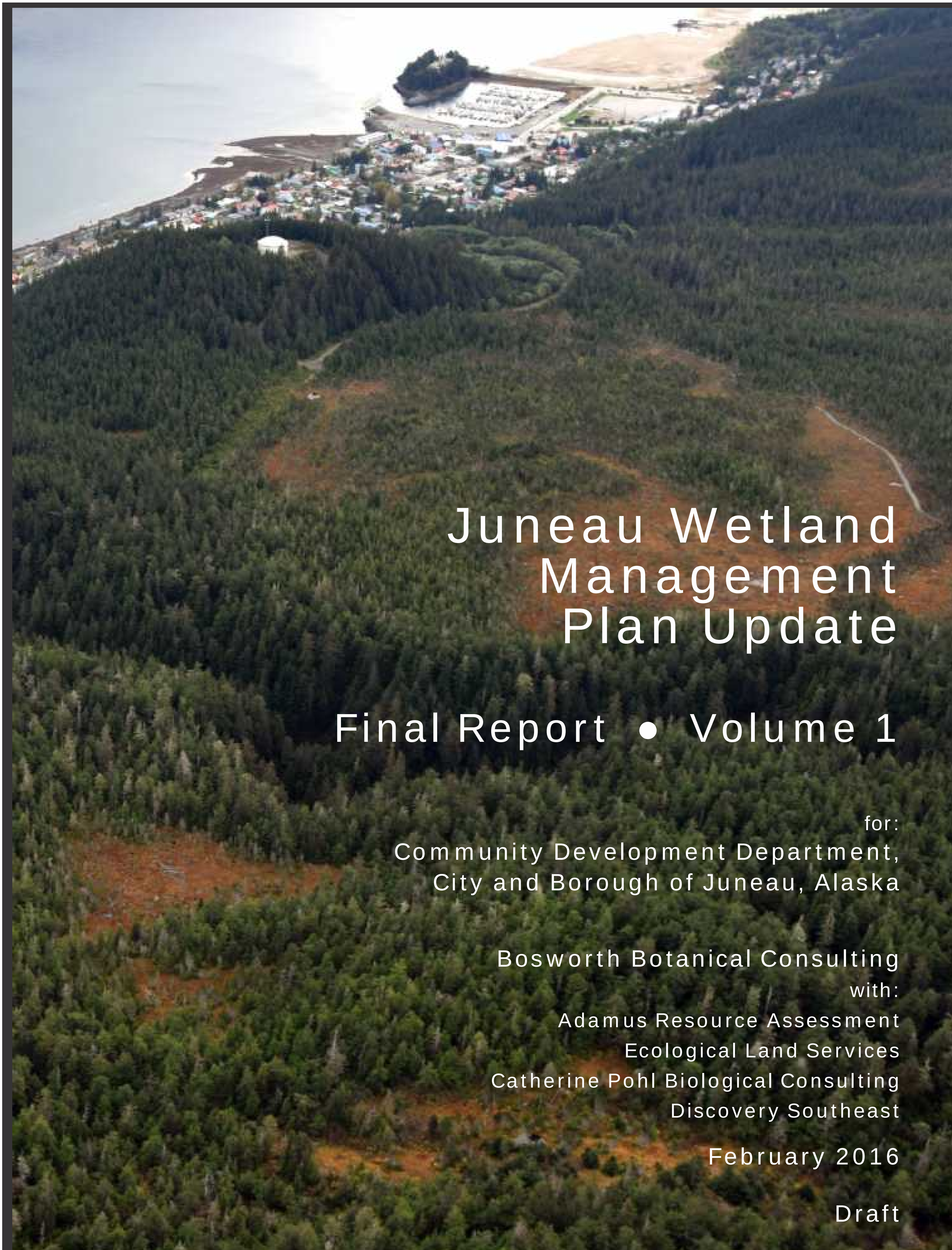

Juneau Wetland Management Plan Update

Final Report ● Volume 1

for:
Community Development Department,
City and Borough of Juneau, Alaska

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Cover: View east-southeast over Lawson Creek and Crow Hill to Douglas, September 2014.

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Executive Summary

The Juneau Wetland Management Plan (JWMP), Volume 1, provides results of wetlands mapping and wetland functional assessments for currently undeveloped parcels within the City and Borough of Juneau (CBJ). The study areas were selected for their potential for future development based on low elevation and proximity to existing infrastructure. During the 2014 and 2015 field seasons, 94 distinct wetlands were mapped covering 5,204 acres. Within these, 13 tidal and 332 non-tidal Assessment Areas (AA) were assessed. Rapid functional assessments of wetlands were conducted for each study area in the field and from the office using the Wetland Ecosystem Services Protocol for Alaska—Southeast (WESPAK-SE) methodology. WESPAK-SE assesses 22 functions and 18 values provided by wetlands. Volume 2 contains all the raw data and assessments discussed in Volume 1.

The scope of the project included mapping of approximate wetland boundaries, post-field processing of GPS data, field and office based assessments of wetland functions and values, and the calculation of raw and re-scaled wetland assessment scores. The areas selected are likely the main focus of development during the next 20 years. The project area consists of 78 Priority Areas (PA), the majority of which are located in lower elevation landscapes. All of the areas mapped and assessed are clustered within 10 map pages.

The existing JWMP was adopted by CBJ's governing board in November 1992 and reissued with minor revisions in 1997. It divided Juneau wetlands into four main categories: A, B, C and D. In 1994, the Army Corps of Engineers (Army Corps) signed a cooperative agreement with CBJ allowing the established Wetland Review Board (WRB) to assume all responsibility for lower functioning wetlands (C & D). Since the expiration of the General Permit in 2011, wetland management in the Juneau area has continued under direction from the WRB, but all permitting responsibility resides with the Army Corps. In conjunction with the expiration of the General Permit and the issuance of the Army Corps' 2008 Federal Compensatory Mitigation for Losses of Aquatic Resources Rule, 33CFR Part 332 (2008 Federal Rule), mandating standards for compensatory mitigation for wetlands, CBJ recognized the need for broader and more informed planning which necessitated an update to the existing JWMP.

General goals and objectives of this update and future efforts, relying on the wetlands mapping and assessments of Volumes 1 and 2, include, improving consistency in wetland policy and regulation, developing a categorization of wetlands, developing a long-range strategy to avoid, minimize and mitigate wetland impacts and promote mitigation options, restore wetlands and minimize adverse impacts, increase permit predictability, protect wetlands near anadromous water bodies and drinking water supplies, and promote wetland education.

The Federal Clean Water Act (CWA) requires regulatory agencies to consider a wetland's function and value when reaching decisions about permit approval. Functions are what wetlands do naturally and value describes what wetlands do for society. WESPAK-SE is a standardized tool, that utilizes both a field and office component, for assessing a wetland's functions and values and consists of data forms and a spreadsheet that computes a score for each function, value, or other attribute on a scale of 0 (lowest) to 10 (highest). WESPAK-SE uses rapidly observable indicators to document the relative level of a given function in a specific wetland AA. After scores are normalized and computed, a descriptor (Lower, Moderate, Higher) is placed next to each function and value score. To ensure the quality, consistency and accuracy of collected WESPAK-SE several procedures were put in place throughout the duration of the study which include, double-entered data entry, repeatability of results and field form interpretations. A wetland function score is estimated to remain valid for a period of 10-30 years.

At present, the WRB has no authority to issue wetland permits. Additionally, the 2008 Federal Rule states a watershed approach must be used to establish compensatory mitigation requirements in Army Corps permits. Furthermore, the 2008 Federal Rule states preference for the type and location of compensatory mitigation includes mitigation bank credits, in-lieu fee program, permittee-responsible mitigation under a watershed approach and permittee-responsible mitigation through off-site and/or out-of-kind mitigation. Volumes 1 and 2 of this JWMP update follow a watershed approach in the mapping and functional assessment of wetlands. With the information collected, the JWMP will become a long-range planning document that will assist public land managers and interested private landholders in the practical management of their respective properties and establish future wetland categories consistent with the goals and policies presented herein. Volume 1 presents three potential options for future management of wetlands within CBJ. The three options are 1) use the JWMP as a planning and educational tool only, 2) update enforceable policies and CBJ Land Use Code to reflect 1997 management strategy and acquire a General Permit from the Army Corps, and 3) update the enforceable policies and CBJ Land Use Code to manage and permit all wetlands by CBJ independent of the Army Corps.

1.0 INTRODUCTION

This Juneau Wetland Management Plan (JWMP), Volume 1, provides results of wetlands mapping and wetland functional assessments within large and currently undeveloped parcels in the Juneau area. The study area included Priority Areas (PA) within The City and Borough of Juneau (CBJ). PAs were selected by CBJ staff of the Community Development Department (CDD) for their suitability for potential areas of future development based on low elevation and proximity to existing infrastructure. The majority of the study area consists of CBJ-owned property. A few privately-owned properties are also within the study area. Field work was conducted during the spring and fall of 2014 and the summer of 2015.

Wetlands mapping in the study area was a reconnaissance-level effort, short of jurisdictional wetlands delineation. In nearly all areas, mapping involved physically walking wetland boundaries with hand-held Global Positioning System (GPS) units affording a high level of wetland mapping accuracy for CBJ planning purposes. Rapid functional assessments were conducted for each wetland Assessment Area (AA), in the field and from the office, utilizing the Wetland Ecosystem Services Protocol for Alaska – Southeast (WESPAK-SE). WESPAK-SE assesses 22 functions and 18 values provided by wetlands.

The purpose, scope, background, methods and results of this wetland mapping and assessment effort is included in Volume 1. Additionally, potential approaches to use the information for future CBJ development planning is discussed, along with implementation of a watershed-based approach for wetland impact avoidance, minimization and mitigation. Also included are policies and implementing action items that will potentially direct future efforts of the CDD. Rapid assessment scores and maps for each AA are found in the accompanying Volume 2.

1.1 Study Purpose

The wetland mapping and assessment project reported here was developed to provide accurate information about the location and characteristics of wetlands on large and undeveloped parcels in the Juneau area. The information is intended to make land use decisions more objective, science-based, and efficient; providing key information for updates of the previous JWMP for the CBJ. The wetland inventory accomplished through this JWMP update does not provide legal wetland delineation lines, but more of a guidance tool to locate wetlands and understand their functions.

1.2 Scope

Primary tasks of this project include:

- Preliminary mapping of wetlands and AAs to plan and guide field efforts;
- Documentation of wetland boundaries using GPS coordinates;
- Post-field processing of GPS data: differential correction, archiving and exporting to shapefile;
- Mapping of wetland boundaries in Geographic Information System (GIS) using GPS results;
- Field and office-based assessment of wetland functions and values;
- Calculation of raw and re-scaled wetland assessment scores;
- Bi-weekly progress reports;
- Draft of final report completed in 2015, including a section on implementation/planning options and;
- Final report completed in 2016.

The mapping and assessment was conducted in parts of the CBJ designated by the CDD as a priority for this study. The study area, encompassing about 1% of CBJ, was conducted within PAs shown on maps throughout this document. The boundaries included areas CDD staff believe(d) are likely to be the main focus of development during the next 20 years.

1.3 History

In 1985, the CBJ formed a Wetlands Interagency Advisory Committee, which recommended a study to analyze and prioritize public and private wetlands within the CBJ for development and conservation; the study utilized was Adamus Resource Assessment 1987a, b, c. In 1992, the CDD used the results of this study to formulate the first JWMP. The JWMP was adopted by CBJ's governing board (herein referred to as the Assembly) in November 1992 and reissued with minor revisions in 1997. The Assembly also appointed a Wetlands Review Board (WRB) composed of seven members from the public at large.

Prior to November 1992, wetland management in Juneau was primarily under the jurisdiction of the U.S Army Corps of Engineers (Army Corps). In 1992, in order to establish a stronger local role in wetland management, CBJ government adopted the JWMP. Regulatory provisions of the JWMP were adopted into the CBJ Land Use Code and given oversight by the newly formed CBJ WRB. Part of the WRB's oversight included adoption of a general wetlands mitigation strategy. This strategy pursued wetlands protection, public education and wetlands restoration and creation as the primary mitigating actions for wetland impacts. Following adoption of the JWMP into Land Use Code, regulatory provisions of the JWMP have had the full effect of federal law administered at the local level. The JWMP was recognized by the Army Corps and used at the federal level for decisions regarding local wetland fill permits and other management strategies for public wetland resources.

Under the JWMP, Juneau's wetlands were divided into four main categories: A, B, C, and D. Categories A and B were considered higher quality wetlands; C and D were considered lower quality wetlands. A fifth category, Enhancement Potential (EP) refers to wetlands with potential for enhancement projects. In 1994 the Army Corps signed a cooperative agreement with CBJ government allowing the WRB to assume all responsibility for C and D wetlands, providing the WRB with local oversight and authority to grant a General Permit for wetland fill. The Army Corps retained permitting authority for the higher quality A and B wetlands, as well as any wetlands not otherwise classified under the JWMP or identified on existing wetland inventory maps. Any impacts proposed for A or B wetlands required an Individual or Nationwide permit to be issued by the Army Corps, granted within the standard federal regulatory procedure.

The Army Corps continued to reissue local authority for General Permits in C, D, and EP wetlands from 1993 until 2011. In 2011, the Army Corps did not renew the General Permit because the vast majority of C and D wetlands (as identified on existing JWMP wetland maps) had been filled. Since the expiration of the General Permit in 2011, wetland management in Juneau has continued under direction and oversight from the WRB. At present, the WRB has no authority to issue wetland permits, and does not have a defined framework for interpreting or applying broadly applicable mitigation actions (the Juneau Wetlands Mitigation Bank was initiated in 2008 and abandoned in 2009).

Following a grant award, CBJ scheduled updates to the JWMP for 2013. Field mapping was concluded in 2014 and a new draft of the JWMP was completed in 2015. This draft addresses new strategies for local wetland regulation as well as exploring new opportunities for meeting requirements of the Army Corps' 2008 Federal Compensatory Mitigation for Losses of Aquatic Resources Rule, 33CFR Part 332 (2008 Federal Rule) for development impacts in Juneau's wetland areas.

The 2008 Federal Rule established standards and criteria for the use of all types of compensatory mitigation, including on-site and off-site permittee responsible mitigation, mitigation banks, and in-lieu fee mitigation to offset unavoidable impacts to waters of the U.S. The 2008 Federal Rule outlines a general preference for the methods of mitigation as 1) restoration, 2) establishment or enhancement, and in certain circumstances 3) preservation. Another requirement of the 2008 Federal Rule is a watershed approach must be used to establish compensatory mitigation requirements in Army Corps permits. In general, mitigation should be located in the same watershed as the impact site and where it is most likely to effectively replace lost functions and services while taking into account such watershed scale features as aquatic habitat diversity, habitat connectivity, relationships to hydrologic sources, trends in land use, ecological benefits, and compatibility with adjacent land uses. Where watershed boundaries do not exist, such as marine areas, an appropriate spatial scale should be used rather than watershed boundaries.

The issuance of the 2008 Federal Rule, the expiration of the Army Corps' General Permit in 2011, and the need for broader and informed planning by CBJ necessitates this update to the JWMP. General goals of the update and future efforts of CBJ, which rely on the wetlands mapping and assessments presented in Volumes 1 and 2, include the following:

- Promote consistency in wetland policies and regulations.
- Rank or categorize wetlands to identify high and low functioning wetlands.
- Maximize use of other sources of wetland mapping and functional assessment.
- Ensure the long-term scientific integrity of the JWMP.
- Promote long-range development strategies with the Army Corps and other partners to avoid, minimize and mitigate wetland impacts.
- Promote a variety of mitigation options for development in appropriate areas.
- Promote restoration opportunities in degraded wetland areas.
- Minimize adverse impacts to high functioning wetlands.
- Increase wetland permit predictability and streamline the permitting process.
- Provide informed decisions regarding protection and development of wetlands.
- Incorporate a diversified, watershed-based approach to protect and manage wetlands and minimize cumulative effects.
- Protect wetlands in or near anadromous water bodies, or adjacent to public water sources.
- Promote wetland education.

Results of Volume 1 and 2 will be used by CBJ to expand the area covered by the original JWMP, updating it to include more rigorous mapping and assessment methods. The study uses assessment methods developed under a federal grant to the Southeast Alaska Land Trust (SEAL Trust) and later refined through a federal grant to CBJ (Adamus 2012, Adamus 2013). The WRB and the project's Habitat Mapping Working Group (a state and federal agency group advising CDD), have formally approved the WESPAK-SE method for the project.

Importantly, Volumes 1 and 2 do not include Army Corps-verified wetland jurisdictional delineations. To be Army Corps-verified a wetland boundary delineation needs significantly more detail, including on-the-ground staking or flagging, wetland and upland determination plots and detailed data sheets, and a report prepared describing the effort. That level of detail was not within the scope of this effort. Also important, this update to the JWMP does not include categorization, rating or ranking of wetlands. However it does provide a discussion of possible approaches to developing a wetland categorization system based on the functional scores derived from WESPAK-SE.

1.4 Project Area

The project area consists of 78 PAs; each assigned one of four levels of priority for mapping and assessment. The majority of the PAs are lower elevation landscapes with low or moderate slope; however some steep and/or higher elevation sites are also included. The tracts span from Cowee Creek at the northern end of Glacier Highway to southern Douglas Island. Vast and varied lowland wetlands on both sides of the Douglas highway are included, as well as large tracts along Fish Creek, at Eaglecrest, and on west Douglas Island.

For the purposes of this report, the areas mapped and assessed are clustered within 10 map pages. North to south, these are, Echo Cove (01EC), Eagle River (02ER), Lena Point (03LP), Auke Bay (04AB), North Valley (05NV), South Valley (06SV), Lemon Creek (07LC), North Douglas (08ND), West Juneau (09WJ), and West Douglas (11WD). Areas within CBJ's map page 10, South Douglas Island, were assigned lower priority for field efforts so were not included in the field surveys. Instead, they were mapped and assessed using a different, off-site method, described below in Section 2.3.4, Off-Site Assessments.

1.5 Wetland Functions and Values

The Federal Clean Water Act (CWA), under Section 404, requires regulatory agencies to consider a wetland's function and value when reaching decisions about permit approval and mitigation needs. *Functions* are what wetlands do naturally, such as store water, purify polluted runoff, and provide habitat. Dozens of functions could be described for any given wetland, but some are of unknown or limited importance to society and/or ecological resources, and others are difficult to assess. Therefore, most wetland assessments focus on a limited set of generally recognized functions and other attributes that are most relevant in a given region. Those considered having the greatest potential relevance to Southeast Alaska, and which therefore were assessed in this study and could be used to prioritize Juneau wetlands, are defined in Table 1. As contrasted with Functions, wetland *Values* describe the context of a wetland in a broader physical, biological, and social landscape, as well as addressing the extent to which one wetland function may contribute to others. Assessments of functions and values together help regulators evaluate whether altering a wetland may have a negative effect on people and/or ecosystems.

Table 1. The definition and values of the wetland functions assessed in this study

Function or Other Attribute	Definition	Values
Water Storage & Delay	Storing runoff or delaying the downslope movement of surface water for long or short periods.	Flood control, maintain ecological systems.
Stream Flow Support	Contributing water to streams, especially during the driest part of a growing season.	Support fish and other aquatic life.
Water Cooling	Maintaining or reducing temperature of downslope waters.	Support coldwater fish and other aquatic life.
Water Warming	Increasing the temperature of downslope waters and extending length of the aquatic growing season.	Maintain late-season ice-free conditions.
Sediment Retention & Stabilization	Intercepting and filtering suspended inorganic sediments thus allowing their deposition, as well as reducing energy of waves and currents, resisting excessive erosion, and stabilizing underlying sediments or soil.	Maintain quality of receiving waters. Protect shoreline structures from erosion.
Phosphorus Retention	Retaining phosphorus for long periods (>1 growing season)	Maintain quality of receiving waters.
Nitrate Removal & Retention	Retaining particulate nitrate and converting soluble nitrate and ammonium to nitrogen gas while generating little or no nitrous oxide (a potent greenhouse gas).	Maintain quality of receiving waters.
Carbon Sequestration	Retaining both incoming particulate and dissolved carbon, and converting carbon dioxide gas to organic matter (particulate or dissolved), and then retaining that organic matter on a net annual basis for long periods while emitting little or no methane (a potent greenhouse gas).	Reduce risk of global climate warming.
Organic Nutrient Export	Producing and subsequently exporting organic nutrients (mainly carbon), either particulate or dissolved.	Support food chains in receiving waters. Facilitate transfer of iron to marine waters.
Anadromous Fish Habitat	Supporting rearing or spawning habitat of fish species that migrate from marine waters into freshwater streams to spawn, e.g., coho and sockeye salmon.	Support commercial, subsistence, sport, and ecological values. Infuse uplands with marine nutrients.

Function or Other Attribute	Definition	Values
Resident Fish Habitat	Supporting an abundance and diversity of native fish (both resident and visiting species) that are not anadromous, e.g., Dolly Varden and cutthroat trout.	Support commercial, subsistence, sport, and ecological values.
Invertebrate Habitat	Supporting or contributing to an abundance or diversity of invertebrate animals which spend all or part of their life cycle underwater or in moist soil. Includes dragonflies, midges, clams, snails, water beetles, shrimp, aquatic worms, and others.	Support salmon and other aquatic life. Maintain regional biodiversity.
Amphibian Habitat	Supporting or contributing to an abundance or diversity of native frogs, toads, and salamanders.	Maintain regional biodiversity.
Waterbird Feeding Habitat	Supporting or contributing to an abundance or diversity of waterbirds that migrate or winter but do not breed in the region.	Support subsistence, sport, and ecological values. Maintain regional biodiversity.
Waterbird Nesting Habitat	Supporting or contributing to an abundance or diversity of waterbirds that nest in the region.	Maintain regional biodiversity.
Songbird, Raptor, & Mammal Habitat	Supporting or contributing to an abundance or diversity of native songbird, raptor, and mammal species and functional groups, especially those that are most dependent on wetlands or water.	Maintain regional biodiversity.
Pollinator Habitat	Supporting pollinating insects, such as bees, wasps, flies, butterflies, moths, and beetles.	Maintain forest productivity and food chains.
Native Plant Habitat	Supporting or contributing to a diversity of native, hydrophytic, vascular plant species, communities, and/or functional groups.	Maintain regional biodiversity and food chains.
Public Use & Recognition	Prior designation of the wetland, by a natural resource or environmental protection agency, as some type of special protected area. Also, the potential and actual use of a wetland for low-intensity outdoor recreation, education, or research.	Commercial and social benefits of recreation. Protection of prior public investments.
Wetland Ecological Condition*	The integrity or health of a wetland, as defined operationally by its vegetation composition and richness of native species. More broadly, the similarity of a wetland's structure, composition, and function with that of reference wetlands of the same type and landscape setting, operating within the bounds of natural or historical disturbance regimes.	
Wetland Sensitivity*	A wetland's lack of intrinsic resistance and resilience to human and natural stressors (higher score = more sensitive).	
Stress Potential*	The degree to which a wetland has recently been altered by or is exposed to risk from factors capable of reducing one or more of its functions and which are primarily human-related.	

* These are other attributes of wetlands and are not considered to be either functions or values

2.0 METHODS

2.1 Mapping Wetland Boundaries

When an applicant applies for a permit to fill a wetland, by law, a determination must be made regarding the exact location of the boundary between what is wetland and what is non-wetland. For this study, wetlands were delineated using the Routine Determination Method according to the *Army Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987): Alaska Region (Version 2.0) (Army Corps 2010). For regulatory purposes under the CWA, Section 404, the Environmental Protection Agency (EPA) defines wetlands as “areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (EPA 2014). These three criteria were applied to draw wetland boundaries in the PAs described in this document.

Before wetlands were assessed, ArcGIS software, digital orthophotography, Light Detection and Ranging (LiDAR), and high resolution aerial imagery were used to predict potential wetland locations. Geo-referenced PAs and predicted wetland boundaries were uploaded to GPS units for real-time navigation on the ground. Predicted wetland locations provided a starting point for field analysis and were at times very close to reality on the ground. In most situations wetlands were found to be larger in the field than predicted using imagery. Wetlands were also found in locations that were not predicted by imagery or existing maps. Tidal extreme and mean high water lines were used for identifying wetland boundaries per the Army Corps' CWA lateral jurisdiction: 33 CFR 328.3e. Wetland data collected in the field was downloaded, archived, and post-processed daily. Post-processed GPS files were exported to Environmental Systems Research Institute (ESRI) ArcGIS shapefiles in the NAD 2011 State Plane projection and used to draw averaged wetland units presented in this report.

2.2 Mapping Wetland Assessment Areas

The CDD requested entire wetlands be divided into multiple wetland AAs if larger than one acre in size and met other specific criteria described below. This was requested for logistical reasons as some Juneau wetlands extend for many miles, which can potentially reduce the accuracy and utility of scores that might be assigned to the entire wetland.

Dividing an entire wetland into separate AAs is a subjective process, as boundary locations can dramatically influence the resulting scores. The CDD specified that guidelines in the WESPAK-SE manual be used as the basis for splitting AAs, and that no individual AA smaller than one acre be mapped or separated from its contiguous wetland (Adamus 2012). The proposal, in an effort to honor those guidelines and provide additional detail essential to enhance consistency, stated that AAs would be distinguished as follows:

a. Different wetland type using definitions in Form F of WESPAK-SE.

b. Different wetland system, class, or subclass as mapped by the National Wetlands Inventory using the Cowardin classification.

c. Road crossing or other persistently non-vegetated area.

d. Pre-existing data that shows clear differences in one or more functions within a possible wetland (e.g., anadromous fish in one intersecting stream but not another).

e. Convex topography or watershed boundary (e.g., half the precipitation hitting the wetland would flow in one direction and the rest would flow in the opposite direction due to a topographic mound within the wetland).

It was never intended that all above rules be applied in all cases; rather, used as a guide. If *all* of the above criteria had been applied to the wetlands in the study area, the number of resulting AAs would likely have exceeded 1,000 and visiting and assessing a number that large would have been cost prohibitive to the project. As a more realistic target, the CDD had suggested that 400 AAs within the study area be visited and assessed. Based only on interpretation of aerial imagery (LiDAR and orthophotos provided by the CDD), in the early phases of the project it was estimated the number of AAs in the study area would come closest to matching the target number if they were delimited only by criteria (a) and (e). Those criteria also best reflect the WESPAK-SE manual's statement that *"boundaries of the AA should be based mainly on hydrologic connectivity."*

As relates to criterion (a), the following seven wetland types were used to delimit separate AAs:

- Tidal Wetland (*td*)
- Forested Peatland (*fw*)
- Open Peatland (*op*)
- Fen/Marsh (*fm*)
- Uplift Meadow (*um*)
- Floodplain Wetland (*fl*)
- Beaver-influenced Wetland (*bi*)

Definitions are found in Table 2 and illustrated in the WESPAK-SE *Short Guide* and manual, with one exception: Beaver-influenced wetland. While similar to Fen/Marsh and Floodplain Wetland, it differs in several important ways functionally, and meets the objective of representing a dramatically different hydrologic regime.

Subshed mapping Watersheds can be delimited at many spatial scales. For this study, models of stream networks were adjusted to an appropriate level of detail and used to delimit the watersheds, which were termed “subsheds.” That is, wherever a wetland of a particular type was intersected by a significant watershed divide, the portions of the wetland draining to each stream were delimited as separate AAs despite being contiguous with each other and of the same wetland type. However, where application of this watershed criterion would have resulted in an AA smaller than one acre, no splitting was done.

Subshed mapping was done as-needed over the course of the 2014 field season. Near the end of the season, a similar, but borough-wide, streams model, received from CBJ, allowed fine-tuning of subshed boundaries. Some wetland units were merged (subsumed) and others split along basin divides. For more information on this process and criteria, see report entitled *subshedmapping.pdf* (Bosworth, Carstensen & Pohl, 2014b).

2.3 Assessing Wetland Functions and Values

WESPAK-SE is a standardized tool for assessing a wetland’s functions and values as well as other attributes. It consists of data forms and a spreadsheet that computes a score for each function, value, or other attribute on a scale of 0 (lowest) to 10 (highest). Although many standardized tools are available for assessing wetland functions, the CDD selected WESPAK-SE because it is specifically customized for Southeast Alaska wetlands and has previously been tested and reviewed in Juneau and throughout the region. Additionally, consultants and agency personnel have been trained in its use.

WESPAK-SE does not measure wetland functions and values directly. Rather, it uses rapidly observable indicators to build a case for the relative level of a given function that may exist in a specific wetland AA (relative meaning relative to other wetlands in the study area). Indicators are used in lieu of direct measurement which would be extremely expensive and require years of data.

WESPAK-SE has both a field component and an office component. Completing both is essential in order for the tool to generate scores for each function and value. The implementation of these components is described below. Other features of WESPAK-SE, including its strengths and limitations, detailed accounts of its models, and descriptions of how it computes scores, are presented in the WESPAK-SE manual (Adamus 2012).

2.3.1 Field Component

The orthophotos and derivatives of LiDAR products provided by CDD helped field crews navigate to the AAs, locate features within each AA to assess, find inflow and outflow channels, and estimate gradients. Field data was collected by up to five team members, often in two teams. The field portion of the WESPAK-SE assessment typically required less than two hours to complete during a single visit, while recording wetland-upland boundaries with GPS required from one to several days depending on size, remoteness, and character of the wetland area. Typically, one team member conducted a set of assessments and took photos, while the other crew member(s) located and documented the wetland boundary using GPS. Team membership and roles varied throughout the field season, which ran from May 8, 2014 to mid-October 2014. A few remaining assessments were completed in June 2015.

The orthophotos and LiDAR provided by CDD were helpful in ensuring accurate estimation of several indicators of wetland functions. These images and data layers were reviewed before completing each AA’s WESPAK-SE data forms. In particular, they measured wetland and stream gradient; located small streams, beaver dams, and topographic indicators of groundwater discharge, and measured tree heights and percentages of conifer vs. deciduous vegetation and tree vs. shrub cover.

2.3.2 Office Component

The WESPAK-SE office forms require a WESPAK-SE user to access and obtain many types of data from an internet portal assembled specifically for WESPAK-SE by Southeast Alaska GIS Library. However, when large numbers of wetlands need to be assessed, efficiencies can be gained by using desktop GIS software to query the same or similar spatial data layers— as was done for this study. A set of improved and additional GIS layers tailored to the needs of this project were developed, along with a guide to its use (Bosworth, Carstensen & Pohl, 2014c).

2.3.3 Normalizing the Scores

Although each of the models WESPAK-SE uses to assign scores has a theoretical minimum score of 0 and a maximum score of 10, in practice when WESPAK-SE is applied to a large number of wetlands the actual range for any given function, value, or other attribute is usually narrower. Depending on the function or value, the resulting range of raw scores found among all sites may be broad (e.g. 1 to 9) or narrow (e.g. 3 to 8). After all field data had been collected and raw scores calculated, they were converted mathematically to a common zero to 10 scale for ease of interpretation and rough comparison. This is termed normalizing. The normalizing of scores for a given wetland AA was done by comparing its raw scores with the range of scores determined for all of the assessed AAs. A formula was then applied using the range of raw scores for each wetland function and each wetland value among the 332 non-tidal AAs and then separately for the 13 tidal AAs. Again, note that raw scores were normalized to those from the population of local wetlands visited by this study, not to a range of raw scores from all Juneau wetlands or to wetlands throughout Southeast Alaska.

After scores were computed and normalized, a descriptor (Lower, Moderate, Higher) was placed next to each function and value score. For a given function or value, natural breaks in the statistical distribution of scores among all assessed sites in the PA were used to determine whether to characterize a score as Lower, Moderate, or Higher. Natural breaks were identified using a popular statistical procedure called Jenks Optimization (Jenks 1967). Using iterative calculations with gradual adjustments in group membership, the method minimizes variance within groups while maximizing the variance between groups.

2.3.4 Off-site Assessments

A number of the parcels chosen by the CDD for potential mapping and assessment in this project could not be assessed on-site. The CDD asked the study team to map and assess 12 of these private parcels, which would have to be assessed off-site. Additionally, one other CBJ parcel located on South Douglas Island, with difficult access, was also done off-site.

As with mapping of on-site AAs, the CBJ's 2013 high-resolution aerial imagery and LiDAR- derived digital elevation model and associated products were useful in determining wetland boundaries for the off-site areas, especially with open peatlands, fen/marshes, uplift meadows and tidal wetlands.

If necessary, wetlands were further divided into AAs using the same two criterion as the on-site wetlands—wetland type and subshed. The office form component of the assessment was no different than the on-site form. However, by referring to the combination of normalized vegetation, high-resolution stream maps, hillshade, fine contours, and color infrared orthophotography, most of the field form questions could be answered, even without a site visit to the wetland. Therefore, the raw scores of wetlands assessed only from off-site were normalized not by comparison with all assessed Juneau wetlands, but rather by comparison with the other wetlands assessed off-site.

2.3.5 Quality Assurance

Several procedures were undertaken throughout the duration of the project to ensure the quality (consistency and accuracy) of the collected WESPAK-SE data. These include but are not limited to ones described below.

Data Entry
As WESPAK-SE field assessments were completed, data was double-entered into the standard spreadsheet. An Excel script automatically flagged entries that were in conflict. The hard-copy data form was then referred to in order to resolve any discord. Data entry proved highly accurate so double entry was discontinued mid-season.

Repeatability of Results
The repeatability of WESPAK-SE scores among independent users visiting the same wetlands had been tested previously in 2013 with generally good results (mean error of + or - 0.86 on a scale of 0 to 10). Repeatability testing was conducted again at the start of the 2014 field season and the results demonstrated a higher overall level of consistency.

All office-based portions of the wetland assessments were completed using ESRI ArcMap desktop GIS software along with locally tailored and enhanced data layers specific to the project area. To check accuracy of the office form portion of the wetland assessment protocol, office assessments were completed independently by another person for four separate AAs using similar data layers via the University Alaska Southeast online WESPAK-SE wetlands portal and GoogleEarth. No inconsistencies were found.

Clarifications and Interpretations Provided for WESPAK-SE: Field Questions
To help maintain consistency among assessments, field form interpretations and clarifications prepared by the WESPAK-SE author were used and are noted below.

Non-tidal Wetlands
Definitions of wetland types that comprise the choices for the first question of the non-tidal field form were clarified and refined as follows:

- Forested Peatland was clarified to include *muck* (either mineral or organic muck) as well as peat soil.
- Uplift Meadow was refined as *usually less than 30% tree canopy cover.*
- Open Peatland was clarified as having *less than 5% cover of trees* (in addition to already specifying less than 30% cover of woody plants over 3 feet tall).
- Definition of Fen/marsh was clarified similarly.
- Fen/marsh was described with additional examples of regionally common emergent plant species (*marsh marigold*) and settings (*often beaver-created or adjoining larger water bodies*).

Several clarifications were also made to other WESPAK-SE non-tidal field form questions to ensure consistent and intended interpretation:

- For question F9, loose muck was included as part of water depth. In question F12, the flat shoreline extent is expressed as percent of shoreline length.
- In question F21, the color of water is more specifically described as tea-stained.
- Inflow, in question F25, was clarified to mean surface water that at least once annually, flows from a stream or ditch longer than 300 feet (before it reaches the AA) or in a pipe or hardened conduit, directly or as overbank floodwater.
- The flow complexity choice in question F28 is to be selected for most of the flowing water or the choice producing the greatest friction, rather than the first applicable description.

- For question 31, part b concerning flow into a soil pit was disregarded.
- Question F43, Moss Extent, refers to the percent of the vegetated ground cover comprised of peat- forming moss (excluding moss on trees or rocks).
- Upland inclusions, F46, can be mounds of any type of upland soil. Invasive species (F54) can be woody or herbaceous.
- Shorebird feeding habitat, question F48, is further defined as non-acidic water shallower than 4 inches.
- In question F54, the slope from disturbed lands is to be considered uphill of the unit, or adjoining it if there are none.
- For F55 (Weed Source), the upland edge can be in any direction, not just uphill.
- For question 63, non-consumptive uses, walking refers to walking access for an average person. Interpretive centers, trails with signs or brochures, or regular guided tours apply only if within .25 mile of the AA and if they interpret the natural features of the AA or associated lands.
- All hunting is to be included (question F68) with waterfowl hunting; known berry picking areas are to be included with harvesting of native plants.

Tidal Wetlands

The definition of Tidal Wetland includes tidal freshwater as well as saline areas. "Dominated by emergent herbaceous or woody plants" was interpreted simply as "*dominated by vascular plant cover (excluding submerged aquatics)."* The criterion "level of surface water fluctuates every ~6 hours" was interpreted to mean *only when surface water is present,* which may be as little as once annually. *"Driftwood"* (Tidal Form question 12) refers to largely horizontal logs on the ground near the high water line. "*Large woody debris*" refers to wood such as root masses, large trunks and branches carried into the unit by currents or fallen from adjacent uplands.

2.3.6 Limitations

Known limitations of the WESPAK-SE tool used to score this study's wetlands are described in the WESPAK-SE manual and will not be repeated here. In addition, the following is a partial list of other significant limitations:

- In nearly all instances, and as a result of time and budget constraints, wetland AAs were visited only once during the two-year field component of this project. This has the potential to affect the location of some wetland boundaries but especially, the scores resulting from use of WESPAK-SE. To address this, the study teams used observable indicators and previously-acquired knowledge of the project area's climate and geology to interpret conditions that were not directly observable on the day of the visit.

- Although federal wetland delineation criteria served as a guide for mapping wetland boundaries in the field, test plot data routinely required in formal wetland delineation were not collected or recorded. Doing so over such a large area was not possible within the time frame and funding constraints of the grant that supported this project. For this reason, wetland boundaries and locations presented in this report are to be considered approximate; they provide an inventory of wetland resources rather than a delineation of wetland boundaries. Data presented in this report normally cannot be considered "final" for use in applications for wetland alteration permits. Primarily, it is intended to be used for land use planning

- Considerable variation in vegetation, water regime, and ultimately function may occur *within* a wetland. For example, a Forested Peatland could be split by form (shrub or tree) and/or foliage (deciduous or conifer), and Tidal Wetland could be split into low marsh (inundated daily) versus high marsh. In this example, splitting Forested Peatland into finer components could provide more-refined information useful for assessing biodiversity at broader scales. It could also indicate which areas within a wetland AA contribute more or less to its function score. However, using a wetland classification any finer than the current seven-class one, even if such existed, was beyond the time and budget constraints of this project. It is likely that much of the sort of variation within the project wetlands that is important for predicting their functions was captured by the 126 questions in the WESPAK- SE tool.

- The office form component of the WESPAK-SE score calculator requires the use of spatial data obtained from resource agencies. The source agencies typically make no claims as to the completeness, accuracy, precision, or recentness of the spatial data they provide. Nonetheless, excluding the data entirely from these wetland assessments would result in much poorer estimates of wetland function. The data obtained from other agencies have varying levels of influence on the scores and ratings of the wetlands described in this report. The degree of influence depends on which function is being assessed.

- Although it is not possible to state with certainty for how long the scores of any wetland AA will remain valid, a best estimate suggests approximately 10-30 years. A more exact estimate would depend on forecasting the likelihood of short and long-term changes in climate, uplift from glacial rebound, new debris flows or roads, beaver activity, natural succession of vegetation, development-related land cover changes in nearby areas, and a host of other factors. A particular wetland's capacity to resist functional change in response to these factors cannot be predicted, nor can the functions which would be most sensitive to these factors be identified beforehand. Major changes in any of these factors that are apparent in a wetland or within a few miles, especially along connected streams, could suggest a need to reassess the wetland using the same version of WESPAK-SE used in this study.

- The indicators and models featured in WESPAK-SE are intended to represent wetland science as it currently exists. As with all science, continued research in this region and elsewhere could yield new discoveries that might suggest a need to change some of the indicator variables and assumptions currently embedded in WESPAK-SE. It is recommended that new spatial data sets and new learnings about wetland science be reviewed at least once every 10 years and their impact on WESPAK-SE models, scores, and ratings be evaluated. However, any future changes made to the indicator variables WESPAK-SE uses, the wording of its questions, or the weights and combination rules of its models, will require that all the wetland AAs covered by this study be reassessed and re-categorized. That would be true regardless of which methodology had been used in this study.

3.0 INVENTORY OVERVIEW

3.1 Acreages, Wetland Distributions

During the 2014 and 2015 field seasons, 94 distinct (contiguous) wetlands were mapped within 60 PAs, dividing these into 345 units and covering 5,204 acres. Within these, the functions of 13 tidal and 332 non-tidal wetland AAs were assessed. The PAs surveyed were as follows: 13 of 21 in Priority I Area; 23 of 27 in Priority II Area, and 24 of 27 in Priority III Area. Two AAs surveyed on request from private owners were located outside of any PA.

PAs not covered in the wetland surveys included 15 priority I, II, & III private parcels (eight priority I; four priority II; three priority III); the private-land portions of three priority I areas, including a large area on the west side of Douglas Island; and the three priority IV areas.

Wetlands mapped totaled 5,584 acres, or 44% of the 12,717 acres of PAs surveyed. The most extensive wetlands occurred on level, poorly drained marine terraces, notably the raised benches of North Douglas (87%), West Juneau (67%) and West Douglas. To give a more realistic percentage for those ancient marine landforms on West Douglas, the estimated acres from off-site assessments on private lands seaward of CBJ property were added. Because this side of the island was more wave exposed at time of deposition (~9000 to 12,000 years ago), sediments are coarser, and wetlands fewer, with much less open peatland.

Underlying these patterns in wetland distribution are the geographic constraints governing PAs the CBJ wanted investigated. Steep slopes pose challenges to construction and are also avoided due to liabilities such as postlogging erosion and impacts to streams downslope. This drives PA selection toward low-lying landforms whose drainage characteristics depend on sediment size, which in turn stems from glaciomarine history. Most of the flat but well-drained alluvial, deltaic or coarse-till surfaces in the CBJ were developed by the 1970s. Remaining flat or gently rolling terrain is generally blanketed by marine fines, raised above sea level millennia ago. These sediments are referred to locally as "blue clay," and while they typically contain more silt than clay-sized particles, they generally support open or forested wetlands.

Least wetland cover (28%) was found on PAs within the Lemon Creek (LC) Map Page. Considerable portions of these units occupy fairly well-drained toeslope (colluvial) positions. Forested Peatlands comprise the large majority (76% by acreage) of wetlands within the study PAs. Many of the forested wetlands had small, well-dispersed hemlocks with large gaps between tree crowns, resulting in brushy understories over an herbaceous layer dominated by skunk cabbage. Wetlands with skunk cabbage were also present, however, in larger closed-canopy hemlock forest, often on moderate slopes, and in large-tree riparian spruce forest.

Second most common (15%) are open peatlands (*op*), typically with very deep, saturated sphagnum or sedge/sphagnum peat. These ranged from recently uplifted tidelands (*e.g.* Amalga) to ancient peatlands. They varied from nearly flat sphagnum-dominated bogs to sloping spike rush-dominated, pond-studded fens with orchids.

The remaining five wetland types are relatively rare, collectively constituting only 8% of the total by acreage, and 24% by number of mapped units. Such low percentages do not mean these wetland types are ecologically insignificant. Beaver wetlands (*bi*) support rich fish and wildlife traffic. Uplift meadows (*um*) are Juneau's most globally unique habitats on the most heavily developed landform. Tidal wetlands (*td*) are uncommon within the surveys because few assigned PAs overlapped tidelands.

If the AA boundaries based upon differing wetland type or subshed (*i.e.* hydrologic divide) were dissolved, the total number of discrete wetlands assessed drops from 345 to 94.

4.0 IMPLEMENTATION

4.1 Comparison of 1997 JWMP to 2016 JWMP

Table 2 provides a summary of major differences between the previous JWMP (1997) and the 2016 JWMP Update, represented by Volumes 1 and 2.

Table 2: Comparison: 1997 JWMP vs. 2016 JWMP

YEAR	Areas Covered	Wetland Categories	Wetland Mapping Methods	Functional Assessment Methodology	Watershed Approach
JWMP 1997	15-square mile area in the Juneau area; 141 wetlands mapped and assessed. No estuarine or tidal wetlands assessed.	Four categories from higher value (A or B) to lower value (C or D) and a fifth category for wetlands with potential for enhancement (EP).	Based on 1986 Corps' mapping by aerial photo, with updates on case by case delineations or permit actions from 1986 to 1997.	Adamus WET technique with 14 separate functions for freshwater wetlands.	Not specifically as all wetlands were mapped and assessed independent of the watersheds in which they were located.

YEAR	Areas Covered	Wetland Categories	Wetland Mapping Methods	Functional Assessment Methodology	Watershed Approach
JWMP 2016	Approximately 20-square miles of study area, including 94 distinct wetlands within 60 assessed PAs. Areas mapped and assessed are included in 10 map pages. Includes 15 estuarine or tidal wetlands assessed.	No categories developed in Volumes 1 & 2, however framework provided to form categories based on function and value scores of wetlands.	On-the-ground GPS mapping of wetland boundaries on accessible properties, aerial photo mapping of wetlands on in-accessible properties, during the spring, summer and fall of 2014-2015	WESPAK-SE assessing 22 functions and 18 values provided by seven wetland types.	Yes-certain functions, for example, relationship of any AA wetland to other wetlands, contains important elements of a watershed approach.

4.1.1 Wetland Management in CBJ

Since the expiration of the General Permits in 2011, wetland management in Juneau has continued under direction and oversight from the WRB. The WRB is composed of seven members, appointed by the Assembly which chooses representatives from the public at large, along with two representatives of the CBJ Planning Commission. When making appointments, the Assembly is required to consider the "broadest possible representation from those technical fields with knowledge of the values, functions and uses of wetlands, such as fish or wildlife biology, geology, hydrology, land use planning, and engineering" (CBJ49.70.1010). Appointments are three-year terms. The presence of five members constitutes a quorum and any action of the WRB requires five or more affirmative votes to be approved.

At present, the WRB has no authority to issue wetland permits, and does not have a defined framework for interpreting or applying broadly applicable mitigation actions (the Juneau Wetlands Mitigation Bank was initiated in 2008 and abandoned in 2009). Instead, the WRB functions as an advisory body to the Planning Commission and the Director of the CDD regarding general wetlands issues. WRB responsibilities include (but are not limited to) providing comments on wetland permit applications under Army Corps review, reviewing protection standards for streams and riparian areas, and the overall conduct of local, state and federal projects that affect wetlands and streams.

Following an attempt to establish the Juneau Wetlands Mitigation Bank the primary method for mitigating wetland impacts in CBJ is through the fee-in-lieu program sponsored by the SEAL Trust. The fee-in-lieu program is required to meet regulations named in the 2008 Federal Rule. SEAL Trust's fee-in-lieu program functions similarly to a preservation bank: the funds received for wetland mitigation fund permanent conservation of wetland areas across Southeast Alaska. The fee-in-lieu program is a form of wetland mitigation but meets the second (not the first) preferred option as defined by the Army Corps.

4.1.2 The 2008 Federal Rule

The purpose of the 2008 Federal Rule is to establish standards and criteria for the use of all types of compensatory mitigation, including on-site and off-site permittee responsible mitigation, mitigation banks, and in-lieu fee mitigation to offset unavoidable impacts to waters of the U.S. authorized through the Corp permits under Section 404 of the CWA and Sections 9 or 10 of the Rivers and Harbors Act. The 2008 Federal Rule directs that standards and criteria shall:

- to the extent practicable, maximize available credits and opportunities for mitigation;
- provide for regional variations in wetland conditions, functions, and values, and;
- apply equivalent standards and criteria to each type of compensatory mitigation.

For all Army Corps permits, the applicant must take all appropriate and practicable steps to avoid and minimize adverse impacts to waters/wetlands of the U.S. prior to proposing and implementing mitigation. This is referred to as sequencing, where the permit process requires in sequence: 1) avoidance, 2) minimization, and 3) mitigation. Permits cannot be obtained by directly proposing mitigation for anticipated impacts. Instead, the Army Corps requires the applicant demonstrate avoidance and minimization measures have been fully considered and documented before moving to the mitigation phase of the permit process. Equal mitigation/impact ratio is required for most permits and the quality/quantity of that is weighed in the permitting process, but only after avoidance and minimization measures are considered.

The 2008 Federal Rule outlines a general preference for the methods of mitigation as 1) restoration, 2) establishment or enhancement, and in certain circumstances 3) preservation. Preservation, which does not create, restore, rehabilitate, enhance, or otherwise lift wetland function, can only be utilized when all the following criteria are met:

- the resources to be preserved provide important physical, chemical, or biological functions for the watershed and
- the resources to be preserved contribute significantly to the ecological sustainability of the watershed

Where preservation is used, the 2008 Federal Rule states that “to the extent appropriate and practicable the preservation shall be done in conjunction with aquatic resource restoration, establishment, and/or enhancement activities. When this requirement is waived by the Army Corps District Engineer, and deemed preservation only, compensation ratios shall be higher.”

Another requirement of the 2008 Federal Rule is a watershed approach must be used to establish compensatory mitigation requirements in Army Corps permits. In general, mitigation should be located in the same watershed as the impact site and where it is most likely to effectively replace lost functions and services taking into account such watershed scale features as aquatic habitat diversity, habitat connectivity, relationships to hydrologic sources, trends in land use, ecological benefits, and compatibility with adjacent land uses. Where watershed boundaries do not exist, such as marine areas, an appropriate spatial scale should be used rather than watershed boundaries. The 2008 Federal Rule does not specify at what scale watersheds should be mapped, so without further guidance it is not possible to ensure that mitigation occurs "in the same watershed as the impact site." This CBJ study has mapped watersheds (subsheds) in the study area at a much finer scale than is commonly used to evaluate mitigation requirements. See section 4.3.2 for additional description of how this study has implemented a watershed approach.

Furthermore, the 2008 Federal Rule stated preference for the type and location of compensatory mitigation is listed as follows along with a brief characterization of each type:

1) Mitigation bank credits: a site or suite of sites where resources are restored, established, enhanced, and/or preserved. In general, a mitigation bank sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the mitigation bank sponsor.

2) In-lieu fee program means a program involving the restoration, establishment, enhancement and/or preservation of resources through funds paid to a governmental or non-profit natural resource management entity. Similar to a mitigation bank, credits are sold to permittees whose obligation to provide mitigation is then transferred to the in-lieu fee sponsor.

3) Permittee-responsible mitigation under a watershed approach: resource restoration, establishment, enhancement and/or preservation undertaken by the permittee.

4) permittee-responsible mitigation through on-site and in-kind mitigation, performed by the applicant on the project site.

5) Permittee-responsible mitigation through off-site and/or out-of-kind mitigation, performed by the applicant on another site arranged by the applicant.

4.1.3 Mitigation in Southeast Alaska

Following the mitigation sequencing explained above, mitigation demonstrating restoration and enhancement is preferred over preservation mitigation. The availability of wetland restoration and enhancement opportunities on private land in Southeast Alaska is limited, and furthermore, such opportunities on public land are often encumbered with legal or administrative prohibitions or policies discouraging private investment. As such, preservation mitigation has been the primary source of mitigation found in Southeast Alaska to date.

The resources necessary to restore or enhance wetlands in Southeast Alaska, due to such factors as limited or remote access, mobilization logistics, weather constraints, and terrain, magnify the significance, and therefore the value, of those restoration and enhancement opportunities that do exist.

A bank offering some restoration or enhancement opportunities, even if proportionally less than that provided by preservation, and considering the overall constraints to mitigation banking specific to Southeast Alaska, is given preference in the determination of credit generation ratios when a lift in functions can be achieved.

There are proposed private mitigation banks in Southeast Alaska that could provide restoration and enhancement opportunities. When avoidance and minimization have been addressed and wetland impacts remain in a proposed project, the primary mitigation option for wetlands within the CBJ remains fee-in-lieu until a wetland mitigation bank with a service area reaching Juneau is approved.

4.2 Best Available Science

The objective of the JWMP is to develop a long-range planning document that will assist public land managers and interested private landholders in the practical management of their properties. The project meets this goal by providing wetland maps and scores and ratings for wetland functions and values. It provides comparative, site-specific information identifying the higher-functioning wetlands and lower-functioning wetlands. The WESPAK-SE assessments and mapping are also in compliance with the 2008 Federal Rule as it takes into account regional differences in wetland resources and functions and features key elements of a watershed approach to wetland management (see section 4.3.2 of this report).

The JWMP will assign wetlands to planning categories using the scores and ratings WESPAK-SE produced for 22 functions and 18 values of each wetland AA. That site-specific foreknowledge will allow landowners to anticipate the likely ease or difficulty in obtaining permits necessary for wetland alterations, and thus the likely time and cost constraints. For example, a landowner proposing a development within the part of the CBJ covered by this study would have access to the wetland inventory including location of wetlands, if any, and function and value scores of those wetlands. By facilitating transfer of such information earlier in the planning process, this may allow for project decisions to be made earlier in the planning process. If the project is proposed in an area with higher-functioning wetlands, the landowner may decide to find alternative building sites. Or, if the project area would impact lower-functioning wetlands, the landowner may decide to continue planning for the development of that area and would be provided with mitigation regulations applicable to wetlands that may be impacted.

CBJ strives to protect higher-scoring wetlands while allowing impacts, with avoidance and mitigation, to some lower-scoring wetlands. The planning category to which a wetland will be assigned will be decided through review of its function scores and ratings, as implemented through a public process. In addition, where impacts to a wetland are unavoidable, the WESPAK-SE information from this report will tell the landowner and the CBJ which functions need to be replaced in mitigation to achieve the Army Corps' longstanding national goal of "no net loss."

4.3 Wetland Categories for Plan Implementation

Establishing wetland categories is potentially useful in implementing the JWMP. However, at this time, CBJ will not establish specific wetland categories that indicate high value (A and B) or low value (C and D). This option may be considered at a later date before or after the JWMP is finalized. The reason CBJ has chosen not to establish categories at this stage is categorization requires a public discussion, among agencies, stakeholders and the public, of the relative value of different wetland functions (for example, whether salmon habitat or flood control/water storage has more value to society). The wetland mapping and WESPAK-SE assessments presented in the previous chapters provide a body of science-based information on the functions wetlands provide in the CBJ; a key tool necessary for the categorization process to be successful. The process of reaching wetland categories is a collaborative process with CBJ staff, policy makers, and stakeholders to agree upon a prioritization of wetland functional values.

4.3.1 Options for Summarizing a Wetland's Relative Importance

In order for the CBJ to make consistent decisions regarding wetlands, a procedure is needed that specifies how to use WESPAK-SE scores to evaluate and compare wetlands. A single score or rating derived from the 40 functions and values assessed by WESPAK-SE for an individual AA affords decision makers a consistent tool to manage wetlands within the CBJ. The challenge is how best to combine into a single score or rating the 40 scores that WESPAK-SE generates for an individual wetland. WESPAK-SE provides science and statistics for wetland analysis; these must be paired with policies or preferences of agencies and elected officials to provide meaningful rules.

To date, CBJ has not adopted a detailed procedure for summarizing a wetland's relative importance from the assessment scores provided by WESPAK-SE. Creating a wetland rating system will involve using the 22 functions and 18 values that WESPAK-SE produces for each wetland and combining those numbers into an overall wetland score in a manner that does not distort the information. Input from resource agencies, stakeholders, and the public will be required for this task.

To begin a discussion for combining scores for multiple functions and values into one overall score per wetland, three questions must be addressed:

1) Should the overall wetland score reflect functions, values, or both functions and values? What weight should be given to values as opposed to functions?

2) How should scores for different functions and their values be combined to yield an overall wetland score?

3) For converting a wetland's overall score to a rating, should that score first be placed into one of three groups (e.g., Lower, Moderate, Higher) or four (e.g., A, B, C, D), or an alternative grouping?

Question #1
Consider the function and value scores, and function ratings, for "Anadromous Fish Habitat" calculated from eight wetlands in the JWMP update:

Table 3. Example of function and value scores and ratings for the function, "Anadromous Fish Habitat," for eight of the AAs assessed by this study

Site ID	Function score (normalized)	Function rating	Value score (normalized)	Value rating
ER08	8.44	Higher	8.17	Higher
ER71	10.00	Higher	6.67	Moderate
WD15	9.09	Higher	1.75	Lower
ER07	7.26	Moderate	8.67	**Higher**
ER02	4.28	Moderate	6.67	Moderate
EC49	6.19	Moderate	0.50	Lower
ER66	1.55	Lower	6.67	**Moderate**
AB01	0.00	Lower	0.00	Lower

Function, in this instance, refers to the likely capacity of each wetland to support anadromous fish based on access and the presence of surface water. If anadromous fish cannot access a wetland or if the wetland never has surface water then the function score is 0. That does not mean they are unimportant to anadromous fish. At least some of those AAs help support fish habitat downstream by maintaining water temperature and the flow of nutrients and invertebrate foods to downstream fish habitat that is accessible. Those functions are scored and rated separately at this stage of the calculations and so are not shown in this table. Function scores for wetlands accessible to anadromous fish depend mainly on the estimated duration of their stream connection, their hydrologic regime, habitat structure, productivity, absence of man-made features likely to harm fish, and the condition of adjoining riparian habitat. The specific indicators (e.g., large wood in channel) that define these broader attributes (such as habitat structure), and the manner in which they were estimated visually and combined, are described in the WESPAK-SE manual and spreadsheet calculator.

Value of Anadromous Fish Habitat in any wetland is automatically assigned a 0 if the Function score is 0 due to no fish access. For all other wetlands, the Value of the wetland's Anadromous Fish Habitat is considered more important if the wetland:

- is predicted to provide good habitat for two other functions (the AA's scores for Waterbird Feeding Habitat and Songbird-Raptor-Mammal Habitat are averaged), or,
- is visited more frequently or there is evidence of fishing, or,
- is located within one of the higher-scoring watersheds for anadromous fish habitat in all of Southeast Alaska as denoted in the "Conservation Assessment and Resource Synthesis for Southeast Alaska," sponsored by Audubon Alaska and The Nature Conservancy (Schoen and Dovechin 2007).

The maximum of these three is what determines the Value score. Thus, a wetland with fish access can still receive a high Value score if it lacks of one of them. However, if the AA cannot be accessed by anadromous species, its Value score is set at 0 (because its Function score will be 0), regardless of whether it is located in one of the higher-scoring watersheds.

In Table 3, note the two AAs (ER07 and ER66), whose Value score is higher than their Function score. A wetland would be considered to be of higher value if it provides only mediocre habitat is because Function and Value use different criteria, and partly because there is no consensus as to how much a Value score should be increased if a Function score is relatively large. Similarly, in the opposite situation (site WD15, whose Value score is lower despite the site scoring high for Function), there is no consensus as to how much (if at all) the Function score should be lowered because its Value score is low.

One option for wetland rating would be to always use the Function score and/or rating to represent a site's Anadromous Fish Habitat unless the site's Value score or rating for Anadromous Fish Habitat is greater. In those rare cases (3 percent of the study wetlands) the average of the two scores could be used to represent Anadromous Fish Habitat. Alternatively, the function score could be increased by some uniformly-applied percentage any time the value score is greater than the function score.

A second option is to ignore the value score entirely and use only the function score to represent a site's Anadromous Fish Habitat. In those cases, there is a risk that fish-accessible wetlands whose watersheds provide some of the best overall habitat for anadromous fish in Southeast Alaska could potentially score lower than fish-accessible wetlands in watersheds that are unremarkable overall for anadromous fish habitat. For this reason, the second option is not recommended. Indicators and criteria used to determine the value score of the other wetland functions considered by WESPAK-SE are described in the WESPAK-SE manual.

Table 4. For Anadromous Fish Habitat, the number of wetland AAs having different combinations of function and value ratings

Function Rating	**Value Rating**	**# of AA's having that combination**	**%**
Higher	Higher	6	2%
Higher	Moderate	25	8%
Higher	Lower	2	1%
Moderate	Higher	8	2%
Moderate	Moderate	26	8%
Moderate	Lower	6	2%
Lower	Higher	0	0%
Lower	Moderate	2	1%
Lower	Lower	256	77%

Question #2

With regard to this question, several options for calculations are shown at the bottom of Table 5.

Table 5. Normalized function scores and ratings for four study area wetlands, with results of six options for calculating an overall score for each wetland

	Site:	ER71		ER02		ER09		ER08	
Group	Function	Score	Rating	Score	Rating	Score	Rating	Score	Rating
1	Anadromous Fish Habitat	**10.00**	H	4.28	M	0.00	L	**8.44**	H
	Resident Fish Habitat	8.60	H	7.09	M	6.61	M	7.48	H
2	Carbon Sequestration	2.65	L	6.87	H	**7.09**	H	2.83	L
	Nitrate Removal	4.84	H	2.12	M	1.84	L	3.11	M
	Phosphorus Retention	3.78	M	3.83	M	4.20	H	3.55	M
	Sediment Retention & Stabilization	3.81	M	2.59	M	6.22	H	4.88	H
3	Invertebrate Habitat	6.22	H	2.75	L	1.88	L	2.23	L
	Organic Nutrient Export	7.32	M	5.35	L	4.51	L	6.57	M
	Stream Flow Support	2.57	L	0.42	L	0.50	L	4.29	M
	Water Cooling	4.85	M	4.28	M	4.60	M	7.51	H
	Water Warming	4.12	M	2.94	M	0.00	L	1.26	L
4	Water Storage	3.98	M	5.96	H	2.56	L	5.90	H
5	Amphibian Habitat	1.55	L	4.04	M	4.36	M	2.90	M
	Waterbird Feeding Habitat	8.07	H	6.33	H	6.71	H	0.00	L
	Waterbird Nesting Habitat	5.61	M	3.86	M	0.00	L	3.98	M

6	Songbird, Raptor, & Mammal Habitat	4.76	M	**7.30**	H	5.19	M	7.53	H
	Native Plant Habitat	4.85	M	4.55	M	3.23	M	5.86	H
	Pollinator Habitat	2.31	L	4.97	M	1.77	L	3.09	L
	Option 2a. Average of All	4.99		4.42		3.40		4.52	
	Option 2b. Maximum of All	10.00		7.30		7.09		8.44	
	Option 2c. (Average + Max)/2 of All	7.50		5.86		5.25		6.48	
	Option 2d. Group Averages, then Average Groups	5.19		4.83		3.35		4.94	
	Option 2e. Group Averages, then Max of Groups	9.30		5.96		4.84		7.96	
	Option 2f. Group Max's, then Average Groups	6.51		6.48		5.46		6.37	

- In the table's Options 2d-f, the functions are placed into thematic groups before doing the final calculations. If the CDD wishes to form such groups that are intermediate in the calculations of each site's overall score, the membership of the groups may be changed or stay the same as shown here. The grouping in this table, while recommended, is mainly for illustration.
- The CDD may choose to use weighted averages rather than plain averages, with weights for the more important wetland functions decided by the CDD after public input.
- In any of the summarizing calculations, the CDD may choose to include the scores of either or both of two other attributes calculated by WESPAK-SE but which are not truly wetland functions and thus were not shown in the table. Those are: Public Use & Recognition, and Wetland Sensitivity.
- Once a particular option is chosen, the overall scores of all assessed sites must be normalized (adjusted mathematically to ensure they fully span a 0-to-10 scale) and then converted to ratings by using the recommended statistical procedure (described in section 2.3.3) to identify natural breaks in the distribution of overall scores among those sites.
- The CDD may choose to weight an AA's overall score by the size (area) of either the AA or of the AA plus its adjoining AAs, if any. The CDD may also choose to weight an AA's overall score by the AA's proximity to public roads, with the assumption that AAs closest to roads are most attractive for development, all other factors being equal. In calculations associated with either option, the CDD must decide whether to weight an AA's overall score based on WESPAK-SE equally with either or both of these factors.
- Any score combination procedure which involves use of averages, maximums, or percentiles will introduce some statistical distortion because the score distributions of different functions differ. Some functions skew high overall, others low; this is due both to differences among functions in the overall capacity of local wetlands to perform those functions and to the structures of the function models. While efforts have been made to reduce this distortion, some is inevitable.

For the sites in Table 5 the calculation option (2a-2f) had no measurable effect on the ranking of the sites. The ranking results unintentionally parallel the ranking of the sites based on just their Anadromous Fish Habitat function score. It is unknown whether the results are generally applicable to this study's data.

The same normalized score sometimes results in different ratings for different functions. For example, for site ER08 a score of 2.90 for Amphibian Habitat results in a rating of Moderate, yet a score of 3.09 for Pollinator Habitat gets a rating of Low. Although that may seem counterintuitive, it occurs because each function's scores have a statistical distribution that differs from those of the other functions. This is explained further in section 2.3.3. Tables 6 and 7 show the break-points used in this study to convert the normalized scores to ratings for each function.

Table 6. Thresholds of normalized scores used to determine rating of each function or value in each **non-tidal** wetland AA

	Thresholds for Function Rating		Thresholds for Value Rating	
Function:	Low IF:	High IF:	Low IF:	High IF:
Anadromous Fish Habitat	≤ 2.76	≥ 7.37	≤ 2.00	≥ 7.33
Resident Fish Habitat	= 0	≥ 7.23	≤ 2.31	≥ 5.66
Carbon Sequestration	≤ 3.88	≥ 6.02	N.A.	N.A.
Nitrate Removal	≤ 1.86	≥ 3.17	≤ 3.03	≥ 5.35
Phosphorus Retention	≤ 2.56	≥ 3.85	≤ 2.15	≥ 5.67
Sediment Retention & Stabilization	≤ 2.28	≥ 4.1	≤ 1.93	≥ 6.27
Invertebrate Habitat	≤ 3.17	≥ 5.22	≤ 2.85	≥ 6.36
Organic Nutrient Export	≤ 5.93	≥ 7.67	N.A.	N.A.
Stream Flow Support	≤ 3.2	≥ 5.8	= 0	≥ 4.58
Water Cooling	≤ 2.04	≥ 5.3	≤ 2.04	≥ 3.95
Water Warming	≤ 1.43	≥ 4.75	≤ 2.63	≥ 5.61
Water Storage	≤ 2.75	≥ 5.03	≤ 3.06	≥ 7.08
Amphibian Habitat	≤ 2.72	≥ 5.16	≤ 3.75	≥ 6.31
Waterbird Feeding Habitat	= 0	≥ 5.94	= 0	≥ 5.33
Waterbird Nesting Habitat	= 0	≥ 5.66	= 0	≥ 9.70
Songbird, Raptor, & Mammal Habitat	≤ 2.62	≥ 6.93	≤ 2.50	≥ 6.73
Native Plant Habitat	≤ 3.10	≥ 5.25	≤ 1.88	≥ 5.29
Pollinator Habitat	≤ 4.11	≥ 6.72	= 0	≥ 4.47
Public Use & Recognition	N.A.	N.A.	≤ 2.38	≥ 4.41
Wetland Sensitivity	N.A.	N.A.	≤ 4.44	≥ 6.77
Wetland Risk	N.A.	N.A.	≤ 3.88	≥ 6.40
Wetland Stressors	N.A.	N.A.	≤ 4.84	≥ 7.63
Wetland Ecological Condition	N.A.	N.A.	≤ 3.23	≥ 5.70

Table 7. Thresholds of normalized scores used to determine rating of each function or value in each **tidal** wetland AA

	Thresholds for Function Rating		Thresholds for Value Rating	
Function:	Low IF:	High IF:	Low IF:	High IF:
Anadromous Fish Habitat	= 0	≥ 4.34	= 0	≥ 7.62
Carbon Sequestration	≤ 1.30	≥ 3.49	N.A.	N.A.
Organic Nutrient Export	≤ 2.49	≥ 5.71	N.A.	N.A.
Sediment Retention	≤ 1.49	≥ 4.26	≤ 1.80	≥ 4.79
Waterbird Feeding Habitat	≤ 2.08	≥ 6.40	≤ 3.33	≥ 6.67
Songbird, Raptor, & Mammal Habitat	≤ 2.43	≥ 5.89	= 0	= 10
Native Plant Habitat	≤ 1.39	≥ 3.60	= 0	= 10
Public Use & Recognition	N.A.	N.A.	= 0	≥ 7.61

Question #3

The CBJ's 1997 JWMP assigned wetlands to four categories. Going forward with four or more categories would provide more flexibility in wetland planning decisions and complies with past practices in Juneau, although the criteria used to define the boundaries of the categories using the current data would differ from those used previously. Alternatively, the use of three categories may be more statistically defensible (e.g., broader confidence intervals), given the potential for some human error in applying WESPAK-SE.

4.3.2 The Watershed Context for Wetland Function Scores

This study assigned scores to individual AAs. However, the relationship of any one AA to others, as well as to anadromous streams, was partially factored into each AA's score. Thus, this study contained key elements of a watershed approach. The connectivity or contiguity (even ephemeral) of any AA to an anadromous stream is indicated by its Anadromous Fish Habitat function score--all those with a score of 0 cannot be accessed by anadromous fish. If a wetland unit has a channel outlet but no fish access, and the waters flowing through that outlet connect to tidewater or anadromous fish habitat further downslope, this was noted during the field work. The WESPAK-SE models are constructed such that it potentially increases the scores of that wetland unit for several functions: Stream Flow Support, Water Cooling, Organic Nutrient Export, Aquatic Invertebrates, and Native Plant Habitat. It does so because, despite the absence of anadromous fish in the AA itself, the AA potentially buffers environmental extremes and thus supports the temperature, hydrologic, and water quality regimes of anadromous fish habitat below blockages. Such blockages prohibit fish upstream movement into the AA but generally do not halt the seaward flow of surface water out of the AA.

Analysis of function ratings generated by the WESPAK-SE models support the importance of non-anadromous wetlands for a host of other functions. Of the sites rated Lower for Anadromous Fish Habitat, more than half were rated Moderate or Higher for the following functions by the WESPAK-SE models:

- Songbird, Raptor, & Mammal Habitat
- Water Cooling
- Carbon Sequestration
- Organic Nutrient Export
- Water Warming
- Pollinator Habitat
- Water Storage
- Native Plant Habitat
- Phosphorus Retention

Another aspect of connectivity concerns the contiguity of any single wetland AA to others. The identification numbers of all such contiguous AAs can be identified from the maps in JWMP Volume 2, which also shows the watershed ("subshed") boundaries in the project area. The WESPAK-SE models used to rate the wetlands are structured such that AAs which are adjoined by growing numbers of other AAs are more likely to have higher scores for all the habitat functions, provided they meet other requirements of most species associated with that function: Aquatic Invertebrate Habitat, Amphibian Habitat, Waterbird Feeding Habitat, Waterbird Nesting Habitat, Songbird-Raptor-Mammal Habitat, Native Plant Habitat, Pollinator Habitat.

Although beyond the scope of resources available in this current contract, an analysis could be undertaken in the future that would identify, from the current data set, which wetland functions are rarest in each subshed (watershed) or in the study area overall. Then, the value scores of any wetlands that do perform those rare functions in that subshed could be increased in proportion to the rarity of those functions in that subshed or study area or by some predetermined percentage. However, it must be recognized that watershed boundaries are not relevant to several wetland functions (e.g. Pollinator Habitat, Waterbird Habitat) and values (Public Use & Recognition) because the use of a wetland by pollinators, waterbirds, and people is virtually unaffected by a watershed boundary.

Another analysis that could strengthen a watershed approach would apply to AAs that are not accessible to anadromous fish but would involve using each AA's flow-path distance to anadromous fish habitat (stream, floodplain, or estuarine) as a weighting factor for Anadromous Fish Habitat function or value score. Preferably, the flow-path distance would be measured only after the study area's hydrologic connections are determined and mapped more thoroughly, and surveys are completed that document fish presence (especially coho) in smaller channels and floodplains of the study area.

Additionally, another examination that could strengthen a watershed approach, but was also beyond the scope of resources available, would involve using as a weighting factor the historical losses of wetlands or specific wetland types in the study area or its watersheds. However, comprehensive data on such losses do not exist. Looking forward, careful record-keeping of the extent of wetland alterations permitted, by watershed and function scores/ratings, could help address concerns about cumulative impacts of function losses associated with the permit programs.

4.4 Plan Implementation Options

If categories are needed for the implementation of JWMP, once they are agreed upon and established, the JWMP can be implemented through different options presented in this chapter. Since the first plan, written in 1993, CBJ's management strategy has involved the use of a General Permit from the Army Corps. This implementation chapter examines the successes and issues with wetland management in the past and proposes three options for future wetland management implementation in Juneau. Regional examples of wetland management are cited and compared for reference. The three options are 1) use the wetlands management plan as a planning and educational tool, 2) update enforceable policies and CBJ Land Use Code to reflect 1997 management strategy and apply for a General Permit from the Army Corps, 3) update the enforceable policies and CBJ Land Use Code to manage and permit wetlands by CBJ independent of the Army Corps.

Option 1: Planning and Education Tool Only - This option reflects the current status of wetland permitting in CBJ. Since the expiration of CBJ's General Permit in 2011, wetland permitting has been managed by the Army Corps for all categories of wetlands. The WRB is currently fulfilling an advisory role; in this capacity it could continue to function as an advisory body to the Planning Commission and to the Director of the Community Development on wetlands issues. Advisory functions would also include comments on wetland permit applications administered by the Army Corps, protection for stream side riparian areas and any affects that CBJ, state, or federal projects may have on wetlands and streams. This option could involve the continued advisory role of the WRB. CBJ could still comment on wetland fill permit applications through the Army Corps public process, but would not be involved in administering any wetland fill permits.

The detailed and extensive wetland mapping and WESPAK-SE assessments offer a science-based product that provides the JWMP an educational tool and guiding principles for wetland management. This tool is compliant with the 2008 Federal Rule as it takes into account regional differences in wetland resources and functions and, as much as possible, uses a watershed approach to wetland management. An example of this type of implementation can be found in Matanuska-Susitna Borough's (MSB) Wetlands Management Plan (MSBWMP, HDR, 2012). The purpose of the MSBWMP document is stated as:

This plan serves primarily as an educational tool and promotes coordination among all entities involved in wetland management. This plan does not propose or include any new regulations or permitting requirements. It encourages voluntary practices to conserve and protect wetland resources within the Mat-Su.

In addition to wetland and watershed mapping, the MSB Assembly passed several ordinances related to wetlands conservation and protection. Topics of these ordinances include flood control, shoreline setbacks, Best Management Practices (BMPs) for development, mitigation banking, and watershed classifications.

The overarching goals of wetlands planning in the MSBWMP involves taking a long-term management approach using three main goals; identify, assess, and protect. The MSB encompasses a much larger area than the CBJ. The goal is to identify wetlands at a planning scale of information that involves determining size, boundary and type of wetlands. Assessing wetlands for MSB involves developing unique functional assessment methodology. Lastly, implementing conservation and protection efforts includes the input of an advisory committee for avoiding, minimizing or compensating impacts on-site, participating in an in-lieu fee program, and creating wetland banks.

These goals of the MSBWMP provide a regional example to CBJ of how the JWMP can be used as a planning and educational tool. CBJ has many advantages due to the size of the borough and their accessibility and agreement to use WESPAK-SE. The recent mapping produced in this update should not limit CBJ's ability to acquire updated wetland and habitat mapping in the future. The current mapping and assessments provide a snapshot of the landscape and, with a dynamically changing environment, should continue to be updated in future efforts. The mapping and WESPAK-SE assessments allows for informed decision-making for wetland conservation and protection, and regulation. The Army Corps has expressed its support of the WESPAK-SE tool and CBJ has seen potential for its use in growth management planning.

Additionally, the JWMP is a useful tool to all stakeholders as a source for best available science. As a science-based document, the JWMP plays a valuable role in planning for future development by all entities involved in wetland management. The JWMP therefore is least influenced by political pressures, yet serves as a tool for future planning regarding community and borough priorities and values. In this option, wetland categories (such as A, B, C, D or High, Moderate, Low) are not necessary to complete the JWMP update. If so desired, the public process of creating categories from WESPAK-SE can be done as a next step to wetland management and land planning in Juneau.

There are some limitations to this option for the JWMP update. Since the past JWMP has included enforceable policies and, until 2011, the administration of wetland fill permits for lower quality wetlands, using the JWMP only as best available science and not assigning any regulatory authority to its contents may be interpreted as a step backward in wetland management by some stakeholders. This option would maintain CBJ as a stakeholder and commenter on proposed wetland fill permits issued by the Army Corps and would not reinstate any authority over wetland permits. The only remaining authority with CBJ would be in the scenario of CBJ as an applicant or landowner for a proposed project. CBJ would then be able to act as more than a commenter of the project application and would be involved in other local codes that apply to the proposed project. Applicants may have found clarity and consistency from the CBJ's past involvement in wetland permitting and this may be lost in relinquishing authority to the Army Corps for all types of wetland fill. However, with the previous update of the JWMP seven years ago, and the expiration of the general permits almost five years ago, the current situation has likely become familiar as the status quo.

Option 2: General Permit Update
This option would maintain, or reauthorize, the wetland management process described in the 2008 JWMP. In the 2008 JWMP a Plan Implementation section summarizes the approach the plan takes and is provided below. The language would match much of what is named below and in the existing JWMP or would be amended through the current update.

"On June 30, 1995, the Corps of Engineers issued General Permit 92-1 for wetlands that are classified as Category C, D, and EP in the Revised Juneau Wetlands Management Plan. On July 24, 2000, the Corps of Engineers issues four General Permits (2000-01, -02, -03 and -04) that replaced 92-1. On May 24, 2006, three of the General Permits (GP) were renewed: GP 2000-01, -02, -03. GP 2000-04 was not renewed due to lack of use. The General Permits authorize the discharge of fill material into wetlands, for the purpose of creating foundation pads for structures, utilities, associated roads, driveways, parking areas, and other domestic, governmental, and commercial development, as well as enhancement of certain environmental situations. These GPs authorize mechanized land clearing and other activities that could result in a re-deposition of fill material. Copies of both original and the new General Permits are included in Appendix II-F.

The Corps of Engineers has authorized the CBJ Wetlands Review Board to administer the General Permit through the permitting process outlined in this plan. The Board has the authority to issue wetland permits locally for the *discharge of dredged or fill material in these lower value and enhancement wetlands (Category C, D and EP) for the purposes listed in the General Permit. The Board will issue permits in compliance with the enforceable policies of this plan and the specific and general conditions included in the General Permit.*

For the Category C, D and EP wetlands, the CBJ has become a 'one-stop' wetlands permitting agency, greatly reducing permit processing time. No individual permit from the Corps of Engineers, consistency determination from the Alaska Department of Natural Resources, Office of Project Management and Permitting, nor individual water quality certification ("401 certification") from the Alaska Department of Environmental Conservation, is required for development in these wetlands. However, other local, State and federal permits may be needed for the project and it is the responsibility of the applicant to obtain all required permits.

For development proposals in Category A and B wetlands, and for any wetlands that are not within the Juneau Wetlands Management Plan study area or are not classified under the plan, a permit must still be obtained from the Corps of Engineers. The enforceable policies of the wetlands plan will be applied when those permit applications are reviewed by the Corps of Engineers."

The wetland categories mentioned in an earlier section of this chapter would need to be updated with the chosen categorization method. This option will require agreement between the Army Corps and CBJ on what constitutes "lower" and "higher" functioning wetlands through the established categorization system.

A regional example of this method is the 2014 Anchorage Wetland Management Plan (AWMP). Anchorage currently has General Permits issued to the municipality for lower valued wetlands, just as Juneau used to have. Using General Permits in wetland regulation requires agreed upon wetland categories for the Corp and CBJ to then name which agency will be in charge of issuing wetland permits for each category of wetland. Since WESPAK-SE is a wetland assessment tool designed for the Southeast Alaska region, Anchorage has created its own wetland assessment methodology, Anchorage Wetlands Assessment Methodology (AWAM) as well as a credit-debit method for mitigation, Anchorage Debit-Credit Method (ACDM). AWAM devised three categories of wetland, A, B, and C. The Corp issued General Permits for Anchorage to administer wetland fill permits for category C wetlands.

Additionally, the AWMP uses a watershed approach and accounts for regional characteristics in compliance with the 2008 Federal Rule. It also established procedures to determine debits and credits for impacts/mitigation regardless of whether it's a mitigation bank, in-lieu fee program or permittee-responsible mitigation. The AWMP fits with a General Permit as it also identifies the higher functioning and lower functioning wetlands, allowing impacts to lower quality wetlands and offering more protection for the higher quality wetlands. While it discusses the 2008 Federal Rule, the AWMP does not emphasize the specifics of it, especially the order of preference of banks first, in-lieu fee programs second and permittee-responsible approaches third.

It is important to note that the AWMP only acknowledges mitigation banking and in-lieu fee programs as tools for wetland preservation, when in fact the 2008 Federal Rule, as noted above, prioritizes mitigation banks and lists preservation as a last priority for mitigation type. For parts of Alaska, wetland restoration and enhancement opportunities have been difficult to find and successfully implement; preservation has instead been the focus. The preservation- only approach, does not meet the no-net-loss standard of the CWA (the foundation of the 2008 Federal Rule) because preservation does not restore or enhance wetland functions. Thus, when wetland impacts occur, no corresponding increase in function is provided to off-set the impact, only preservation of land already undeveloped. While the AWMP generally is consistent with the 2008 Federal Rule approach, the lack of restoration and enhancement opportunities has made the mitigation approach focus mostly on preservation only, which in the 2008 Federal Rule is the last approach in the order of preference.

Renewing and continuing to manage CBJ wetlands with General Permits provides some incentives to consider. This method inherently directs future wetland impacts toward lower functioning wetlands as it keeps wetland permitting at the local level for lower category wetlands. For applicants applying to impact lower category wetlands, this process should provide some certainty in acquiring a wetland permit and expedite their permitting process at the local level. Using the General Permit options for wetlands management could transfer wetland delineation and determination authority to CBJ in some cases and will be beneficial to CBJ's own development planning services.

Some drawbacks of this management option center around the need to renew the General Permit every five years. The initial acquisition and the renewal process require the Army Corps' approval which may come with uncertainty and additional expenses. Once the General Permits are approved, CBJ will need to have an established administrative and technical review for wetland impact assessment and mitigation. Additional updating of the CBJ code would also be necessary, which adds time and expenses to the process. CBJ would be required to write a new set of regulation or revise existing codes for the applicable wetlands, most likely incorporating a local political process, again adding time and cost.

Option 3: Local Code

This option involves the CBJ expanding current code for all wetlands of all categories within the borough and requires project applicants to adhere to CBJ code provisions (such as avoidance criteria and mitigation) while maintaining the Army Corps' administration of wetland fill permits. This example can be found in Washington and Oregon where local governments can adopt ordinances related to land use and critical area impacts. In Washington State, cities and counties are given this authority through the Growth Management Act (Chapter 36.70A RCW). Juneau is given this authority through the Alaska Coastal Management Program (ACMP) 11 AAC 110, 112, and 114. Critical areas regulated under local code can include geologically hazardous areas, frequently flooded areas, critical aquifer recharge areas, wetlands, and fish and wildlife habitat conservation areas.

Without a General Permit from the Army Corps, CBJ would not have primary control over issuing wetland permits and an Army Corps permit would still be required in all cases. However, similar to some of the code in place now, applicants would be required to submit an application to the CBJ that included approval of, or proof they are seeking, a wetland fill permit from the Army Corps. The application would also include reports along with their site plan such as, but not limited to, a habitat assessment, wetlands delineation report, wetland mitigation plan, and stormwater plan. There are many examples of this code language and application in Washington State and Oregon cities and counties.

In an attempt to find code from a similar landscape area of a municipality encompassing similar landscape characteristics and population size as Juneau, code was reviewed from City of Bellingham, Port Angeles, and City of Longview in Washington State. If this option is chosen in the final draft of the JWMP, CBJ would analyze more code examples and templates for CBJs code update in accordance with the ACMP. There are restrictions in the ACMP in regard to local jurisdiction of wetlands that will need to be considered when developing local code for critical areas and their mitigation without a General Permit from the Army Corps.

CBJ jurisdiction would not be limited to the wetlands mapped in the inventory completed between 2014 and 2015; instead, it would apply to all lands within CBJ, both public and private. Wetland mapping completed for the JWMP update would serve as a reference tool for general wetland locations, types, and extents within the CBJ. Site analysis for wetlands would still be required prior to site development; wetlands located by this analysis would require formal delineation, categorization, and subsequent local and federal regulation. In short, CBJ strived to meet the criteria of a wetland according to the regional supplement. Further steps would be to adopt wetland management policies and codes for the category of wetlands, mitigation standards, etc.

Local jurisdictions often adopt the Army Corps' mitigation sequencing within their state, county, or municipal mitigation codes. Requiring wetland buffers of varying widths according to wetland category and proposed land-use intensity is another method that can be employed to further refine mitigation sequencing. Each local jurisdiction has the authority to develop and regulate buffers, or omit them. Similarly, CBJ has the opportunity in the JWMP update to refine wetland protection standards and subsequent mitigation requirements in ways that promote development in Juneau's unique environment without compromising the federal standard of no net loss of wetland area.

Incentives provided to CBJ by this option include:

1) CBJ retains an active role in local wetland management and mitigation requirements;
2) creates a favorable setting for private mitigation providers;
3) addresses public concerns regarding environmental conditions of the borough, and;
4) has the potential to streamline wetland impacts permitting and subsequent compensatory mitigation through a local (rather than regional) lead agency review process.

Drawbacks of this approach include the possibility of initial inefficiencies regarding code adoption. As mentioned above, resources and examples from other jurisdictions in other states may prove to be useful as templates or general guidelines, but these examples notwithstanding, any new codification process would most likely be time consuming. Ultimately, adopting local code creates a more refined regulatory process. This could be interpreted as an incentive for protecting public environmental interests, as well as a drawback for developers (local and non-local) for whom additional regulatory processes would result in longer time commitments for project approval and potential duplication of efforts when requesting permits from both CBJ and the Army Corps.

4.5 Summary

The implementation strategy for the JWMP 2016 update is an important decision that will shape future wetland management in Juneau. Three options have been proposed in this chapter for the consideration of CBJ staff, Planning Commission, WRB, and Assembly members. These three options do not represent the only options available to CBJ, and they do not have to act as standalone scenarios. Portions of one option can be incorporated with others where necessary. In summary, the three options are:

1) Planning and Educational Tool Only
2) General Permit Update
3) Local Code

Local and regional examples of each type of management have been provided as guidance for decisions that shape the JWMP update and its contents. This background information and scenario presentation has been provided in the draft JWMP report to further inform decisions for the final JWMP and future wetland management in CBJ.

4.6 Wetland Policies and Implementing Actions

Big-Picture Planning

1. Promote consistency in wetland policies and regulations within adopted CBJ documents.
    a. Revise the CBJ Comprehensive Plan, Title 49, and other officially adopted documents to ensure consistency among wetland policies and regulations, and to ensure conformance with federal law.

2. Ensure the long-term scientific integrity of the JWMP and the wetland methodology that supports it.
   a. Update the JWMP with Best Available Science and peer review among resource professionals.
   b. Evaluate and include scientific information when determining wetland policies, plans, and regulations that support the plan.

Protection

3. Minimize adverse impacts to high functioning wetlands.
   a. Rank and/or categorize wetlands to identify high and low functioning wetlands suitable for development and protection.
   b. Consider establishment of a wetland categorization task force comprised of WRB representatives, resource agency representatives, CBJ staff, and other qualified members to determine a scientifically-sound ranking method.
   c. Consider development of regulations and/or more detailed wetland policies to support wetland rankings or categorization.

4. Protect wetlands near or adjacent to anadromous lakes or streams, and near or adjacent to public water sources.
   a. Consider development of regulations and/or specific policies that upgrade the value or ranking of wetlands near anadromous lakes or streams and provide stricter development requirements.
   b. Provide special consideration for wetlands near Alaska Department of Environmental Conservation-classified impaired water bodies and/or unique habitat areas.

5. Promote restoration opportunities in degraded wetland areas.
   a. Identify degraded wetland areas, or wetlands that may be suitable for enhancement, as documented through WESPAK-SE wetland assessments.
   b. Identify funding sources and establish a restoration plan.

6. Incorporate a diversified, watershed-based approach to better protect wetlands and to manage cumulative effects.

Development/Permitting Process

7. Provide for informed decisions regarding protection and development of wetlands.

8. Increase wetland permit predictability and streamline wetland permitting processing.

9. Promote development in lower functioning wetlands, particularly along road corridors and within the Urban Service Boundary.
   a. Identify lower functioning wetlands through a ranking process using the WESPAK-SE wetland assessments.
   b. Prioritize lower functioning wetland areas according to proximity to roaded and higher-density areas.

10. Promote a variety of wetland mitigation options to allow for wetland development in appropriate areas.
    a. Identify large areas of CBJ-owned high functioning wetlands or degraded wetlands eligible for preservation or restoration.

b. Consider development of a mitigation bank or single-user mitigation site(s) based on restoration, enhancement, preservation, or a combination.

11. Develop long-range development strategies with the Army Corps and other partners to promote development in appropriate areas while preserving high value wetlands.
    a. Investigate options for use of General Permit for expedited wetland permitting utilizing advance wetland mitigation and planned development.
        i. Identify large areas of vacant public-private land within a preferred development corridor for a long-term development plan.
    b. Identify large contiguous or connected high functioning wetlands. Consider options for joint protection among property owners.
    c. Develop a Memorandum of Agreement with the Army Corps to promote collaboration and communication.
    d. Cooperate with private and non-profit organization mitigation providers to cooperatively identify wetland mitigation areas to compensate proposed wetland development.

Outreach & Education

12. Maximize use of wetland mapping and wetland functional assessment sources available within CBJ.
    a. Utilize previous versions of the JWMP as a resource inventory.
    b. Develop partnerships with the Southeast Alaska GIS Library, NOAA Shorezone Program, Army Corps, and other entities to maximize information sharing regarding wetland resources.

13. Promote wetland education.
    a. Identify wetland areas near schools.
    b. Identify grant funding for wetland education and interpretative signage.
    C. Educate property owners on the value of delineating and protecting wetlands.

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