Siuslaw Estuary Partnership
An Integrated Multiple Objective Approach
To Watershed Protection and Restoration

Florence Area
Local Wetlands and Riparian Inventory

Prepared for

City of Florence
Florence, Oregon 97439
as part of the Siuslaw Estuary Partnership

Prepared by

Pacific Habitat Services, Inc.
Wilsonville, Oregon

June 13, 2013

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250 Highway 101
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June 13, 2013

Oregon
John A. Kitzhaber, MD, Governor

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June 27, 2013

The Honorable Nola Xavier
Florence City Hall
250 Highway 101
Florence, OR 97439

Re: Approval of the City of Florence Local Wetlands Inventory and Assessment

Dear Mayor Xavier:

I am pleased to notify you that the Department of State Lands (DSL) has approved your revised Local Wetlands Inventory (LWI) and assessment. We appreciate your planning staff and the wetland consultant, Pacific Habitat Services, Inc., working with our staff to ensure that the inventory meets state LWI requirements (OAR 141-86-0180 through -0240) and the city's needs. The DSL-approved report and maps can be viewed and downloaded from our website at http://www.oregon.gov/dsl/WETLAND/Pages/lwi_disclaimer_agree.aspx The DSL-approved GIS datasets are available for download from the Department's ftp site at ftp://rogue.dsl.state.or.us/. Please contact DSL if you would like a paper copy of the approved-LWI. The final inventory requirement is for the city to notify property owners with wetlands mapped on their property within 120 days of this approval. Please provide us with a copy of the landowner notification, indicating the date of notification when notification has been completed.

Approval by DSL means that the revised LWI replaces the 1997 inventory and becomes part of the Statewide Wetlands Inventory. The revised LWI must now be used by the city instead of the 1997 inventory for the Wetland Land Use Notification Process (ORS 227.350). The revised LWI and functional assessment also form the foundation for your wetland planning under Statewide Planning Goal 5, and the revised LWI must be adopted by the city per the Goal 5 requirements. Please note when significant wetlands are designated by the city, "non-significant" wetlands may be coded to distinguish them from "significant wetlands" but must not be removed from the approved LWI maps. These wetlands are still subject to state and federal permit requirements.

While considerable effort has been made to identify accurately most wetlands within the study area, DSL's approval does not guarantee that all regulated wetlands have been mapped. The mapped wetland boundaries are estimated boundaries, they have not been surveyed, and there are inherent limitations in mapping accuracy. DSL advises persons proposing land alteration on parcels containing mapped wetlands first to contact DSL, or to obtain a wetland boundary delineation by a qualified consultant and submit it to DSL for approval, prior to the land alteration.

It will be important to annotate your map and associated database as new wetland delineations are completed and approved by DSL in order to keep your revised LWI updated. A few additional delineations have been approved since the LWI revision process was initiated back in 2010. We will forward copies of those delineations to the city's planning department and recommend the DSL file number be noted on the affected tax lots. Future wetland delineation approvals will be provided to the city's planning department.

We are pleased that the City of Florence has conducted a thorough wetlands inventory and has made wetland planning a high priority. We look forward to working with you and your staff as you continue on the Goal 5 wetland planning effort. Please feel free to contact Peter Ryan at 503-986-5232 with any questions you may have about the LWI or its use.

Sincerely,

Bill Ryan
Assistant Director
Wetlands and Waterways Conservation Division

ec: Kelli Weese, City of Florence
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Pete Anderson, DEQ
John Bauer, Oregon Biodiversity Information Center
Bob Lobdell, DSL

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1.0 INTRODUCTION

The City of Florence (City) partnered with Pacific Habitat Services, Inc. (PHS) to conduct an update to the 1996 *City of Florence Local Wetlands and Riparian Area Inventory*. This update to the inventory was conducted as part of the Wetland and Riparian Areas Project Element of the Siuslaw Estuary Partnership. The Siuslaw Estuary Partnership (SEP) is a collaborative effort to protect and improve water quality and fish and wildlife habitat in the lower Siuslaw River Watershed. The Wetland and Riparian Project Element updates the Florence wetland and riparian areas inventory performed in 1996 and it includes the adoption of protection measures, as required by state law. The objectives of this project were to: update the 1996 biological and functional assessment; assess omitted wetlands; include delineations made since 1996; and adopt policies and measures to protect the unique functions and values of the resources. The City also did preliminary work to assess the potential for restoration of riparian areas and wetlands on City-owned property. This project resulted in the development of a "City of Florence Significant Wetlands and Riparian Corridors Plan". A comprehensive functional assessment is important in this watershed because the capacity of existing natural wetland systems, and potential future constructed wetlands, to store and slow the velocity of stormwater prior to discharge to area creeks and the estuary, is not currently established. It is also not known whether the carrying capacity of the land is sufficient for the environment to fully address the anticipated impacts from planned urbanization. The functional assessment of the wetlands within the Urban Growth Boundary will provide critical information to help guide future urbanization policy and stormwater management policy and capital programs.

The Siuslaw Estuary Partnership has been funded in part by the United States Environmental Protection Agency under assistance agreement WC-00J04801-0 to the City of Florence. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

This update to the Florence Local Wetlands Inventory (LWI) included a larger study area than the 1996 work. This inventory included areas not previously located with the Urban Growth Boundary (UGB), as well as adjoining areas of Lane County east and north of the UGB. The eastern boundary of the study area follows the ridge line of hills east of the City. The study area was confined to the south by the Siuslaw River and adjoining estuary and by the Pacific Ocean on the west. The approximate study area is shown on Figure 1. All figures are in Appendix A.

The goal of the study was to respond to an interest in establishing some local protections of wetlands and to meet the wetland and riparian requirements of Statewide Planning Goal 5 (*Natural Resources, Scenic and Historic Areas, and Open Spaces)* Oregon Administrative Rule (OAR) Section 660, Division 23. The objective of Goal 5 is to "protect natural resources and conserve scenic, historic and open space resources for present and future generations."

PHS determined the general location, approximate size, and quality/condition of wetlands throughout the study area. The quality/condition of wetlands was determined by applying the Oregon Rapid Wetland Assessment Protocol (ORWAP) where appropriate. This report presents the results of the wetland inventory and riparian assessment.

1.1 Report Format

This report begins with definitions used in the report and inventory (Section 2). Section 3 includes a discussion of the methodology used to conduct the field work for the LWI; the wetland assessment methodology; and the methodology used to produce the maps for the inventory. Section 4 is a brief discussion of project cartography. Section 5 describes general conditions within the study area, addressing climate, topography, soils and vegetation. Section 6 is a more detailed discussion of wetlands within the study area and addresses wetland distribution, acreage, and Cowardin classification. Section 7 discusses the results of the *Oregon Rapid Wetland Assessment Protocol* and Section 8 is the identification of Locally Significant Wetlands in the study area. Section 9 describes options for designating riparian corridors within the study area. Section 10 presents staff qualifications. Section 11 provides a list of the references used in the report.

There are six appendices to the report. Appendix A contains figures illustrating the study area boundary, mapped soils, and the National Wetland Inventory; as well as the Local Wetland Inventory and Riparian Inventory maps generated for the project.

Appendix B contains the wetland summary sheets for each wetland (or wetland grouping) of greater than one-half acre in size, organized by wetland code. The summary sheets note wetland location, tax lots, acreage, Cowardin classification, Hydrogeomorphic (HGM) classification, soil series, wetland and adjacent upland vegetation, and other unique or clarifying notes related to the wetland. If site access was granted, data was typically collected, and associated sample point numbers are noted. Upon completion of the significance determination, locally significant wetlands will also be noted on this sheet.

Appendix C contains the wetland determination data forms. These forms document wetland and upland conditions where data was collected for the inventory. Hydrology, soils, and dominant vegetation are recorded for each sample point where wetland or upland data was collected.

Appendix D includes the *Oregon Rapid Wetland Assessment Protocol* (ORWAP) answers for each wetland unit. Each wetland's functions were assessed according to an established state methodology.

Appendix E includes a letter from the Oregon Department of State Lands outlining and approving the use of ORWAP in identifying locally significant wetlands within the Florence urban growth boundary.

Appendix F includes the *Urban Riparian Inventory and Assessment Guide* Field Forms and Summary Tables for mapped riparian areas within the study area using the standard inventory method.

2.0 DEFINITIONS

These terms helped define the methodology used for the Florence Local Wetlands and Riparian Inventory and may be referred to in this report.

1987 Manual

The primary source documents for wetland delineations within Oregon is the *Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region, (Version 2.0)* (U.S Army Corps, 2010).

These manuals are used by the Army Corps of Engineers ("Corps") and the Oregon Department of State Lands ("DSL") to document the location of wetlands within the State of Oregon. The 1987 manual, along with regional supplement, provide technical criteria, field indicators, and recommended procedures to be used in determining whether an area is a jurisdictional wetland. Undisturbed areas require three criteria for them to be classified as wetland. These criteria are hydric soils, a dominance of hydrophytic vegetation, and wetland hydrology.

Cowardin Wetland Classification

The classification of wetlands as defined by plants, soils and the frequency of flooding is described in *"Classification of wetlands and deepwater habitats of the United States."* (Cowardin, et. al. 1979) See also "Palustrine Wetlands".

Estuarine Wetlands

" Deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the ocean, with ocean-derived water at least occasionally diluted by freshwater runoff from the land. The upstream and landward limit is where ocean-derived salts measure less than 0.5 ppt during the period of average annual low flow. The seaward limit is (1) an imaginary line closing the mouth of a river, bay, or sound; and (2) the seaward limit of wetland emergents, shrubs, or trees when not included in (1). "(Cowardin et. al. 1979)

Field verify

To walk over and/or visually check an area to make a wetland determination and map wetlands. This may or may not include on-site access or the collection of sample plot data. (OAR 141-086)

Goal 5

Goal 5 (OAR 660) is intended "to protect natural resources, and conserve scenic and historic areas and open spaces." (DLCD, 2010)

Goal 17

This Inventory addresses the significance of wetlands and riparian areas under Statewide Planning Goal 5. Wetlands that are regulated under Statewide Planning Goal 17, Coastal Shorelands, are not subject to Goal 5 significance or protection. In the Florence UGB, Goal 17 resources are identified in the Lane County Coastal Resources Inventory, the Management Unit descriptions in the Florence Comprehensive Plan, and in the Coastal Shorelands standards in Florence City Code Title 10 Chapter 19. As provided in Goal 5, this local wetland inventory and assessment (2013 LWI) will be used to update the general location and assessment of the South Heceta Junction Seasonal Lakes Goal 17 wetlands. This is necessary because the 2013 LWI is more current and precise and the general location of these wetlands in the 1978 Management Unit do not align with the general wetland location in the 2013 LWI (see "2013 City of Florence Significant Wetlands and Riparian Areas Plan" for additional details.)

Growing Season

The growing season has begun and is ongoing when either of the two following conditions is met:

1) Two or more non-evergreen vascular plant species growing in the wetland or surrounding areas exhibit one or more of a specific list of indicators of biological activity (such as leaf emergence; appearance of new growth; emergence or opening of flowers; etc.)

2) When soil temperature measured at a depth of 12 inches is 41ºF (5ºC) or higher

Hydric Soils

"Soils which are ponded, flooded, or saturated for long enough during the growing season to develop anaerobic conditions." (USDA, SCS, 1985)

Periodic saturation of soils causes alternation of reduced and oxidized conditions which leads to the formation of redoximorphic features (gleying and mottling). Mineral hydric soils will be either gleyed or will have bright mottles and/or low matrix chroma. The redoximorphic feature known as gley is a result of greatly reduced soil conditions, which result in a characteristic grayish, bluish or greenish soil color. The term mottling is used to describe areas of contrasting color within a soil matrix. The soil matrix is the portion of the soil layer that has the predominant color. Soils that have brightly colored mottles and a low matrix chroma are indicative of a fluctuating water table.

Hydric soil indicators include: organic content of greater than 50% by volume, sulfidic material or "rotten egg" smell, and/or presence of redoximorphic features and dark soil matrix, as determined by the use of a Munsell Soil Color Chart. This chart establishes the chroma, value and hue of soils based on comparison with color chips. Mineral hydric soils usually have a matrix chroma of 2 or less in mottled soils, or a matrix chroma of 1 or less in unmottled soils.

Hydrogeomorphic (HGM) Wetland Classification

A method of assessing wetlands using the physical, chemical, and biological functions of wetlands. It is based on the relationship of geomorphic setting, water source, and hydrodynamics. (Brinson, 1993)

Hydrophytic Vegetation

"Plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content." (National Resource Council, 1995)

The U.S. Fish and Wildlife Service, in the *National List of Plant Species that Occur in Wetlands,* has established five basic groups of vegetation based on their frequency of occurrence in wetlands. These categories, referred to as the "wetland indicator status," are as follows: obligate wetland plants (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), and obligate upland (UPL).

Local Wetlands Inventory (LWI)

An inventory of all wetlands greater than 0.5 acres in size within a local jurisdiction using the standards and procedures of OAR 141-86-180 through 141-86-240.

In 1989, the Oregon State legislature authorized DSL to develop a statewide wetlands inventory for planning and regulatory purposes. Accordingly, DSL established Local Wetlands Inventory (LWI) standards and guidelines under ORS 196.674. A DSL-approved LWI replaces the National Wetlands Inventory map (see Figure 3 in Appendix A) and is incorporated into the statewide wetlands inventory.

An LWI is conducted using color or color infrared aerial photographs taken within 5 years of the inventory initiation and at a minimum scale of 1 inch = 200 feet (1" = 200'). Wetlands are located using the on-site option where access to property is allowed or off-site where access is denied. Wetlands can be mapped off-site by using information such as topographic and National Wetlands Inventory maps, aerial photographs, and soils surveys.

The approximate location of wetlands is placed on a parcel-based map. The parcel-based map allows the property owner, the local jurisdiction, and DSL, to know which tax lots may contain wetlands.

The maps and documents produced for the LWI are intended for planning purposes only. Mapped wetland boundaries are accurate to within 5 meters; however, there may be unmapped wetlands that are subject to regulation. In all cases, actual field conditions determine wetland boundaries.

Palustrine Wetlands (e.g. PEM)

"All nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens and all such wetlands that occur in tidal areas where salinity is less than 0.5%. This includes areas traditionally called swamps, marshes, fens, as well as shallow, permanent or intermittent water bodies called ponds." (Cowardin et. al. 1979)

- **Palustrine Unconsolidated Bottom (PUB)**

A wetland or deepwater habitat with at least 25% cover of particles smaller than stones, and a vegetative cover less than 30%.

- **Palustrine Emergent Wetland (PEM)**

These wetlands have rooted herbaceous vegetation that stand erect above the water or ground surface.

- **Palustrine Scrub-shrub Wetland (PSS)**

Wetlands dominated by shrubs and tree saplings that are less than 20 feet high.

- **Palustrine Forested Wetland (PFO)**

Wetlands dominated by trees that are greater than 20 feet high.

Probable Wetland (PW)

An area noted during the course of LWI field work that appears to meet, or does meet, wetland criteria but is less than one half of an acre in size; or is small and of undetermined size, and is mapped as a point rather than a polygon on the LWI maps. Probable wetlands are designated in the inventory through the use of the extension '-PW' at the end of the resource code.

Riparian Area

"The area immediately adjacent to a water resource, which affects or is affected by the water resource. Riparian areas do not include the water resource itself." (PHS, 1998)

Riverine System

"The riverine system includes all wetlands and deepwater habitats contained within a channel." (Cowardin, et. al. 1979)

Waters of the State

Natural waterways including all tidal and nontidal bays, intermittent streams, constantly flowing streams, lakes, wetlands and other bodies of water in this state, navigable and nonnavigable. Natural waterways are defined as: waterways created naturally by geological and hydrological processes and waterways that would be natural but for human-caused disturbances (e.g. channelized or culverted streams, impounded waters, partially drained wetlands or ponds created in wetlands). (ORS 196.800-196.990, 1995)

Water Resource

"An intermittent or perennial stream, pond, river, lake including their adjacent wetlands." (PHS, 1998)

Wetland

"Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." (Federal Register 1982).

Wetland Assessment

A scored determination of the relative effectiveness and relative values of various wetland functions. The methodology used for this LWI is the *Oregon Rapid Wetland Assessment Protocol (ORWAP).* (Adamus, et. al. 2010)

Wetland Condition

"The integrity of a wetland's physical and biological structure. This determines the ability of the wetland to perform specific functions, as well as its resilience and enhancement opportunities." (Roth et al., 1996)

Wetland Function

"A characteristic action or behavior associated with a wetland that contributes to a larger ecological condition such as wildlife habitat, water quality and/or flood control." (Roth, et. al. 1996)

Wetland Hydrology

"Permanent or periodic inundation or prolonged soil saturation sufficient to create anaerobic conditions in the upper soil profile." (COE, 1987)

Wetland hydrology is related to duration of saturation, frequency of saturation, and critical depth of saturation. The Regional Supplement defines wetland hydrology as 14 or more consecutive days of flooding or ponding, or a water table 12 inches or less below the soil surface, during the growing season at a minimum frequency of 5 years in 10.

Wetlands Regulation

Wetlands in Oregon are regulated by the Department of State Lands (DSL) under the Removal-Fill Law (ORS 196.800-196.990) and by the U.S. Army Corps of Engineers (Corps) through Section 404 of the Clean Water Act.

Wetland Value

The value of a wetland is an estimate of the importance or worth of one or more of its functions to society. For example, a value can be determined by the revenue generated from the sale of fish that depend on the wetland, by the tourist dollars associated with the wetland, or by public support for protecting fish and wildlife. (USEPA, 2001)

3.0 PROJECT METHODOLOGY

3.1 Public Involvement

Public involvement for the Wetlands and Riparian Areas project is set out in the approved Public Involvement Plan. Key public involvement consisted of three annual open houses; three annual newsletters distributed to all residents and/or property owners in the study area; targeted outreach; a Stakeholder process; media outreach; and public hearings before the Planning Commission and City Council.

In addition, public involvement efforts were conducted specifically for wetlands and riparian areas. Prior to beginning the inventory field work, selected landowners (i.e. those suspected of having wetlands or waters of the state on their property) were mailed notices describing the project and asking permission to enter their property. Right of access was granted by landowner permission only. The properties of those not responding were not accessed. Access information was collected in a database and then transferred to a base map for use in the field.

The City of Florence held an open house meeting May 5, 2010 to inform the public about the wetland inventory process and answer questions from property owners deciding whether or not to grant access to their property. Following completion of initial fieldwork, a second public meeting was held to allow citizens to observe the location of mapped wetlands and comment as appropriate. This second meeting was held on September 22, 2010.

On March 6, 2012, the Wetlands and Riparian Area Team concurred with proposed criteria for determining the significance of wetlands and riparian corridors in the Florence urban growth boundary (UGB). At their meetings in March and April, 2012 the Stakeholder Groups forwarded this proposal to the public for comment. Then, the proposal was presented to the public at the April 30, 2012 Open House. The Stakeholders reviewed the criteria again at their meeting on July 11, 2012 and the proposal, and all updates to the proposal, have been consistently posted to the project web site at www.SiuslawWaters.org with an invitation for public comment on the home page. On January 31, 2013, the Team reviewed and concurred with the revised significance criteria and the results presented in this report.

3.2 Local Wetlands Inventory Methodology

Within the study area PHS determined the location of wetlands and assessed the quality/condition of each. The wetland location was determined by application of the required methodology outlined in the Regional Supplement of the 1987 Manual (see Section 3.2.1 & 3.2.2 for more details). The quality/condition of wetlands was determined by applying the Oregon Rapid Wetland Assessment Protocol (ORWAP; see Section 3.3) where appropriate.

3.2.1 Routine Off-site Determination

Prior to beginning field work, off-site mapping was reviewed to determine the approximate location of wetland boundaries based on available information. This information included the 1996 LWI mapping and report, Regional Land Information System (RLIS) geographic

information, the USGS topographic quadrangles, soil survey maps for Lane County (NRCS, 1982), the *National Wetlands Inventory* maps (USFWS, July 1989), and true color aerial photographs (1"=200'). The boundaries of wetlands that had been concurred with by DSL were utilized as well.

If access was allowed, the wetland boundaries were verified in the field (see Section 3.2.2). If access was not granted, the boundaries were based on the mapping conducted in the office (non-field verified), or on the observation of wetland boundaries from adjacent roads, right-of-ways, or properties, if possible (field verified). Some of the larger wetlands were only partially field verified, denoting access to and/or visual confirmation of a portion, but not all of the wetland. Due to limited time and resources for verification, wetlands on many of the large publicly owned parcels that could not be easily accessed were not field verified. Wetlands on the parcels were mapped and assessed using off-site assessment protocols.

3.2.2 Routine On-site Determination

On-site observation and inspection of soils, vegetation, and hydrology were made using the required methodology outlined in the Regional Supplement of the 1987 Manual. Soil pits were typically excavated to a depth of approximately 18-inches in selected locations. The soil profiles were examined for hydric soils and wetland hydrology field indicators.

A visual percent-cover estimate of the dominant species of the plant community for a maximum 30-foot radius was conducted at each sampling location. Sampling locations were chosen to document a change in the wetland boundary and a particular plant community. Data was recorded in the field and transferred to computer-generated wetland delineation data sheets (Appendix C).

Field work for the inventory was conducted between June and August 2010. Additional field work was conducted in March 2011 as a result of the September 2010 public meeting. Three property owners that attended this meeting granted PHS access to their properties to review the wetland boundaries. No wetland boundaries were staked or flagged in the field as part of this LWI.

3.3 Wetland Quality Assessment

3.3.1 The *Oregon Rapid Wetland Assessment Protocol*

An assessment of the quality for each wetland identified through the inventory was conducted using the *Oregon Rapid Wetland Assessment Protocol* (ORWAP) (Adamus et al, 2010). [The full text of methodology is available at http://www.oregon.gov/DSL/WETLAND/docs/orwap_manual_v2.pdf]. The ORWAP is a standardized protocol for rapidly assessing 16 wetland functions and 21 values. The protocol was developed by DSL, with funding from the U.S Environmental Protection Agency. It uses 140 indicators assessed from on-site analysis, aerial photography, and information from several web sites. The answers are tabulated within ORWAP spreadsheets to provide a final score for 16 individual wetland functions. These individual functions are further grouped to provide group scores (see Section 8.2.1 for a discussion of Grouped Functions).

The advantage of the ORWAP over other assessment methodologies is that it provides a standardized process for scoring indicators of wetland values and provides a score for the relative value of each function. Since the protocol baseline analyzed wetlands of diverse types throughout the state, it allows for a qualitative comparison of wetlands of any type anywhere in Oregon.

3.3.2 Functions and Values in ORWAP

A wetland's functions and values are independent of one another. For example, a wetland that is extremely effective for removing whatever nitrate enters it is not considered to be of high *value* for that *function* unless it is exposed to significant loads of nitrate and/or its watershed has been designated as "Water Quality Limited" as a result of ongoing problems with nitrate pollution. A high level of function does not alone make a wetland valuable. Likewise, even if a wetland's effectiveness for storing water is low, the *value* of that function may be considered potentially high if the wetland is situated above homes that are periodically flooded by heavy runoff. (Adamus et. al., 2010). In essence, the value of a particular function is linked to a specific wetland's opportunity to perform that function. The value of a wetland is determined in large part by adjoining land cover and land use.

Following is a brief description of each wetland function and value as defined for use in the ORWAP; this information and more can also be found in Appendix B of the ORWAP Manual (Adamus et.al;. 2010).

Water Storage & Delay: The effectiveness of a wetland for storing water or delaying the downslope movement of surface water for long or short periods (but for longer than a tidal cycle), and in doing so to potentially influence the height, timing, duration, and frequency of inundation in downstream or downslope areas.

Sediment Retention & Stabilization: The effectiveness of a wetland for intercepting and filtering suspended inorganic sediments thus allowing their deposition, as well as reduce current velocity, resist erosion, and stabilize underlying sediments or soil. The performance of this function has both positive values (e.g., reduction in turbidity in downstream waters) and negative values (e.g., progressive sedimentation of productive wetlands, slowing of natural channel migration).

Phosphorus Retention: The effectiveness for retaining phosphorus for long periods (>1 growing season) as a result of chemical adsorption, or from translocation by plants to below ground zones with less potential for physically or chemically remobilizing phosphorus into the water column.

Nitrate Removal & Retention: The effectiveness for retaining particulate nitrate and convert soluble nitrate and ammonia to nitrogen gas, primarily through the microbial process of denitrification, *while generating little or no nitrous oxide (N2O)*. Note that most published definitions of Nitrate Removal do not include the important restriction on N2O emission.

Thermoregulation: The effectiveness of a wetland for maintaining or reducing summertime water temperature, and in some cases, for moderating winter water temperature.

Carbon Sequestration: The effectiveness of a wetland both for retaining incoming particulate and dissolved carbon, and through the photosynthetic process, converting carbon dioxide gas to organic matter (particulate or dissolved). And to then retain that organic matter on a net annual basis for long periods *while emitting little or no methane.* Note that most published definitions of Carbon Sequestration do not include the important limitation on methane emission.

Organic Matter Export: The effectiveness of a wetland for producing and subsequently exporting organic matter, either particulate or dissolved.

Aquatic Invertebrate Habitat: The capacity to support an abundance and diversity of marine and freshwater invertebrate animals which spend all or part of their life cycle underwater or in moist soil. Includes dragonflies, midges, crabs, clams, snails, crayfish, water beetles, shrimp, aquatic worms, and others. This function does not predict habitat suitability accurately for every species. See worksheet *WetInverts* in the *ORWAP_SuppInfo* file for list of freshwater aquatic invertebrates known or likely to occur in Oregon wetlands.

Fish Habitat – Anadromous: The capacity to support an abundance of native anadromous fish (chiefly salmonids) for functions other than spawning. This function does not predict habitat suitability accurately for every species, nor is it intended to assess the ability to restore fish access to a currently inaccessible wetland. See worksheet *WetVerts* in the *ORWAP_SuppInfo* file for the list of the species included in ORWAP.

Fish Habitat - Non-Anadromous: The capacity to support an abundance and diversity of *native* non-anadromous fish (both resident and visiting species). This function does not predict habitat suitability accurately for every species, nor is it intended to assess the ability to restore fish access to a currently inaccessible wetland. See worksheet *WetVerts* in the *ORWAP_SuppInfo* file for the list of the species included in ORWAP.

Amphibian & Reptile Habitat: The capacity of a wetland to support an abundance and diversity of native amphibians and native wetland-dependent reptiles. This function does not predict habitat suitability accurately for every species. See worksheet *WetVerts* in the *ORWAP_SuppInfo* file for the list of the species included in ORWAP.

Waterbird Habitat – Feeding: The capacity to support an abundance and diversity of feeding waterbirds, primarily outside of the usual nesting season. This function does not predict habitat suitability accurately for every species. See worksheet *WetVerts* in the *ORWAP_SuppInfo* file for the list of the species included in ORWAP.

Waterbird Habitat – Breeding: The capacity to support an abundance and diversity of nesting waterbirds. This function does not predict habitat suitability accurately for every species. See worksheet *WetVerts* in the *ORWAP_SuppInfo* file for the list of the species included in ORWAP.

Songbird, Raptor, & Mammal Habitat: The capacity to support an abundance and diversity of songbirds, raptors, and mammals, especially species that are most dependent on wetlands or water. This function does not predict habitat suitability accurately for every species. See worksheet *WetVerts* in the *ORWAP_SuppInfo* file for the list of the species included in ORWAP.

Pollinator Habitat: The capacity to support pollinating insects, such as bees, wasps, butterflies, moths, flies, and beetles.

Native Plant Habitat: The capacity to support an abundance and diversity of songbird, raptor, and mammal species and functional groups, especially those that are most dependent on wetlands or water. See worksheet *WetVerts* in the *ORWAP_SuppInfo* file for the list of the species included in ORWAP.

In addition to a value score for each of the functions above; except for carbon sequestration and organic matter export, which do not have value scores; ORWAP assesses five other values and attributes.

Public Use & Recognition: The potential and actual capacity of a wetland to sustain low-intensity human uses such as hiking, nature photography, education, and research. Considerations include (are assumed), wetlands designated officially as wetland priority areas, are in public ownership, have less restrictive access policies and a greater degree of visibility from roads, are physically accessible to a wider range of users, have more prior investment of funds for conservation or enhancement, and/or some history of scientific monitoring or use for compensatory mitigation.

Provisioning Services: The passive and sustainable providing of tangible natural items of potential commercial value (i.e. the harvesting of hay (crops), timber, other wild plants, fish, or wildlife.

Wetland Ecological Condition: The integrity or health of the wetland as defined primarily by its vegetation composition (because that is the only meaningful indicator that can be estimated rapidly). More broadly, the structure, composition, and functions of a wetland as compared to reference wetlands of the same type, operate within the bounds of natural or historic disturbance regimes. However, in the case of ORWAP, the model outputs were not scaled to reference wetlands.

Wetland Stressors (Risk): The degree to which the wetland is or has recently been altered by, or exposed to risk from, human and natural factors.

Wetland Sensitivity: The lack of intrinsic resistance and resilience of the wetland to human and natural stressors

3.3.3 Office Assessment

When possible, the ORWAP assessment begins in the office; where information on the wetland, its adjoining landscape, and contributing area are gathered. The office portion of ORWAP includes a series of 49 questions that are answered utilizing published databases available online, as well as resource mapping and air photo interpretation.

3.3.4 Field Methodology

The field component of the ORWAP involves visiting as much of the wetland as possible and filling out two field forms. Though the method suggests visiting during both the wettest and driest times of year, due to the limitations of time and resources for an LWI, these forms are generally completed during a single site visit (though multiple visits were made to several wetlands to get a local "feel" for changing hydrologic conditions over time).

As a result, the assessment relied on aerial imagery, maps and other office information, as well as field indicators. Information provided by landowners or other residents of Florence was also utilized when available.

If the wetland assessment was off-site or even office based (as was necessary for several of the wetlands located in the dunes, far from developed access), the assessment relied upon data and observations of wetlands that were presumed to be of similar condition, Cowardin class, and/or landscape position.

4.0 CARTOGRAPHY

Color aerial photographs were obtained for use in the field. These photos were taken in 2008, with a scale of approximately 1 inch = 200 feet. The boundaries of wetlands from the 1996 inventory were added to the field maps to assist with the field verification process. Wetland boundaries and data point locations were drawn directly onto field maps at the time of assessment. Wetland boundaries are intended to be accurate to within 5 meters. Separate maps were utilized for site access, hydric soils, and the National Wetland Inventory. Wetland boundaries as drawn onto the field maps were transferred into a digital format and inserted into a computer-based map derived from the City's Geographic Information Systems (GIS) base.

Small potential wetlands that could not be accurately assessed, or known wetlands of less than one-half acre in size, are labeled on the maps with a designation of "PW" ("probable wetland"). The final digital maps include the location of all streams, wetlands, and PW's, as well as artificially created wetlands such as golf course or water quality features. They also include the location of sample points, legend, north arrow, scale, and a DSL required disclaimer.

5.0 STUDY AREA CHARACTERISTICS AND EXISTING INVENTORY INFORMATION

5.1 Topography

Elevations within the Florence study area range from sea level to approximately 495 feet National Geodetic Vertical Datum (NGVD) 1929. Elevations in Florence increase gently from the ocean to the base of the bedrock ridges that form the edge of the dune sheet along the eastern study area boundary. The highest elevations in the study area are along a ridge east of Clear and Collard Lakes, which defines the eastern edge of the study area.

5.2 Hydrology

5.2.1 Hydrologic Features of the Florence Area

Hydrologic features of the Florence study area include: the Pacific Ocean; the Siuslaw River, which flows along the southern and western edges of the city; the North Fork Siuslaw River, which flows south along the eastern edge of the city; Collard, Clear, Ackerley, and Munsel Lakes, a series of hydrologically connected lakes along the eastern boundary of the study area; Munsel Creek, a perennial stream channel flowing south from Munsel Lake into the Siuslaw River; and relatively large shallow lakes and ponds formed in the dunes.

The origin of Collard, Clear, Ackerley, and Munsel Lakes is the same. The lakes formed along the eastern margin of the dune sheet, between the accumulation of sand to the west and the impermeable bedrock to the east. The energy of the wind transporting sand to the west is deflected upward into the surrounding hills. The sand being carried by the wind is dropped, creating a ridge near the base of the hills. Between the ridge of sand and the hills is a depression or series of troughs. Collard, Clear, Ackerley, and Munsel Lakes all formed in this depressional area.

Clear Lake is over 80 feet deep and Munsel Lake is 71 feet deep. Water flows out of Collard Lake into Clear Lake through a small drainage channel. Water flow is a relatively constant 1 to 2 cubic feet per second. Water continues south into Ackerley Lake and Munsel Lake and into Munsel Creek, which eventually drains into the Siuslaw River. The average annual discharge of Munsel Creek is 3,000 acre-feet.

The source of hydrology for the creeks and lakes of the Florence area is groundwater. The dune sand which underlies Florence is moderately permeable and allows infiltration of large amounts of rainfall. It is estimated that over 55 inches of the 65-inch average annual rainfall goes to groundwater recharge. Each square mile of the dune sand produces approximately 2.7 million gallons per day (Hampton, 1963). Consequently, the water supply for the Florence area is drawn from the dunal aquifer, which stretches approximately 50 miles along the coast. The Heceta Water District draws water for domestic uses from Clear Lake in the northeast corner of the study area. The quality of the water is generally good. The water is soft and weakly acidic, but can contain high amounts of iron. High iron content is especially noticeable beneath wetlands and other bodies of shallow water.

Groundwater movement in the Florence area flows downward toward the edges of the dune sheet. Water drains out of the dune sheet south into the Siuslaw River, east into the North Fork Siuslaw River, or west into the Pacific Ocean. There is relatively little overland flow due to the high permeability of the sand. Only during times when excess rainfall has completely saturated the sand does water flow over the surface. The lack of well-defined tributaries to the streams and lakes is an indication that much of the water reaching the channels is through groundwater flow and not through surface water.

The water table adjacent to Munsel Creek and four other unnamed creeks in the project area is generally higher than the stream levels. During periods of sufficient recharge, the water table discharges into the creeks. However, during the summer months when the precipitation levels are low, the water table falls below the level of some of the creeks and water ceases to flow.

5.2.2 Hydrologic Basin Designation

The study area was divided into three drainage basins based on the 7th field (sub-watershed) of the Hydrologic Unit (HUC-7). Sub-watersheds within the Florence LWI study area include Mercer Lake in north; Bernhardt Creek through the central and south portions; and the Lower North Fork Siuslaw River. These drainage basins and their size are listed in Table 1 below:

Table 1. Hydrologic Basin Areas for the City of Florence Local Wetlands Inventory

Hydrologic Basin (Sub-watershed)	Area (acres)
Bernhardt Creek	6,827
Lower North Fork Siuslaw River	624
Mercer Lake	694
Total Project Acreage	**8,145**

5.3 Soils

Table 2 lists the soils that have been mapped by the Natural Resources Conservation Service (NRCS; formerly the Soil Conservation Service) within the study area. Figure 2 shows the mapped location of these soils.

Table 2. Soils Mapped Within the Florence LWI Study Area

Symbol	Map Unit Name	Hydric?
10	Beaches	Yes
16D	Bohannon gravelly loam, 3 to 25 percent slopes	No
17	Brallier muck, drained	Yes
18	Brallier variant muck	Yes
21C	Bullards-Ferrelo loams, 7 to 12 percent slopes	No
21E	Bullards-Ferrelo loams, 12 to 30 percent slopes	No
21G	Bullards-Ferrelo loams, 30 to 60 percent slopes	No
44	Dune land	No (Yes on marine terraces and interdunes)
47E	Fendall silt loam, 3 to 30 percent slopes	No
53	Heceta fine sand	Yes
74B	Lint silt loam, 0 to 7 percent slopes	No (Yes in depressions)
74C	Lint silt loam, 7 to 12 percent slopes	No (Yes in depressions)
74D	Lint silt loam, 12 to 20 percent slopes	No (Yes in depressions)
94C	Netarts fine sand, 3 to 12 percent slopes	No (Yes on marine terraces and interdunes)
94E	Netarts fine sand, 12 to 30 percent slopes	No (Yes on marine terraces)

Table 2, continued

Symbol	Map Unit Name	Hydric?
111D	Preacher loam, 0 to 25 percent slopes	No
112G	Preacher-Bohannon-Slickrock complex, 50 to 75 percent slopes	No
124D	Slickrock gravelly loam, 3 to 25 percent slopes	No
124F	Slickrock gravelly loam, 25 to 50 percent slopes	No
131C	Waldport fine sand, 0 to 12 percent slopes	No (Yes on marine terraces and interdunes)
131E	Waldport fine sand, 12 to 30 percent slopes	No (Yes on marine terraces and interdunes)
131G	Waldport fine sand, 30 to 70 percent slopes	No (Yes on marine terraces)
132E	Waldport fine sand, thin surface, 0 to 30 percent slopes	No (Yes in interdunes)
133C	Waldport-Urban land complex, 0 to 12 percent slopes	No on dunes and urban land Yes on marine terraces
140	Yaquina loamy fine sand	Yes
141	Yaquina-Urban land complex	Yes on dune slacks No on urban land

5.4 Vegetation

5.4.1 Vegetation Overview

The City of Florence is located within the Sitka Spruce *(Picea sitchensis)* Forest Zone (as characterized by Franklin and Dyrness, 1973). This vegetation zone occupies a low-elevation strip along the immediate coastline, often only a few miles wide, subject to a relatively wet and mild climate. The zone is essentially a variant of the western hemlock *(Tsuga heterophylla)* Zone, distinguished largely by the presence of Sitka spruce, frequent summer fogs, and proximity to the ocean. The climate provides nearly ideal growing conditions, accounting for the high productivity of forest stands, as well as prolific growth in shrub and herb-dominated communities.

Common trees found in this region include Sitka spruce, western hemlock, western red cedar *(Thuja plicata),* Douglas fir *(Pseudotsuga douglasii)*, shore pine *(Pinus contorta),* and red alder *(Alnus rubra).* Sites disturbed through fire or logging may develop into stands of mixed conifers including spruce, hemlock and Douglas fir. However, red alder may overtop the regenerating conifers and develop into a nearly pure alder forest. Dense shrub communities may also form on disturbed sites, often in conjunction with red alder; the dense understory may delay conifer colonization almost indefinitely. Thicket-forming shrubs common in the region include salmonberry *(Rubus spectabilis),* salal *(Gaultheria shallon),* and evergreen huckleberry (*Vaccinium ovatum).* Further discussion of coastal plant communities within the Sitka Spruce Zone can be found in *Natural Vegetation of Oregon and Washington* (Franklin and Dyrness 1973).

A landform type especially significant to Florence area plant communities consists of the extensive active-to-stabilized dune system that extends for miles both north and south of the Siuslaw River mouth, as well as several miles inland (see Section 5.4.2 for more discussion of this landform type). The dynamic nature of these systems represents rapidly changing, and often times hostile, growing conditions for plants.

5.4.2 Local Vegetation Communities

Generalized plant communities encountered within the City of Florence study area include upland active dune complexes, upland broadleaf-scrub/shrub thicket, upland coniferous forest, upland mixed coniferous/deciduous forest, developed-urban, wetland, and riparian/ lacustrine. Wetland communities are further distinguished as freshwater, which includes deflation plains (palustrine unconsolidated bottom, palustrine emergent, palustrine scrub-shrub, and palustrine forested), and brackish (estuarine emergent, and estuarine scrub-shrub) following the Cowardin classification system developed for the US Fish and Wildlife Service (Cowardin et al., 1979). Each of the above communities is described in the sections below.

Upland Active Dune Complex

The upland dunal systems common in the Florence area are unconsolidated and dynamic, with large volumes of sand continually being brought ashore by wave action. The sand is highly mobile when subject to a sufficiently strong wind. Sand grains may be blown considerable distances unless held in place by surface tension when saturated (as within a deflation plain), protected from wind behind a ridge of accumulated sand, or in contact with stabilizing vegetation. Few plants are able to tolerate partial sand burial, let alone maintain a foothold in this shifting substrate. However, several grasses and forbs may persist for a time and eventually stabilize portions of the active dune. Species most commonly encountered include European beach grass *(Ammophila arenaria) (*widely introduced as a sand-binder), seashore bluegrass *(Poa macrantha),* beach silvertop *(Glehnia leiocarpa),* beach knotweed *(Polygonum paronychia),* American dune-grass *(Elymus mollis),* and beach pea *(Lathyrus japonicus).*

As larger areas of sand surface are protected from further wind action by these plants, other species less tolerant of sand burial are able to become established as well. Seedlings of such trees and shrubs as shore pine, Sitka spruce, Douglas fir, salal, and evergreen huckleberry establish more structured communities that protect ever-larger areas of sand, ultimately leading to the establishment of shrub and forest communities.

Upland Broadleaf-Scrub/Shrub Thicket

In addition to colonizing recently stabilized sand dunes, shrub communities are often associated with relatively recent disturbance (i.e. following logging, grading, or fire). Dominant species may include saplings of regenerating conifers such as Sitka spruce or Douglas fir, deciduous trees such as red alder, and shrubs such as salmonberry, thimbleberry *(Rubus parviflorus),* salal, evergreen huckleberry, rhododendron *(Rhododendron macrophyllum),* and blackberries *(Rubus* spp.). Introduced Scots' broom *(Cytisus scoparius)* and gorse *(Ulex europaeus)* are also rapid colonizers in disturbed areas. Herbaceous species are common in cleared openings, often being the first plants to colonize disturbed ground.

Upland Coniferous Forest

The dominant species in the coniferous overstory are Douglas fir, Sitka spruce, western hemlock, western red cedar, and shore pine. Sitka spruce and shore pine are more common closer to the ocean (especially within the dune systems) with the other species becoming more dominant inland, further from the effects of salt spray and shifting sands. Understory plants vary greatly with the density of the tree canopy. A closed canopy forest tends to suppress understory species diversity and density, though species such as false lily-of-the valley *(Maianthemum dilatatum)* and sword fern *(Polystichum munitum)* are commonly encountered. Openings in the canopy allow greater shrub development, with salmonberry, salal, rhododendron, and evergreen huckleberry often evident.

Upland Mixed Coniferous-Deciduous Forest

The conifer species mentioned above may be codominant with deciduous hardwoods such as red alder, bigleaf maple, and willows. Shrub understories are often well-developed given the more open tree overstory for much of the year. Common shrubs include salmonberry, red elderberry *(Sambucus racemosa),* evergreen huckleberry, salal, and Pacific wax myrtle *(Myrica californica).*

Developed-Urban

Plant communities in large portions of the City of Florence study area have been influenced by human activities for most of this century. The study area includes heavily developed commercial areas and single-family residential subdivisions, as well as widely dispersed residential to undisturbed natural areas. Residences, businesses, parking areas, roads, and sidewalks all represent unvegetated or landscaped areas. Vegetation is often of horticultural origin or weedy in these areas. The fringes of these developed areas may have been subject to disturbance as well, often allowed to regenerate as red alder, salmonberry, or blackberry thickets. More frequent disturbance may maintain areas as open spaces dominated by weedy grasses and forbs.

Riparian/Lacustrine

Riparian forests are often similar to the upland mixed evergreen-deciduous forests, though species preferring wetter sites may be more common. Sitka spruce and shore pine may codominate with red alder and western red cedar; Douglas fir and western hemlock may also be present. The shrub layer is often quite dense, especially within a red alder or otherwise more open stand, and may consist of such species as salmonberry, salal, and evergreen huckleberry. Herbaceous species may dominate the understory under a closed evergreen canopy, with lady fern, sword fern, or false lily-of-the-valley often present. Riparian communities are often transitional to or include wetland communities, especially along lake edges.

Lacustrine plant communities vary widely depending on water depths and the degree of stabilization of sideslopes. Many of the lakes in the study area are within interdunal depressions, with active dune movement into the lake edge from one or more directions. Consequently, slopes may be very steep with a short transition from unconsolidated sand into deep water. In these areas the riparian vegetation may be nonexistent or composed only of early successional dune species. In portions of the interdunal depression where wind is blowing sand away from the lake, nearly level sand flats may extend for hundreds of feet, with sufficient water to support a variety of palustrine emergent and scrub/shrub species.

Wetlands

Wetland areas are generally transitional between upland or riparian areas and truly aquatic sites with permanently open water. Open water may or may not be present, in which case the wetland can occupy a position where the groundwater table comes close to the surface for an extended period at some time during the growing season. The Florence study area contains extensive areas of freshwater, or palustrine wetlands, often associated with lake margins within interdunal depressions. In addition, brackish, or estuarine wetlands are present along the tidally influenced banks of the Siuslaw River estuary, as well as along the North Fork Siuslaw River.

The composition of palustrine wetlands in the study area is largely determined by the stability of the dune system surrounding wet depressions. Newly formed deflation plains between unstabilized dunes support primarily emergent species that can survive in soils with minimal organic content. The more stable dunes provide better growing conditions for a variety of species, especially shrubs and trees. More mature palustrine forested wetlands in the area are dominated primarily by an overstory of Sitka spruce, shore pine, and red alder; an herb understory dominated by skunk cabbage *(Lysichitum americanum)* and slough sedge *(Carex obnupta)* is often present as well. At earlier stages of dune stability, palustrine scrub/shrub wetlands often include saplings of the above tree species, along with such shrubs as Hooker's willow *(Salix hookeriana),* bog blueberry *(Vaccinium uliginosum),* Labrador tea, *(Ledum glandulosum),* Douglas' spiraea *(Spiraea douglasii),* and four-line honeysuckle *(Lonicera involucrata).* Palustrine emergent wetlands are generally dominated by herbaceous species such as slough sedge, water parsley *(Oenanthe sarmentosa),* soft-stem bulrush *(Scirpus validus),* rushes *(Juncus* spp.), and purple cinquefoil *(Potentilla palustris).* Some of these least disturbed emergent areas include small populations of uncommon or rare species, including California pitcher plant (*Darlingtonia californica*) or sundew (*Drosera sp.*).

There are also brackish or estuarine wetlands along the margins of the Siuslaw River and its North Fork. These wetlands are primarily composed of emergent species, though scrub/shrub or forest communities are often present at the upper limits of estuarine influence. These transitional woody communities primarily consist of Sitka spruce, Hooker willow, four-line honeysuckle, salmonberry, and occasionally red alder. At lower elevations, the combined influences of high salinity and daily tidal inundation produce pronounced zonation of species composition. Common herbaceous species in the high salt marsh areas include Lyngbye's sedge *(Carex lyngbyei),* tufted hairgrass *(Deschampsia cespitosa),* Puget Sound gumweed *(Grindelia integrifolia),* Baltic rush *(Juncus balticus),* and seacoast bulrush *(Scirpus maritimus).* At a somewhat lower elevation, and with a consequent increase in salinity and frequency of inundation, several halophytic species become dominant. These include pickleweed *(Salicornia virginica),* fleshy jaumea *(Jaumea carnosa),* and seashore saltgrass *(Distichlis spicata).* There are several estuarine wetlands along the banks of the Siuslaw River. These wetlands are recognized under *Goal 16: Estuarine Resources*. Though these wetlands are present, they have not been assessed or inventoried as part of the Goal 5 work for this inventory.

5.4.3 Wetland and Upland Indicator Species

Species lists of commonly encountered plants, along with their status as indicators of wetland conditions, have been prepared for all regions of the country by the USFWS (1988). The status of a particular plant, as identified on Table 3, is the probability of that plant occurring in a wetland.

Table 3. Wetland Indicator Codes and Status

Indicator Code	Status
OBL	Obligate wetland. Estimated to occur almost exclusively in wetlands (>99%)
FACW	Facultative wetland. Estimated to occur 67-99% of the time in wetlands.
FAC	Facultative. Occur equally in wetlands and non-wetlands (34-66%).
FACU	Facultative upland. Usually occur in non-wetlands (67-99%).
UPL	Obligate upland. Estimated to occur almost exclusively in non-wetlands (>99%). If a species is not assigned to one of the four groups described above it is assumed to be obligate upland.
NI	Has not yet received a wetland indicator status, but is probably not obligate upland.

Many plants are found in transitional areas between wetlands and uplands. These areas are usually characterized by flat to gradually sloping terrain where the species composition may not reflect true wetland boundaries. In such areas, a species with a status of FACU may extend into the wetland areas, just as FACW species may also be present in upland areas.

6.0 LWI DISCUSSION AND CONCLUSIONS

6.1 U.S. Fish & Wildlife Service National Wetland Inventory Areas

The U.S. Fish and Wildlife Service, as part of the National Wetlands Inventory (NWI) program, have mapped wetland in the study area (Figure 3). The NWI maps are generated primarily on the basis of interpretation of relatively small-scale color infrared aerial photographs (e.g., scale of 1:58,000) with limited "ground truthing" conducted to confirm the interpretations.

Since much of the LWI study area was included in the previous LWI work, NWI mapping was utilized primarily for areas outside the original study area. The NWI maps were useful in identifying the approximate location of wetlands, though additional ground truthing and/or additional air photo interpretation were utilized to “fine tune” the boundaries as suggested on the NWI maps.

Despite being generally accurate as to the presence of wetlands in a given area, we found that there were often significant differences between the mapped size and shape. In forested areas for example, the NWI is prone to identifying medium to large wetlands in areas that are in actuality a complex of smaller wetlands. These general inaccuracies can be attributed to canopy

cover (typically of shore pine) which creates difficulty in defining wetlands and uplands from air photo interpretation alone. Though development since the time of NWI mapping has no doubt contributed to small differences between NWI designated wetlands and those identified for the LWI, development in the Florence area has generally been limited to areas away from the large wetlands and forested tracts.

6.2 Local Wetlands Inventory Results

6.2.1 Wetland Acreage and Distribution

A total of 34 grouped wetlands of greater than one-half acre were identified during the LWI, with a total area of approximately 654.54 acres. Though some were isolated features and generally separated from other wetlands or water features, many were located in close proximity to other wetlands and as a result, formed larger wetland complexes that were grouped if they were similar in character and located in area of similar land use. The acreage total therefore does not included mapped PWs or exempt wetlands such as golf course ponds or stormwater facilities. It also does not include the acreage of other waters; including streams and lakes, or estuarine wetlands that border the study area along the Siuslaw River.

6.2.2 Wetland Classification

Each wetland was classified according to the Cowardin system. Forested (PFO) wetlands are the most dominant type within the study area at 60 percent, totaling 390.24 acres. Scrub shrub (PSS) wetlands were the second most common at 21 percent (138.71 acres). These were followed by emergent (PEM) wetlands at 10 percent (67.02 acres), unconsolidated bottom (PUB) at 8 percent (50.57 acres), lacustrine aquatic bed (L2AB) at approximately 1 percent (6.6 acres), and aquatic bed (PAB) at only 1.4 acres within the study area.

Table 4 includes the total acreage of each Cowardin wetland class for each wetland. It should be noted that Table 4 does not include the acreage of probable wetlands, other water features (such as golf ponds or ditches), or other waters of the State (including creeks and lakes). It also does not include any portion of a wetland that extends beyond the boundary of the LWI study area.

Table 4. Cowardin Classification of all Wetlands Identified in the Florence LWI

Wetland Code	USFWS Wetland Classification						Total Acreage
	PFO	PSS	PEM	PUB	PAB	L2AB	
1	3.18		4.93				8.11
2		2.59					2.59
3	4.59						4.59
4	12.93	6.27					19.2
5	38.01	6.61	5.31		0.43		50.36
6	0.21	29.32	1.19				30.72
7	2.75						2.75
8	1.78						1.78
9	0.69						0.69

Wetland Code	USFWS Wetland Classification						Total Acreage
	PFO	PSS	PEM	PUB	PAB	L2AB	
10		1.34					1.34
11	6.46			1.03			7.49
12	45.16	0.85	10.29				56.30
13	11.86	0.94	4.64				17.44
14	9.22		14.55				23.77
15	3.83						3.83
16	1.82		1.11				2.93
17	2.42		0.07				2.49
18	0.58						0.58
19	4.47						4.47
20	1.97						1.97
21	23.01						23.01
22						1.56	1.56
23	60.57						60.57
24	16.26	14.04		16.36			46.66
25	3.08	6.61					9.69
26	1.23						1.23
27	88.73		1.24				89.97
28	5.05			0.80			5.85
29	16.89	0.12	23.69	24.44			65.14
30	6.88						6.88
31	10.40	70.02		7.94	0.97		89.33
32	3.72					5.04	8.76
33	0.61						0.61
34	1.88						1.88
TOTAL	**390.24**	**138.71**	**67.02**	**50.57**	**1.4**	**6.6**	**654.54**

7.0 OREGON RAPID WETLAND ASSESSMENT PROTOCOL RESULTS

7.1 Wetland Quality Assessment

The ORWAP has been formulated to produce an objective analysis of wetland functions and values. “ORWAP is intended to provide consistent and accurate numeric estimates of the relative ability of a wetland to support a wide variety of functions and values important to society” (Adamus et. al. 2010). To obtain accurate and consistent results requires the observation and documentation of dozens of variables, or indicators. As is typical for an LWI, permission for right of access cannot be obtained for all wetlands. As a result, completing the ORWAP assessment via off-site methods increases the level of uncertainty for many variables. Subjectivity increases with the increase in off-site observations, aerial photo interpretation, the need for best professional judgment, or decisions based upon observations of wetland perceived to be similar in character. Nevertheless, an ORWAP assessment was completed for each

wetland identified by this inventory. Appendix D contains the ORWAP answers database; which includes all answers to all questions of the quality assessment conducted on each wetland (or wetland group) of greater than one-half acre in size.

As required by regulation, the LWI must inventory and assess the condition of all wetlands greater than one-half acre in size. Wetlands of less than one-half acre in size (a probable wetland or PW) were not assessed. When possible, individual wetlands of less than one-half acre were grouped with other wetlands. Wetlands were grouped when they were located in the same geomorphic position, were hydrologically connected or shared a hydrologic source, and had similar adjacent land use patterns. Though DSL protocol does allow for the identification of wetland mosaics; "a complex of several wetlands that are interspersed between areas of non-wetland each less than one half acre in size," PHS elected to use observations of onsite conditions and/or air photo interpretation to provide a more accurate representation of the general size and location of the relationship of wetlands and uplands for several wetlands in the northern portions of the study area (such as Wetlands 13, 14, 17 and 30).

The resultant scores generated in ORWAP for the functions and values of each wetland can be found in Appendix B (which shows all function scores for each wetland) and Table 6 (where the grouped function scores of all wetlands are shown in a single table). The characterization sheets in Appendix B include not only the scores produced by ORWAP, but also a summary sheet for each wetland that includes additional information such as the wetland's location, mapped soil type(s), Cowardin and hydrogeomorphic classes, dominant vegetation, and a general description of wetland characteristics and/or unique observations.

8.0 SIGNIFICANT WETLANDS DETERMINATION

8.1 Goal 5 Locally Significant Wetlands Criteria

On September 1, 1996, the Land Conservation and Development Commission adopted a revised Statewide Planning Goal 5. The goal requires local jurisdictions to inventory the natural resources covered under the goal, determine the significance of these resources, and develop plans to achieve the goal. In other words, local jurisdictions must adopt land use ordinances regulating development in and around significant areas.

The committee that created the Goal 5 significance criteria determined that even relatively small wetlands might provide an important (or major) function in their particular landscape position. For example, a small wetland in an urban area may provide habitat for a rare, threatened, or endangered species. However, as stated above, only wetland groups greater than one-half acre were assessed with ORWAP.

Local jurisdictions determining significant wetlands must use the criteria adopted by the Oregon Department of State Lands (ORS 197.279(3)(b)) or other approved criteria. For this inventory, the ORWAP scores for the relative effectiveness and value of each function group were analyzed statistically by identifying which wetlands scored above the 75th percentile for function or value. A percentile is the value of a variable below which a percent of observations fall. For example, the 75th percentile is the value below which 75 percent of the scores were located.

For the Florence LWI, the criterion for determining significance of non-Goal 17 wetlands in the Florence urban growth boundary (UGB) is wetlands that score at or above the 75th percentile in either Function or Value for one or more of the following Grouped Functions, as defined in ORWAP:

a. Hydrologic Control (water storage and delay or "flood control"); or
b. Water Quality (sediment retention and stabilization, phosphorus retention, nitrate removal and retention, and thermoregulation); or
c. Habitat for fish, aquatic, or terrestrial species.

This criterion was developed through a joint effort between the City of Florence, EPA, DSL planning staff, and stakeholders of the Siuslaw Estuary Partnership project. See Appendix E for a letter from the Oregon Department of State Lands outlining and approving this criterion. The letter goes into greater detail regarding the use of ORWAP in identifying locally significant wetlands within the Florence urban growth boundary.

8.2 Applying Significant Wetland Criteria to the LWI Study Area

8.2.1 Goal 5 Significant Wetlands

Goal 5 significant wetlands are identified in Table 6 and the Significant Wetlands map. For the purpose of analyzing wetland functions and values for significance, the scores of "grouped services," as established in ORWAP, were utilized. The score for each group is defined by the maximum score of several component functions or values. The grouped function and its component functions are identified below in Table 5.

Table 5. Grouped Functions in ORWAP

Grouped Function	Component Functions
Hydrologic Function (WS)	Water Storage & Delay (WS)
Water Quality Support Group (WQ)	Sediment Retention & Stabilization (SR) Phosphorus Retention (PR) Nitrate Removal & Retention (NR) Thermoregulation (T)
Aquatic Habitat Support Group (AQ)	Organic Matter Export (OE) Aquatic Invertebrate Habitat (INV) Amphibian & Reptile Habitat (AM) Waterbird Feeding Habitat (WBF) Waterbird Nesting Habitat (WBN)
Fish Support Group (FISH)	Anadromous Fish Habitat (FA) Non-anadromous Fish Habitat (FR)
Terrestrial Habitat Support Group (TERR)	Songbird, Raptor, & Mammal Habitat (SBM) Pollinator Habitat (POL) Native Plant Diversity (PD)

As mentioned above, the criterion for determining significance of non-Goal 17 wetlands in the Florence UGB for this inventory is wetlands that score at or above the 75th percentile in either Function or Value for one or more of the Grouped Functions outlined in Table 5.

Results

In applying the significance criterion to the 2013 LWI, the sixteen non-Goal 17 wetlands within the Florence UGB are significant, as shown in Table 6 and the map: Significant Wetlands. This is almost exclusively due to their high Function or Value in providing flood control or water quality protection. All of the wetlands, except Wetland 25, met the criterion for Hydrologic Control or Water Quality; and Wetland 25 met the criterion for Aquatic Habitat and is also at the head of a significant riparian corridor. In addition, all of the wetlands except 8, 26, and 34 met the criterion for providing habitat for fish, aquatic, and/or terrestrial species.

Analysis

1. The criterion for determining significance for the 2013 Inventory bases significance on the ORWAP scores separately for relative effectiveness of the Function and Value of the wetland. The proposed criteria do not require high scores in both Function and Value. The Florence Wetlands Project is a pilot and, as such, is one of the first attempts to use the ORWAP method for planning purposes. The Wetlands and Riparian Area Team worked together to come to a mutual understanding of how best to use the ORWAP tool and to agree to criterion for significance that makes sense in a planning context.

2. The "service area" for the Florence Comprehensive Plan is the urban growth boundary (UGB). Flood control and water quality are critical issues for the North Florence Dunal Aquifer, both inside and outside the City limits. Wetlands that provide flood control or water quality protection, today or in the future, are of critical importance in providing these two services. For this reason, the criterion takes both the Function and the Value of the wetlands into consideration in determining significance.

3. The significance criterion recognizes the critical role that wetlands play in controlling floods and protecting water quality in the North Florence Sole Source Dunal Aquifer. All wetlands in the UGB play a role, or will play a role in the future, in Hydrologic Control and/or Water Quality Protection. All but one of the "significant" wetlands met the criterion for these functions or values. The criterion also recognizes the importance of wetlands for providing Habitat for fish, aquatic, and terrestrial species. All of the wetlands except 8, 26, and 34 met the criterion for providing habitat for fish, aquatic, and/or terrestrial species.

8.3 Statewide Planning Goals 5 and 17

The significant wetlands in Table 6 are either Goal 5 or Goal 17 significant resources (see map: Coastal Shorelands & Wetland Areas). This project addresses the significance of Goal 5 resources. Wetlands and riparian areas that are significant through the application of Statewide Planning Goal 17, Coastal Shorelands, are identified in the Lane County Coastal Resources Inventory, the Management Unit descriptions in Florence Comprehensive Plan Chapter 17, and in the Coastal Shoreland Overlay Zone map and standards in Florence City Code Title 10 Chapter 19.

Updated wetland inventories done under Goal 5 can be used to clarify Goal 17 resources.[1] In Florence's case, the Coastal Shoreland Management Units were identified in 1978; and the 2013 wetland data are more accurate and current. The 2013 LWI data are not substantially different from the 1978 data for Goal 17 resources, except for one location: the South Heceta Junction Seasonal Lakes (see map). For this reason, "Florence City Code Consistency Amendments" will reference the 2013 LWI for the *general* location of the South Heceta Junction Seasonal Lakes and reference the 2013 Inventory Report for purposes of assessing the functions and values of this resource inside the Florence city limits. The entire area affected by this change today is publicly owned parkland (County and State).

[1] **OAR 660-023-0240**. **Relationship of Goal 5 to Other Goals**
"(2) The requirements of Goals 15, 16, 17, and 19 shall supersede requirements of this division for natural resources that are also subject to and regulated under one or more of those goals. However, local governments may rely on a Goal 5 inventory produced under OAR 660-023-0030 and other applicable inventory requirements of this division to satisfy the inventory requirements under Goal 17 for resource sites subject to Goal 17."

Table 6. ORWAP Scores for All Wetlands' Functions (F) and Values (V) and Identification of Goal 5 Significant Wetlands

Wet-land #	Hydrologic Control		Water Quality		Fish Habitat		Aquatic Habitat		Terrestrial Habitat		Notes and Significance			
	F	V	F	V	F	V	F	V	F	V	Outside UGB	Goal 17 Resource	In City Limits	Goal 5 Significant-Wetland
1	5.75	3.67	10	7.19	5.87	10	4.88	6.67	5.94	6.67	Part Out		In part	yes
2	3.5	3.08	10	6.07	3.69	4.2	6.37	7.33	6.63	6.67			Outside	yes
3	7	4.72	10	6.19	2.16	6.67	6.89	6.67	6.55	6.67	Outside			
4	2.31	7.64	6.17	7.5	6.56	10	6.11	10	7.61	7.51	Part Out		Inside	yes
5	3.09	7.22	7.39	7.5	7.89	10	6.52	7.33	8.79	10	Part Out	Outside UGB=G17	In part	yes
6	1.77	2.17	4.84	7.5	6.95	10	7.39	7.33	7.51	7.43			Mostly in	yes
7	6.0	3.17	10	6.03	2.21	6.67	6.41	7.33	5.23	6.67			Outside	yes
8	3.5	3.08	10	6.03	0.67	6.67	6.72	6.67	5.99	6.67			Inside	yes
9	3.46	2.17	7.37	5.28	2.3	6.67	7.12	4.0	7.9	6.67	Outside			
10	4.5	2.17	10	5.43	3.69	6.67	7.87	4.0	7.39	6.67	Outside			
11	2.67	6.81	6.93	5.59	2.83	6.67	5.86	7.33	9.01	7.72			Mostly Outside	yes
12	3.25	2.17	10	4.94	3.33	6.67	8.39	7.33	7.76	7.77	Part Out		Mostly Outside	yes
13	5.75	2.17	10	5.82	2.32	6.67	7.01	6.67	5.9	6.67	Outside			
14	4.25	2.17	10	5.07	3.52	6.67	8.04	6.67	6.94	6.67	Outside			
15	2.63	2.33	5.09	6.67	6.68	10	7.14	6.67	7.84	6.67	Outside			
16	3.25	2.17	10	5,07	0.74	6.67	7.67	7.33	6.68	6.7	Outside			
17	3.25	2.17	10	5.57	2.05	6.67	7.87	7.33	7.09	6.99	Outside			
18	3.85	2.33	6.46	5.78	1.59	6.67	6.92	7.33	7.71	6.67	Outside			
19	3.25	2.17	10	5.36	2.64	5.11	7.31	6.67	6.53	6.67	Outside			
20	3.25	2.17	10	5.36	0.83	6.67	7.34	7.33	6.06	6.67	Outside			
21	4.5	3.58	10	6.49	2.95	6.67	7.84	7.33	6.99	7.22	Outside			
22	3.13	2.67	4.21	6.67	7.06	10	6.97	6.67	6.34	6.67	Outside	G17		
23	4.5	2.17	10	5.45	4.26	5.47	8.28	7.33	6.72	7.21	Outside			
24	5.75	2.17	10	5.61	3.54	6.67	7.82	7.33	7.08	7.09	Part Out	Part G17	Outside	yes
25	3	2.17	5.52	5.28	2.59	5.41	7.23	7.33	5.83	6.7	Part Out		Outside	yes
26	3.25	2.42	10	5.57	2.89	6.67	5.98	6.67	5.95	6.67			Outside	yes
27	3.5	2.67	10	6.28	3.22	4.73	6.78	7.33	5.35	6.67	Part Out		Outside	yes
28	2.25	2.17	10	5.28	3.9	6.67	6.38	7.33	5.85	6.67			Outside	yes
29	4.5	2.17	10	5.36	3.33	6.67	6.41	7.33	5.43	6.67		G17	In part	
30	3.5	1.67	10	5.11	3.97	6.67	7.42	7.33	6.16	6.67		G17	Inside	
31	2.71	2.92	6.17	7.5	7.93	10	5.89	7.33	6.3	7.03		G17	Inside	
32	2.26	2.0	5.56	6.67	6.64	10	6.90	7.33	8.73	7.96	Outside	G17		
33	4.5	1.67	10	4.77	1.22	7.13	7.36	7.33	7.09	6.97			Inside	yes
34	1.64	1.67	5.03	6.64	2.57	6.67	6.06	6.67	4.66	6.67		Part G17	Inside	yes
75%	**4.50**	**3.04**	**10.00**	**6.60**	**4.19**	**7.02**	**7.50**	**7.33**	**7.48**	**7.08**	**Goal 5 Significance Threshold**			

9.0 RIPARIAN AREAS AND CORRIDORS

A "riparian area" is defined as the area adjacent to a river, lake, or stream, consisting of the transition from an aquatic ecosystem to a terrestrial ecosystem. A "riparian corridor" is a Goal 5 resource that includes the water areas, fish habitat, adjacent riparian areas, and wetlands within the riparian boundary.

The riparian inventory for the Siuslaw Estuary Partnership (SEP) project includes several perennial and intermittent streams that flow directly to the Siuslaw River or Pacific Ocean, plus a chain of interconnected lakes lying northeast of Florence.

The Goal 5 Administrative Rules require local governments to inventory and determine significant riparian corridors by following either a “safe harbor” process or a “standard” methodology. This process used a combination of the safe harbor and standard processes, as discussed below.

9.1 Riparian Areas Inventory and Assessment

OAR 660-023-0090 provides that “Local governments shall inventory and determine significant riparian corridors by following either the safe harbor methodology described in section (5) of this rule or the standard inventory process described in OAR 660-023-0030 as modified by the requirements in section (4) of this rule. The local government may divide the riparian corridor into a series of stream sections (or reaches) and regard these as individual resource sites.”

The riparian corridors in the Florence UGB were divided into 17 riparian reaches in the following 5 basins:

- Munsel Creek
- Rhododendron Drive
- Airport
- Heceta Beach
- North Fork Siuslaw

Goal 5 allows for the riparian inventory and determination of widths to use either the standard process or a safe harbor process. Safe Harbor was used to identify the significant riparian corridor and width for the Munsel Creek Reaches (50 feet from top of bank). In the case of RMC-C, the riparian corridor includes a major wetland where the standard distance to the riparian corridor boundary shall be measured from, and include, the upland edge of the wetland; and two minor wetlands of < ½ acre each where the width is 25 feet consistent with prior DSL approvals.

Safe Harbor Riparian Inventory

OAR 660-023-0020 defines “safe harbor” as follows:

> ‘“Safe Harbor” consists of an optional course of action that satisfies certain requirements under the standard process. Local governments may follow safe harbor

> requirements rather than addressing certain requirements in the standard Goal 5 process. For example, a jurisdiction may choose to identify "significant" riparian corridors using the safe harbor criteria under OAR 660-023-0090(5) rather than follow the general requirements for determining "significance" in the standard Goal 5 process under OAR 660-023-0030(4). Similarly, a jurisdiction may adopt a wetlands ordinance that meets the requirements of OAR 660-023-0100(4)(b) in lieu of following the ESEE decision process in OAR 660-023-0040."

The safe harbor inventory approach is only available in Goal 5 for fish bearing streams:

> "(5) As a safe harbor in order to address the requirements under OAR 660-023-0030, a local government may determine the boundaries of significant riparian corridors within its jurisdiction using a standard setback distance from all fish-bearing lakes and streams shown on the documents listed in subsections (a) through (f) of section (4) of this rule, as follows:…"

Munsel Creek is the only fish bearing stream in the Florence UGB and the annual stream flow is less than 1,000 cubic feet per second; so, in accordance with Goal 5, below, the riparian corridor boundary for Munsel Creek shall be 50 feet from the top of bank:

> "(b) Along all lakes, and fish-bearing streams with average annual stream flow less than 1,000 cfs, the riparian corridor boundary shall be 50 feet from the top of bank."

There is a section of the main channel of Munsel Creek (Reach RMC-C) where the riparian corridor includes portions of a significant wetland. In accordance with Goal 5, below, the standard distance to the riparian corridor boundary in this area shall be measured from, and include, the upland edge of the wetland and the riparian corridor boundary for two minor wetlands (< ½ acre each) is set at 25 feet consistent with the approved PUD plat for Florentine Estates.

> "(c) Where the riparian corridor includes all or portions of a significant wetland as set out in OAR 660-023-0100, the standard distance to the riparian corridor boundary shall be measured from, and include, the upland edge of the wetland."

Standard Riparian Inventory

The "standard" inventory approach was used to identify riparian widths for the remainder of the riparian inventory.

Note that field data sheets and maps were completed for Munsel Creek, including the Munsel Creek side channel, even though the safe harbor option was used to determine the boundaries of these corridors. The standard inventory maps and reach summaries for Munsel Creek are included in the 2013 Inventory as background information; they are not intended for use in, and are not referenced in, any local planning or land use context.

The standard inventory involves the following steps:

1. Inventory: determine stream characteristics and riparian widths – typical tree height or topographic break, using the Urban Riparian Inventory and Assessment Guide, Oregon Department of State Lands, 1998
2. Assess riparian functions – water quality, flood management, thermal regulation, and wildlife habitat
3. Determine significance
4. Adopt protection measures

The assessment of the riparian corridors was based on the following functions:

- Water quality: riparian vegetation traps sediment, filters runoff, and binds soil to prevent erosion
- Flood management: vegetation slows the rate of storm runoff and increases groundwater recharge
- Thermal regulation: trees and herbaceous layers provide shade and add humidity, cooling the water and providing important habitat for juvenile fish
- Wildlife habitat: riparian trees, vegetation, ground cover, and woody debris provide habitat for wildlife that thrive near a water resource.

9.2 Urban Riparian Inventory and Assessment Guide (URIAG)

Goal 5 OAR 660-023-0090 provides that , "Local governments are encouraged, but not required, to conduct field investigations to verify the location, quality, and quantity of resources within the riparian corridor:"

> "(4) When following the standard inventory process in OAR 660-023-0030, local governments shall collect information regarding all water areas, fish habitat, riparian areas, and wetlands within riparian corridors. Local governments may postpone determination of the precise location of the riparian area on lands designated for farm or forest use until receipt of applications for local permits for uses that would conflict with these resources. Local governments are encouraged, but not required, to conduct field investigations to verify the location, quality, and quantity of resources within the riparian corridor."

For the SEP project, the City of Florence elected to use the Oregon DSL "Urban Riparian Inventory and Assessment Guide" (URIAG). Using this method, all water resources are inventoried, riparian widths and characteristics are determined by field evaluation, and riparian quality is determined by a functional assessment scoring system. This approach will assure that all riparian resources in the project area are identified, and that their location, extent, quality, and functional benefits are documented and made known to local officials, property owners, and residents.

The URIAG methodology is comprised of a riparian inventory and a riparian assessment. For the inventory, hydrologic basins are identified and the riparian corridors within each basin are mapped and broken into "reaches" with similar characteristics such as water body (stream vs. lake), vegetation patterns, and/or land use. For each reach, the riparian area was characterized

by a combination of field observations at accessible locations, aerial photographs, GIS maps, and the recently available Light Detection and Ranging (LIDAR) topography. Each riparian reach has a right (R) and left (L) side, looking downstream. If the riparian information differs for the left and right sides, two forms may be used.

The riparian inventory requires determination of the riparian width. Width of the riparian area is measured horizontally out from the edge of the water resource, typically either the top of a streambank (TOB) or the high water line of a lake or wetland. In order to capture the riparian functions of stream shading and delivery of organic debris, the URIAG sets the width value as the Potential Tree Height (PTH) at maturity for the dominant tree species in the area.

The SEP inventory has used the PTH criteria wherever it provides a reasonable and credible result. However, several of the stream reaches within the urban City limits are favored with stands of Douglas fir, Western hemlock, and/or Sitka spruce; thus the PTH is 120 feet — which would extend the riparian area well into the established residential structures and facilities. These reaches typically have a topographical break at the top of the riparian slope, which also sets the usual boundary with the adjacent residential or commercial development. For such reaches, the SEP inventory has chosen to recognize "realities on the ground" by defining the riparian width as "TOB to topographical break" — the horizontal dimension of the slope which runs from the streambank up to where the ground is roughly level or slopes away from the water resource; this slope has the primary potential for positive or negative contributions to water quality and flood management. Further, for water resources in the urban area, this slope also seems to support the heaviest and most consistent vegetation — trees, shrubs and woody debris — which is the primary source of shading for thermal regulation as well as organic material for wildlife habitat.

9.3 URIAG Assessment and Results

The riparian area assessment is completed by "scoring" each reach with respect to beneficial riparian functions using URIAG parameters. The inventory field observations answered a series of questions which describe the characteristics of the riparian area. Those answers are weighted and summed to quantify riparian potential regarding water quality, flood management, thermal regulation, and wildlife habitat. The scored results for the reach indicate whether the potential for each function is High, Medium, or Low. The ratings provide a basis for local authorities to identify significant riparian resources, and to establish appropriate protection policies and land use trade-offs.

For the SEP project, riparian field assessments were conducted at 51 locations on the drainages and lakes in the project area. At many locations, separate information was recorded for the left and right sides of the water resource. Each assessment location was assigned a code based on a project defined drainage basin and a number (e.g. RMC-1). A data sheet was completed during the visit at each location which documents the existing channel, topography, and vegetation conditions and estimates riparian measurements. In a few cases, the assessments were based on aerial photographs and LIDAR data due to the lack of project access. All riparian field data sheets are included in Appendix F.

Based on these field observations, the streams and lakes in the SEP project area were divided into reaches with roughly uniform riparian qualities. Location of the reaches and the riparian areas are illustrated in the maps of Sheets E through H. A total of 12 stream reaches and 5 lake reaches were identified, with codes based on drainage basin and a letter (e.g. RMC-A). The riparian characteristics for each reach were set as a composite of the assessment site information. Reach summary sheets are included in Appendix G. These reach characteristics were scored as noted above to determine High, Medium, or Low functional quality of the reach.

Five tree species were determined to be the dominant native trees within riparian areas of the project. The most common tree species in the riparian areas included Douglas fir, Sitka spruce, western hemlock, shore pine, and red alder. Potential tree heights at maturity (PTH) for each are included in Table 7.

Table 7. Potential tree heights (PTH) of dominant species in the Florence area

Common Name	Botanical Name	Potential Tree Height/ Riparian Corridor Widths (feet)
Sitka spruce	*Picea sitchensis*	120
Shore pine	*Pinus contorta*	50
Douglas fir	*Pseudotsuga menziesii*	120
Western Hemlock	*Tsuga heterophylla*	120
Red alder	*Alnus rubra*	65

Riparian Acreage and Distribution Field Data

Table 8 summarizes the riparian area widths and resulting acreage for each reach in the SEP project area using the field data and URIAG. The bases used to determine riparian width are also indicated in each case. The bases in Table 8 reflect the field data, not the significant riparian widths which are presented and discussed in section 9.6. The protection measures adopted as part of this project apply to the significant riparian widths in Table 10.

Table 8. Field Data Acreage of Riparian Areas by Reach and Basin

Riparian Basin	Reach Code	Width L/R	Basis	Acreage	Basin Total
Munsel Creek	RMC-A	30/40	Topography	0.9	179.7
	RMC-B	50/50	Topography	19.6	
	RMC-C	50/50	PTH/Topo	33.5 (incl wetland)	
	RMC-Cs	25/25	Topography	2.2	
	RMC-D	40/40	Topography	15.4	
	RMC-D1	50/50	Topo/PTH	5.5	
	RMC-E	120/15[1]	PTH/Topo	93.6	
	RMC-F	50/120	Topo/PTH	9.0	
Airport	RAIR-A	20/20	Topography	8.0	18.6
	RAIR-B	65/65	PTH	9.0	
	RAIR-C	30/30	Topography	1.6	

Riparian Basin	Reach Code	Width L/R	Basis	Acreage	Basin Total
Heceta Beach	RHB-A	20/20	Topography	0.6	2.6
	RHB-B	50/50	PTH	2.0	
North Fork Siuslaw	RNS-A	40/40	Topography	1.8	1.8
Rhododendron	RRH-A	50/50	PTH	5.8	5.8
			Riparian Acreage Total		**208.5**

[1]West (right) of the northern lakes, sand dunes reach to the shoreline in many areas; thereby inhibiting the growth of vegetation and the establishment of a functional riparian area.

Table 9 summarizes the riparian assessment results for each reach in the SEP project area using URIAG.

Table 9. Summary of Riparian Functional Assessments Using URIAG

Riparian Reach	Water Quality	Flood Management	Thermal Regulation	Wildlife Habitat
RMC-A	H	H	M	H
RMC-B	H	M	H	H
RMC-C	H	H	H	H
RMC-Cs	H	M	H	M
RMC-D	H	M	H	H
RMC-D1	H	M	M	M
RMC-E Left	H	M	M	H
RMC-E Right	M	M	L	M
RMC-F Left	H	M	M	M
RMC-F Right	H	M	M	H
RAIR-A	M	M	L	L
RAIR-B	H	M	H	H
RAIR-C	M	M	M	M
RHB-A	H	M	H	M
RHB-B	H	H	H	H
RNS-A	M	M	H	M
RRH-A	M	M	H	M

H = High M = Medium L = Low

The quality of the SEP project riparian corridors using URIAG scoring indicate that most of the inventoried riparian reaches (70%) rate HIGH for water quality functioning, because they filter the runoff from nearby land. In the flood management category, 80% of the riparian areas rated MEDIUM; only the three with associated wetlands rated HIGH. For the important thermal regulation function, 50% rated HIGH while 12% rated LOW due to lack of effective vegetation coverage. Valuable wildlife habitat is characterized by multi-layered vegetation near the streams; for this function 47% of the SEP reaches rated HIGH and 47% rated MEDIUM.

In general, Munsel Creek and the undeveloped lakeshores were judged to have excellent riparian functional value. In addition, RAIR-B and the Heceta Beach (RHB) reaches also had superior ratings.

9.4 Significant Riparian Corridors and Widths

The Significant Riparian Corridors and Widths are presented in Table 10. The protection measures adopted as part of this project apply to the significant riparian widths in Table 10.

Table 10. Significant Florence Riparian Corridors, Widths, and Functional Assessment

Basin and Reach[1]	Riparian Width,[2] ft	Functional Assessment				Goal 5 Significant?	Notes		
		Water Quality	Flood Mgmt	Thermal Regulation	Wildlife Habitat		Goal 17?	Outside UGB?	In City Limits?
Munsel Creek Basin									
RMC-A	50/50-G17	H[3]	H	M	H	--	Goal 17		Yes
RMC-B	50/50-SH	H	M	H	H	Yes			Yes
RMC-C	50/50 –SH[4]	H	H	H	H	Yes			Yes
RMC-Cs	50/50-SH	H	M	H	M	Yes			Yes
RMC-D	50/50-SH	H	M	H	H	Yes			Yes, in part
RMC-D1	50/50-PTH	H	M	M	M	--		Outside	
RMC-El	120-PTH	H	M	M	H	--	Goal 17		No
RMC-Er	15 - PTH	M	M	L	M	--		Outside	
RMC-Fl	50 - Topo	H	M	M	M	--		Outside	
RMC-Fr	120-PTH	H	M	M	H	--		Outside	
Airport Basin									
RAIR-A	20/20 Topo	M	M	L	L	No			Yes
RAIR-B	65/65-PTH	H	M	H	H	Yes	Goal 17, in part		Yes
RAIR-C	30/30 Topo	M	M	M	M	No			Yes
Rhododendron Drive Basin									
RRH-A	50/50-PTH	M	M	H	M	Yes	Goal 17, in part		Yes
Heceta Beach Basin									
RHB-A	20/20Topo	H	M	H	M	Yes			No
RHB-B	50/50-PTH	H	H	H	H	Yes			No
North Fork Siuslaw Basin									
RNS-A	40/40 Topo	M	M	H	M	--		Outside	

1. See Map "City of Florence Significant Riparian Reaches 2013" for Significant Riparian Corridor locations. The Appendices of this Inventory contain information and maps for riparian areas not deemed significant.
2. Left and Right values, measured horizontally from top of bank for streams. Basis for width:
   G17 = Goal 17 setback; SH = Goal 5 Safe Harbor;
   PTH = Potential Tree Height; Topo = Top of bank to topographical break
3. Functional assessment ratings based on Urban Riparian Assessment Guide (URIAG) Scoring: L = Low, M = Medium, H = High
4. Where RMC-C includes a wetland, the riparian boundary shall be measured from, and include, the upland edge of the wetland [OAR 660-023-0090 (5)(c)]; and the riparian corridor boundary for two minor wetlands (< ½ acre each) is set at 25 feet consistent with the approved PUD plat for Florentine Estates.

Significance Criteria for Riparian Corridors and Widths

The significance criteria for non-Goal 17 riparian corridors in the Florence urban growth boundary (UGB) are as follows:

1. **Munsel Creek:** use the "Safe Harbor" provisions of Statewide Planning Goal 5 to determine as a "significant riparian resource" the riparian corridor with boundaries 50 feet from the top of bank along each side of Munsel Creek, the only fish-bearing stream in the Inventory. This safe harbor width includes the side channel of Munsel Creek (RMC-Cs). For RMC-C (main channel where there is a wetland), the riparian width is 50 feet measured from, and including, the upland edge of the wetland; and the riparian corridor boundary for two minor wetlands (< ½ acre each) is set at 25 feet consistent with the approved PUD plat for Florentine Estates.

2. **Riparian corridors other than Munsel Creek:** determine as "significant riparian corridors" the inventoried widths of all Riparian Reaches that scored at least one High Value in the Riparian Functional Assessment in Table 10.

Results

As shown in Table 10, the only two Reaches that do not meet this threshold, and thus will not be deemed "significant," are RAIR-A and RAIR-C. RAIR-A is cleared and channeled via Siuslaw High School, the airport runway, and Greentrees to 12th Street. RAIR-C runs from the south airport fence to 9th Street; and restoration of this reach is questionable. The significant riparian reaches are shown in the Significant Riparian Reaches map.

Analysis

Goal 5 provides that a 50 foot "Safe Harbor" significant riparian width can be used for fish bearing streams. Munsel Creek is the only fish bearing stream in the Inventory. As such, the Safe Harbor provisions in Goal 5 are used to establish significance with a riparian width of 50 feet from top of bank, with the exception of the wetland area of the main channel section of RMC-C where the riparian corridor boundary is 50 feet from the edge of the wetland; and the riparian corridor boundary for two minor wetlands (< ½ acre each) is set at 25 feet consistent with the approved PUD plat for Florentine Estates.

For those streams within the Florence UGB that are not fish-bearing, the standard inventory approach was used, consistent with Statewide Planning Goal 5 which provides that, when Safe Harbor is not an option, the determination of significance shall be based on:

(a) The quality, quantity, and location information;
(b) Supplemental or superseding significance criteria set out in OAR 660-023-0090 through 660-023-0230; and
(c) Any additional criteria adopted by the local government, provided these criteria do not conflict with the requirements of OAR 660-023-0090 through 660-023-0230.

Munsel Creek and Munsel Creek Side Channel

OAR 660-023-0090 requires the local government to consult specific sources in completing the standard inventory:

> At a minimum, local governments shall consult the following sources, where available, in order to inventory riparian corridors along rivers, lakes, and streams within the jurisdiction:
>
> (a) Oregon Department of Forestry stream classification maps;
> (b) United States Geological Service (USGS) 7.5-minute quadrangle maps;
> (c) National Wetlands Inventory maps;
> (d) Oregon Department of Fish and Wildlife (ODFW) maps indicating fish habitat;
> (e) Federal Emergency Management Agency (FEMA) flood maps; and
> (f) Aerial photographs."

The 50 foot safe harbor significant riparian width was applied to Munsel Creek, including the Munsel Creek side channel, based on the conclusions from consultation with ODFW, the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), and the Florence Salmon and Trout Enhancement Program (STEP) at-large Director. These agencies concluded that Munsel Creek and this side channel reach and its riparian area be declared as significant and protected with a 50-foot riparian setback. They concluded: "Munsel Creek and the side channel are both considered as critical habitat for Oregon Coast coho salmon (a federally listed threatened species) and are important to the conservation and recovery of this species."

Fish biologists from ODFW, NMFS, and one of the at-large Directors of the STEP agreed in written communications that "When Oregon Coast coho salmon were listed under Endangered Species Act, NMFS also designated critical habitat and Munsel Creek was included in this designation. Therefore, Munsel Creek and the side channel are both considered by NMFS as critical habitat for Oregon Coast coho salmon and are important to the conservation and recovery of this species. Munsel Creek and the side channel are also designated as essential fish habitat (EFH) for coho salmon under the Magnuson-Stevens Fishery and Conservation Management Act." "Therefore, I recommend that this side channel reach and its riparian be declared as significant and protected with a 50-foot riparian setback."

10.0 STAFF QUALIFICATIONS

John van Staveren:	President; Senior Scientist; Professional Wetland Scientist
Project Role:	Project Manager
Project Responsibility:	Contract negotiations, monthly billing
	Public presentations
	Quality control
	Regulatory agency coordination

As President, Mr. van Staveren directs Pacific Habitat Services' environmental projects throughout the Pacific Northwest. He has conducted over 1,000 wetland delineations, 30 Local Wetland Inventories and riparian inventories, designed and implemented dozens of freshwater

and estuarine wetland mitigation plans, provided expert witness testimony, and testified at numerous public hearings. John served on three state-appointed Technical Advisory Committees concerning wetland policy in the State of Oregon. He is principal author of the *Urban Riparian Inventory and Assessment Guide* prepared for the Oregon Department of State Lands and *Freshwater Wetland Restoration*, a chapter in *The Art and Science of Ecological Restoration in Cascadia. The Science and Practice of Ecological Restoration (Island Press, 2006).*

Shawn Eisner

Project Role:	Wetland Scientist
Project Responsibility:	Wetland inventory field work and assessment
	Report writing
	Quality control and editing
	Data input

Shawn provides specialized support pertaining to wetland delineations, determinations, and monitoring; stream and natural resource assessments and environmental permit processing. He conducts field work and data collection for Local Wetland Inventories and is involved in data analysis and report preparation. He has played an integral role in the Arch Cape, North Bethany Planning Area, Bull Mountain Planning Area, Molalla, Bandon, North Plains, Corvallis, Depoe Bay, and Eugene LWIs.

Amy Hawkins

Project Role:	Wetland Scientist
Project Responsibility:	Wetland inventory field work and assessment

Amy is certified as a Professional Wetland Scientist and is certified by the Oregon Department of Transportation to prepare endangered species effects assessments. Amy has delineated numerous wetlands and prepared wetland mitigation plans. She conducts field work and data collection for Local Wetland Inventories as well as completion of functional assessments.

Caroline Rim

Project Role:	Wetland Scientist
Project Responsibility:	Wetland inventory field work

Caroline has over 14 years of experience as an environmental consultant. She conducts wetland delineations and wildlife habitat assessments, designs and monitors wetland mitigation areas, and assists environmental permit processing. She has worked on several local wetland inventories. She conducts field work and data collection.

Jane Le Blanc

Project Role:	Technical Editor
Project Responsibility:	Graphics
	Report editing, formatting and layout
	Data input

Jane is a technical editor and provides permitting support for PHS. Her duties include formatting and editing wetland reports, proposals, and letters as well as data input.

Solye Brown

Project Role:	GIS Cartographer
Project Responsibility:	Mapping GIS database management

Solye's experience is in AutoCad and Geographic Information Systems (GIS) mapping. Her specialties include Geodatabase development and management, and data preparation. Her roles in this project include the database management and preparation of final maps.

Kelli Weese

Project Role:	GIS analyst and Cartographer
Project Responsibility:	Mapping GIS database preparation

Kelli's experience includes work as a Geographic Information Systems (GIS) analysis for the City of Florence. Her roles in this project include the creation of field maps, GIS data from field collected and attribute data, and mapping of results.

Clarence Lysdale

Project Role:	Riparian Inventory
Project Responsibility:	Riparian inventory field work and assessment

Clarence is a registered professional engineer. His roles in this project included riparian fieldwork; development of the assessment protocol; oversight of riparian map preparation; and riparian report preparation.

Mark Tilton

Project Role:	Riparian Inventory
Project Responsibility:	Riparian inventory field work and assessment

Mark was a member of the Florence Planning Commission. His roles in this project included riparian fieldwork and development of the assessment protocol.

11.0 REFERENCES

Adamus, P., J. Morlan, and K. Verble. 2010. *Oregon Rapid Wetland Assessment Protocol (ORWAP):* calculator spreadsheet, databases, and data forms. Oregon Dept. of State Lands, Salem, OR.

Brinson, Mark. 1993. *A Hydrogeomorphic Classification for Wetlands*. Technical Report WRP-DE-4. Wetlands Research Program. U.S. Army Corps of Engineers. Washington D.C.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service, Office of Biological Services, FWS/OBS-79/31. 103 pp.

Department of Land Conservation and Development (DLCD), 2010. *Oregon's Statewide Planning Goals & Guidelines*. Oregon Department of Land Conservation and Development (March 12, 2010).

Environmental Laboratory. *Corps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1)*. (U.S. Army Corps of Engineers, 1987).

Federal Register. 1982, *Title 33: Navigation and Navigable Waters, Chapter II, Regulatory Programs of the Corps of Engineers*, Vol. 47, No. 138, p31810, US Government Printing Office, Washington, D.C.

Franklin and Dyrness, 1973. *Natural Vegetation of Oregon and Washington* Land Conservation and Development Commission, 1996. *Statewide Planning Goal 5. Amended Administrative Rules OAR 660, DSL 23*.

Oregon Department of Environmental Quality, 2006. *2004/2006 Section 303(d) list* Oregon's 2004/2006 Integrated Report Database. http://www.deq.state.or.us/WQ/assessment/rpt0406/search.asp

Pacific Habitat Services, 1998. *Urban Riparian Inventory & Assessment Guide*. Prepared for Oregon Department of State Lands, March 1998.

Reed, Porter B., Jr. 1988 (May). *National List of Plant Species that Occur in Wetlands: Northwest (Region 9)*. Prepared by the U.S. Fish and Wildlife Service, St. Petersburg, FL. NERC-88/18.37.

U.S. Army Corps of Engineers. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0). May 2010.*

U.S.D.A., Soil Conservation Service, 1987. *Soil Survey of Lane County Area, Oregon*.

U.S. Environmental Protection Agency, 2001. *Functions and Values of Wetlands.* EPA 843-F-01-002c September 2001.

U.S.F.W.S. *National Wetlands Inventory*. GIS data utilized for mapping. Information available at http://www.fws.gov/wetlands/.

Appendix A

Figures and Sheets

LWI Study Area Boundary

SIUSLAW RIVER

N

0 810 1,620 2,430 3,240 Feet

FLORENCE AREA LWI STUDY AREA

PACIFIC HABITAT SERVICES
9450 SW Commerce Circle, Ste. 180
Wilsonville, Oregon 97070
Phone: (503) 570-0800
Fax: (503) 570-0855
E-mail: phs@pacifichabitat.com

FIGURE 1
3/18/11

N

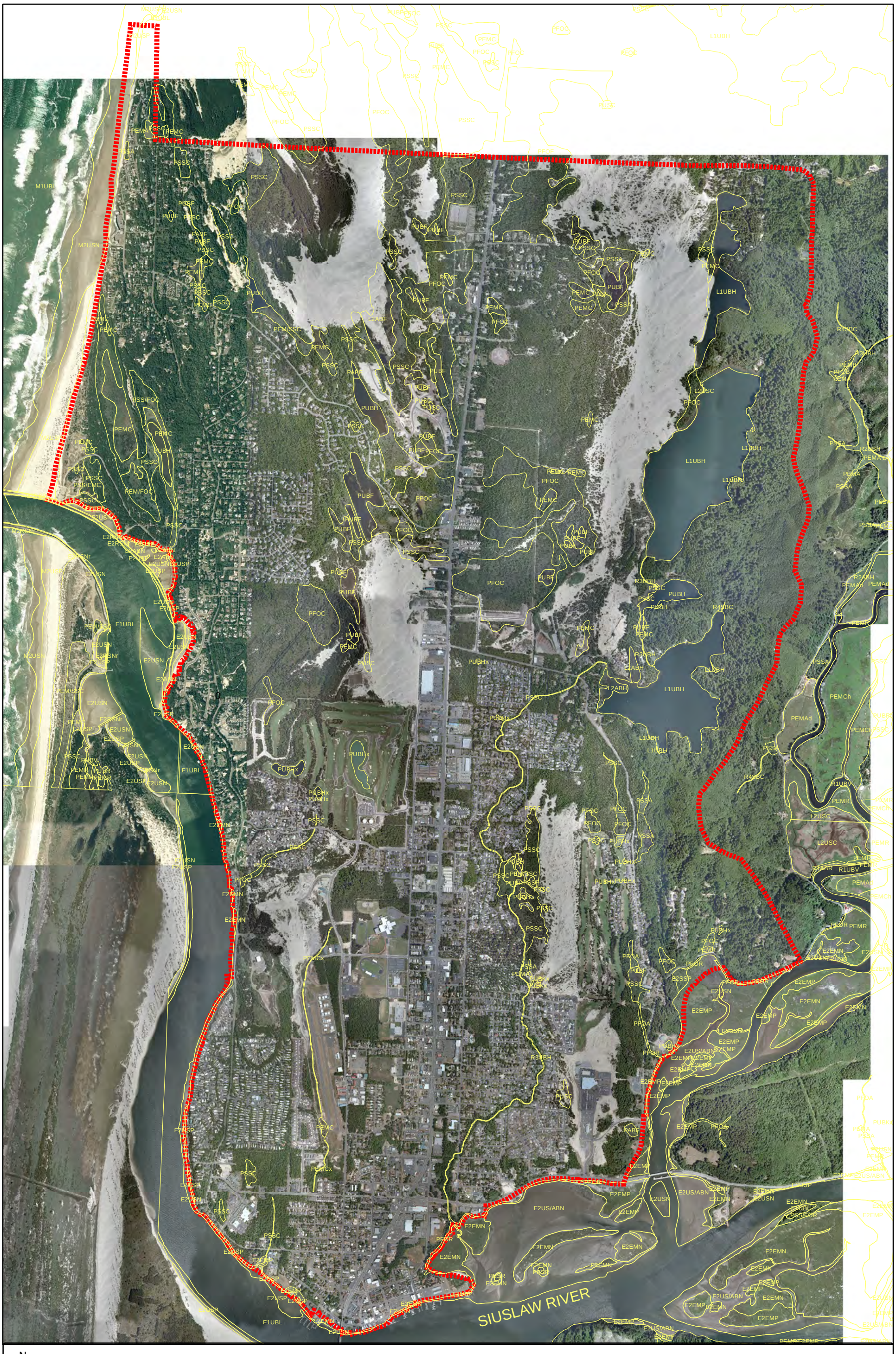
0 820 1,640 2,460 3,280 Feet

FLORENCE AREA LWI
MAPPED SOIL SURVEY

PHS

PACIFIC HABITAT SERVICES
9450 SW Commerce Circle, Ste. 180
Wilsonville, Oregon 97070
Phone: (503) 570-0800
Fax: (503) 570-0855
E-mail: phs@pacifichabitat.com

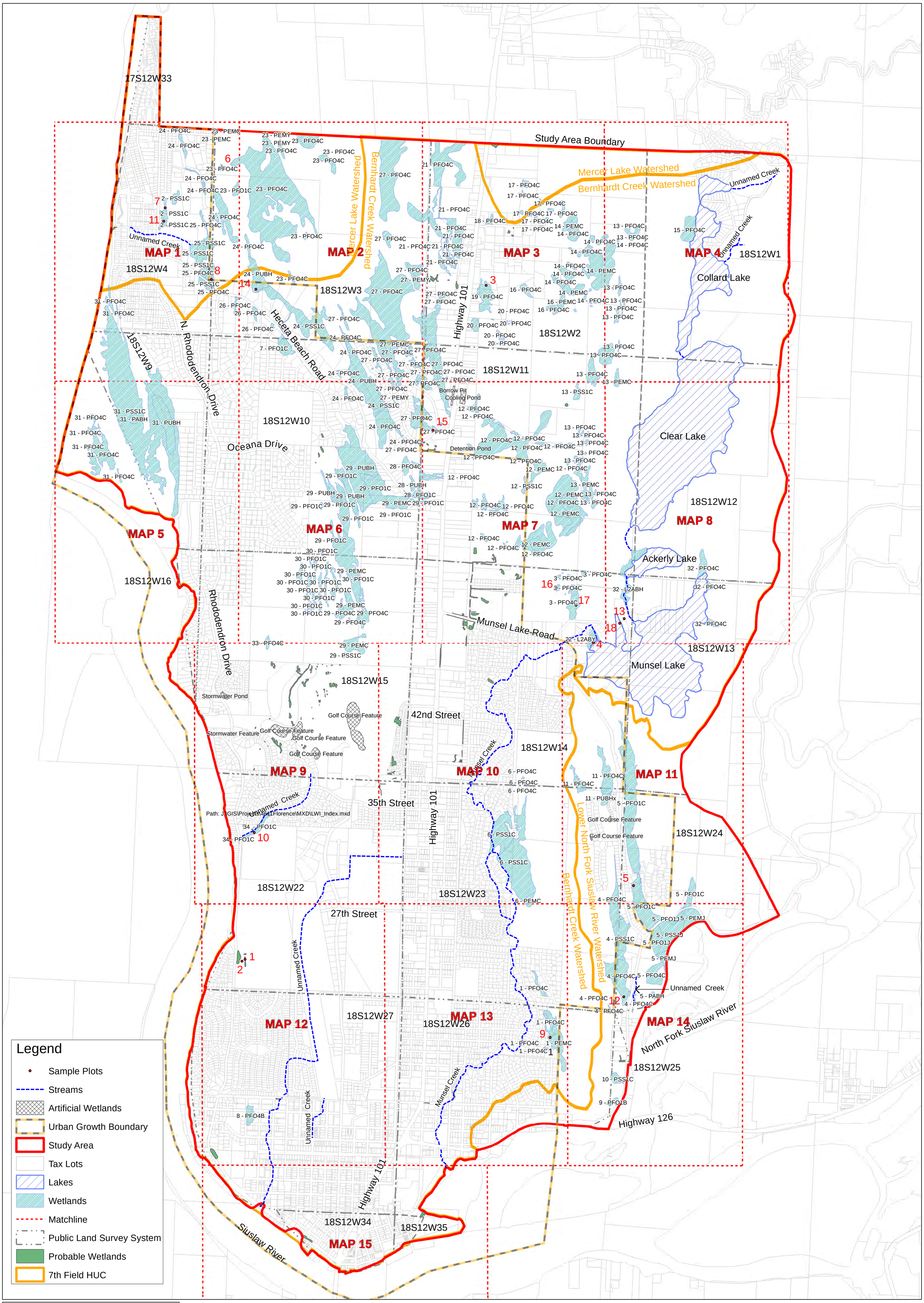
FIGURE 2
3/18/11



FLORENCE AREA LWI
NATIONAL WETLANDS INVENTORY

FIGURE 3
3/18/11

PACIFIC HABITAT SERVICES
9450 SW Commerce Circle, Ste. 180
Wilsonville, Oregon 97070
Phone: (503) 570-0800
Fax: (503) 570-0855
E-mail: phs@pacifichabitat.com



Information shown on this map is for planning purposes, represents the conditions that exist at the map date, and is subject to change.The location and extent of wetlands and other waters approximate.There may be unmapped wetlands and other waters present that are subject to regulation. A current Oregon Department of State Lands-approved wetland delineation is required for state removal-fill permits. You are advised to contact the Department of State Lands and the U.S. Army Corps of Engineers with any regulatory questions.

Map Date 06-13-2013

FLORENCE, OREGON

Local Wetlands Inventory - Index Map

PACIFIC HABITAT SERVICES
9450 SW Commerce Circle, Ste. 180
Wilsonville, Oregon 97070
Phone: (503) 570-0800
Fax: (503) 570-0855
E-mail: phs@pacifichabitat.com

City of Florence

Significant Wetlands

Significant Wetlands by Number

- 1
- 2
- 4
- 5
- 6
- 7
- 8
- 11
- 12
- 24
- 25
- 26
- 27
- 28
- 33
- 34

Other

- Urban Growth Boundary
- City Limits

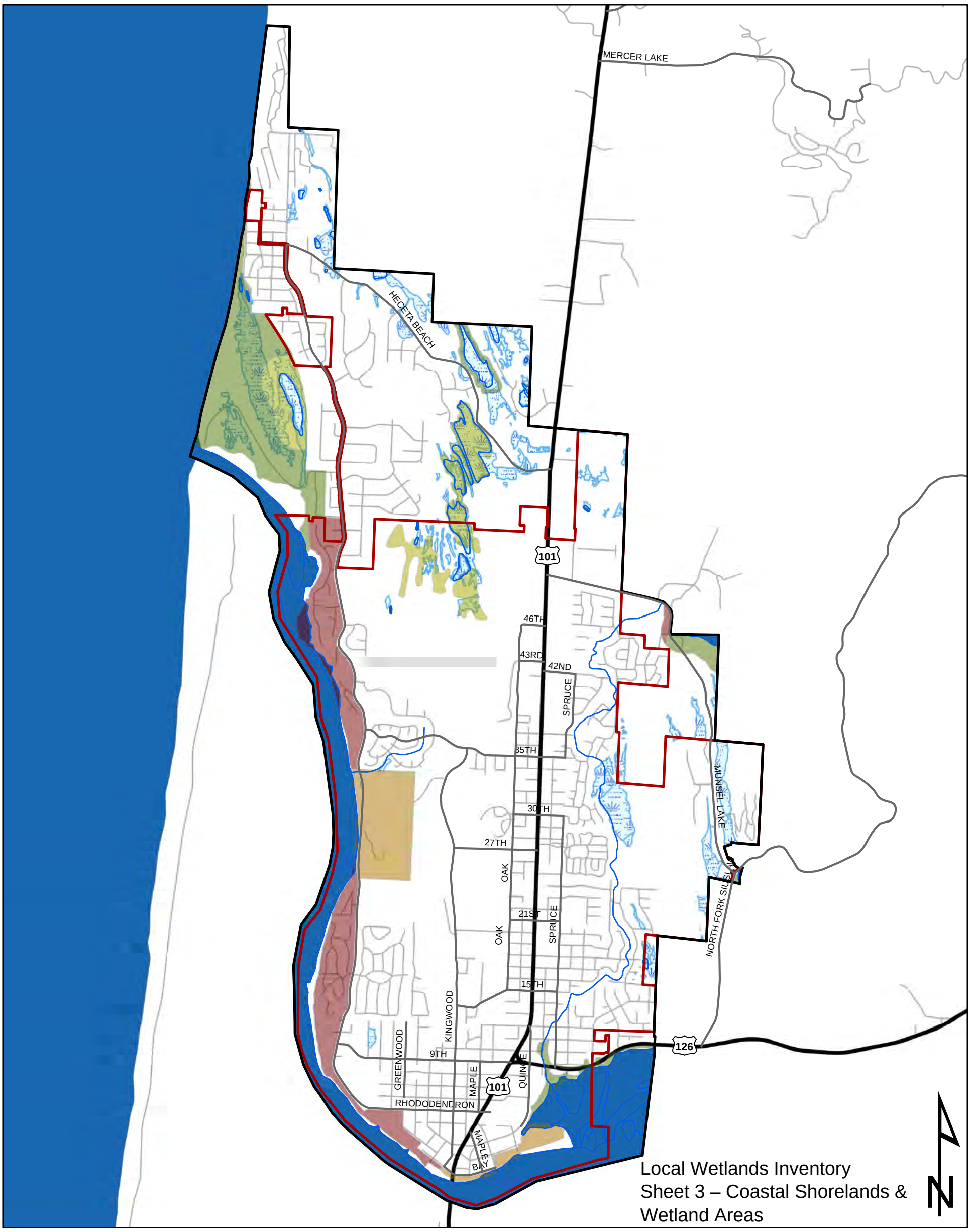
City of Florence
250 Hwy 101 N.
Florence, OR 97439
(541) 997-8237

June 5, 2013

0 0.25 0.5

Miles

Local Wetlands Inventory
Sheet 2 – Significant Wetlands



City of Florence

Florence Local Wetland Area Inventory

Coastal Shorelands & Wetland Areas

Wetland Inventory

Wetlands (2010)

0 0.5 1 Miles

Shoreland Management Units

Mixed Development

Residential Development

Prime Wildlife

Natural Resource Conservation

City Limits

UGB

City of Florence

250 Hwy 101 N.
Florence, OR 97439
(541) 997-8237

June 5, 2013

Data: City of Florence GIS; Pacific Habitat Services; Lane Council of Governments (LCOG); Lane County Oregon; U.S. Environmental Protection Agency (EPA); U,S. Geological Survey (USGS); Oregon Department of Transportation (ODOT)

City of Florence

Significant Riparian Reaches

RHB-A

RHB-B

RMC-D

RRH-A

RMC-C

RMC-Cs

RMC-B

RAIR-B

Significant Riparian Reaches

- RAIR-B
- RHB-A
- RHB-B
- RMC-B
- RMC-C
- RMC-C Side
- RMC-D
- RRH-A

Other

- Urban Growth Boundary
- City Limits

City of Florence
250 Hwy 101 N.
Florence, OR 97439
(541) 997-8237

February 8, 2013

0 0.25 0.5

Miles