowments, trusts, contractual arrangements with future responsible parties and other appropriate financial instruments; and
   f. public authority or government agency responsible for long-term management, must include plan for long-term financing of the mitigation site

11. Adaptive Management Plan:
   a. includes a strategy to address unforeseen changes in site conditions or other components of the mitigation project;
   b. must include party responsible for implementing adaptive management measures;
   c. adaptive management measures may include: site modification, design changes, revisions to maintenance requirements, and revised monitoring requirements

12. Financial Assurances:
   a. need to assess whether financial assurance is required;
   b. government agencies or public authorities with a formal documented commitment do not need to post financial assurances;
   c. is another regulatory entity requiring financial assurances;
   d. amount is based on the size and complexity of the mitigation project, likelihood of success, past performance of project sponsor, the degree of completion of the project at the time of project approval
   e. financial assurances may be in the form of performance bonds, escrow accounts, casualty insurance, letters of credit, legislative appropriations for government sponsored projects, or other appropriate instruments
   f. rationale for determining the amount of the required financial assurances, or not requiring any, must be documented in the administrative record

E. Required Criteria for using ONLY Preservation as Compensatory Mitigation (33 CFR 332.3(h))

1. The resources to be preserved provide important physical, chemical, or biological functions for the watershed;

2. The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate tools, where available;
3. Preservation is determined by the DE to be appropriate and practicable;
4. The resources are under threat of destruction or adverse modifications; and
5. The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

F. Tables and Appendices

The tables and appendices were compiled using multiple resources and are to be utilized as tools and resources to assist in the regulator's evaluation. The regulator may choose to use the functional assessment tools together, separately, or not at all. Every project needs to be evaluated based on its own merit, and the tools are generalizations that may need adjusting or further analysis, which should be determined by the regulator on a case-by-case basis.

Table 1: Citations from the new rule (preamble and the regulations) that are of particular value to Alaska
Table 2: Examples of projects that will require compensatory mitigation and examples of projects that may or may not require compensatory mitigation

Appendix A: Functional Assessment Information and Tools
Appendix B: Sample Ratios for Compensatory Mitigation
Appendix C: Performance Standards
Appendix D: Glossary

2/25/09
Date

Michael Rabbe
Chief, Regulatory Division

Table 1. Citations from the new rule (preamble and the regulations) that are of particular value to Alaska

Page 19617 (332.3(a) - Flexibility in Mitigation Requirements): Flexibility in compensatory mitigation requirements is needed to account for regional variations in aquatic resources, as well as state and local laws and regulations. There also needs to be flexibility regarding the requirements for permittee-responsible mitigation. Practicability is an important consideration when determining compensatory mitigation requirements.
Page 19625-19626 (332.2 - Definitions for Watershed and Service Area): District engineers will determine appropriate watershed scales for compensatory mitigation projects, including services areas for mitigation banks and in-lieu fee programs.... In general, compensatory mitigation projects should be located in the same watershed as the permitted impacts, at a scale determined to be appropriate by the district engineer based on the factors specified in the rule.
Page 19627 (332.3(a) - Mitigation Options & Practicability): If a particular compensatory mitigation project is cost-prohibitive, then an alternative compensation project that is more practicable should be required. District engineers will also consider impacts to the public interest, including potential losses of aquatic resource functions and services, when evaluating permit applications and compensatory mitigation proposals, and determining appropriate and practicable compensatory mitigation requirements.
Page 19627 (332.3(a) – Environmentally Preferable Mitigation): [The regs] provide flexibility for district engineers to make compensatory mitigation decisions based on what is environmentally preferable and is most likely to successfully provide the required compensatory mitigation.
Page 19627 (332.3(c) - Watershed Approach & DE Flexibility): [The regs] provide flexibility for district engineers to use innovative approaches or strategies for determining more effective compensatory mitigation requirements that provide greater benefits for the aquatic environment.
Page 19632 (332.3(b)(6) - Out-of-kind Mitigation): District engineers can require the use of out-of-kind compensatory mitigation when he or she determines that it will serve the aquatic resource needs of the watershed.
Page 19635 (332.3(h) - Preservation as Compensatory Mitigation): Preservation will be provided in conjunction with aquatic resource restoration, establishment, and/or enhancement activities, unless the district engineer waives this requirement in a situation where preservation has been identified as a high priority using a watershed approach. If the district engineer makes such a waiver, a higher compensation ratio shall be required.
Page 19654 (332.8(d)(6)(ii)(A) - Bank Service Area): The district engineer, in consultation with the IRT, will determine the appropriate service area(s) for mitigation banks and in-lieu fee programs.
Page 19660 (332.8(o)(6) - Credits Provided by Preservation): Preservation may also be used as the only form of compensatory mitigation, at the discretion of the district engineer, but this should only be allowed where preservation of specific resources has been identified as a high priority using a watershed approach...

Table 2. Examples of projects that <u>will</u> require compensatory mitigation and examples of projects that <u>may</u> or <u>may not</u> require compensatory mitigation

Notes:

1. These are examples. Every project must be reviewed on a case-by-case basis and compensatory mitigation requirements must be determined through the permit review process for each project.

2. This table assumes that avoidance and minimization has occurred for the project to the PM/RS's satisfaction, and been documented. The decision whether to require compensatory mitigation must also be well documented in the administrative record.

3. This table does not mean that impacts considered small for purposes of ILF or Mitigation Bank credit would never require another form of compensatory mitigation.

WILL REQUIRE
The project occurs in degraded, rare, difficult to replace, or threatened wetlands, areas of critical habitat, 303(d) waters, etc.
The project, even if minimally impacting, occurs in a watershed where cumulative impacts are a concern (i.e., urban areas, transportation corridors, etc.)
Fill placed in intertidal waters associated with special aquatic sites, streams, rivers, lakes and/or riparian areas.
Fill placed in anadromous fish streams and wetlands adjacent to anadromous fish streams.
The project is federally funded, so compensatory mitigation is required under Executive Order 11990 (no net loss of wetlands).
MAY OR MAY NOT REQUIRE
The impacting project requires an IP or permanently impacts more than ½ acre of wetlands and/or other waters of the U.S.
The impacts from the project are so small (e.g. loss of 1/2 acre of forested wetlands in a remote, relatively undisturbed watershed) that they cannot be effectively compensated
There is no opportunity within the watershed for compensatory mitigation AND the impacts are so small that an ILF or Bank Sponsor could not sell a credit that would be worth the money to process (cost/benefit analysis does not add up)
The project impacts are minimal or in a watershed with large expanses of wetlands that are not at risk of being cumulatively degraded.

Appendix A

WETLAND FUNCTIONS AND SERVICES FORM

*****This is an example. Best professional judgment should be used on each specific site*****

Helpful when evaluating permittee-responsible mitigation to determine which functions are being lost; therefore, these functions should be replaced in the applicant's mitigation proposal

File #:_____ Assessed by:_____

Cowardin Class:_____ Wetland Size:_____ Date:_____

Function/Service	Occurrence Y	N	Rationale	Comments
Flood Flow Alteration				
Sediment Removal				
Nutrient & Toxicant Removal				
Erosion Control & Shoreline Stabilization				
Production of Organic Matter and its Export				
General Habitat Suitability				
General Fish Habitat				
Native Plant Richness				
Educational or Scientific Value				
Uniqueness and Heritage				

NOTE: The function/services that are to be lost with the project are the functions/services that should be replaced.

Appendix A

SUMMARY OF POTENTIAL FUNCTIONS FOR HGM CLASS WETLANDS

*****This is an example. Best professional judgment should be used on each specific site*****

Common definitions of HGM Classification Types:

Riverine - Riverine wetlands occur in floodplains and riparian corridors in association with stream or river channels. They lie in the active floodplain and have important hydrologic links to the water dynamics of the river or stream. The distinguishing characteristic of Riverine wetlands is that they are frequently flooded by overbank flow from the stream or river. Flood waters are a major factor that structures the ecosystem in these wetlands. Wetlands that lie in floodplains but are **not** frequently flooded are not classified as Riverine.

Depressional - Depressional wetlands occur in topographic depressions. Dominant water sources are precipitation, groundwater discharge, and interflow from adjacent uplands. The direction of flow is normally from the surrounding uplands toward the center of the depression. Elevation contours are closed, thus allowing the accumulation of surface water. Depressional wetlands may have any combination of inlets and outlets or may lack them completely. Dominat hydrodynamics are vertical fluctuations, primarily seasonal. Depressional wetlands may lose water through intermittent or perennial drainage from an outlet and by evapotranspiration and, if they are not receiving groundwater discharge, may slowly contribute to groundwater.

Lacustrine Fringe - Lacustrine fringe wetlands are adjacent to lakes where the water elevation of the lake maintains the water table in the wetland. In some cases, these wetlands consist of a floating mat attached to land. Additional sources of water are precipitation and groundwater discharge, the latter dominating where lacustrine fringe wetlands intergrade with uplands or slope wetlands. Surface water flow is bidirectional, usually controlled by water-level fluctuations such as seiches in the adjoining lake.Lacustrine fringe wetlands are indistinguishable from depressional wetlands where the size of the lake becomes so small relative to fringe wetlands that the lake is incapable of stabilizing water tables. Lacustrine wetlands lose water by flow returning to the lake after flooding, by saturation surface flow, and by evapotranspiration.

Tidal Fringe - Tidal Estuarine wetlands occur along coasts and estuaries and are under the influence of the sea level. They intergrade landward with riverine wetlands where tidal current diminishes and river flow becomes the dominant water source. Additional water sources may be groundwater discharge and precipitation. The interface between the tidal fringe and riverine classes is where bidirectional flows from tides dominate over unidirectional ones controlled by floodplain slope of riverine wetlands. Because tidal fringe wetlands frequently flood and water table elevations are controlled mainly by sea surface elevation, tidal fringe wetlands seldom dry for significant periods. Tidal fringe wetlands lose water by tidal exchange, by saturated overland flow to tidal creek channels, and by evapotranspiration.

Slope - Slope Wetlands normally are found where there is a discharge of groundwater to the land surface. They normally occur on sloping land; elevation gradients may range from steep hillsides to slight slopes. Slope wetlands are usually incapable of depressional storage because they lack the necessary closed contours. Principal water sources are usually groundwater return flow and interflow from surrounding uplands as well as precipitation. Hydrodynamics are dominated by downslope unidirectional water flow. Slope wetlands can occur in nearly flat landscapes if groundwater discharge is a dominant source to the wetland surface. Slope wetlands lose water primarily by saturation subsurface and surface flows, and by evapotranspiration. Slope wetlands may develop channels, but the channels serve only to convey water away from the slope wetland.

Flats - Flats wetlands occur in topographically flat areas that are hydrologically isolated from surrounding ground or surface water. The main source of water in these wetlands is precipitation. They receive virtually no groundwater discharge. This characteristic distinguishes them from Depressional and Slope wetlands.

Appendix A

Description of Wetland Categories Based on Functions

*****This is an example. Best professional judgment should be used on each specific site*****

Category I – High functioning wetlands
These wetlands are the "cream of the crop." Generally, these wetlands are less common. These are wetlands that: 1) provide a life support function for threatened or endangered species that has been documented; 2) represent a high quality example of a rare wetland type; 3) are rare within a given region; or, 4) are undisturbed and contain ecological attributes that are impossible or difficult to replace within a human lifetime, if at all. Examples of the latter are mature forested wetlands that may take a century to develop, and certain bogs and fens with their special plant populations that have taken centuries to develop. The position of the wetland in the landscape plays an integral role in overall watershed health.

Category II – High to Moderate functioning wetlands
These wetlands are those that: 1) provide habitat for very sensitive or important wildlife or plants; 2) are either difficult to replace (such as bogs); or 3) provide very high functions, particularly for wildlife habitat. These wetlands may occur more commonly than Category I wetlands, but still need a high level of protection.

Category III – Moderate to low functioning wetlands
These wetlands can provide important functions and values. They can be important for a variety of wildlife species and can provide watershed protection functions depending on where they are located. Generally these wetlands will be smaller and/or less diverse in the landscape than Category II wetlands. These wetlands usually have experienced some form of degradation, but to a lesser degree than Category IV wetlands.

Category IV – Degraded and low functioning wetlands
These wetlands are the smallest, most isolated, have the least diverse vegetation, may contain invasive species, and have been degraded by humankind. These are wetlands that we should be able to replace and, in some cases, be able to improve from a habitat standpoint. These wetlands can provide important functions and values, and should to some degree be protected depending on where they are located in the watershed and the condition of that watershed (urban vs. rural). In some areas, these wetlands may be providing groundwater recharge and water pollution prevention functions and, therefore, may be more important from a local point of view. Thus, regional differences may call for a more narrow definition of this category.

Wetland Functions Data Form-Alaska Regulatory Best Professional Judgment Characterization

*****This is an example. Best professional judgment should be used on each specific site*****

File #:_____ Date:_____

Wetland Name:_____ PM/RS:_____

A. Flood Flow Alteration (Storage and Desynchronization)	Likely or not likely to Provide (Y or N)
1. Wetland occurs in the upper portion of its watershed. 2. Wetland is relatively flat area and is capable of retaining higher volumes of water during storm events, than under normal rainfall conditions. 3. Wetland is a closed (depressional) system. 4. If flowthrough, wetland has constricted outlet with signs of fluctuating water levels, algal mats, and/or lodged debris. 5. Wetland has dense woody vegetation 6. Wetland receives floodwater from an adjacent water course 7. Floodwaters come as sheet flow rather than channel flow.	1. 2. 3. 4. 5. 6. 7. 5 – 7 (Y) – High Function 1 – 4 (Y) – Moderate Function None - Low Function
B. Sediment Removal	Likely or not likely to Provide (Y or N)
1. Sources of excess sediment (from tillage, mining or construction) are present upgradient of the wetland. 2. Slow-moving water and/or a deepwater habitat are present in the wetland. 3. Dense herbaceous vegetation is present. 4. Interspersion of vegetation and water is high in wetland. 5. Ponding of water occurs in the wetland. 6. Sediment deposits are present in wetland (observation or noted in application materials).	1. 2. 3. 4. 5. 6. 4 – 6 (Y) – High Function 1 - 3 (Y) – Moderate Function None – Low Function

Note: e.g., for Flood Flow Alteration, answering yes to at least 3 out of 7 attributes would rate the wetlands as high functioning; answering yes to 1, 2, 3, or 4 out of the 7 attributes would rate the wetland as moderate; and not answering yes to any of the 7 attributes would rate the wetland low for Flood Flow Alteration function.

C. Nutrient and Toxicant Removal (important with high adjacent land use/industrial areas) 1. Sources of excess nutrients (fertilizers) and toxicants (pesticides and heavy metals) are present upgradient of the wetland. 2. Wetland is inundated or has indicators that flooding is a seasonal event during the growing season. 3. Wetland provides long duration for water detention. 4. Wetland has at least 30% aerial cover of live dense herbaceous vegetation. 5. Fine grained mineral or organic materials are present for the wetland (in wetland report).	Likely or not likely to Provide (Y or N) 1. 2. 3. 4. 5. 3 – 5 (Y) – High Function 1 - 2 (Y) – Moderate Function None – Low Function
D. Erosion Control and Shoreline Stabilization *If associated with watercourse or shoreline* 1. Wetland has dense, energy absorbing vegetation bordering the water course and no evidence of erosion. 2. A herbaceous layer is part of this dense vegetation. 3. Trees and shrubs able to withstand erosive flood events are also part of this dense vegetation.	Likely or not likely to Provide (Y or N) 1. 2. 3. 1-3 (Y) – High Function None – Low Function
E. Production of Organic Matter and its Export 1. Wetland has at least 30% aerial cover of dense herbaceous vegetation. 2. Woody plants in wetland are mostly deciduous. 3. High degree of plant community structure, vegetation density, and species richness present. 4. Interspersion of vegetation and water is high in wetland. 5. Wetland is inundated or has indicators that flooding is a seasonal event during the growing season. 6. Wetland has outlet from which organic matter is flushed.**	Likely or not likely to Provide (Y or N) 1. 2. 3. 4. 5. 6. 4 – 6 (Y) – High Function 1 - 3 (Y) – Moderate Function None – Low Function **If 6 is N, then automatically low function
F. General Habitat Suitability 1. Wetland is not fragmented by development. 2. Upland surrounding wetland is undeveloped. 3. Wetland has connectivity with other habitat types. 4. Diversity of plant species is high. 5. Wetland has more than one Cowardin Class (i.e., PFO, PSS, PEM, POW, etc.) 6. Has high degree of Cowardin Class interspersion. 7. Evidence of wildlife use, e.g., tracks, scat, gnawed stumps, etc., is present.	Likely or not likely to Provide (Y or N) 1. 2. 3. 4. 5. 6. 7. 5 – 7 (Y) – High Function 1 – 4 (Y) – Moderate Function None - Low Function

G. General Fish Habitat *Must be associated with a fish-bearing water* 1. Wetland has perennial or intermittent surface-water connection to a fish-bearing water body. 2. Wetland has sufficient size and depth of open water so as not to freeze completely during winter. 3. Observation of fish. 4. Herbaceous and/or woody vegetation is present in wetland and/or buffer to provide cover, shade, and/or detrital matter. 5. Spawning areas are present (aquatic vegetation and/or gravel beds.) 6. Juvenile rest areas	Likely or not likely to Provide (Y or N) 1. 2. 3. 4. 5. 6. 4 – 5 (Y) – High Function 1 - 3 (Y) – Moderate Function None – Low Function
H. Native Plant Richness 1. Dominant and codominant plants are native. 2. Wetland contains two or more Cowardin Classes. 3. Wetland has three or more strata of vegetation. 4. Wetland has mature trees.	Likely or not likely to Provide (Y or N) 1. 2. 3. 4. 3 - 4 (Y) – High Function 1 - 2 (Y) – Moderate Function None – Low Function
I. Educational or Scientific Value 1. Site has documented scientific or educational use. 2. Wetland is in public ownership. 3. Accessible trails available.	Likely or not likely to Provide (Y or N) 1. 2. 3. 2 - 3 (Y) – High Function 1 (Y) – Moderate Function None – Low Function
J. Uniqueness and Heritage 1. Wetland contains documented occurrence of a state or federally listed threatened or endangered species. 2. Wetland contains documented critical habitat, high quality ecosystems, or priority species respectively designated by the U.S. Fish and Wildlife Service 3. Wetland has biological, geological, or other features that are determined rare 4. Wetland has been determined significant because it provides functions scarce for the area. 5. Wetland is part of: an estuary, bog, or a mature forest.	Likely or not likely to Provide (Y or N) 1. 2. 3. 4. 5. 3 – 5 (Y) – High Function 1 – 2 (Y) – Moderate Function None – Low Function

APPENDIX B

SAMPLE RATIOS FOR COMPENSATORY MITIGATION

Note: The ratios provided below are guidance and represent what a permit applicant should expect as a compensation requirement, thereby providing some predictability. However, a Corps regulator may deviate from this guidance. Corps regulators must make an individual determination on the compensatory mitigation ratios required for specific aquatic resource impacts to ensure that the compensation is proportionate to the proposed loss or degradation of an aquatic resource area and/or its functions.

	TYPE OF COMPENSATORY MITIGATION	
Impacted Wetland or Other Waters of the U.S.	**Preservation**	**Restoration and/or Enhancement**
LOW Category III or IV	1.5:1	1:1
MODERATE Category II or III	2:1	1:1
HIGH Category I or II	3:1	2:1

Assumptions and/or considerations when determining ratios:

- Impacts to ponds, lakes, rivers and streams, should be mitigated for in the HIGH category, due to their inherent high level of functions and services. Compensatory mitigation for tidal and intertidal waters can generally be parsed out by habitat type; where unvegetated (inter)tidal habitat would be compensated for in the MODERATE category, while those (inter)tidal waters associated with special aquatic sites would be compensated for in the HIGH category. Deviations from this should be well reasoned and documented (e.g., document existing site degradation and lack of specific functions/services).
- Watershed position – the compensatory mitigation site should be located in areas where the compensation can contribute to ecosystem functioning at a large scale (e.g., part of river corridors and green belt space)
- Most ratios will be greater than 1:1 because there is a risk of failure associated with many forms of compensation, there is usually a temporal loss (it may take years for a compensation site to develop wetland functions and/or structure

equivalent to the impacted wetland), and preservation and enhancement activities result in net loss of wetland acreage and/or function

- Ratios shown represent a compensatory project that is constructed or protected in perpetuity concurrent with aquatic resource impacts. If there is a time delay in constructing or securing a preservation site the ratios will increase due to temporal loss
- Preservation sites selected for compensatory mitigation will be moderate to high functioning systems that meet the criteria in 33 CFR 332.3(h)
- If using a mitigation bank, rules and ratios applicable to the individual bank should be used
- Consider indirect and/or secondary impacts. For example, impacting a small portion of the wetland (<25% on the edge) is less impact then bisecting a wetland in the middle or impacting >70% of a wetland

Example for using ratio:
An applicant proposes to impact 5 acres of moderate value wetlands and it is determined compensatory mitigation is required. The applicant wants to use an ILF for preservation. The applicant would be required to provide mitigation at a 2:1 ratio using the above table, which would result in 10 credits (acres) in preservation through the ILF sponsor.

Appendix C

Examples of performance standards that should NOT be used, rationale, and a suggested standard

Standards NOT to use	Rationale	Suggested Standard
By the end of the fifth year, there will be X-X% coverage.	This standard does not specify what type of coverage (cumulative, aerial, or relative), or what should be providing the cover (it could be non-native species). Also missing from the standard is the location (where the cover should be.)	An alternate standard would be: After 5 years, native wetland (FAC or wetter) species will provide X% aerial cover in the wetland.
X-X acres will be dominated by native forested wetland vegetation in the XXX community types.	This standard provides a range for acreage, which is good. However, specifying the exact plants that need to dominate these areas could be setting this site up for failure by not allowing natural colonization and site conditions to influence plant community composition. Also missing from this standard is a time frame, an exact location, and a clear description of the action. Multiple interpretations of the word "dominated" are possible.	Several standards may be needed. For example: 1) A minimum of X (number of) species of native shrubs or trees will be present in the wetland by the end of the monitoring period. 2) A minimum of X (number of) native, herbaceous species will be present in the wetland by the end of the monitoring period. 3) X species (same as X above)[i.e., scrub shrub, forested] will each provide at least X% aerial cover in the compensatory mitigation wetland site by the end of the X-year monitoring period.
Within 5 years vegetation will provide adequate food and habitat to support populations of species found in natural areas of compatible size.	This standard is not useful for regulatory purposes. It is not measurable. It does not identify an attribute of vegetation that would be measured, nor does it provide a quantity/status that should be reached. Also missing from the standard is a location. The time frame and action are ambiguous.	Several standards may be needed. For example: 1) By year 5 there will be X-X acres of native, palustrine emergent wetland (PEM, as defined by Cowardin et al. 1979) at the wetland mitigation site. 2) By year 5 there will be X-X acres of native, palustrine scrub-shrub wetland (PSS, as defined by Cowardin et al. 1979) at the wetland mitigation site.
In the first year of monitoring, X% of the planted species or appropriate volunteers must be present and viable.	This standard is confusing and may be hard to measure or enforce. Words like "viable" have multiple interpretations. The words "appropriate volunteers" may be subject to interpretation, also.	An alternate standard would be: Native woody species (planted or volunteer) will maintain an average stem density of X in the scrub-shrub wetland in all monitoring years.

Performance Standard	Rationale	Alternate Standard
In year 3, survival of planted vegetation will be X%.	This is ambiguous, immeasurable, and unachievable. Standards should distinguish between woody and herbaceous plantings. The survival rate of planted herbaceous species is difficult to measure (dead herbaceous planting can disappear quickly and living individuals are difficult to distinguish for many plants). For woody plantings, measuring survival at year 3 can also be difficult and does not provide a good depiction of what is on-site: natural recruitment of woody species may have occurred. It would be better to measure stem density and then aerial cover in later years.	Alternate standards for the establishment of woody vegetation could be: In year 1, survival of planted woody vegetation at the mitigation site will be 100%. Of all dead plantings are replaced, the standard will be considered met. In year 3, woody vegetation at the mitigation site will have a stem density of at least X stems/acre. In year 10, woody vegetation at the mitigation site will achieve at least X% aerial cover.
The wetland will be saturated during the growing season.	This is ambiguous, immeasurable, and unachievable.	An alternate standard could be: The compensatory mitigation site will have X-X% area that is seasonally inundated (surface water present for > 1 month, but no more than 6 months) each year of monitoring.