

Siuslaw Estuary Partnership

An Integrated Multiple Objective Approach To Watershed Protection and Restoration

April 7, 2011

TO: Stakeholders

FROM: Sandra Belson, Project Manager
Carol Heinkel, Project Coordinator

SUBJECT: Local Wetlands and Riparian Inventory and Local Options

This memo provides information for discussion of this topic by the Stakeholder Groups on April 11, 2011. The memo gives a summary of the *City of Florence Local Wetlands and Riparian Inventory Report*, Draft 4-1-11, by Pacific Habitat Services (Inventory Report), explains the local options available to the City and its partners, and includes considerations for policy discussions. The draft report is posted to the Stakeholders section of the Community Involvement page of the public web site: www.siuslawwaters.org (or control click on agenda link).

At the meeting, the Stakeholder Groups will be asked to agree on comments on the report that will be addressed prior to presenting the results to the general public at the April 25 Open House. The Wetland and Riparian Area Team will meet on April 14 and will review and address the Stakeholders' comments at that meeting. Then, a revised report will be presented at the April 25 Open House.

Staff will give a brief presentation on this report at the Stakeholder meeting. Please review the March 31 Stakeholder memo, included in this meeting packet, for background information and definitions of key terms.

Florence Local Wetlands and Riparian Inventory

This summary of key findings in the Inventory Report are presented first for wetlands and then for riparian areas. For both wetlands and riparian areas, the following topics are addressed: Local Inventory Results, Significance Assessment, and Local Options.

Wetlands: Local Inventory Results

A total of 34 grouped wetlands of greater than one-half acre were identified during the Local Wetland Inventory (LWI), with a total area of approximately 620.02 acres.

Wetlands by type and prominence in the study area are shown in the Table below. The locations of the wetland types are shown in the Map, Local Wetland Inventory Index Sheet, on the following page of this memo.

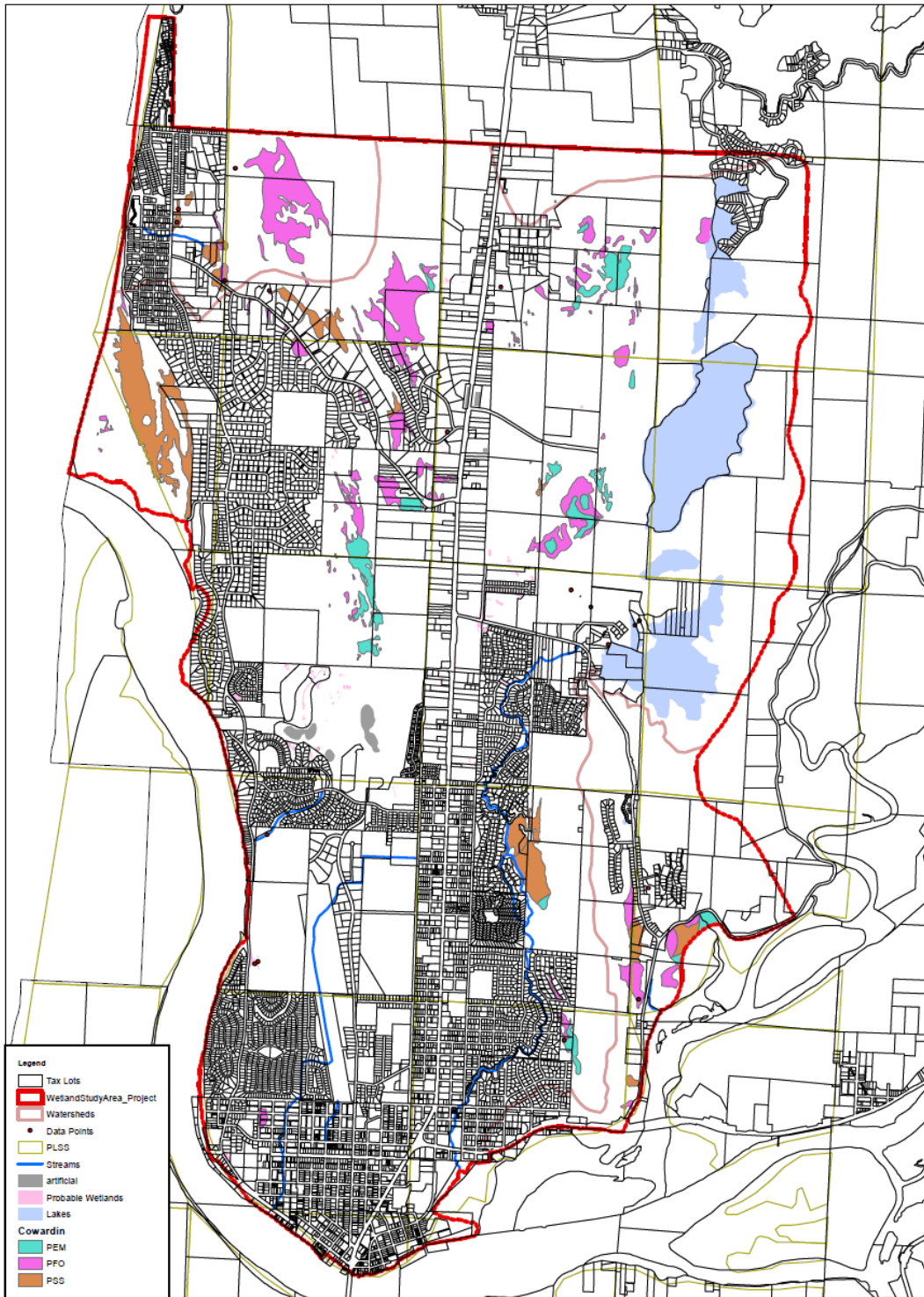
Fresh Water Wetlands in Florence Study Area*

Type	Description	Number**	Acres	%
Forested (PFO) wetlands	More mature forested wetlands in the study area are dominated primarily by an overstory of Sitka spruce, shore pine, and red alder; an herb understory dominated by skunk cabbage (<i>Lysichitum americanum</i>); and slough sedge (<i>Carex obnupta</i>) is often present as well. Wetlands dominated by trees that are greater than 20 feet high.	30	367.03	58%
Scrub shrub (PSS) wetlands	At earlier stages of dune stability, scrub/shrub wetlands often include saplings of the above tree species, along with such shrubs as Hooker's willow (<i>Salix hookeriana</i>), bog blueberry (<i>Vaccinium uliginosum</i>), Labrador tea, (<i>Ledum glandulosum</i>), Douglas' Spiraea (<i>Spiraea douglasii</i>), and four-line honeysuckle (<i>Lonicera involucrata</i>). Wetlands dominated by shrubs and tree saplings that are less than 20 feet high.	12	138.82	22%
Emergent (PEM) wetlands	Emergent wetlands are generally dominated by herbaceous species such as slough sedge, water parsley (<i>Oenanthe sarmentosa</i>), soft-stem bulrush (<i>Scirpus validus</i>), rushes (<i>Juncus</i> spp.), and purple cinquefoil (<i>Potentilla palustris</i>). Some of these least disturbed emergent areas include small populations of uncommon or rare species, including California pitcher plant (<i>Darlingtonia californica</i>) or sundew (<i>Drosera</i> sp.). These wetlands have rooted herbaceous vegetation that stand erect above the water or ground surface.	13	66.71	11%
Other Wetlands	Three other types of wetlands represented about 9% of the total inventory: Unconsolidated Bottom (PUB) wetlands; Aquatic Bed (PEB) wetlands; and Lacustrine Aquatic Bed (L2AB) wetlands	4	57.04	9%
Total		34	620.02	100%

Notes:

*Table does not include the acreage of probable wetlands, other water features (such as golf ponds or ditches), or other waters of the State (includes creeks and lakes). It also does not include any portion of a wetland that extends beyond the boundary of the LWI study area.

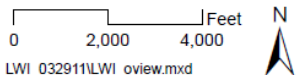
**Many of the 34 total wetland areas contain more than one type of wetland. As a result, the total number in this column does not add up to 34.



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 is 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.

Florence, Oregon
Local Wetlands Inventory
April, 2011

Index
Sheet



Path: J:\GIS_011310\Projects\4611 Florence\Florence_LWI_032911\LWI_oview.mxd

Forested (PFO) wetlands are the most dominant type within the study area at 58 percent, totaling 367.03 acres. Scrub shrub (PSS) wetlands were the second most common at 22 percent (138.82 acres). These were followed by Emergent (PEM) wetlands at 11 percent (66.71 acres), Unconsolidated Bottom (PUB) wetlands at 8 percent (49.54 acres), Lacustrine Aquatic Bed (L2AB) wetlands at approximately 1 percent (6.1 acres), and Aquatic Bed (PEB) wetlands at 1.4 acres within the study area.

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). Each wetland was classified according to the Cowardin system. This Inventory includes only Palustrine, or Freshwater, Wetlands:

"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)

The composition of freshwater 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.

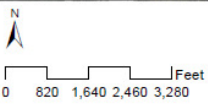
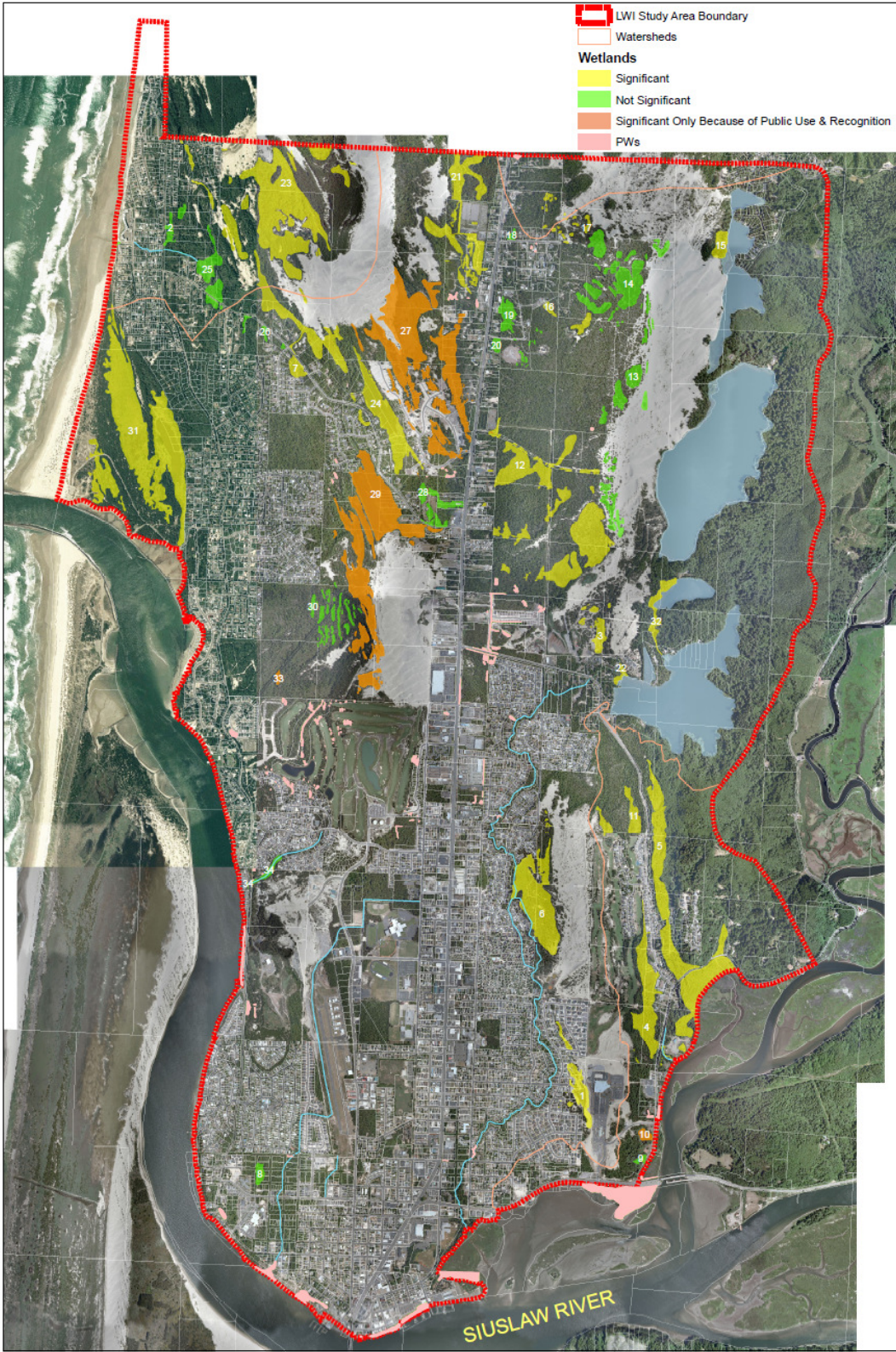
Though some wetlands were isolated features and generally separated from other wetlands or water features, many were located in close proximity to other wetlands and as a result, formed larger wetland complexes that were grouped if they were similar in character and located in area of similar land use. The acreage total therefore does not include mapped probable wetlands (PW) 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.

Wetlands Significance Assessment

Locally Significant Wetlands criteria were applied to all wetlands in the Florence Study Area. Based on the criteria, 21 of the 34 wetlands (62%) were determined to be locally significant (see Table 6). These wetlands met the criteria for significance because they scored above the 75th percentile for the relative effectiveness and relative value in one more of the Grouped Services (as defined in ORWAP). Identified locally significant wetlands are identified in the last column of Table 6 from the Draft Report, reproduced on the following page of this memo. The locations of the Locally Significant Wetlands are shown in the Map, Overview of Locally Significant Wetlands, on the following page of this memo.

Table 6. Grouped Wetland Services that score above the 75th percentile for both relative effectiveness and relative values

Wetland	WS: Hydrologic Function	WQ: Water Quality Group	FISH: Fish Sup- port Group	Aq: Aquatic Support Group	TERR: Terrestrial Support Group	PS: Provisioning Services	PU: Public Use and Recog- nition	Locally Significant Wetland
1	X	X	X				X	Yes
2								No
3	X						X	Yes
4			X		X			Yes
5			X		X			Yes
6			X		X			Yes
7	X						X	Yes
8								No
9								No
10							X	Yes
11					X			Yes
12				X	X			Yes
13								No
14								No
15			X					Yes
16				X				Yes
17				X				Yes
18								No
19								No
20								No
21	X			X				Yes
22			X			X		Yes
23				X			X	Yes
24				X				Yes
25								No
26								No
27							X	Yes
28								No
29							X	Yes
30								No
31			X					Yes
32			X		X	X	X	Yes
33							X	Yes
34								No
Count	4	1	8	6	6	2	9	21



FLORENCE AREA LWI
OVERVIEW OF LOCALLY SIGNIFICANT WETLANDS

ODFW OVERVIEW
4/6/11

Appendix E, attached, includes the raw scores for the function and value of each Grouped Service, for each wetland. The 75th percentile was calculated for both the function and value scores and can be found below the table of raw scores, along with the mean and median score. Each raw score was then compared to the 75th percentile for that function or value. The second table indicates which functions and values exceeded the 75th percentile for each Grouped Service. Cells marked “true” represent scores that exceeded the 75th percentile, while those marked “false” did not. Table 6 summarizes the results of the true-false tables by indicating with an ‘X’ those Grouped Functions that exceeded the 75th percentile (i.e. were both marked “true”).

Although a wetland may score high for relative effectiveness for one or more functions, if the relative value of that function did not also rise above the necessary percentile, the criteria for significance was not satisfied. The reverse is also true, i.e., wetlands with high relative values but low relative effectiveness are not locally significant.

Example: In Appendix E, wetland #10 scored 4.5 for “relative effectiveness” in WS (Hydrologic Function) which is at the 75th percentile for that function (see the last row in Appendix E). However, wetland #10 did not satisfy the significance criteria for WS because it scored only 2.17 in WS in “relative value” of that function (the right hand table in Appendix E), which is *below* the 75th percentile for that function (3.04).

The Oregon Rapid Wetland Assessment Protocol (ORWAP) method was used to assess the wetlands for local significance. “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).

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. Where 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. Appendix D of the draft report contains ORWAP data results of the quality assessment conducted on each wetland (or wetland group) of greater than one-half acre in size.

For the purpose of analyzing wetland functions and values for significance, the scores of “grouped services,” as established in ORWAP, are used. Grouped services combine functions and their associated values into organized thematic categories. The score for each group is defined by the maximum score of several component functions or values. The grouped services and the component functions used in the Florence wetland assessment are identified in the table below.

Grouped Services Used in Florence Wetland Inventory Assessment

Grouped Services	Component Functions
Hydrologic Function: WS	Water Storage and Delay (WS)
Water Quality Support Group: WQ	Sediment Retention and Stabilization (SR) Phosphorus Retention (PR) Nitrate Removal & Retention (NR) Thermoregulation (T)
Fish Support Group	Anadromous Fish Habitat (FA) Non-anadromous Fish Habitat (FR)
Aquatic Habitat Support Group: Aq	Organic Matter Export (OE) Aquatic Invertebrate Habitat (INV) Amphibian and Reptile Habitat (AM) Waterbird Feeding Habitat (WBF) Waterbird Nesting Habitat (WBN)
Terrestrial Habitat Support Group: TERR	Songbird, Raptor, and Mammal Habitat (SBM) Pollinator Habitat (POL) Native Plant Diversity (PD)
Provisioning Services*: PS	The passive and sustainable providing of tangible natural items of potential commercial value
Public Use and Recognition*: PU	The potential and actual capacity of a wetland to sustain low-intensity human uses such as hiking, nature photography, education, and research

*Though currently considered to be of secondary importance for state and federal permitting in Oregon, the Wetland and Riparian Team requested that *Public Use and Recognition* (PU) and *Provisioning Services* (PS) values also be considered in the examination of significance.

To better understand the meaning of these terms and why these functions and values are important, please see the memo attachment: Wetland Functions and Values.

Local Options for Assessing Wetlands Significance

The Group Services of ORWAP are used to assess the significance of wetlands in the study area. The Wetland and Riparian Team requested that *Public Use and Recognition* (PU) and *Provisioning Services* (PS) values be considered in the examination of significance. The decision to use or not use these two criteria is a local option.

There are no wetlands that would be significant based solely on their scores in the Provisioning Services category and there are four wetland groups that could be considered to be significant solely on the basis of their scores in the Public Use and Recognition Category: #10, #27, #29, and #33. Wetland #10 is on tribal land (outside the city limits); wetlands #27 and #29 are outside the city limits and either wholly or partly inside the UGB; and wetland #33 is entirely within the city limits.

These wetlands met the Public Use and Services grouped service criteria because they have “the potential and actual capacity to sustain low-intensity human uses such as hik-

ing, nature photography, education, and research.” Please refer to Appendix E at the back of this memo for the functions and values these wetlands provide in addition to Public Use and Services.

Wetland #10 is on Tribal property, just north of Highway 126. As such, it would be up to the Confederated Tribes to determine how to treat that wetland.

Wetland #27 is partially within the Florence UGB with the majority outside the UGB. The portion in the UGB is within “The Reserve,” a development of Heceta Lake Joint Venture. It includes a mitigation site – a site where wetlands were created to compensate for filling of wetlands. In this case, Heceta Lake Joint Venture created wetlands to compensate for the filling required for the development.

Wetland #29 is known as the South Heceta Junction Seasonal Lakes. These lakes are currently protected through an overlay zone of Prime Wildlife. According to the Florence Realization 2020 Comprehensive Plan description of this area, based on the Lane County Coastal Resource Management Plan, the area is subject to considerable standing water in winter months. It includes brush thickets, blueberry bushes, snags, and seasonal water that provide natural habitat. Given the natural values present and the lack of adequate drainage in the area that would pose problems for development, it was chosen for inclusion in the Prime Wildlife Area Management Unit in the Florence Comprehensive Plan. Wetland #29 also includes a wetland mitigation site.

Wetland 33 is on City-owned property that is zoned Open Space.

Riparian Areas: Local Inventory Results

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)

Riparian field assessments were conducted at 48 locations on the drainages and lakes in the study 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 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.

Based on these field observations, the streams and lakes in the study area were divided into reaches with roughly uniform riparian qualities. A total of 11 stream reaches and 5 lake reaches were identified, with codes based on drainage basin and a letter (e.g. RMC-A). Please see the project web site Wetlands and Riparian Areas Page for the maps of the riparian areas: www.siuslawwaters.org. The riparian characteristics for

each reach were set as a composite of the assessment site information. 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 of the Draft Report.

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	<i>Picea sitchensis</i>	120
Shore pine	<i>Pinus contorta contorta</i>	50
Douglas fir	<i>Pseudotsuga menziesii</i>	120
Western Hemlock	<i>Tsuga heterophylla</i>	120
Red alder	<i>Alnus rubra</i>	65

Local Option For Determining Riparian Width

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. Based on stream shading and organic debris, the *Urban Riparian Inventory and Assessment Guide* (URIAG) sets the width value as the Potential Tree Height (PTH) at maturity for the dominant tree species in the area.

The 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 Wetland and Riparian Team 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 clearly has the primary potential for positive contributions to water quality and flood management (since land beyond the topographic break will typically drain away from the stream). 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.

Table 8 in the Draft Report summarizes the riparian area widths and resulting acreage for each reach in the study area. The criteria which were applied to determine riparian width are also indicated in each case.

Table 8: Acreage of Riparian Areas by Reach and Basin

Riparian Basin	Reach Code	Width L/R	Criteria	Acreage	Basin Total
Munsel Creek	RMC-A	30/40	Topography	0.9	146.8
	RMC-B	50/50	Topography	19.6	
	RMC-C	/50	Topography	2.8	
	RMC-D	40/40	Topography	15.4	
	RMC-D1	50/50	Topo/PTH	5.5	
	RMC-E	120/15	PTH	93.6	
	RMC-F	50/120	Topo/PTH	9.0	
North Fork Siuslaw	RNS-A	40/40	Topography	1.8	1.8
Airport	RAIR-A	20/20	Topography	8.0	18.6
	RAIR-B	65/65	PTH	9.0	
	RAIR-C	30/30	Topography	1.6	
Heceta Beach	RHB-A	20/20	Topography	0.6	2.6
	RHB-B	50/50	PTH	2.0	
Rhododendron	RRH-A	50/50	PTH	5.8	5.8
Riparian Acreage Total				175.6	

PTH – Potential Tree Height

Riparian Area Assessment

The riparian area assessment is completed by “scoring” each reach with respect to beneficial riparian functions. 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.

Table 9 in the Draft Report summarizes the riparian assessment results for each reach in the study area.

Table 9: Summary of Riparian Functional Assessments

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-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 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 two 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 50% of the reaches rated HIGH and 45% rated MEDIUM.

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

Local Options for Assessing Riparian Areas Significance

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. A plan for protection including trade-offs for conflicting uses is required for those riparian resources judged to be significant.

In the safe harbor approach, only fish-bearing water bodies are inventoried and all are classed as significant with a pre-determined corridor boundary width -- 50 feet from Top of Bank (TOB).

In the standard 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. The local jurisdiction then uses these results to determine which water bodies are classed as significant and subject to protection plans and use trade-offs.

For this project, the Wetland and Riparian Team elected to use the standard method, which is set forth in the Oregon DSL “Urban Riparian Inventory and Assessment Guide” (URIAG). 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.

Considerations for Policy Discussions

The following Guiding Principles have been endorsed by City and its partners¹ to help provide guidance on this project element. In addition, other local standards and criteria have been adopted by the City and the County to address natural hazards, water quality, and shoreland protection. These existing standards will be reviewed as part of the policy analysis for protection measures in the next phase of the project and will factor in the results of the City’s Surface and Ground Water Quality and Quantity Monitoring Program.

“Wetlands and Riparian Area Protection

Guiding Principles

1. Protect the functions and values of significant² wetlands for water quality, water storage, fish and wildlife habitat, public recreation and use, and education.
2. Protect the functions and values of significant riparian areas³ for water quality, flood management, thermal regulation, and fish and wildlife habitat.
3. Restore and protect publicly-owned wetlands and riparian areas.
4. Encourage restoration and protection of privately-owned wetlands and riparian areas through education and incentives.
5. Retain and restore native shoreline and riparian vegetation cover, manage invasive plants, monitor significant streamsides, and protect streamsides from erosion.”

¹ These Guiding Principles were endorsed by the City Council, the County Board, Heceta Water District Board, the Confederated Tribes, the Soil and Water Conservation District, and the Siuslaw Watershed Council.

² “Significant” means wetlands that meet the definition of significant in Statewide Planning Goal 5.

³ Id.

Memo Attachment: Wetland Functions and Values

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 on-going 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).

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).

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 summer-time 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_SupplInfo* 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_SupplInfo* 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_SupplInfo* 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_SupplInfo* 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_SupplInfo* 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_SupplInfo* 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_SupplInfo* 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_SupplInfo* 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.

APPENDIX E

City of Florence Local Wetlands and Riparian Inventory Draft Report, PHS, April 1, 2011

ORWAP Summary for Florence LWI

Wetland	Relative effectiveness of the function				
	WSf	WQf	FISHf	AQf	TERRf
1	5.75	10	5.87	4.88	5.94
2	3.5	10	3.69	6.37	6.63
3	7	10	2.18	6.89	6.55
4	2.31	6.17	6.56	6.11	7.61
5	0	7.39	7.89	6.52	8.79
6	1.77	4.84	6.95	7.39	7.51
7	6	10	2.21	6.41	5.23
8	3.5	10	0.67	6.72	5.99
9	3.46	7.37	2.3	7.12	7.9
10	4.5	10	3.69	7.87	7.39
11	2.45	6.2	3.01	8.31	9.01
12	3.25	10	3.33	8.39	7.76
13	5.75	10	2.32	7.01	5.9
14	4.25	10	3.52	8.04	6.94
15	2.63	5.09	6.68	7.14	7.84
16	3.25	10	0.74	7.67	6.68
17	3.25	10	2.05	7.87	7.09
18	3.85	6.46	1.59	6.92	7.71
19	3.25	10	2.64	7.31	6.53
20	3.25	10	0.83	7.34	6.06
21	4.5	10	2.95	7.84	6.99
22	3.13	4.21	7.06	6.97	6.34
23	4.5	10	4.26	8.28	6.72
24	5.75	10	3.54	7.82	7.08
25	3	5.52	2.59	7.23	5.83
26	3.25	10	2.89	5.98	5.95
27	3.5	10	3.22	6.78	5.35
28	2.25	10	3.9	6.38	5.85
29	4.5	10	3.33	6.41	5.43
30	3.5	10	3.97	7.42	6.16
31	2.71	6.17	7.93	5.89	6.3
32	2.09	5.08	6.3	7.08	7.48
33	4.5	10	1.22	7.36	7.09
34	1.64	5.03	2.57	6.06	4.66
Mean/AVG	3.58	8.52	3.66	7.05	6.71
Median	3.36	10.00	3.28	7.10	6.66
75th	4.50	10.00	4.19	7.61	7.46

Wetland	Relative Values of the function							Acreage
	WSv	WQv	FISHv	Aqv	TERRv	PSv	PUv	
1	3.67	7.19	10	6.67	6.67	0	2.38	8.17
2	3.08	6.07	4.2	7.33	6.67	0	0.71	2.59
3	4.72	6.19	6.67	6.67	6.67	0	1.55	4.59
4	7.64	7.5	10	10	7.51	0	0	19.20
5	7.22	7.5	10	7.33	10	0	0	50.37
6	2.17	7.5	10	7.33	7.43	0	0	30.73
7	3.17	6.03	6.67	7.33	6.67	0	10	2.75
8	3.08	6.03	6.67	6.67	6.67	0	0	1.78
9	2.17	5.28	6.67	4	6.67	0	0.71	0.69
10	2.17	5.43	6.67	4	6.67	0	10	1.34
11	6.39	4.34	6.67	5.67	7.68	0	0	6.14
12	2.17	4.94	6.67	7.33	7.77	0	0	56.01
13	2.17	5.82	6.67	6.67	6.67	0	0.48	17.44
14	2.17	5.07	6.67	6.67	6.67	0	0	23.77
15	2.33	6.67	10	6.67	6.67	0	0.48	3.83
16	2.17	5.07	6.67	7.33	6.7	0	0	2.94
17	2.17	5.57	6.67	7.33	6.99	0	0	2.49
18	2.33	5.78	6.67	7.33	6.67	0	1.19	0.58
19	2.17	5.36	5.11	6.67	6.67	0	0.71	4.47
20	2.17	5.36	6.67	7.33	6.67	0	1.19	1.97
21	3.58	6.49	6.67	7.33	7.22	0	0	23.30
22	2.67	6.67	10	6.67	6.67	2	1.19	1.06
23	2.17	5.45	5.47	7.33	7.21	0	10	60.57
24	2.17	5.61	6.67	7.33	7.09	0	0.48	46.74
25	2.17	5.28	5.41	7.33	6.7	0	1.19	10.21
26	2.42	5.57	6.67	6.67	6.67	0	1.19	1.23
27	2.67	6.28	4.73	7.33	6.67	0	3.57	70.26
28	2.17	5.28	6.67	7.33	6.67	0	1.19	5.84
29	2.17	5.36	6.67	7.33	6.67	0	1.9	64.83
30	1.67	5.11	6.67	7.33	6.67	0	0	6.88
31	2.92	7.5	10	7.33	7.03	0	0.95	89.34
32	2	6.67	10	7.33	7.35	2	1.9	5.04
33	1.67	4.77	7.13	7.33	6.97	0	10	0.61
34	1.67	6.64	6.67	6.67	6.67	0	0	1.86
Mean/AVG	2.87	5.92	7.22	6.97	6.97	0.12	1.85	
Median	2.17	5.70	6.67	7.33	6.67	0.00	0.71	
75th	3.04	6.60	7.02	7.33	7.08	0.00	1.46	

WS = Hydrologic Function
WQ = Water Quality Group

FISH = Fish Support Group
AQ = Aquatic Support Group

TERR = Terrestrial Support Group
PS = Provisioning Services
PU = Public Use & Recognition