

# **SCAPPOOSE BAY BOTTOMLANDS CONSERVATION AND RESTORATION PLAN**



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**Submitted to:  
Lower Columbia River Estuary Partnership**

# **SCAPPOOSE BAY BOTTOMLANDS CONSERVATION AND RESTORATION PLAN**

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## Table of Contents

<b>Executive Summary .....</b>	<b>1</b>
<b>I. Project Description.....</b>	<b>3</b>
Watershed Description .....	3
Study Area .....	4
Need for the Plan .....	7
<b>II. Natural Features of Scappoose Bay Bottomlands.....</b>	<b>7</b>
Natural Habitats .....	7
Important and Characteristic Plant, Wildlife, and Fish Species .....	8
Important and Characteristic Plant Associations .....	11
Historical Conditions and Ecological Processes.....	11
Regional Context for Scappoose Bay Bottomlands Biodiversity.....	14
Current Conditions and Ecological Processes .....	14
<b>III. Land Use.....</b>	<b>18</b>
Open Space .....	18
Natural Resources.....	20
Fish.....	20
Terrestrial and aquatic mammals .....	20
Waterfowl.....	20
Wetlands.....	21
Fish and Wildlife Habitat .....	21
Summary .....	22
<b>IV. Sociological Aspects of Scappoose Bay Bottomlands--Economics .....</b>	<b>22</b>
Gravel extraction .....	22
Agriculture.....	23
Residential-Commercial Development.....	24
Industrial Development .....	26
Recreation.....	26
<b>V. Threats to Conservation .....</b>	<b>26</b>
Altered Hydrology .....	27
Agriculture.....	27
Gravel Extraction.....	28
Residential Development.....	28
Invasive Species: reed canary grass, grass carp.....	28

Combined Threats: Land Use and Gravel Extraction.....	29
<b>VI. Reference Sites .....</b>	<b>31</b>
Role of Reference Sites in Management Plan .....	31
Description of Reference Sites .....	33
<b>VII. Conservation and Restoration Opportunity Areas .....</b>	<b>35</b>
Conservation and Restoration Areas .....	35
Sites inside Scappoose Drainage District .....	39
Sites outside Scappoose Drainage District .....	45
Performance Criteria for Restoration and Conservation Projects.....	50
<b>VIII. Conclusions and Recommendations .....</b>	<b>50</b>
Conservation and Restoration Opportunities.....	50
Planning Opportunities .....	51
Acknowledgements .....	52
<b>IX. References .....</b>	<b>53</b>

## List of Figures

Figure 1. Scappoose Bottomlands Study Area.....	5
Figure 2. Infrared view of Study Area and Environs. ....	6
Figure 3. Historic Natural Vegetation Distribution at Scappoose Bay Bottomlands and Environs.....	12
Figure 4. Historic Natural Vegetation Map of Scappoose Bay Bottomlands and Environs. ....	13
Figure 5. Current Landcover Distribution for Scappoose Bay Bottomlands and environs.....	15
Figure 6. Historic vs. Current Wetland/Non Wetland Area for Scappoose Bay Bottomlands. ....	15
Figure 7. Current Landuse/Landcover Map. ....	16
Figure 8. Landuse Conservation Compatibility Map for Scappoose Bay Bottomlands and environs. ....	17
Figure 9. Zoning Map (detail of statewide map).....	19
Figure 10. Zoning & Gravel Extraction Combined Threats. ....	30
Figure 11. Proposed Conservation Sites, Reference Sites and existing Wildlife Areas. ....	32
Figure 12. Conservation/Restoration Target Sites (North) .....	37
Figure 13. Conservation/Restoration Target Sites (South) .....	38
Figure 14. Wenker Property.....	40
Figure 15. Round Lake .....	41
Figure 16. Janke Property .....	43
Figure 17. Bernet Property.....	44
Figure 18. Hogan Ranch Property.....	46
Figure 19. Malarkey Property .....	47
Figure 20. Armstrong Industries Property .....	49

## Appendices

Appendix 1. Wetland and transitional upland plants in vicinity of Scappoose Bay.....	55
Appendix 2. Vertebrate and invertebrate species in vicinity of Scappoose Bay tracked by ORNHIC.....	58
Appendix 3. Native wetland plant associations of Scappoose Bay area.....	59
Appendix 4. Wildlife species in the vicinity of the Scappoose Bottomlands .....	61
Appendix 5. Birds detected in Scappoose Bottomlands during early winter.....	71
Appendix 6. Birds detected in Scappoose Bottomlands during breeding season .....	75

## Executive Summary

The Scappoose Bay watershed, 85,000 acres in size, historically supported four of six species of Pacific salmon and a large proportion of the waterfowl, riparian and shorebird species found in the Pacific Northwest. The Scappoose watershed encompasses a rapidly urbanizing community, with growth pressures from the expanding Portland metropolitan region strongly influencing residential and commercial development. These new development activities have the potential to conflict with the natural resource functions and values provided by the Scappoose Bay Bottomlands. To date, most conservation efforts have focused exclusively on salmon habitat in the Scappoose Bay region with little regard for wetlands and uplands.

The Wetlands Conservancy, The Nature Conservancy and The Oregon Natural Heritage Information Center have produced The Scappoose Bay Bottomlands Conservation and Restoration Plan in an effort to balance conservation needs in the region. The Plan characterizes the remaining higher quality wetlands in the Bottomlands and describes possibilities for conserving and restoring these wetlands. This is intended to be a community based roadmap prioritizing lands for conservation and restoration and opportunities for future partnerships and funding. The Plan was developed by collecting and synthesizing the existing information, assessing the wetland conditions in the context of human disturbances or stressors, determining valued ecosystem functions and completing a risk assessment.

The Plan describes the study area, the historic conditions and ecologic processes as well as the current plant communities, fish and wildlife use and wetland values. It also summarizes the natural resource and open space components of the Columbia County Comprehensive Land Use Plan. This information provides the foundation for the Plan by looking back, cataloguing temporary and permanent landscape changes and ecosystem function and giving a picture of what may be possible to conserve and restore in the future.

Next we identify the economic importance of agriculture and mineral extraction, the principal economic activities in the Bottomlands, to Columbia County and its residents and also outline potential opportunities and conflicts in conserving and enhancing both the sociological and ecological values of the watershed. The most prevalent threats to conservation are briefly discussed with a focus on where conservation, restoration or enhancement might play a role in containing or lessening their impacts to the biodiversity of Scappoose Bay Bottomlands.

Three existing natural areas within and adjacent to the study area that can serve as reference sites for future restoration and enhancement projects in Scappoose Bay are identified and described. The three sites were chosen because they are located in the parts of the Scappoose Bay Bottomlands where diking was never done and drainage efforts were ineffective. Reference sites include contiguous areas across the Columbia that are undiked.

Lastly, the Plan identifies the seven highest priority conservation and restoration areas in the Bottomlands and provides recommendations for conserving these sites. These areas were chosen by reviewing aerial photography, historic and current vegetation information, the Natural Heritage Database, field reconnaissance and conversations with local residents and agency staff. Four of these sites are located within the Scappoose Drainage District, and three are located

outside the drainage district. The seven sites were the main focus of the field survey efforts. Land value appraisals were conducted on four of the seven properties where conservation easements or fee title acquisition appeared to be a viable conservation strategy with willing landowners. Each site contains a site description and proposed conservation strategies for the property.

The Scappoose Bay Bottomlands provide some of the best remaining natural habitats in the Lower Columbia River system. Although the Scappoose Bay Bottomlands have been affected over the last 180 years by grazing, artificial drainage, urbanization, and flood control, these are some of the largest remnants of natural vegetation in the Lower Columbia River estuary that are not yet under formal conservation arrangements. Conservation, restoration and planning opportunities are summarized that will assure the conservation of these important wetland remnants.

The plan is intended to serve as a blueprint and catalyst for future conservation and restoration efforts in the Scappoose Bay Bottomlands. The plan can support the Goal 5 implementation of Columbia County, the Columbia Soil and Water Conservation District outreach to landowners, the Scappoose Bay Watershed Council implementation of their watershed assessment plan, the Oregon State Parks and Department of Fish and Wildlife as they manage their adjacent properties and consider future parks and fish and wildlife habitat areas, and nonprofit organizations such as the Lower Columbia River Estuary Partnership, The Wetlands Conservancy, The Nature Conservancy and The Columbia Land Trust as they promote and implement bottomland conservation in the Lower Columbia River.

## **I. Project Description**

The goal of this project is to characterize the remaining higher quality wetlands in the Scappoose Bay Bottomlands that formerly were within the floodplain of the Columbia River in the vicinity of Scappoose Bay, and to describe possibilities for conserving and restoring these wetlands. The Scappoose Bottomlands have long been identified as an important habitat area in a variety of fish and wildlife habitat assessments and plans written by federal, state, local and non-profit agencies and organizations. More specifically, the area was recognized in The Nature Conservancy's Willamette Valley Ecoregional Plan (Floberg et al. 2004), The Wetlands Conservancy's Oregon's Greatest Wetlands (The Wetlands Conservancy 2000) and the Lower Columbia River Estuary Partnership Plan (1999).

Over the past year The Wetlands Conservancy, Columbia Land Trust, The Nature Conservancy and the Pacific Coast Habitat Joint Venture have received phone calls from several landowners interested in selling their properties in the Scappoose Bay area for conservation purposes. Additionally, The Scappoose Bay Watershed Council is very interested in conservation and restoration opportunities in the watershed lowlands, as the implementation step to their watershed assessment (David Evans and Associates 2000).

The Scappoose Bay Conservation and Restoration Plan is intended to be a community based roadmap prioritizing lands for conservation and restoration and opportunities for future partnerships and funding. The plan was initiated by collecting and synthesizing the existing information, assessing the wetland conditions in the context of human disturbances (or stressors) and valued ecosystem functions and completing a risk assessment. The second phase included developing a picture of reference conditions for particular wetland classes and types, prioritizing the sites for protection or restoration, assessing of the restoration potential of the site or suite of sites and developing restoration goals, concepts and performance standards for each prioritized site. The final and more community based task was to begin conversations with private landowners about easements, fee title sale or donations of wetlands and riparian appraisals. Appraisals were conducted on four of the prioritized sites and will be detailed in a separate report.

### **Watershed Description**

The Scappoose Bay watershed, 85,000 acres in size, historically supported four of six species of salmon and a large proportion of the waterfowl and shorebird species found in the Pacific Northwest. Located along the eastern flanks of the Tualatin Mountains and the floodplain of Multnomah Channel, the watershed contains a broad diversity of habitats, ranging from small, steep mountain streams to extended low-gradient stream valleys to the lowland floodplain of the Columbia River estuary.

Early settlers and trappers described the area as abundant with deer, elk, fish, ducks, geese, swans and water. Over the past 150 years, the watershed has been impacted by a broad range of



uses: agriculture, forestry, surface mining, and residential and industrial development. Fur trapping, logging, gravel mining, dairy and small farming, residential and commercial development, water withdrawal, introduction of exotic species and major flood control efforts have changed the historical habitats and effected the fish and wildlife presence and use of the watershed.

Three major ecological communities occurred in the watershed historically: lowland floodplain in the lower watershed, old growth forest in the hills of the upper watershed, and prairie and savanna on the gravel plain between the hills and the floodplain. The lowland floodplain has been influenced and altered by flood control measures, surface mining, and farming while uplands have been under timber production regimes. The savanna and prairie habitat was formerly located where urban areas and rural residential and small parcel agriculture now occur.

## **Study Area**

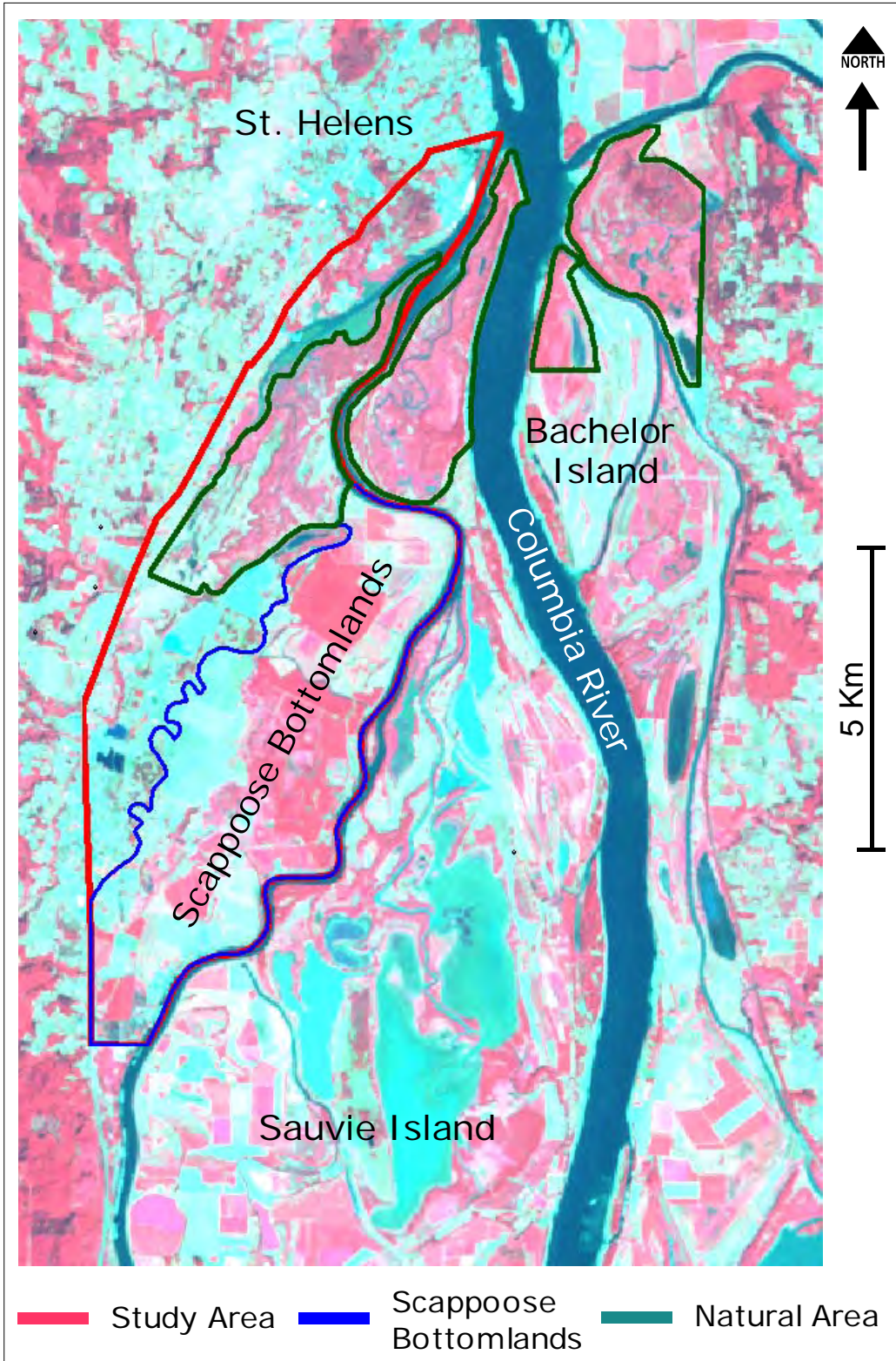
The study area includes the Scappoose Bay lowlands, uplands around the Scappoose Airport and Glacier Northwest gravel pits, and the lands encompassed by the Scappoose Drainage District (Fig. 1). The Scappoose Bay lowlands comprise about one-third of the study area, and the remaining two-thirds are mostly agricultural, commercial, and urban land. Figure 2 shows the area in false color infrared from a LandSat 2002 coverage. The light red to dark red colors represent vigorous vegetation to unhealthy/wet vegetation and the blue/green to white colors are upland vegetation to upland to urban areas. The identified natural areas of Scappoose Bay lowlands, the north end of Sauvie Island, the northwestern corner of Bachelor Island, and the Carty Unit of the Ridgefield NWR are the largest contiguous tracts of undeveloped deciduous bottomland forest remaining along the lower Columbia River between Longview<sup>1</sup> and Bonneville Dam. These tracts form a block of natural areas spanning the Columbia River and are plainly visible in satellite imagery. Although all sites have been affected over the last 180 years by grazing, artificial drainage, urbanization, and flood control, these are the largest remnants of natural vegetation. They and the lands within the study area are contiguous with a large corridor of protected lands extending upriver to Portland, an area 2-2.5 times larger than the study area. These protected areas are managed by the Oregon Department of Fish and Wildlife (Sauvie Island Wildlife Management Area, Burlington Bottoms), Oregon State Parks (Scappoose Bay, Coon Island, Virginia Lake), Metro (Smith and Bybee Lakes, Multnomah Channel properties), the U.S. Fish and Wildlife Service (Ridgefield National Wildlife Refuge), Clark County (Salmon Creek, Green Lake, Vancouver Lake) and Washington Department of Fish and Wildlife (Vancouver Lake Wildlife Area, Shillapoo Wildlife Area).

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<sup>1</sup> Habitats downriver from Longview are not included as part of this study because of differences in landforms, soils, vegetation, and ecological processes.



**Figure 1. Scappoose Bottomlands Study Area**



**Figure 2. Infrared view of Study Area and Environs.**

## **Need for the Plan**

The Scappoose watershed encompasses a rapidly urbanizing community, with growth pressures from the expanding Portland metropolitan region strongly influencing residential and commercial development. While the community has historically been dominated by an agricultural, forest products and industrial economy, today land development and mineral and aggregate extraction are becoming major economic drivers.

These new development activities have potential to conflict with the natural resource functions and values provided by the Scappoose Bay Bottomlands. The goal of the Scappoose Bay Bottomlands Conservation and Restoration Plan is to identify and assess the conditions of the existing natural areas and develop strategies and tools to conserve and restore them. The plan recognizes the economic importance of agriculture and mineral extraction to Columbia County and its residents. Therefore, economic and management conflict were considered when identifying the areas of highest conservation and restoration opportunity and potential. Chapter VIII outlines some options for working with the mineral extraction, livestock, and nursery industries to include water and natural resource restoration and stewardship in their land management activities.

The plan can also serve as a blueprint and catalyst for future conservation and restoration efforts in the Scappoose Bay Bottomlands. The plan can support the Goal 5 implementation for Columbia County, the Columbia Soil and Water Conservation District, outreach to landowners, implementation of the Scappoose Bay Watershed Council Watershed Assessment, Oregon State Parks and Department of Fish and Wildlife as they manage their adjacent properties and consider future parks and fish and wildlife habitat areas and outside nonprofits; and Lower Columbia Estuary Partnership, The Wetlands Conservancy, The Nature Conservancy and The Columbia Land Trust as they promote and implement bottomland conservation in the Lower Columbia.

## **II. Natural Features of Scappoose Bay Bottomlands**

### **Natural Habitats**

The Scappoose Bay lowlands are comprised of seasonal wetlands dominated by various vegetation types, open water, tidal waters and remnant upland prairie-oak savanna habitats that are now mostly oak-Douglas fir forest. Elevations on the historical floodplain vary from 0-10 feet above sea level and silt loams are the primary soils except where sandy dredge spoils have been deposited. Hydric soils are common, but the hydroperiod is seasonal and many areas are well drained. In general, the wetter the site, the fewer exotic species are present. Topography is characterized by linear, shallow troughs and low ridges that run parallel to the Columbia River. These landforms are relics of the extensive reworking of sediments by high-energy floods that occurred prior to flood control.

- **Tidal creeks, lakes, and ponds.** Tidal creeks and broad, shallow overflow lakes and ponds were more common historically than they are today. Lakes and ponds originally were recharged annually by June floods and many dried up by late summer, but most of these are now filled only by direct precipitation during the winter.
- **Mudflats and emergent marsh.** The wettest of the remaining sites in shallows along river channels and lakeshores are dominated by sparsely vegetated mudflats exposed at low tide, and extensive stands of emergent marsh with mostly native species such as spikerush (*Eleocharis palustris*), narrowleaf bur-reed (*Sparganium angustifolium*), wapato (*Sagittaria latifolia*), water purslane (*Ludwigia palustris*), swamp smartweed (*Polygonum hydropiperoides*), and softstem bulrush (*Schoenoplectus tabernaemontani*).
- **Riparian forest.** River willow (*Salix x fluviatilis*) occurs on sandy banks and bars, while Pacific willow (*Salix lucida* ssp. *lasiandra*) is more common on wet flats along channels and around overflow lakes. The most abundant forest type on the floodplain is Oregon ash (*Fraxinus latifolia*), occurring on slightly higher sites. Most of the understory in these habitats has been degraded extensively by grazing and invasion of reed canary grass (*Phalaris arundinacea*). On higher banks and the tops of natural levees, ash occurs intermixed with black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), creek dogwood (*Cornus sericea*), and snowberry (*Symphoricarpos albus*).
- **Upland forest, prairie, and savanna.** Uplands support remnants of oak and Douglas fir savanna with pockets of upland prairie, all degraded extensively by grazing and invasion of exotic plants. In most of the uplands, the oak and fir savanna has converted to Douglas fir-oak forest with a dry understory of hazelnut and snowberry, or in many areas, invasive Himalayan blackberry.

The Scappoose Bay Bottomlands provide some of the best remaining natural habitats in the study area, especially at the Malarkey and Hogan ranches and on the north end of Sauvie Island. Most portions of these properties were never diked and attempts at drainage were largely unsuccessful. These areas come closest to typifying the original topography and vegetation along the Columbia River between Longview and Portland.

## Important and Characteristic Plant, Wildlife, and Fish Species

### Plants

About 120 species of plants are currently known from the Scappoose Bay Bottomlands, about 25 percent of which are exotic (Appendix 1). Highly invasive reed canary grass and Himalayan blackberry are of particular concern for their adverse impacts on native plant species and possibly on wildlife habitat quality. The Oregon Natural Heritage Information Center (ORNHIC) tracks several rare plants in the study area that are identified as conservation targets in the 2003 Oregon Natural Heritage Plan (Appendix 1). Howell's montia (*Montia howellii*; G3S2<sup>2</sup>) is

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<sup>2</sup> ORNHIC ranks species and plant associations according to standard Heritage Program methodology used throughout the United States, Canada, Latin America, and the Caribbean. G = Global rank indicator; denotes rank based on worldwide status. S = State rank indicator; denotes rank based on status within Oregon. B = breeding, N = nonbreeding, T = subspecific rank. 1 = Critically imperiled throughout range because of extreme rarity or vulnerability, usually with 5 or fewer occurrences or very few remaining acres. 2 = Imperiled throughout range because of rarity or vulnerability, usually with 6-20 occurrences or few remaining acres. 3 = Rare, uncommon, or

known from the Hogan Ranch and Sauvie Island, and retrorse sedge (*Carex retrorsa*; G5S1) occurs on Sauvie Island. *Howellia* (*Howellia aquatilis*; G2S1) is known historically from Sauvie Island and may well occur in the study area. It is also present across the river on the Ridgefield NWR in Blackwater Island Research Natural Area.

## Wildlife

For wildlife in the study area, four habitat types have been considered “focal” or “priority” by several regional conservation reports (e.g., Willamette Restoration Initiative 2004, *Conservation Strategy for Landbirds in Lowlands and Valleys of Western Oregon and Washington*) (Altman 2000). These are: (1) perennial sloughs, ponds, and their riparian areas; (2) streams and their riparian areas; (3) seasonal marshes; and (4) oak woodlands. Among riparian tree species, black cottonwood is of particular importance, partly because of its ability to support cavity-nesting riparian birds (e.g., hairy woodpecker, which has declined in lowlands surrounding Portland), canopy-nesting raptors (e.g., bald eagle, great horned owl), and heron rookeries. Also, willow stands are known to be important for habitat they provide to dozens of species of migrating and nesting songbirds (e.g., willow flycatcher, yellow warbler). They may have once supported western Oregon’s only known nests of black-crowned night-heron. At least one bird species – yellow-billed cuckoo – is believed to have inhabited mixed cottonwood-willow stands along the Columbia River but has become extirpated as the area of this habitat type has decreased. Similarly, a presumed decline in the area of native emergent marsh within the Scappoose Bay Bottomlands (as a result of river regulation, diking, drainage, and invasion by exotic plants) has been accompanied by apparent extirpation of nesting populations of short-eared owl, which often nests along the upland fringe of such habitat.

A total of 280 wildlife species (all but 15 of them native) are believed to occur regularly during one or more seasons in the general area. About 207 of these have so far been confirmed to occur specifically in the Scappoose Bay Bottomlands (Appendix 4). These include significant numbers of many wetland species that are declining regionally and/or are of conservation concern for other reasons, such as painted turtle, red-legged frog, western toad, bald eagle, and sandhill crane. The bottomland wetlands are particularly renowned for wintering concentrations of short-eared owl and other raptors, as well as for numbers of northern pintail and American wigeon. During summer, over 100 great egrets have been noted in some places as well as green and great blue herons. Species relative abundance within the bottomland roadsides is illustrated by the tables in Appendices 5 (winter) and 6 (summer). Also noteworthy is the discovery, during brief surveys conducted in support of this plan, of a population of at least 10 pair of red-eyed vireo, a neotropical migrant and designated focal species for conservation of riparian habitat in western Oregon. This may be the farthest western nesting occurrence of the species in North America. Individuals were found among older trees within in a large plantation of hybrid poplar; this habitat superficially resembles young cottonwood stands that have now all-but-disappeared from the Bottomlands partly as a result of flow regulation.

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threatened throughout range, but not immediately imperiled, usually with 21-100 occurrences. 4 = Not rare and apparently secure (though it may be quite rare in parts of its range or at the periphery), but with cause for long-term concern, usually with more than 100 occurrences. 5 = Demonstrably widespread, abundant, and secure (though it may be quite rare in parts of its range or at the periphery), ineradicable under present conditions.

ORNHIC tracks several rare species of wildlife in the study area that are identified as conservation targets in the 2003 Oregon Natural Heritage Plan (Appendix 2). These are northwestern pond turtle (G3G4T3T4S2<sup>2</sup>), painted turtle (G5S2), peregrine falcon (G4T3S2B), dusky Canada goose (G5T2T3S2S3N), streaked horned lark (G5T2S2B), Oregon vesper sparrow (G5T3S2B, S2N), purple martin (G5S2B), and trumpeter swan (G4S1?B, S3N).

### **Mussels**

ORNHIC tracks several rare species of mussels that have been reported from study area and that they have identified as conservation targets. These species (included with vertebrates in Appendix 2) are the California floater (G3S1), Willamette floater (G2QS1), and the western ridgemussel (G3S2). These have been reported from Sauvie Island, Multnomah Channel, and Smith and Bybee Lakes.

### **Fish**

Scappoose Bay waterways provide rearing habitat for juvenile salmonids. Three groups of fish have been identified in the Fish and Wildlife Protection Report for Columbia County by the Oregon Department of Fish and Wildlife. These are:

1. Anadromous fish: coho and fall Chinook salmon, winter steelhead trout, and sea-run cutthroat trout.
2. Resident trout - freshwater fish including rainbow and cutthroat trout.
3. Warm-water game fish - a group which includes bullhead catfish, crappie, bluegill, largemouth bass, and yellow perch.

Five species of federally-listed fish are reported from waters in the study area. These are tracked by ORNHIC and are identified as conservation targets in the 2003 Oregon Natural Heritage Plan (Appendix 2). They include Chinook salmon (G5T2QS2<sup>2</sup>), chum salmon (G5T2QS2), coastal cutthroat (G4T2QS2), coho salmon (G4T2QS2), and steelhead (G5T2QS2). The occurrence of chum salmon in the study is based on a historical report (1960) of chum salmon on Milton Creek (David Evans and Associates 2000). Chinook salmon are reported from Scappoose Creek and Multnomah Channel. Cutthroat trout are reported from Milton, McNulty, Honeyman, Scappoose, and Jackson Creeks. Coho salmon are reported from Milton, Honeyman, and Scappoose Creeks. Steelhead trout are reported from Scappoose and Milton Creeks, and Multnomah Channel.

The major spawning, rearing, and migrating areas within the County are the Columbia, Nehalem, Clatskanie, and Scappoose Systems. Resident trout are found in nearly all of the perennial streams in Columbia County and have been stocked in many lakes and ponds. Warm-water game fish are restricted primarily to the Columbia River and its floodplain but can also be found in Vernonia Lake. Some of the most productive warm-water angling spots are on Sauvie Island, Multnomah Channel, Scappoose Bay, Deer Island Slough, Prescott Slough, Beaver Slough, and Westport Slough. Many rivers and streams in Columbia County drain from the Coast Range to the Columbia River. Here they meet a network of lakes, ponds, sloughs, and other water bodies formed in the old Columbia River floodplain. These features provide an abundance of fish habitat within Columbia County.

## Important and Characteristic Plant Associations

About 40 plant associations in seven ecological systems are known to occur or potentially occur in the study area (Appendix 3). Several of these are tracked by ORNHIC and are identified as conservation targets in the 2003 Oregon Natural Heritage Plan. These are the Columbia sedge (*Carex aperta*; G1S1<sup>2</sup>), Pacific willow / stinging nettle (*Salix lucida* ssp. *lasiandra* / *Urtica dioica* ssp. *gracilis*; G2S2), Oregon ash / Dewey sedge - stinging nettle (*Fraxinus latifolia* / *Carex deweyana* - *Urtica dioica* ssp. *gracilis*; G2SU), teal lovegrass - western marsh cudweed (*Eragrostis hypnoides* - *Gnaphalium palustre*; G2S1), water purslane - swamp smartweed (*Ludwigia palustris* - *Polygonum hydropiperoides*; G2S2), and wapato (*Sagittaria latifolia*; G3S2) associations. The white brodiaea (*Triteleia hyacinthina*; G2S2) association may occur on seasonally wet soils over basalt in the St. Helens uplands, Warrior Point on Sauvie Island, the Armstrong Industries site, and in the Carty Tract of the Ridgefield NWR.

- The **Columbia sedge association** is the rarest plant association in the study area. It once covered extensive areas of bottomland along the Columbia River between Longview and Skamania, but it has been almost completely supplanted by reed canary grass. Only a few high-quality stands remain near Vancouver Lake and at Smith and Bybee Lakes, but none are larger than two acres. The sedge itself is not rare and can be found mixed with canary grass in many areas, but it is never plentiful. With proper water management and/or selective use of herbicide to suppress reed canary grass, the Columbia sedge association could be restored at many sites within the study area.
- The **Pacific willow** and **Oregon ash** associations listed above have all suffered from flood control, grazing, and clearing for agriculture. The original composition of their understories is poorly known, and very few high-quality sites remain. Historically, stands of ash were also heavily cut for fuel and lumber, and old-growth ash is now rare.
- The **teal lovegrass - western marsh cudweed, water purslane - swamp smartweed,** and **wapato** associations have all diminished in area because of flood control and loss of habitat to reed canary grass.

## Historical Conditions and Ecological Processes

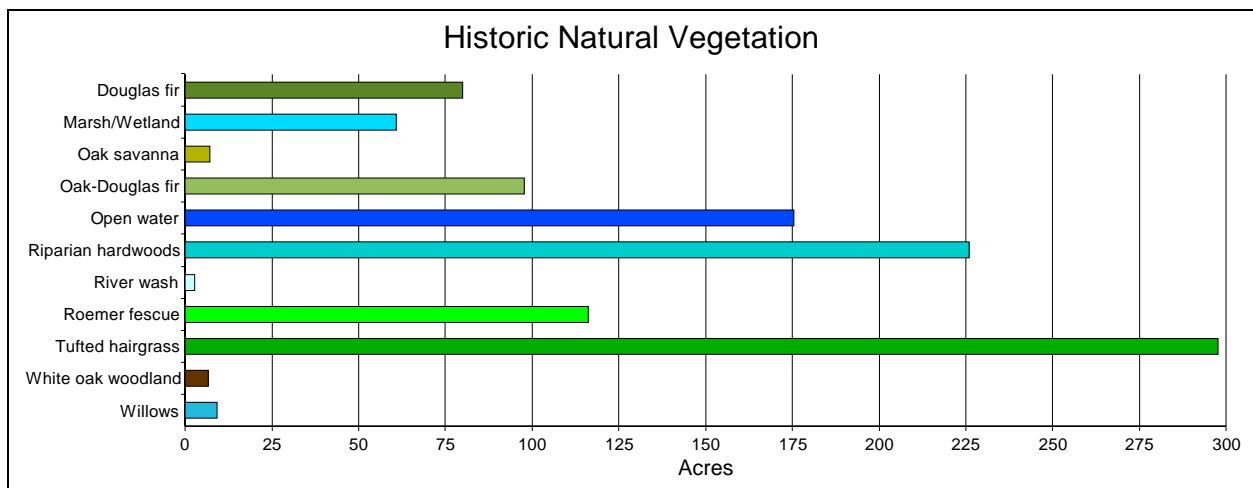
There are no site-specific studies on the effects of fire in the Scappoose area, but its pervasive use as a landscape tool by Native Americans is well documented regionally. The Columbia River flooded under two distinct seasonal regimes, one initiated by winter rain west of the Cascades, the other by spring snowmelt east of the Cascades. Winter floods occurred on an average of once every five years. The largest of these, in 1964, was 29.5 feet above mean low water at Vancouver. Before dams were built on the Columbia River, spring floods were often higher and lasted much longer than winter floods. The average June flood regularly inundated



170,000 acres of bottomland along the lower Columbia River for periods up to 60 days. Major floods inundated 250,000 to 300,000 acres. These spring floods were the primary force influencing landforms and vegetation on the river bottoms. The average spring flood reached a stage of 21.5 ft. above mean low water at Vancouver, a had a flow of about 600,000 cfs. These average flows were punctuated periodically by huge flows from 800,000 to 1,254,000 cfs, the highest reaching 36.2 feet at Vancouver.

During these floods, only the tops of ash, Pacific willow and cottonwood trees were visible, and all the lakes and sloughs were under water. Inundation during the growing season for periods as long as 60 days had profound effects on vegetation. Marsh and wet prairie vegetation was probably similar in composition to what it is today, but covering a much larger area (Thomas 1983, Allen 1999, Burke 2004) (Figs. 3 and 4). The understory in ash and willow stands must have been very different from what it is today. It is possible that with extended flooding into the growing season, there was less understory cover historically than what is present today. On uplands, oak and fir savanna has been converted to Douglas fir-oak forest.

In response to these changes in the region’s dominant vegetation and land cover, wildlife communities also have changed. Numbers of waterfowl found on the Sauvie Christmas Bird Count (which includes Scappoose Bay Bottomlands) have declined dramatically, with American wigeon, northern pintail, and Wilson’s snipe showing the clearest declines since the late 1960s. Over longer periods of time, numbers of wintering sandhill crane may have declined as well (Taft et al. 2003).



**Figure 3. Historic Natural Vegetation Distribution at Scappoose Bay Bottomlands and Environs.**

# Historic Natural Vegetation

- Landcover
- Douglas fir
  - Marsh/Wetland
  - Oak savanna
  - Oak-Douglas fir
  - Open water
  - Riparian hardwoods
  - River wash
  - Roemer fescue
  - Tufted hairgrass
  - White oak woodland
  - Willows

0 1 2 Miles

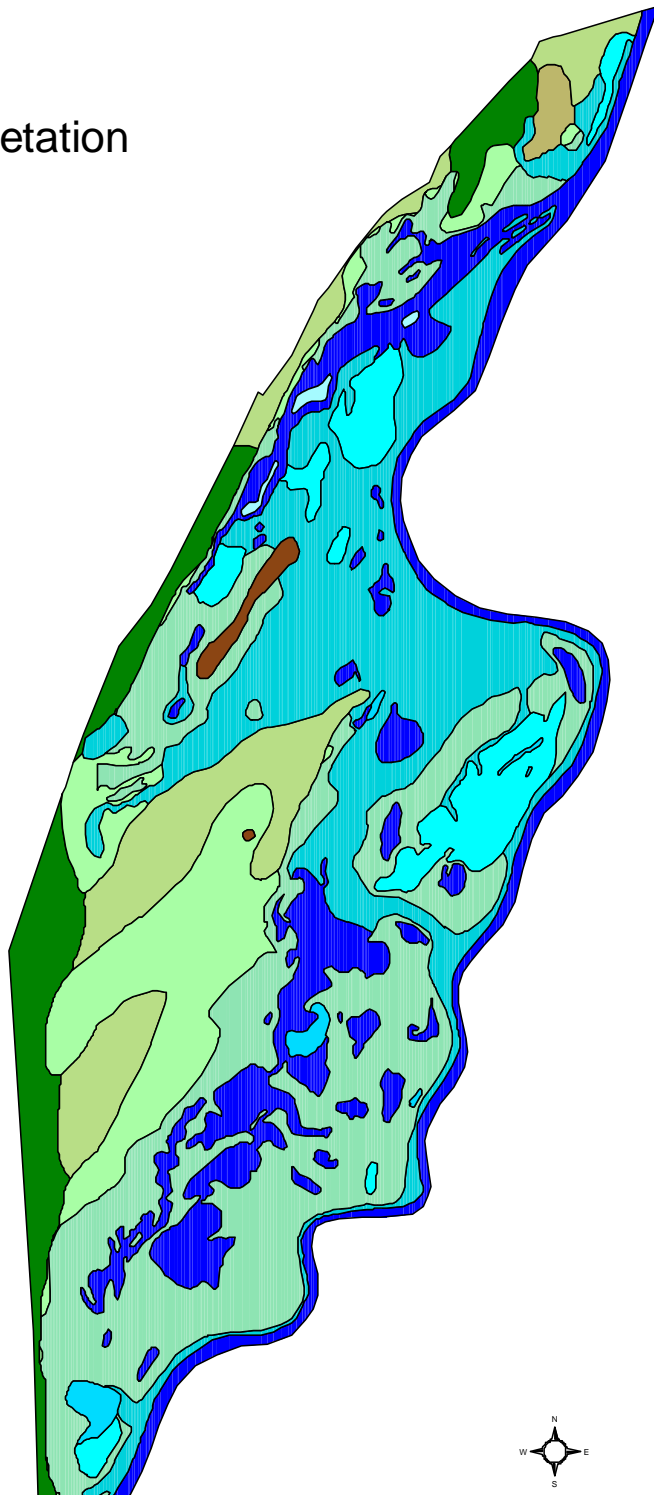


Figure 4. Historic Natural Vegetation Map of Scappoose Bay Bottomlands and Environs.

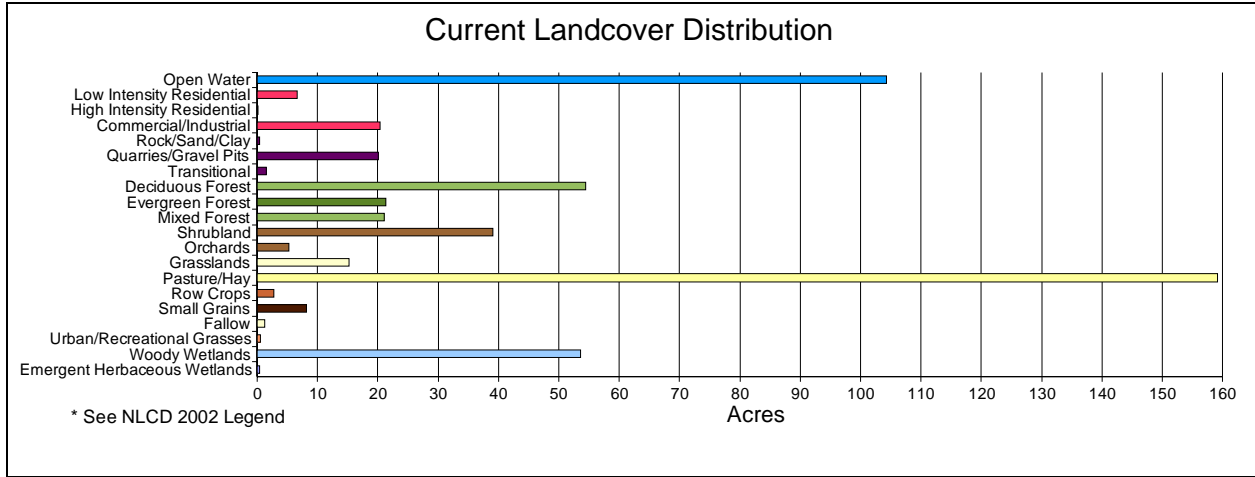
## **Regional Context for Scappoose Bay Bottomlands Biodiversity**

As mentioned earlier, The Scappoose Bay Bottomlands have been identified as important habitat areas of concern and conservation targets by Floberg et al. (2004), The Wetlands Conservancy (2000), The Oregon Habitat Joint Venture (1994) and the Oregon Biodiversity Project (1998). Each of these comprehensive assessments has evaluated the lower Columbia River basin, at a minimum, to provide a regional context for the selection of priority areas that are critical for the conservation of biological diversity. The Willamette Valley-Puget Trough-Georgia Basin Ecoregional Assessment conducted by Floberg et al. (2004) has identified the Sauvie Island Conservation Area that contains the Scappoose Bay Bottomlands as one of the priority sites within the entire ecoregion. This recent assessment is the most comprehensive evaluation of conservation needs in the Willamette Valley and Puget Trough area and utilized a broad spectrum of biological and sociological data to arrive at its conclusions. In each of these different assessments the study area is selected for the same overriding considerations, namely the representations of diverse, wetland habitats and the opportunity to conserve these values if acted upon in a prudent fashion.

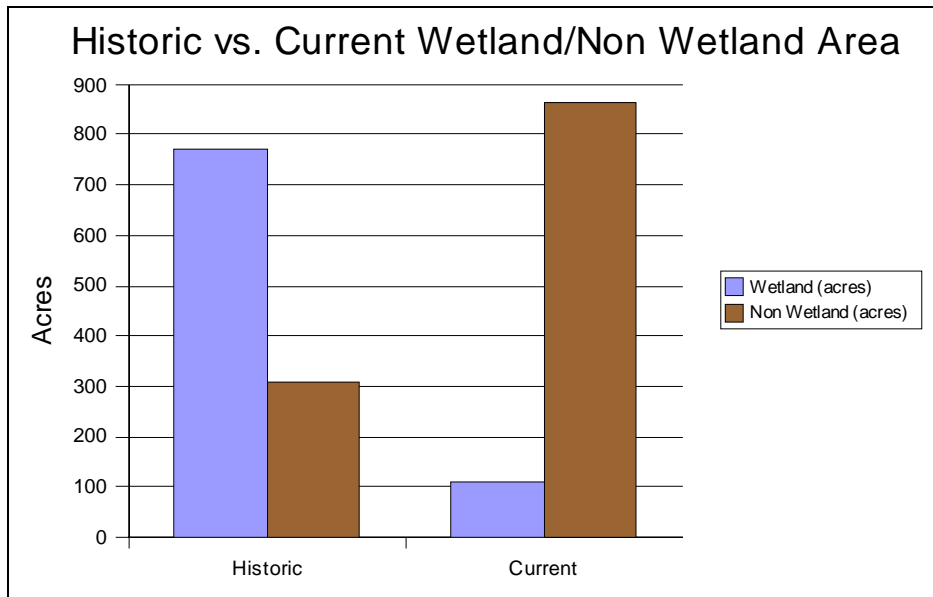
## **Current Conditions and Ecological Processes**

The lower Columbia River has suffered impacts from European settlement and commerce for about 180 years. The entire floodplain has been altered by 100 years of channel manipulation, artificial drainage, fire suppression, grazing, farming, and 65 years of flood control (Allen 1999). Virtually all features of the floodplain have been affected to a greater or lesser degree. Geomorphic features formed by river processes -- such as natural levees, point bars, and side channels -- are now disconnected by dikes from the riverine processes that created them, and in many cases have been obliterated entirely by land development. Annual floods have been virtually eliminated since Bonneville Dam was opened in 1938, and daily tidal flooding regulates vegetation in only a relatively small area below the point of mean high water. What overbank flooding still occurs in the study area is too irregular, too brief, and of insufficient magnitude to sustain the diversity of geomorphic surfaces that is critical to sustaining the variety of native vegetation. Grazing, farming, and gravel extraction have become the primary processes responsible for shaping the floodplain's vegetation and geomorphic surfaces. In the uplands, fire was historically the primary ecological process affecting vegetation, particularly in oak savanna and prairie. However, fire has been excluded from these areas for 150 years. More recently, residential and commercial development has been responsible for the loss of habitat and species diversity (Figs. 5-7).

All these shifts in the processes that shape the floodplain have implications for the ability of the floodplain's wetlands to support biodiversity, filter polluted runoff, and provide other services valued by society. The full extent of these functional changes cannot easily be measured, however, current landcover compatibility with conservation can be seen in Figure 8.



**Figure 5 Current (2002) Landcover Distribution for Scappoose Bay Bottomlands and environs.**



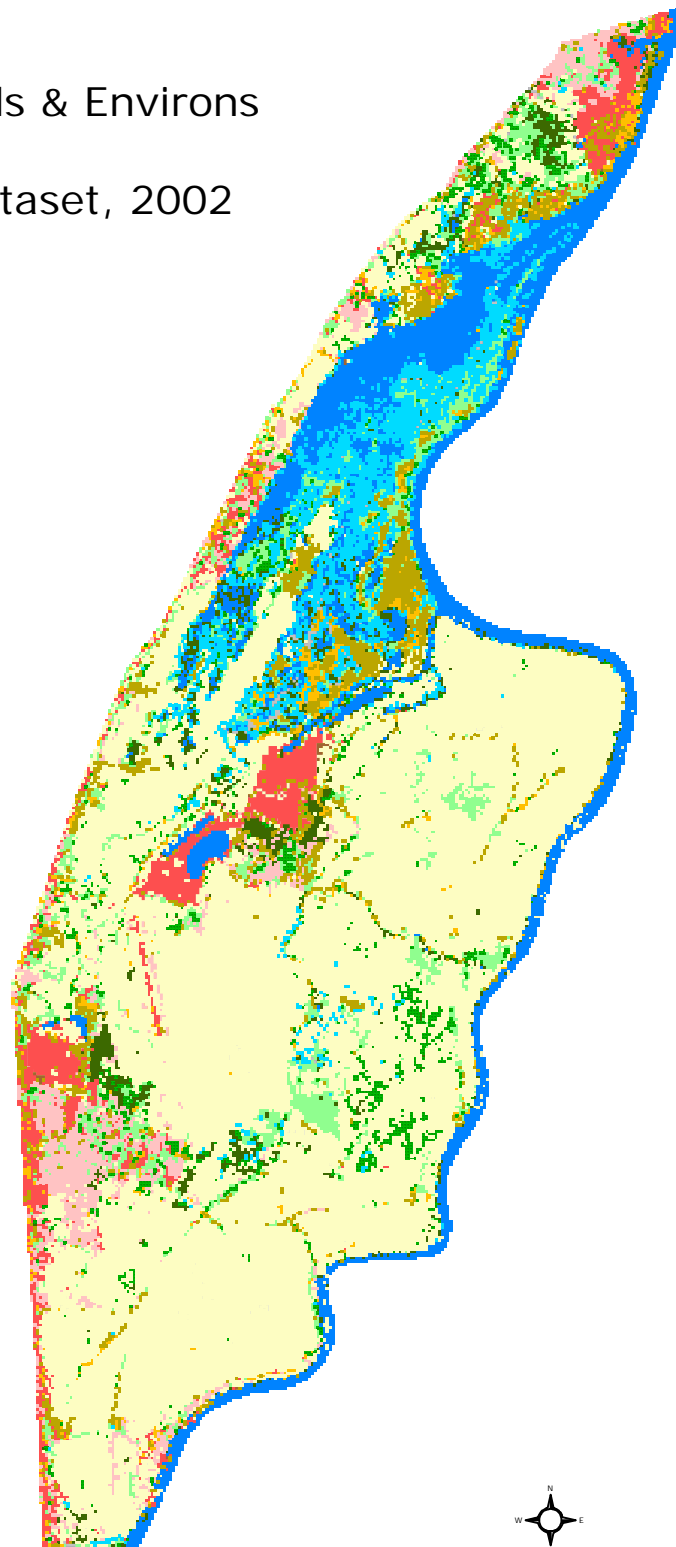
**Figure 6 Historic vs. Current (2002) Wetland/Non Wetland Area for Scappoose Bay Bottomlands and environs.**

Scappoose Bottomlands & Environs  
Landuse/Landcover  
National Landcover Dataset, 2002

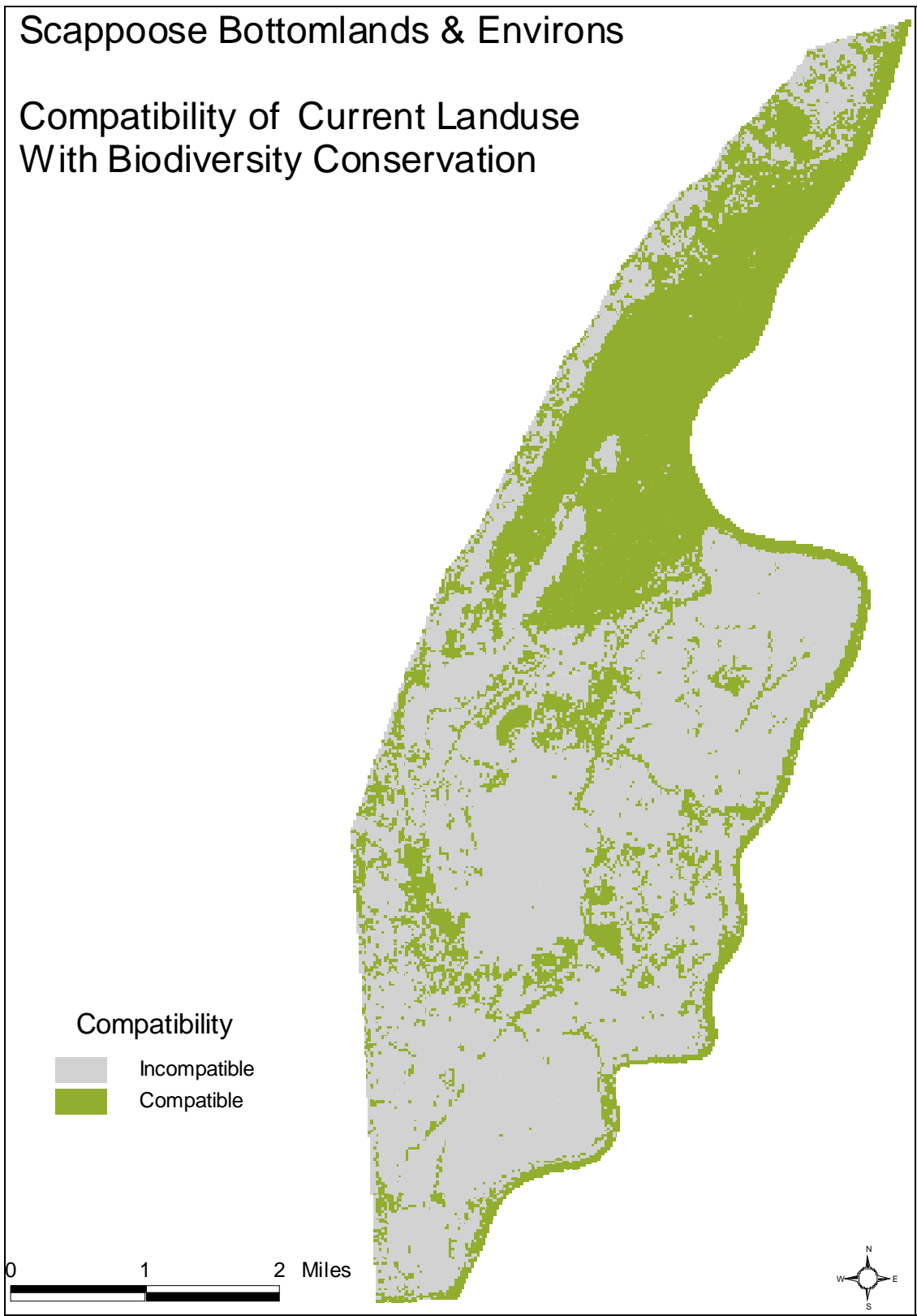
Landuse/Landcover

-  Agriculture
-  Deciduous Forest
-  Evergreen Forest
-  Grassland
-  Industrial
-  Mixed Forest
-  Open Water
-  Residential
-  Rock/Sand
-  Shrubland
-  Transitional
-  Wetlands

0 1 2 Miles



**Figure 7. Current Landuse/Landcover Map.**



**Figure 8. Landuse Conservation Compatibility Map for Scappoose Bay Bottomlands and environs.**

### **III. Land Use**

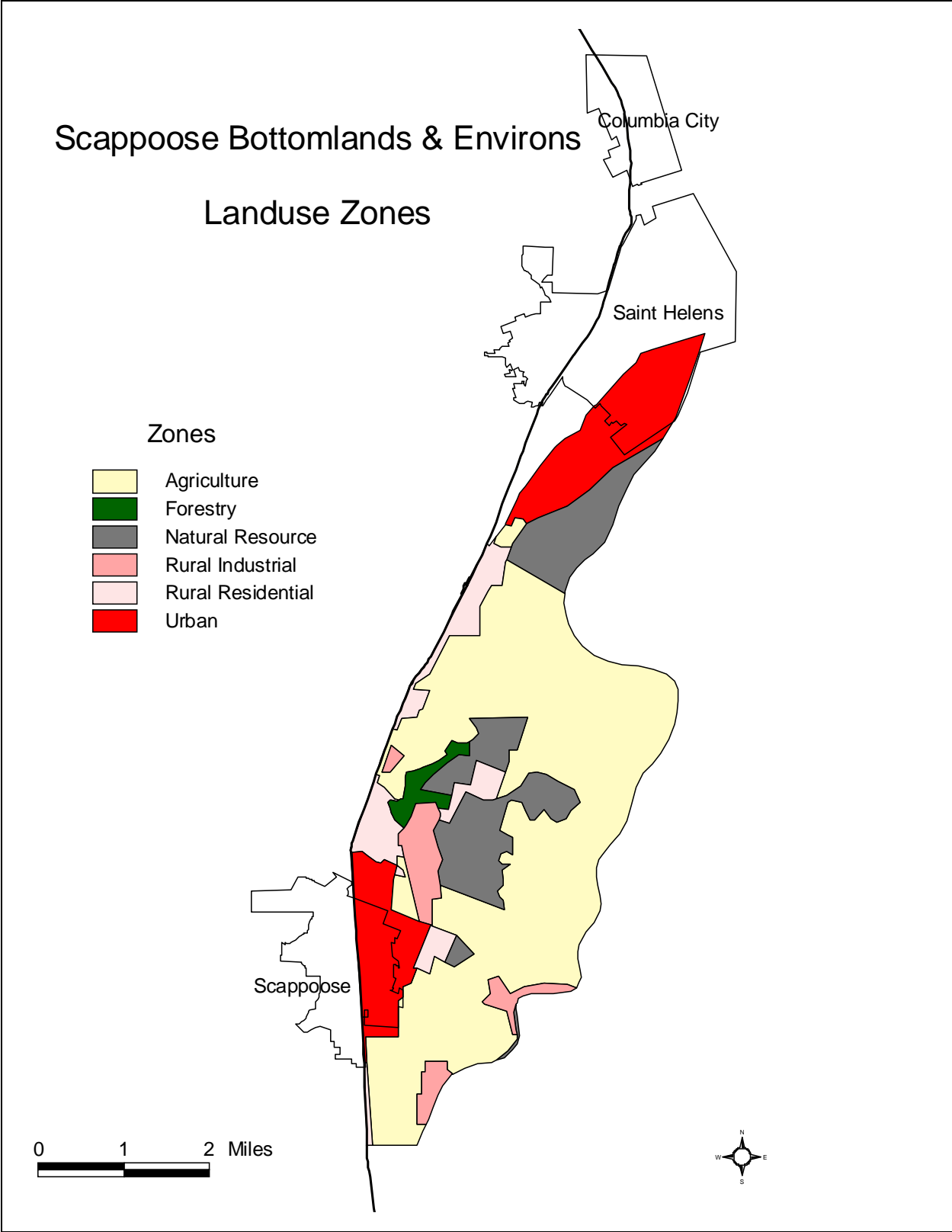
The Columbia County Land Use Plan (2001) identifies land use designations for the Scappoose Bay Bottomlands (Fig. 9). A limited number of these designations may contribute to the conservation of biodiversity in the area while others directly or indirectly impact conservation. The Scappoose Bay Bottomlands includes approximately thirty percent of conservation related or conservation compatible designations. Correspondingly, approximately seventy percent of the area is in land use designations that impact conservation and restrict many conservation activities from being implemented.

#### **Open Space**

The Columbia County Comprehensive Plan defines open space as consisting of lands used for agricultural or forest uses, and any land area that would, if preserved and continued in its present use:

1. Conserve and enhance natural and scenic resources;
2. Protect air or streams or water supply;
3. Promote conservation of soils, wetlands, beaches, or tidal marshes;
4. Conserve landscaped areas, such as public or private golf courses, that reduce air pollution and enhance the value of abutting or neighboring property;
5. Enhance the value to the public of abutting or neighboring parks, forests, wildlife preserves, nature reservations or sanctuaries, or other open space;

The major conflicting uses affecting the open space value of forest and agricultural land are the expansion of rural residential, commercial, industrial development, and mineral and aggregate extraction. These uses convert valuable resource land for other purposes. They also impact and degrade adjacent resource lands and the ability of these lands to protect water quality, conserve soils, and perform other functions.



**Figure 9. Zoning Map (detail of statewide map).**



## **Natural Resources**

The Columbia County Comprehensive Plan (2001) describes the following potential conflicts between development activities and fish, wildlife, waterfowl, wetlands and fish and wildlife habitat.

### **Fish**

Forestry practices, agricultural practices, mineral and aggregate extraction and the development of residential, commercial, and industrial activities can potentially negatively impact fish habitat. Conflicts may include:

1. Obstructions to fish passage that hinder fish migration, including dams, culverts, tide gates, and logging-related landslides.
2. Streamflow levels may be reduced below acceptable levels when waters are diverted for residential, industrial, agricultural, or other purposes.
3. Pollutants introduced into the water because of land use actions may reduce water quality.
4. Removal of riparian and wetland vegetation may destroy fish habitat in rivers, streams, wetlands, and other water bodies by elevating water temperatures and increasing stream sedimentation.
5. Mining and filling practices which change the structure of the stream channel may destroy spawning and rearing habitat in streams and rivers.
6. Limited available access to rivers and streams because of private land ownership may restrict the recreational enjoyment of fish resources.

### **Terrestrial and aquatic mammals**

Beaver, muskrat, mink, river otter, skunk, fox, bobcat and many other mammals in the Scappoose area require forests, ponds, lakes, wetlands streams, and riparian areas.

Land use development activities such as draining and filling of wetlands, and expansion of development into riparian areas have potentially negative impacts on wildlife habitat. Potential conflicts also arise between furbearers and landowners when animals cause damage. Beavers, for example, may cut down trees or block culverts with dams and flood developed lands.

### **Waterfowl**

Waterfowl habitat areas have been identified in Columbia County by the Oregon Department of Fish and Wildlife. These areas lie near the Columbia River and hold standing or slowly moving water at least part of the year. The numerous wetlands, sloughs, rivers, and agricultural lands in Columbia County provide excellent habitat for waterfowl. During late fall and early winter, thousands of migrating birds descend on the Columbia River flood plain and Sauvie Island. Crops planted in managed game areas and on private agricultural lands help attract and feed this waterfowl population and the intricate network of sloughs and drainage ditches provides refuge.

Areas identified as waterfowl habitat are primarily zoned for agricultural use. In addition, the north end of the Scappoose Bay Bottomlands contains valuable gravel deposits and has been placed in a surface mining reserve zone. Activities that are potential conflicts with waterfowl are:

1. Filling, draining, or tilling of wetlands, including conversion of sloughs, flood plains, and

swamp areas to other uses.

2. Removal of riparian vegetation or other vegetation that serves as nesting, feeding, or resting habitat.
3. Unintentional harassment as a result of frequent visits by people on foot.
4. Activities that cause contamination of waterfowl food chains (e.g., urban and agricultural runoff).

State and Federal programs limiting some of the conflicting uses in waterfowl habitat include Section 404 of the Clean Water Act and the State Fill and Removal Law. Columbia County has stated it intends to provide further protection to waterfowl habitat through programs limiting conflicting uses in wetland and riparian areas.

### **Wetlands**

Columbia County contains abundant wetlands within its boundaries. Columbia County and the Cities of Scappoose and St. Helens have conducted a local wetland inventory; 75 wetlands were identified. Many of these lie along the Columbia River within the old floodplain area and are now confined behind dikes and surrounded by lands in agricultural use (Pacific Habitat Services 1998). Nonetheless, it is often possible to protect these wetlands and to resolve potential conflicts with other land use activities. To accomplish this objective, the County intends to develop an overlay zone to protect the Identified Wetland Areas from filling, draining, or other alterations which would degrade their biological value. The majority of the areas containing wetlands are zoned for agricultural use. Activities allowed in this zone will be restricted so as to protect wetland values. However, minor drainage improvements will be allowed.

The Columbia County Comprehensive Plan states that protecting the quality of significant wetlands in Columbia County through regulation will have positive environmental consequences. Not only will such regulation ensure the availability of quality habitat, but it will protect other functions of the wetland ecosystem as well. Some wetlands act as areas for aquifer recharge. When not confined by dikes or driven by tides, wetlands provide natural flood control by storing waters during early winter months and releasing them in the summer when they are needed. Loss of wetlands, through industrial or other land use expansion, would have negative environmental consequences.

### **Fish and Wildlife Habitat**

The Fish and Wildlife Habitat Goal of the County Comprehensive Plan (2001) is to protect and maintain important habitat areas for fish and wildlife in Columbia County.

The County's policies to ensure the goal are:

1. Encourage the provision and acquisition of public access both to and along rivers, streams, and lakes for the release of fish and recreational enjoyment of County residents.
2. Manage its spraying programs to minimize adverse effects on water quality and fish and wildlife habitat.
3. Support preferential taxation methods and density transfers to encourage retention of riparian habitat, brushy fencerows, and wetlands on private lands.
4. Cooperate with the Oregon Department of Fish and Wildlife to better identify sensitive

- habitat areas for fish and wildlife and adopt implementing measures for their protection.
5. Rely on the State Department of Water Resources to insure that minimum streamflow standards are established and maintained in all streams to insure a productive fish habitat and protect aquatic life.
  6. Encourage the use of nonstructural methods of bank stabilization in areas experiencing accelerated soil loss.
  7. Prohibit diversion or impoundment of stream courses, which adversely impact fish and wildlife habitat.

### **Summary**

In summary, fish, wildlife and wetland habitats in the Scappoose Bay watershed continue to be marginally protected under most current government policies and regulations. The severely depleted status of all salmonid stocks, waterbirds, shorebirds, turtles and frogs in the watershed are partially a result of decades of intensive habitat degradation with inadequate protective regulations and poor implementation of those regulations.

## **IV. Sociological Aspects of Scappoose Bay Bottomlands--Economics**

The economics of the Scappoose Bay Bottomlands are driven by the existing land use. The rural character of the area corresponds with the dominant land use, agriculture, and represents what has historically been the primary economy of the area. This scenario is changing, however, with the growing market for high quality gravel that is abundant and readily available over a sizeable area of the Scappoose Bay Bottomlands. Another rapidly increasing use in the area is residential development as the City of Scappoose and Columbia County in general are beginning to be tapped by people moving out from the Portland metropolitan area.

### **Gravel extraction**

Sand and gravel deposits primarily exist along alluvial plains adjacent to the Columbia River in southern Columbia County. In 1977, there were 99 surface mining operations extracting sand, gravel, and/or rock in this area. Past production from these sites has yielded 15,800,000 cubic yards of aggregate material. Future potential for the sites has been calculated at 52,800,000 cubic yards. Of the 99 sites identified in the County Goal 5 analysis, seven (7) are in the sand and gravel category and the remaining are identified as stone quarry sites. Also, small unlicensed rock pits supply rock for small road building and construction needs for a growing industry. An inventory of available aggregate sources indicates there is a potential for expanding this resource. The availability of barge transportation makes the County a prime candidate as a source of material for the Portland Metropolitan area, as well as shipping to more distant markets.

Aggregate deposits located in Columbia County are of generally good quality. The quality of deposits existing in the Scappoose Bay area is said to be some of the highest in the state. Limonite deposits in the Scappoose area are some of the most important in the state though these deposits contain far too little tonnage to be economically feasible.

Surface mining is regulated state-wide by the Mined Land Reclamation Division of the Oregon Department of Geology and Mineral Industries (DOGAMI). DOGAMI has also administered DEQ's requirements that all mines have NPDES stormwater permits. Columbia County is the only county in Oregon where surface mining within county boundaries is not regulated by DOGAMI, but by the County itself. Columbia County's Surface Mining Ordinance (90-11) is very similar to DOGAMI regulations. The County's ordinance states that mining operations must meet all applicable state and federal laws and has some general provisions regarding protection of stream channels and water quality. However, the County does not enforce water quality regulations, but relies upon state agencies. In Columbia County, DEQ retains responsibility for administering the NPDES stormwater permit program and for taking enforcement action for water quality violations. Oregon Division of State Lands (DSL) has regulatory authority for mining if it occurs within the bed or banks (below ordinary high water) of a stream or wetland. Mines that were operating before 1972 are grandfathered and are not regulated under DOGAMI or County permits. No reclamation plans are required for these mines. However, expansion of these mines into new areas after 1972 is regulated. All mines, whether operating before or after 1972, must meet an approved NPDES stormwater permit. Surface mines that are used for forest management purposes (such as building logging roads) and that mine less than 5000 cubic yards are regulated under the Oregon Forest Practices Act. The current regulatory system for surface mining is generally inadequate to protect water quality. Regular field monitoring at mines have not been regularly collected or enforcement actions been taken.

Streams, wetlands, floodplains, and riparian areas are protected from new mining activity by Goal 5 regulations adopted by the counties and by recommendations from other agencies. Columbia County's stream protection rules under Oregon's Safe Harbor provisions require 50-foot buffers along each side of most streams, with a 75-foot wide buffer along major rivers (Columbia River and Multnomah Channel). These riparian buffer widths apply to most proposed development and new mining projects or mine expansions. These buffer widths are generally inadequate to maintain riparian functions for fish and wildlife habitat, according to the best available science (Knutson and Naef 1997). Protection requirements can be expanded by Columbia County or DOGAMI based on comments on the proposed mining permit received from DSL, DEQ, ODFW, and NMFS. The regulatory system has improved protection of wetland and stream habitats from historic conditions, although protection standards remain inadequate. Also, because the regulatory system does not require reclamation of sites mined prior to 1972, restoration of habitats impacted by past mining is not required.

### **Agriculture**

Agriculture is the County's second most important economic activity. 1975 statistics show that agricultural employment contributed only 6% of the County's income and employed only 2% of the County's work force. Recent reports show similar but slightly decreasing numbers. While the labors of the early settlers were primarily timber extraction, the development of the Northwest and the growth of Portland brought a demand for farm produce and encouraged the clearing of land for agriculture. In the late 1800's livestock industries began developing, along with increased specialization and more intensive farming. By the turn of the century, dairying, market gardening, small fruits production, and poultry production were the major agricultural markets.

Farms in excess of 50 acres have shown no increase in number and constitute less than half of the farms in the County. Conversely, smaller acreage farms have increased. Small farms constitute the majority of the farms in the County and have the highest gross sales per acre. Columbia County's agricultural profile is and will continue to be that of small acreage, high intensity farming. Much of the agricultural activity takes place along the valley floors and floodplains located throughout the interior of the County. Some facts from the Columbia County Comprehensive Plan (2001) are:

- Grazing occupies 75% of acreage and 69% of the farms. It produces 35.3% of the agricultural income. In recent years there has been a widespread conversion to the nursery industry, housing, and hybrid poplar plantation.
- The other high-income category (dairy) is operated on 6% of the land by 3% of the farmers. It produces 33.4% of income but has also decreased
- Grain, seed crops, berries, and miscellaneous crops produce the remaining income on about 4% of the acreage and by 11% of the farmers.
- The remainder of the land is either ungrazed woodland or idle.
- Average size of extensive animal grazing farms is 137 acres and the median size is 60-70 acres. However, smaller grazing farms contribute significantly to the County's agricultural enterprise.
- The predominant characteristic of the Columbia County farm is that it is operated as a part-time venture.

Agricultural activities that could impact fish and wildlife wetland habitats include a diverse range of activities, such as surface and groundwater withdrawals for irrigation, grazing or cultivation of riparian zones and wetlands, or non-point pollution, such as manure-contaminated runoff from livestock operations. Water rights are regulated by the OWRD. Potential water quality impacts are regulated by DEQ in coordination with directives of the federal Clean Water Act, administered by EPA and Oregon Department of Agriculture (ODA). The local Soil and Water Conservation District works with landowners to develop voluntary farm plans that address water quality and habitat protection. DSL regulates most wetland and stream activities under the removal/fill permit program. ODFW has reserved in-stream water rights for benefit of fish habitat, but it is unknown whether the reserved in-stream flows are being met. The Oregon State legislature gave ODA authority to develop agricultural area water quality management plans. When the plans are completed, ODA can take enforcement action. To date, a plan has not yet been completed for the Scappoose Bay watershed. DEQ does not conduct monitoring or enforcement to address non-point agricultural pollution in the watershed.

### **Residential-Commercial Development**

Columbia County is one of only a few Oregon counties that have a greater number of people residing in the unincorporated areas than within a city boundary. Recreational opportunities, moderate climate, low taxes and utility rates, and the rural atmosphere play a major part in

attracting people to the county. While 1982 and 1983 showed a decrease in County population, the largest decreases occurred in the incorporated areas. The pattern for residential development in the County is typical of other rural counties in that most of the rural home sites are located along or close to public roads or clustered near intersections. The density of these rural areas varies somewhat, with averages of one unit per five acres or less being common. The County's unique topographic features separate and tend to isolate these various areas, giving each an atmosphere of individuality and seclusion. This type of sprawl requires the extension and maintenance of public utilities and services, discourages in-filling, and negatively impacts valuable resource land. Many of these problems can be lessened through increased in-filling of vacant lands and by allowing more concentrated development.

Columbia County has attracted increased numbers of people over the past few years who desire a rural residential lifestyle and who would rather locate a residence on resource land than within one of the County's incorporated communities. This expansion of residential and commercial development has potential to impact fish, wildlife and wetland habitats by clearing or building in riparian zones, streams, floodplains, and wetlands, as well as by increasing impervious surface in magnitude and frequency of peak flows. Potential impacts also include fish passage barriers at road crossings, water withdrawals, and non-point pollution from urban run-off.

The density and location of development and development standards are regulated by the city of Scappoose, Columbia County, and the Oregon Land Conservation and Development Commission (LCDC). Specific development projects trigger review by these same local jurisdictions, and in some cases, other state and federal agencies. The location and density of development is the major regulatory tool that can regulate the amount of impervious surface area in a watershed. Scientists have found that when impervious surfaces exceed about ten percent of the watershed area, irreversible degradation of stream channel habitat occurs (Booth and Jackson 1994). Recent research indicates that small increases in impervious surfaces above natural levels can initiate habitat degradation (May et al. 1997). Local jurisdictions have not adequately addressed this issue in their zoning and planning efforts. Fortunately, existing urban centers in the Scappoose Bay watershed are located at the lower ends of the major stream systems, reducing the potential effects of impervious surfaces on fish habitat. Development has, however, encroached on the floodplains of the Milton and Scappoose Creeks. Water quality impacts of new development are regulated through the stormwater management standards of local jurisdictions. Most existing residential and commercial development and streets do not have any stormwater treatment facilities. For example, the City of Scappoose has 211 storm drains along the street system, of which 134 flow directly into Scappoose Creek. There is no regulatory requirement for treatment of existing stormwater problems.

Scappoose has also conducted a local wetland inventory. Wetland and stream impacts are regulated by DSL, which has designated certain streams in the Scappoose Bay watershed and across the state as essential fish habitat. Virtually any fill or other disturbance within the ordinary high water of streams so designated is regulated by DSL under the removal/fill permit program. Removal/fill permits are reviewed by USCOE and other agencies under Section 404 of the federal Clean Water Act. Variances, flexibility and lack of enforcement under local and state regulations have generally reduced the effectiveness of these regulatory actions to protect fish, wildlife and wetland habitats.

## **Industrial Development**

Industrial development has similar potential impacts on fish, wildlife and wetland habitats as residential and commercial developments, as well as the potential for unique water pollution impacts from point sources, such as pulp mill discharges. Point source pollution is regulated by DEQ under the NPDES. In the Scappoose Bay watershed, at least seven NPDES waste discharge permits have been issued. Although Scappoose Bay water quality is known to be much better than it was in the 1950s when fish kills were reported, little monitoring in the Bay has been done by DEQ to determine the effectiveness of the current regulations in protecting water quality. The federal Clean Water Act regulations and programs, such as NPDES, have been fairly effective in eliminating point source pollution problems; if not through agency action, then through citizen action suits against the agency.

## **Recreation**

Recreation has not been a major economic driver in the Scappoose Bay Bottomlands to date but it is a growing interest that is currently centered around the Scappoose Bay Marina. Fishing and power boating remains the dominant recreation in the Bay and lower Columbia River but kayaking is growing in popularity with the local population as well as people from the greater Portland metropolitan area.

In addition to water-related recreation there is a proposal to establish a new regional state park in Columbia County to address an under-served and growing segment of the population. At least one potential site for such a park is located within the Scappoose Bay Bottomlands and other sites could likely be identified if plans moved forward. A regional state park could provide considerable conservation opportunities in conjunction with the recreation opportunities that would be the primary focus of the investment. Access to the Bay or other waterways in the area would enhance the diversity of the recreational experience and could provide for restoration of degraded habitats in addition to direct conservation of existing high quality areas. It is understood that the recreation need in Columbia County would be focused on activities and site developments that would be conducive to conservation as well as recreation.

## **V. Threats to Conservation**

Scappoose Bay Bottomlands has undergone considerable changes since presettlement times and all of these changes have impacted the natural setting and biological diversity that the area once supported. As noted in Chapter II these changes resulted in loss of habitat, fragmentation, a breakdown in some ecosystem functions, decreases in wildlife and an increase in non-native invasive species. A number of the changes to the area occurred many years ago when the huge system of dikes were built to prevent the spring flooding of the Columbia River and Multnomah Channel but other changes to the area have been more recent and still pose active threats to conservation. In this section the most prevalent threats to conservation will be briefly discussed with the focus being where mitigation might play a role in containing or lessening their impacts to the biodiversity of Scappoose Bay Bottomlands.

### **Altered Hydrology**

One of the most far-reaching threats to conservation at Scappoose Bay Bottomlands is broad-scale alteration of the underlying hydrology of the site. This alteration has come from a number of sources including the large upriver dams on the Columbia River that have prevented the largest flood events that historically swept down the river and even over Sauvie Island and into Multnomah Channel. These flood events redistributed fines and gravels across the site, laying down productive sediments and creating open habitats that were colonized by wetland and riparian species. On a slightly smaller scale, Multnomah Channel received episodic floodwaters from the Willamette River but these too have been largely stopped by upstream dams that have been specifically engineered for flood control purposes.

In addition to the dams, there are substantial dikes and levees surrounding much of the landscape and lining the Columbia River and Multnomah Channel. Again, the effect has been to quell the floodwaters and the sediments that would have been deposited across the site. The hardening of the banks of the river channels also increased the velocity of the floodwaters with the resultant increase in bank scouring where there were no dikes. This may have led to additional erosion of the downstream end of Sauvie Island and at the mouth of Scappoose Bay accelerated siltation in backwater areas.

Bottomlands confined by dikes also have had considerable hydrologic alteration as most streams within this area have been channelized to some extent and some have been almost completely redirected. A number of sloughs that were tidally connected to the Bay or other waters are now channelized, redirected, and in some cases enlarged to accommodate river traffic.

The final aspect of altered hydrology that has occurred at the site is water management that is ongoing within the Scappoose Drainage District. The District occupies approximately 5000 acres of largely agricultural lands. It has the expressed purpose of managing water levels to support agriculture that would not otherwise be possible if not so managed. The water is managed through a series of ditches and pumps that maintain the water level within fairly narrow tolerances (within approximately 6 inches of target levels). The District is surrounded on the downstream end by the Multnomah Channel levee and other dikes and levees that run along portions of the Santosh Slough. The south end of the District is not diked. The strict water level management greatly inhibits natural wetland function within the drainage district.

### **Agriculture**

The Scappoose Bay Bottomlands has over 33 percent of its lands dedicated to agriculture with much of this in active crop production and the remainder in pasture (Figs. 7 and 9). The development of agriculture has resulted in habitat loss, fragmentation, and alteration or decrease of ecosystem function. At the same, agriculture supports many species, mostly native, that were not common historically in the Bottomlands. Agricultural development in the area is also the root cause of much of the water management that is described above. The most intensively managed lands occur within the drainage district boundaries where land is dedicated to nursery stock production, dairies, truck gardens, orchards and grains. Lands outside of the drainage district, in general, are less intensively managed and are dominated by passive grazing on native and improved pastures.



### **Gravel Extraction**

The Scappoose area is underlain with formidable gravel deposits that are the result of the Missoula floods, a million years ago and continuing to historic times with annual flooding of the Columbia River (most recent ca. 15,000 yr ago). These deposits vary in depth but are of high grade commercial quality and are increasingly becoming a source of revenue for landowners. Mining the gravels entails removing the overburden of varying thickness and digging out the deposits in open pits whose depths penetrate the shallow water table. The end result of the gravel mining is numerous steep sloped, large pits several acres in size that are filled with groundwater. Much of the processing is done on site and adds fine material to the pits. They are typically difficult to restore without considerable recontouring and the addition of soils. Gravel mining is expected to expand in the area in the future and may cover considerable acreage at the site given the extensive deposits. Gravel pits provide feeding or roosting habitat for diving ducks, gulls, grebes, and loons but in general support lower diversity and numbers of birds as compared with natural wetlands and riparian areas.

### **Residential Development**

Current land use zoning restricts residential development from most of the agricultural lands in the Scappoose area. However, lands bordering the town of Scappoose and extending out to the Scappoose airport and beyond have development potential. The Portland metropolitan area is expected to grow steadily in the coming decades and it is likely that development pressures will stretch into Columbia County. The rural-suburban area of Scappoose is an attractive place for metropolitan growth and will continue to result in loss of habitat and open space as well as make some restoration activities more difficult to maintain. Given the history of Washington County and the expansion of development into farmland that has occurred there, Columbia County will experience similar pressures in the future.

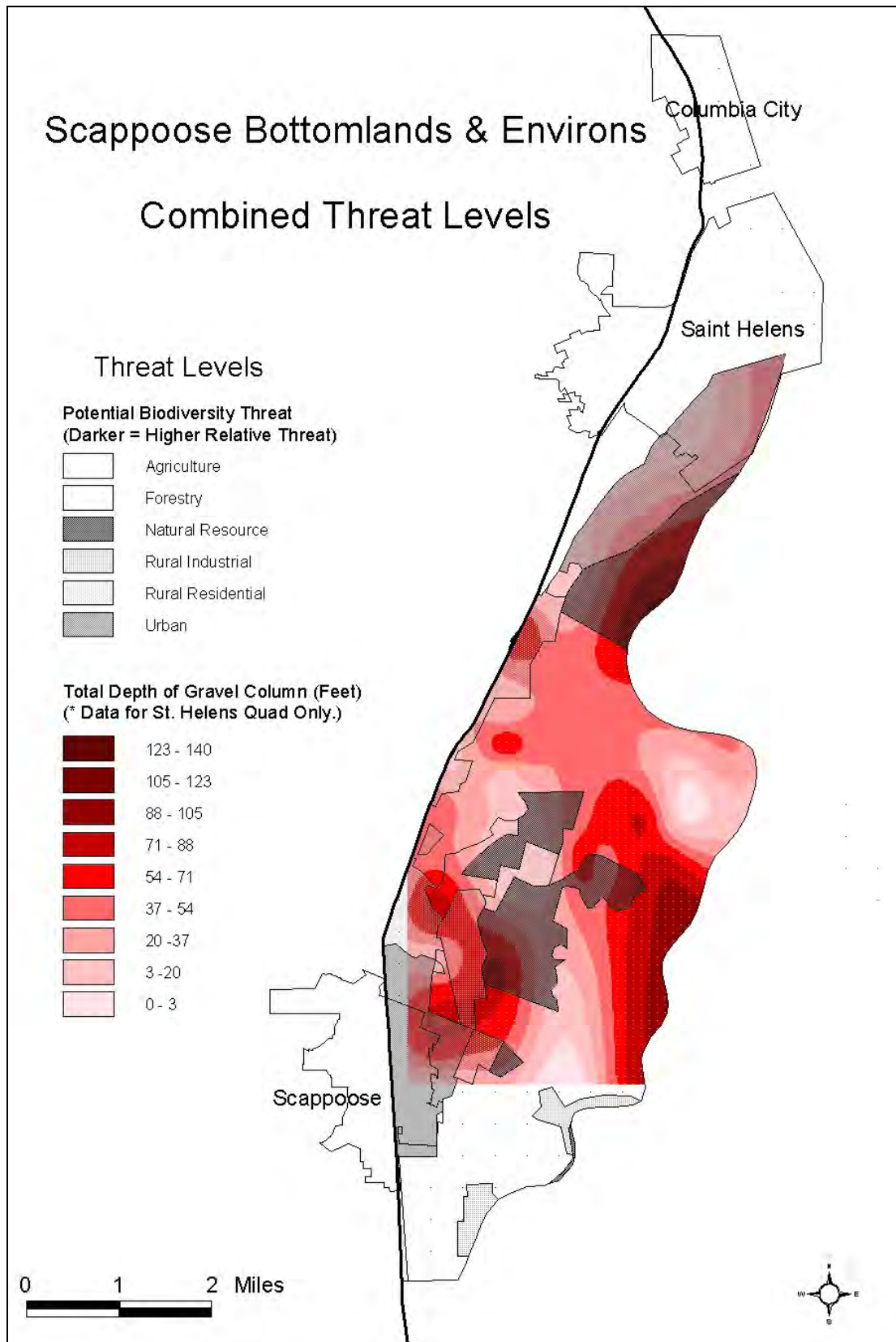
### **Invasive Species: reed canary grass, grass carp**

One of the major threats to conserving the biodiversity of the Scappoose Bay Bottomlands is the rapid expansion of invasive species and the continued introduction of other species that diminish habitats and directly impact populations of native species. Invasive species are prominent in the wetlands of Scappoose Bay Bottomlands where reed canary grass dominates an increasing area every year. Reed canary grass acts to create homogeneous habitat in wetlands that were historically diverse and supported many wildlife species. Effective controls for reed canary grass are not available for large areas and require intensive management and long-term commitments. Another species that is found in the project area is grass carp, a large bottom-dwelling fish that is prevalent throughout lower Columbia River backwaters. The grass carp alters shallow water habitats by continually stirring up bottom sediments, clouding the water column and foraging on aquatic plants, thus reducing aquatic habitat diversity.

Uplands at the Scappoose Bay Bottomlands have also been affected by invasive species as native understories in oak savannas and wet prairies have been almost entirely eliminated and replaced by Himalayan blackberry, European pasture grasses and common herbaceous weeds. The overall affects of invasive species have been habitat degradation and a loss of some ecosystem functions as invasives come to dominate native ecosystems.

### **Combined Threats: Land Use and Gravel Extraction**

Combined zoning and gravel extraction threat locations are based on the Oregon state zoning data from the State Service Center for GIS ([sscgis.state.or.us](http://sscgis.state.or.us)) and the primary well logs of Columbia County (Figure 10). The Oregon generalized zoning map was chosen as the best surrogate for the currently unavailable Columbia County zoning or localized Scappoose and St. Helens zoning data. The zones within the study region were ranked according to their potential negative impact on wetland conservation and area biodiversity. The primary well logs were copied from the original source material to spreadsheet format. The individual logs were ranked according to the spatial precision of the well location descriptors. Wells located to 1/16 section precision were separated for use in the subsurface gravel layer. The wells were geo-located and attributed with the material at depth descriptors from the well logs in a GIS. All gravel material depths were summed for each location and kriging was used to generate the final surface which includes only that area of the study region falling within the St. Helens quad. The two layers were combined using a semi-transparent color scheme to show additive potential negative impacts. The darker the color combination: the higher the potential for negative impact. This map is for illustrative purposes only.



**Figure 10. Zoning & Gravel Extraction Combined Threats.**

## VI. Reference Sites

### Role of Reference Sites in Management Plan

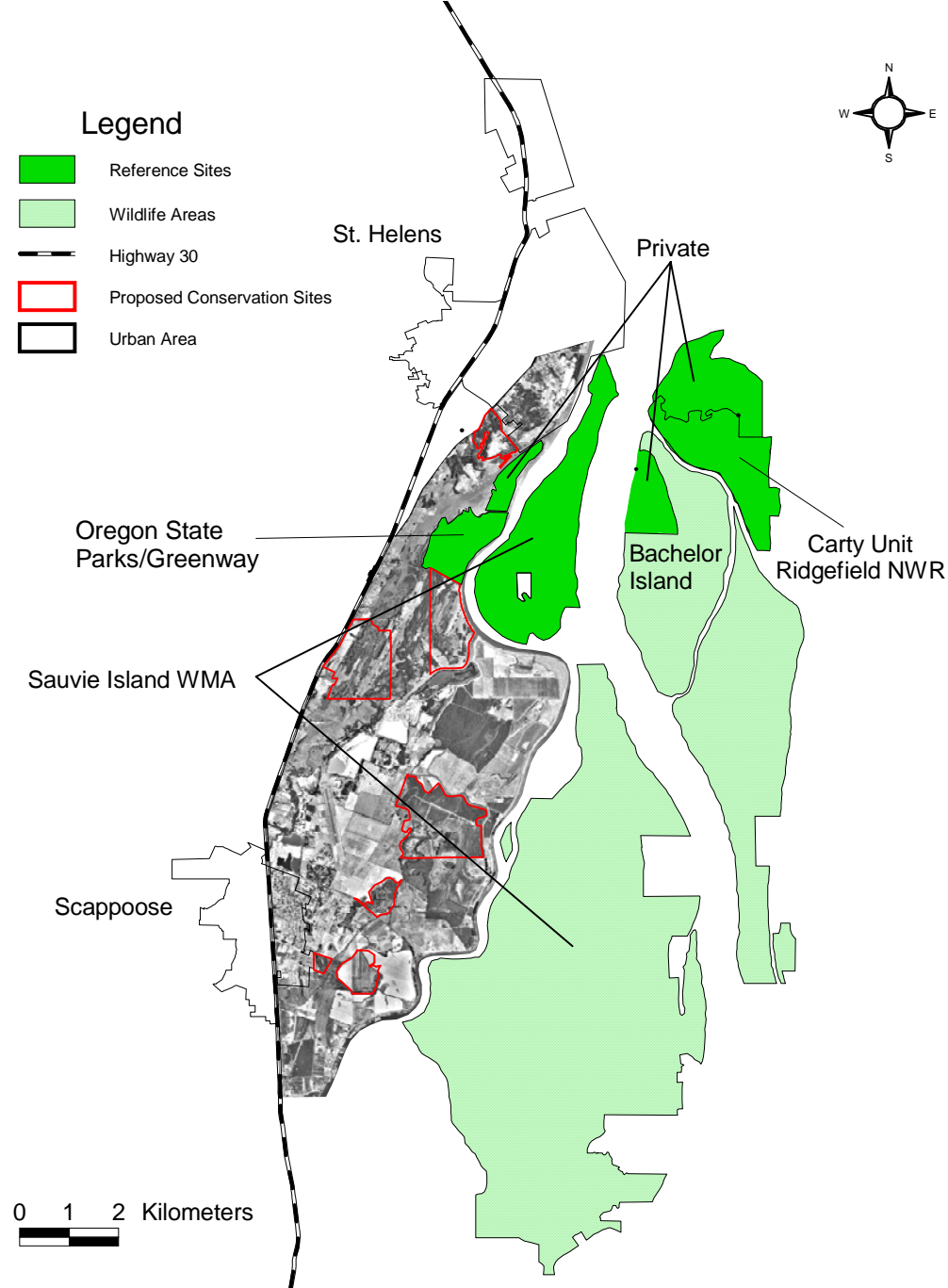
“Reference sites” are sites that are in relatively good ecological condition and generally do not need restoration. Reference sites often have been (or should be) protected by conservation agreements. In contrast, “restoration sites” are sites that ecologically are at least mildly degraded, i.e., have lower ecological integrity than at some time previously, but could be improved through specific management actions. This Plan first proposes some reference sites appropriate for the Scappoose Bottomlands, and Chapter VII describes candidate restoration sites. For this Plan, standardized assessment methods (e.g., HGM, OFWAM) were not applied at either the reference sites or restoration sites to estimate indicators of quality because each “site” actually is a complex of many individual wetlands, thus confounding simple rating of its functions and ecological services. However, the following paragraphs provide a narrative characterization of the reference sites.

Existing natural areas in the study area suitable as reference sites are confined to the parts of the Scappoose Bay Bottomlands where diking was never done and drainage was ineffective (Fig. 2). The Blackwater Island RNA in the Ridgefield NWR (Carty Tract, included in Figs. 2 and 11) is the only formally dedicated natural area in the region, established to protect *Howellia aquatilis* and basalt scabland/pothole topography. Figure 11 shows all reference sites, potential conservation sites and wildlife areas in and adjacent to the study area.

The largest, most diverse and least altered wetland complex in the vicinity is on the north end of Sauvie Island. Here, most floodplain wetlands are unfarmed and retain substantial hydrologic connectivity, many still being influenced by tides. Floodplain microtopography remains basically unaltered and contaminant levels are presumably lower than near pollutant sources on the adjoining mainland. Other potential reference sites in the study area include land owned by the State of Oregon along the east shore of Scappoose Bay, and the Malarkey and Hogan ranches. These sites are smaller than the north end of Sauvie Island and wetlands present are probably not as diverse. Ongoing grazing and proximity to industrial effluent in Scappoose Bay may also affect site conditions. None of these wetland complexes or individual wetlands provides ideal reference conditions because all are influenced by river regulation and in some cases by livestock grazing, but they are the best choices in the area to provide restoration benchmarks and performance criteria that most closely match historic conditions.

Comprehensive assessment of reference sites on Sauvie Island, the state land on Scappoose Bay, and the Malarkey and Hogan ranches was not possible during this study and remains a high priority for future work along the Columbia River between Longview and Bonneville Dam. These sites have been visited by wetland ecologists in the past, however, and good inventory information is available, e.g., Christy and Putera (1993), Christy (2004).

# Scappoose Proposed Wetland Conservation Sites, Wildlife Areas, and Reference Sites



**Figure 11. Proposed Conservation Sites, Reference Sites and existing Wildlife Areas.**

## Description of Reference Sites

### 1) Sauvie Island WMA (ODFW):

**Location:** T4N, R1W, Secs. 3, 10, 15, 16, 21, 22, 27, 28. North end of Sauvie Island, north of the isthmus.

**Size:** ca 1500 ac

**Site description:** This site contains the largest remaining and relatively undisturbed wetland and bottomland complex between Longview and Bonneville Dam and is the best wetland reference area in the region, despite an understory degraded by flood control and grazing. It contains extensive perennially to seasonally flooded lakes, emergent marsh, bottomland ash and willow forest, wet prairie, old pasture, depressions, and tidal channels along Multnomah Channel and the Columbia River.

**Hydrology:** Perennially to seasonally flooded.

**Tree Canopy:** Extensive, generally absent in the wetter areas where emergent marsh predominates. Mostly ash and Pacific willow.

**Native Vegetation:** Mainly *Fraxinus*, *Salix*, *Carex*, *Sparganium angustifolium*, *Lemna minor*, *Ludwigia palustris*, *Polygonum hydropiperoides*, *Sagittaria latifolia*.

**Invasive Vegetation:** Some pasture weeds (*Cirsium* etc.) predominate in drier areas, but most is extensive reed canary grass in ash woods.

**Wildlife:** High diversity and large concentrations of waterbirds and raptors. Uplands on basalt outcrops at Warrior Point with former oak savanna provide additional diversity.

**Existing Uses:** Conservation, hunting. Grazing has been discontinued by ODFW.

**Conservation targets:** Known: all G1 and G2 plant associations in Appendix 3, and probably most vertebrates in Appendix 2. Potential with restoration: improved habitat and extended acreage of targets.

**Priority:** High because of size, diversity, and global significance. Would not be difficult to protect if ODFW could be convinced of site's importance.

**Conservation Strategies:** The entire north end of Sauvie Island, north of the isthmus, should be dedicated as a state Natural Heritage Conservation Area (NHCA). Its size and diversity are of global significance, despite limited disturbance. Hunting will need to be grandfathered because of the site's original purchase with Pittman-Roberts funds that require hunting access, which is permitted under NHCA designation. The private inholding is owned by a duck club and should be purchased or secured with a conservation easement.

### 2) Ridgefield NWR and adjacent private lands (USFWS, private):

**Location:** T4N, R1W, Secs. 1, 2, 10, 11, 12, 13, 14, 15. Carty Unit of NWR and private lands on NW corner of Bachelor Island and north of Carty Unit. On Washington side of Columbia River, between Lewis River and Lake River.

**Size:** ca 1700 ac

**Site description:** Extensive area of perennially to seasonally flooded lakes, emergent marsh, bottomland ash and willow forest, wet prairie, old pasture, depressions, and tidal channels along Lewis River, Columbia River, and Lake River. Much of Bachelor Island is still farmed for wildlife food. The inholding on Bachelor Island contains undiked and undrained bottomland ash and willow forest and much is in excellent condition, except for ubiquitous reed canary grass.

**Hydrology:** Perennially to seasonally flooded.

**Tree Canopy:** Extensive, generally absent in the wetter areas where emergent marsh predominates, and in drier areas of former prairie and pasture. Primarily ash and cottonwood, with Pacific willow in wetter sites.

**Native Vegetation:** Mainly *Fraxinus*, *Populus*, *Salix*, *Carex*, *Sparganium angustifolium*, *Lemna minor*, *Ludwigia palustris*, *Polygonum hydropiperoides*, *Sagittaria latifolia*.

**Invasive Vegetation:** Some pasture weeds (*Cirsium* etc.) predominate in drier areas, but Bottomlands have extensive reed canary grass in ash woods.

**Wildlife:** High diversity and seasonally large concentrations of waterbirds. Uplands on basalt outcrops with former oak savanna provide additional diversity.

**Existing Uses:** Conservation, hunting. Grazing has been excluded from part or all by USFWS.

**Conservation targets:** Known: all G1 and G2 species and plant associations in Appendix 1 and Appendix 3, and probably most vertebrates in Appendix 2. Potential with restoration: improved habitat and extended acreage of targets.

**Priority:** High, given size and diversity of site. USFWS needs to be convinced that these areas are of global significance.

**Conservation Strategies:** The Blackwater Islands RNA should be expanded to include most of the Carty Tract west of the railroad to encompass all the globally significant basalt mound and pothole topography, historic quarry areas, mud flats, and riparian bottomland. The private lands north of the Carty Unit, as well as the inholding in the northwestern corner of Bachelor Island, should be purchased or a conservation easement sought. USFWS has tried to acquire this inholding for decades.

### 3) State Parks/Greenway land on Scappoose Bay and adjacent private land to the north:

**Location:** T4N, R1W, Secs. 16, 17, 20, 21. On peninsula between Scappoose Bay and Multnomah Channel.

**Size:** ca 162 ac

**Site description:** We did not tour this site, but in air photos it appears to be important and of high quality. Includes perennially to seasonally flooded lakes, emergent marsh, bottomland ash and willow forest, wet prairie, depressions, and tidal channels along Scappoose Bay and Multnomah Channel.

**Hydrology:** Perennially to seasonally flooded.

**Tree Canopy:** Extensive, mostly ash and Pacific willow.

**Native Vegetation:** Mainly *Fraxinus*, *Salix*, *Carex*, *Sparganium angustifolium*, *Ludwigia palustris*, *Polygonum hydropiperoides*, *Sagittaria latifolia*.

**Invasive Vegetation:** Extensive reed canary grass in ash woods.

**Wildlife:** Diversity probably high. Not surveyed.

**Existing Uses:** Conservation, hunting. The Hogan Ranch has a grazing lease on the State lands. Boise Cascade is listed as owner for private lands.

**Conservation targets:** Known: most G1 and G2 plant associations in Appendix 3, except for white brodiaea (*Triteleia hyacinthine*), and probably most vertebrates in Appendix 2. Potential with restoration: improved habitat and extended acreage of targets.

**Priority:** High, given probable ease of reaching objective and low opportunity cost.

**Conservation Strategies:** The state lands should be dedicated as a state Natural Heritage Conservation Area (NHCA), representative of relatively undisturbed tidelands and

bottomland forest, and contiguous with large tracts of undeveloped land north and south of property. The private land on the spit should be purchased or a conservation easement sought.

### **Summary**

Reference sites such as those described above are important to restoration because measurements from such sites can be used as **benchmarks** for monitoring and evaluating restoration projects. These measurements from reference sites and the resulting benchmarks can consist of lists of species, structural features, water regime specifications, levels of functions, animal use-days, water quality conditions, or similar characteristics used to represent the ecological performance of a site (Adamus 2001, Johnson et al. 2003). If measurement of these attributes is not possible due to lack of accessible reference sites or insufficient funding, then “virtual” benchmarks must be defined by review of regional scientific literature and expert consensus.

The scale at which benchmarks are defined and evaluated is crucial to ensuring restoration success. To be most effective, wetland restoration efforts should be coordinated and implemented at a watershed, regional or other “landscape” scale. This is because many species are highly mobile and require a complex of cumulatively diverse sites to meet needs throughout their many life stages. Thus, the goal of restoration -- rather than fostering the evolution of a set of wetlands all with a single design believed to be optimal for wildlife -- should be to foster the evolution of a set of wetlands that have a *variety* of designs (naturally-occurring structural characteristics) measured *collectively, at a landscape or regional scale*. Some of these designs might not be optimal for wildlife at a site scale. For example, under such a strategy in some of a region’s wetlands, vegetation would occupy the entire wetland, whereas in other wetlands an even (50-50) mix of water and vegetation would exist. Some wetlands would be inundated year-round whereas others would be inundated only for a few weeks. And so forth. Implementing such a strategy requires first quantifying the types of wetlands in a region, in essence creating a regional wetland profile. The GIS component of this project has attempted to accomplish that in part, and thus helps provide a basis for defining appropriate landscape-scale benchmarks for restoration and conservation.

## **VII. Conservation and Restoration Opportunity Areas**

The Scappoose Bay Conservation and Restoration Plan is intended to be a community based roadmap prioritizing lands for conservation and restoration and opportunities for future partnerships and funding.

### **Conservation and Restoration Areas**

Within the study area seven areas were identified as restoration and conservation targets. These areas were chosen by reviewing aerial photography, historic and current vegetation information, rare species and communities from the Natural Heritage Database, field reconnaissance and conversations with local residents and agency staff.

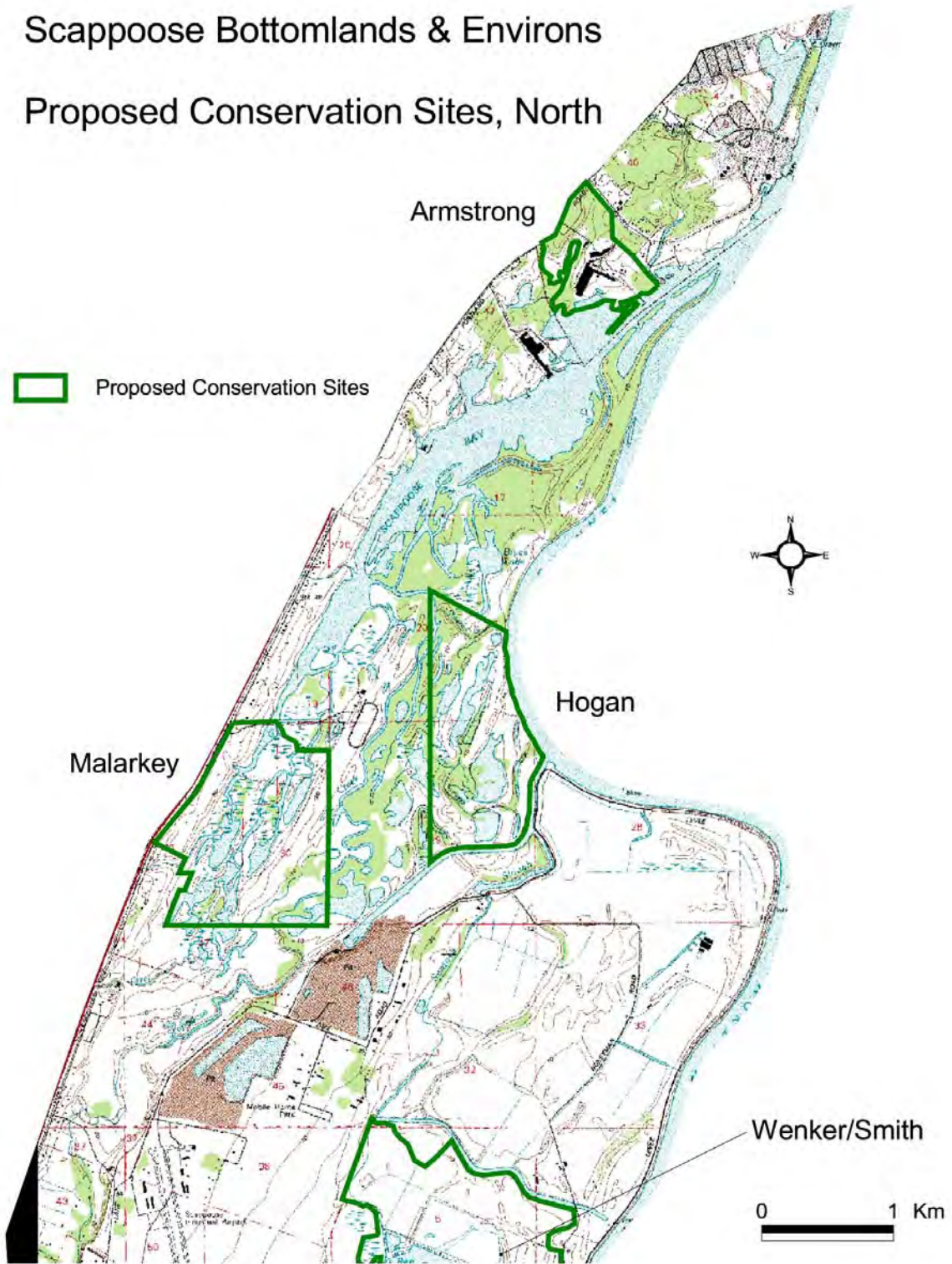


Restoration of the **Columbia sedge, Pacific willow and Oregon ash, teal lovegrass - western marsh cudweed, water purslane - swamp smartweed, and wapato** associations is of the highest priority for associations listed in Table 3. However, restoration of these systems is very problematic because of the pervasive presence of reed canary grass. Some sites within the study area could be restored with proper water management and manual eradication and/or selective use of herbicide to suppress reed canary grass. Water management would most probably have to be done with dikes and water control structures, but there may be certain sites within the Scappoose Drainage District that could be improved simply by turning off pumps and letting the water table rise in those areas.

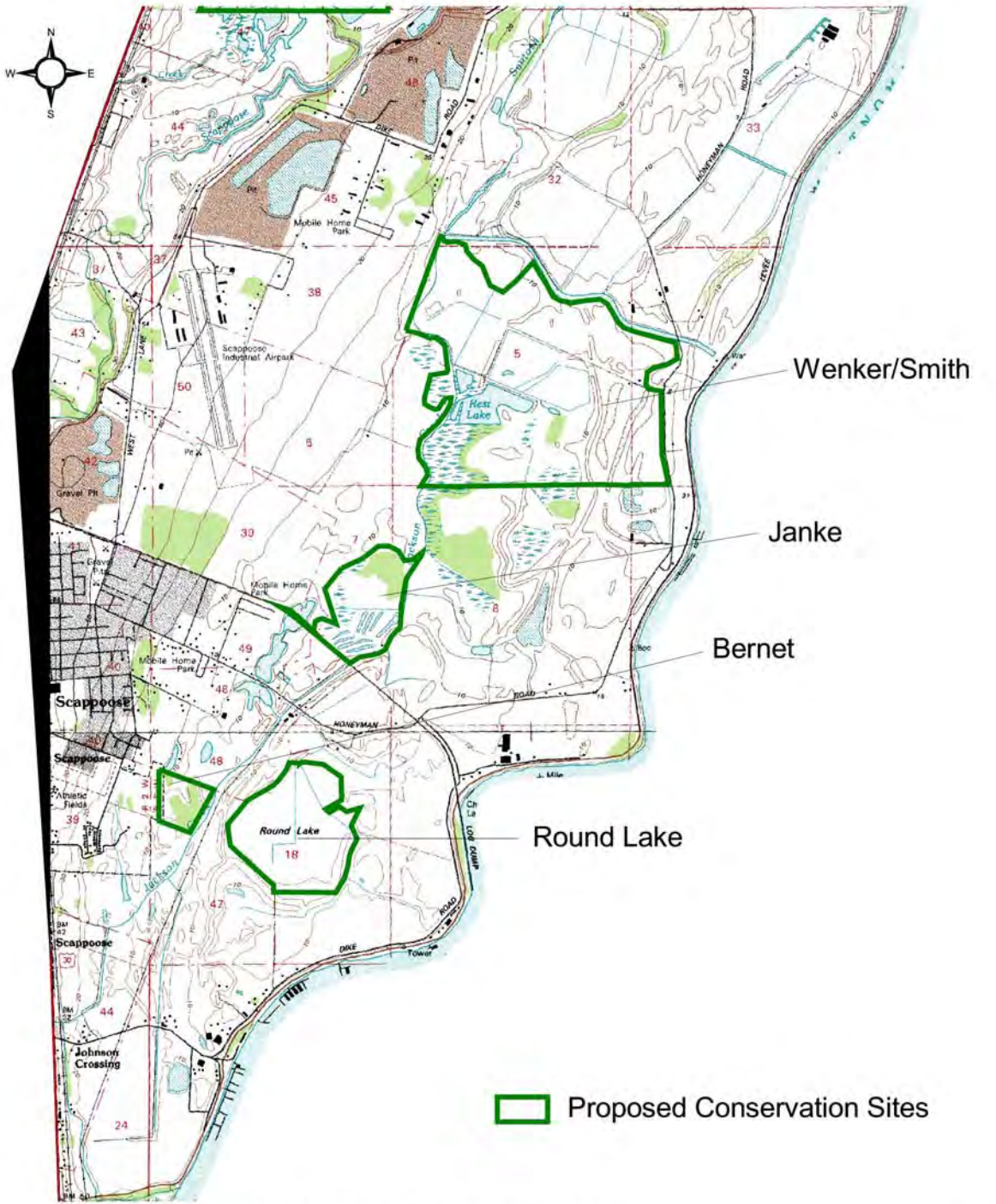
Oak and Douglas fir savanna on uplands could be restored with brush cutting, weed control, and fire. The best and most extensive sites are on the Malarkey and Hogan ranches, but the Armstrong Industries site also has some good tracts at a much smaller scale.

Figures 12 and 13 show the seven highest priority conservation and restoration areas. Four of these sites are located within the Scappoose Drainage District, and three are located outside the drainage district. The seven sites were the main focus of our field survey efforts. Land value appraisals were conducted on four of the seven properties where conservation easements or fee title acquisition appeared to be a viable conservation strategy with willing landowners.

# Scappoose Bottomlands & Environs Proposed Conservation Sites, North



**Figure 12. Conservation/Restoration Target Sites (North)**



Scappoose Bottomlands & Environs  
Proposed Conservation Sites, North

Figure 13. Conservation/Restoration Target Sites (South)

## Sites inside Scappoose Drainage District

### 1. Wenker property (including Rest Lake) – Figure 14

**Location:** T3N, R1W, S4, 5, 6, 7, 8 and 9. Located NE of Scappoose, bordered by Honeyman Road on the S and E, airport uplands on W, and Evans Slough on N. Wenker house is 52200 Honeyman Rd.

**Size:** ca. 500 acres

**Site description:** This site is extensive bottomland that was historically mostly ash forest and marshy lakes, but there are basically no existing natural areas remaining on the property. It is covered with extensive plantations of hybrid poplar, and is crossed by Jackson Creek, Santosh Slough, Evans Slough, and small drainage ditches. The tract is important because of its large size and location in the larger landscape. It is one of the lowest areas within the drainage district, with many old lake beds. The site includes Rest Lake that at one time was a much larger complex and is now an interconnected set of seasonally-flooded stands of reed canary grass surrounded by hybrid poplar. The area also contains a string of wetlands near the City of Scappoose Sewage Treatment Plant. Underlying the area is a large reserve of aggregate resources. A proposal to mine 700 acres within the area has already been submitted for approval. Presently, the area to be mined is in agricultural use and contains no wetlands except those found in conjunction with streams and sloughs.

**Hydrology:** Most of tract the is inundated or saturated only in winter, and subject to continuous monitoring and pumping by the Scappoose Drainage District. No permanently-inundated areas were seen except for drainage canals.

**Tree Canopy:** Extensive in much of site, but almost exclusively hybrid poplar.

**Native Vegetation:** Limited to areas not planted in hybrid poplar. Mostly *Salix*, a few *Populus trichocarpa*. Vegetation follows a gradient from hybrid poplar (driest) to *Equisetum* to *Phalaris arundinacea* along channels.

**Invasive Vegetation:** Extensive *Phalaris arundinacea* along drainage canals and areas not planted to hybrid poplar. Himalayan blackberry along road through plantation and in openings if dry enough.

**Wildlife:** Currently moderate habitat suitability for most species, but high importance to one important species (red-eyed vireo), and potentially higher if wetlands are restored.

**Existing Uses:** Agriculture (hybrid poplar plantation), hunting (family members only).

**Conservation targets:** Known: Red-eyed vireo. Potential with restoration: all G1 and G2 plant associations in Appendix 3 except for white brodiaea (*Triteleia hyacinthine*), and all vertebrates in Appendix 2 except for fish.

**Priority:** Moderate to high because of large size, location central to study area, and opportunity to restore extensive area of bottomland forest and wetlands.

**Conservation Strategies:** Cease pumping, negotiate conservation easement, control exotics, replant native vegetation. If left alone, hybrid poplars will start dying and self-thinning at about 15 years, but woody debris will decay fairly rapidly. Tax structure, riparian, and pesticide rules for growing hybrid poplar change from agriculture to forestry when poplars reach 12 years of age. This is an incentive for landowners to harvest, replant, or convert to other crops before that time, and a disincentive to let stands mature and senesce for conservation purposes. If gravel is present then consider an open water habitat in aftermath of extraction, reconnect drainages on property including Evans Slough, 1000 ac.



**Figure 14. Wenker Property**

## **2) Round Lake – Figure 15**

**Location:** T3N, R1W, S18. SE of Scappoose, N and NW of Dike Road, and S of Honeyman Road.

**Size:** ca 130 acres

**Site description:** This area is an old lakebed that was drained for farming. Its original vegetation was probably very similar to the Bernet wetland and other small depressions that are located about 1000 feet WNW of Round Lake. The lakebed is currently planted for wildlife use and is flooded seasonally for hunting. Round Lake is surrounded by agricultural land, some of which is being converted to growing nursery stock. Streams have been channelized and feed into Jackson Creek. Very little existing wetland vegetation is present on site but would rapidly return with perennial water and would include cattails, sedges, rushes, reed canary grass, and smartweed.

**Hydrology:** Seasonally flooded.

**Tree Canopy:** None in wetland, providing little wildlife cover.

**Native Vegetation:** Mostly reed canary grass in unfarmed areas. Very low diversity.

**Invasive Vegetation:** Primarily *Phalaris arundinacea* and Himalayan blackberry.

**Wildlife:** Currently low to moderate habitat suitability except higher in areas leased for waterfowl hunting.

**Existing Uses:** Agriculture, Rural Residential, hunting

**Conservation targets:** Known: possibly some bird species in Appendix 2. Potential with restoration: all G1 and G2 plant associations in Appendix 3 except for white brodiaea (*Triteleia hyacinthine*), and all vertebrates in Appendix 2 except for fish.

**Priority:** Moderate to high. Relatively small size but restoration would be easy. It is adjacent to large lakes across Multnomah Channel and would complement habitat there. Potential conflict with airport managers, as a large wetland restoration may be perceived as a bird hazard for aircraft, even though the Janke property and adjacent wetlands are even closer to the airport with no negative effects.

**Conservation Strategies:** Restoration of the lake can easily be accomplished by controlling water levels. Manage water through control structures, control exotics, replant with native vegetation. A potential conflict exists between the protection of wetlands and the expansion of nursery facilities.



**Figure 15. Round Lake**

### 3) Janke Property and adjacent wetlands - Figure 16

**Location:** T3N, R1W, S7, 8. South of airport, N of Honeyman Road, W of Jackson Creek

**Size:** ca 100 acres

**Site description:** The Janke wetlands are in relatively good condition. They contain aquatic bed and emergent marsh associations. Most areas of open water were created by drag line dredging ca. 1955, and are now filling in with aquatic vegetation and silt. The landowner believes that dredging may be necessary to maintain areas of open water. An additional wetlands area adjacent to the property by the Janke house extends to the NE toward Jackson Creek. It appears to have more Pacific willow and other wetland shrubs but needs further evaluation. Columbia County reportedly owns adjacent wetlands SW of Janke, across the old railroad grade, between the trailer park and Jackson Creek, which support western painted turtles and many waterbird species. These should be designated as a natural area.

**Hydrology:** Perennially to seasonally-flooded

**Tree Canopy:** Generally absent except for Pacific willow.

**Native Vegetation:** *Typha*, *Sagittaria*, *Polygonum*. Scattered *Salix-Fraxinus* islands.

**Invasive Vegetation:** Extensive reed canary grass, which the landowner attempts to limit with herbicides.

**Wildlife:** High suitability. Diverse.

**Existing Uses:** Conservation, hunting

**Conservation targets:** Known: some bird species in Appendix 2. Potential with restoration: all G1 and G2 plant associations in Appendix 3 except for *Triteleia hyacinthina*, and all vertebrates in Appendix 2 except for fish.

**Priority:** Moderate, because the landowner already manages for conservation, and the site is small compared to some higher-priority areas.

**Conservation Strategies:** Assist owner with management and stewardship of wetlands, potential conservation easement. The adjacent county property to the SW should be designated as a natural area, and the wetland to the NE needs further investigation, but appears to be a worthwhile addition. Opportunity costs are probably relatively low.



**Figure 16. Janke Property**

**4) Bernet Property – Figure 17**

**Location:** T3N, R1W, S18, SW 1/4 NW 1/4

**Size:** 20 acres

**Site description:** This is a classic depressional wetland and part of a cluster of such wetlands about 1000 feet WNW of Round Lake. It is small but in good condition, containing examples of aquatic bed and emergent marsh associations typical of the Scappoose Bay Bottomlands.

**Hydrology:** Perennially to seasonally flooded depressional wetland. No longer receives river flooding.

**Tree Canopy:** Trees occur only around edges. Primarily ash, Pacific willow, and Sitka willow, with scattered cottonwood and escaped non-native cherry and plum cultivars on higher banks.

**Native Vegetation:** Best in wettest parts. Primarily *Sparganium angustifolium*, *Lemna minor*, *Ludwigia palustris* and *Polygonum hydropiperoides*.

**Invasive Vegetation:** Reed canary grass and Himalayan blackberry on banks.

**Wildlife:** High. Diverse for its size



**Existing Uses:** Conservation, hunting.

**Conservation targets:** Known: *Ludwigia palustris* - *Polygonum hydropiperoides* association, *Sagittaria latifolia* association (Appendix 3). No restoration needed.

**Priority:** Low because of small size and owner is committed to protection.

**Conservation Strategies:** Control exotic vegetation, assist owner with stewardship of property.



**Figure 17. Bernet Property**

## Sites outside Scappoose Drainage District

### 1) Hogan Ranch – Figure 18

**Location:** T4N, R1W, S20, 29, 31

**Size:** ca 330 ac.

**Site description:** We did not tour this site, but in air photos it looks very attractive and important. It is primarily seasonally wet pasture with some depressions and tidal channels, including Scappoose Creek and Multnomah Channel, and extensive ash bottomland between Scappoose Creek and Multnomah Channel. Along with the Malarkey Ranch and State Parks land and peninsula to the north, these are the best remaining lands in the study area that are in more or less natural condition, although the understory is degraded from grazing. These properties offer extensive wetlands, ash bottoms, and oak uplands, containing all representative associations for the Scappoose Bay Bottomlands.

**Hydrology:** Seasonally to perennially wet.

**Tree Canopy:** Sparse in upland savanna areas but forming extensive ash forest in the wetter floodplain areas.

**Native Vegetation:** Best in wettest parts. Mainly *Fraxinus*, *Salix*, *Carex*, *Sparganium angustifolium*, *Lemna minor*, *Ludwigia palustris*, *Polygonum hydropiperoides*, *Sagittaria latifolia*. Probably some oak in uplands.

**Invasive Vegetation:** Extensive in grazed uplands, where pasture weeds (*Cirsium* etc.) predominate. Reed canary grass extensive in ash woods.

**Wildlife:** High diversity. Adjacent uplands with former oak savanna provide lots of diversity.

**Existing Uses:** Grazing, hunting.

**Conservation targets:** Not known, but probably all G1 and G2 plant associations in Appendix 3 except for white brodiaea (*Triteleia hyacinthine*), and probably all vertebrates in Appendix 2. Potential with restoration: high-ranked upland prairie and savanna habitats.

**Priority:** Highest. Extremely important because of size, relative lack of disturbance, and presence of some upland savanna. Along with Malarkey Ranch, the highest priority in the study area.

**Conservation Strategies:** Open dialog with owner and explore possibilities. Tour site. Conservation easement or acquisition, removal of exotic vegetation, conduct hydrologic analysis to determine management to correct alterations.



**Figure 18. Hogan Ranch Property**

**2) Malarkey Ranch – Figure 19**

**Location:** T4N, R1W, S19, 20, 29, 30, 31. Home address is 55948 Columbia River Hwy. (Rt. 30) in Scappoose

**Size:** ca 400 acres

**Site description:** Seasonally wet pasture with some depressions, shallow lakes, and tidal channels, including Scappoose Creek, and extensive emergent marsh and ash bottomland between Scappoose Creek and upper part of Scappoose Bay. Along with the Hogan Ranch and state-owned land and peninsula to the north, these are the best remaining lands in the study area that are in more or less natural condition, although the understory is degraded from grazing. These properties offer extensive wetlands, ash bottoms, and oak uplands, containing all representative associations for the Scappoose Bay Bottomlands.

**Hydrology:** Seasonally to perennially wet.

**Tree Canopy:** Sparse in upland savanna areas but forming extensive ash forest in the wetter floodplain areas.

**Native Vegetation:** Best in wettest parts. Mainly *Fraxinus*, *Salix*, *Carex*, *Sparganium angustifolium*, *Lemna minor*, *Ludwigia palustris*, *Polygonum hydropiperoides*, *Sagittaria latifolia*. Extensive oak savanna on ridge running length of property.

**Invasive Vegetation:** Extensive in grazed uplands, where pasture weeds (*Cirsium* etc.) predominate. Reed canary grass extensive in ash woods.

**Wildlife:** High diversity. Adjacent uplands with former oak savanna provide lots of diversity.

**Existing Uses:** Grazing, hunting, bed and breakfast.

**Conservation targets:** Known: all G1 and G2 plant associations in Appendix 3 except for white brodiaea (*Triteleia hyacinthine*), and probably all vertebrates in Appendix 2. Potential with restoration: high-ranked upland prairie and savanna habitats.

**Priority:** Highest. Extremely important because of size, relative lack of disturbance, and presence of some upland savanna. Along with Hogan Ranch, the highest priority in the study area.

**Conservation Strategies:** Conservation easement or acquisition, removal of exotic vegetation, conduct hydrologic analysis to determine management to correct alterations.



**Figure 19. Malarkey Property**

### 3) Armstrong Industries property – Figure 20

**Location:** T4N, R1W, S9. Railroad Avenue in St. Helens

**Size:** ca 60 ac, excluding developed land around factory.

**Site description:** Site is mostly upland mix of oak and Douglas fir, with remnants of savanna and some shallow soil areas over basalt bedrock. Floodplain along Milton Creek is ash bottoms with reed canary grass understory. The lower portion of Milton Creek appears to have been diverted in the 1920s when the pier on Scappoose Bay was constructed. The site has some high quality wapato, bulrush, and scrub shrub wetlands in the old Milton Creek slough and in a tidal inlet along the western edge of the property, and some small to moderate-sized oak savanna that has excellent restoration potential. There is also an isolated pond near the head of the valley in the NW corner of the property that has good-quality emergent vegetation. There may also be cultural resources on site. The entire site is fenced, although dirt bikes are somehow getting into one area of restoration potential.

**Hydrology:** Portions are tidal, but most is formerly tidal floodplain, now saturated only in winter. One permanently inundated pond in headwall of valley, possible beaver origin.

**Tree Canopy:** Extensive in much of the site outside of factory. Oak and Douglas fir on uplands, ash on bottoms.

**Native Vegetation:** *Fraxinus*, *Populus trichocarpa*, *Cornus*, *Quercus*, *Salix*. Also *Impatiens*, *Urtica*.

**Invasive Vegetation:** Extensive reed canary grass and Himalayan blackberry in uplands and bottomland along Milton Creek. Scots broom in one area of former upland prairie and savanna in northwestern corner of tract.

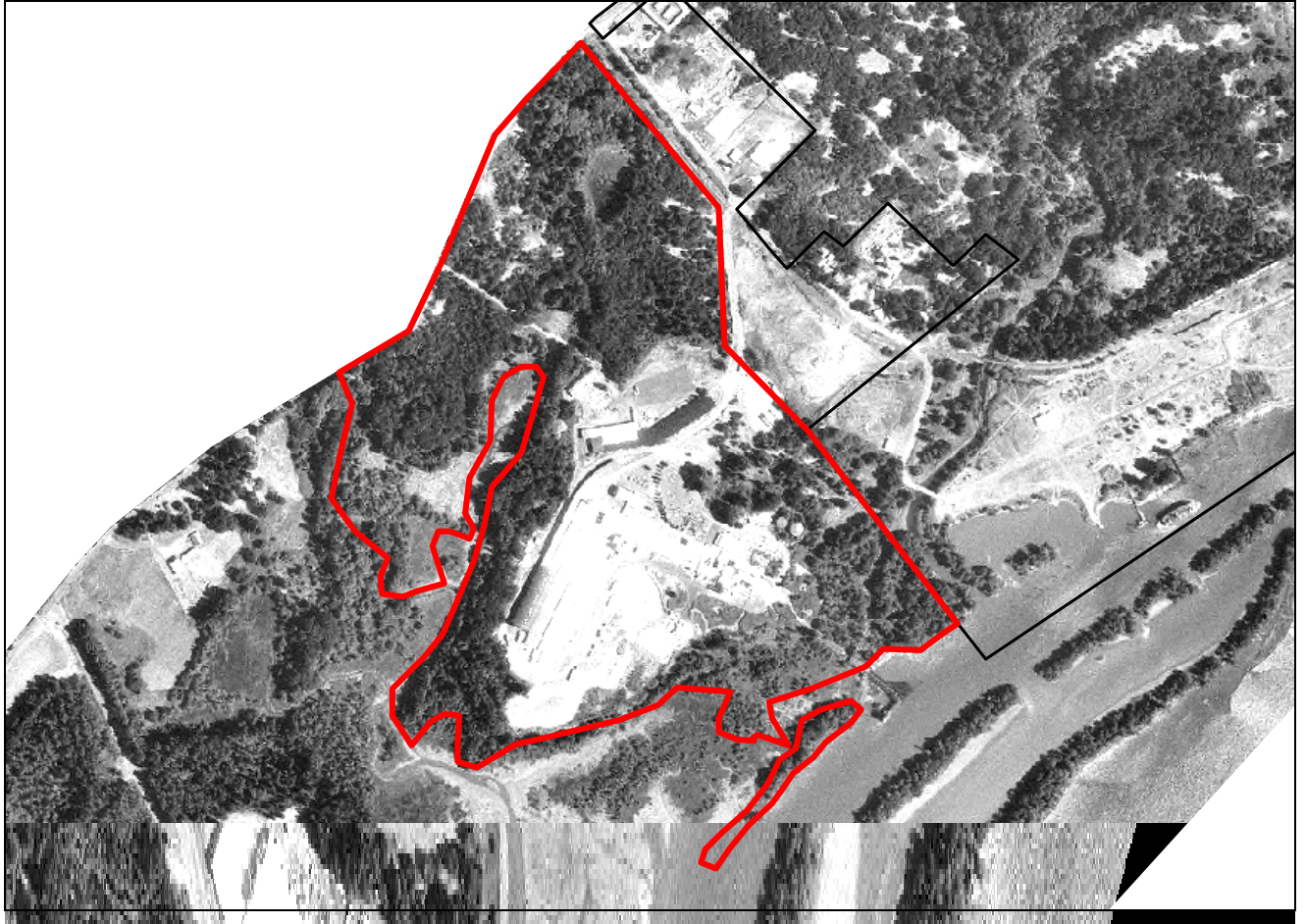
**Wildlife:** High diversity

**Existing Uses:** Unoccupied industrial land adjacent to active manufacturing plant.

**Conservation targets:** Known: all G1 and G2 plant associations in Appendix 3, and probably all vertebrates in Appendix 2. Potential with restoration: high-ranked upland prairie and savanna habitats.

**Priority:** Medium to high. Site is relatively small but presents some interesting opportunities with habitat diversity and potentially motivated owner to assist in conservation.

**Conservation Strategies:** Conservation easement or acquisition. Develop management plan to restore upland habitats. Restoration of both upland and wetlands may have some incentive value to Armstrong as mitigation credit for on-site toxics issues. Incentive could include cost-share or donations.



**Figure 20. Armstrong Industries Property**

## **Performance Criteria for Restoration and Conservation Projects**

Future attempts to assess the success of individual restoration or conservation projects in the Scappoose Bay Bottomlands as plant and wildlife habitat should address at least four questions:

1. To what degree does the site (or part of the site) contain native wetland types, natural structural conditions, and functions found uncommonly in other parts of the Scappoose Bay Bottomlands?
2. What proportion of the communities and species listed in Appendices 3 and 4 does the site regularly support?
3. To what degree does the site support native wildlife species found uncommonly in other parts of the Scappoose Bay Bottomlands?
4. To what degree is the site buffered from future impacts by surrounding undeveloped and protected uplands?

## **VIII. Conclusions and Recommendations**

The Scappoose Bay Bottomlands provide some of the best remaining natural habitats in the Lower Columbia River system. Although the Scappoose Bay Bottomlands have been affected over the last 180 years by grazing, artificial drainage, urbanization, and flood control, these are some of the largest remnants of natural vegetation in the Lower Columbia River estuary that are not yet under formal conservation arrangements.

### **Conservation and Restoration Opportunities**

The Scappoose Bay Bottomlands Conservation and Restoration Plan identifies three publicly-owned reference sites that need formal recognition and protection by their managing agencies. It also identifies and prioritizes seven privately-owned sites for conservation and restoration . These sites represent diverse wetland habitats and provide opportunities to conserve their natural values if acted upon in a prudent fashion. The Malarkey and Hogan ranches, the State of Oregon lands on the Scappoose Bay peninsula and on the north end of Sauvie Island, the federal land in the Ridgefield NWR, and the Armstrong Industries property offer the greatest promise for conservation. Most portions of these properties were never diked and attempts at drainage were largely unsuccessful. These areas come closest to typifying the original topography and vegetation along the Columbia River between Longview and Portland and will require minimal restoration other than the managing for invasive species.

The Wenker, Round Lake, Janke and Bernet properties offer some promise for conservation, but restoration is limited by diking and their presence within the Scappoose Drainage District that maintains active pumping for agricultural and residential lands. These sites generally have smaller occurrences of wetlands and have more complex management issues than the priority conservation sites noted above.

In addition to the three reference sites and seven restoration areas identified, there are possibilities to work with the gravel and agriculture interests in the watershed to identify potential restoration and conservation opportunities as a part of their continuing operations.

## **Planning Opportunities**

### **1. Mineral and Aggregate Industry**

The Scappoose area gravel deposits are of high grade commercial quality and are increasingly becoming a source of revenue for landowners. Mining the gravels entails removing the overburden and digging out the deposits in open pits whose depths penetrate the shallow water table. The end result of the gravel mining is generally numerous steep-sloped, large pits several acres in size that are filled with groundwater.

While the new lakes and ponds do provide resting habitat for waterbirds, there is a significant shift and loss in wetland functions and values prior to extraction. In addition, the ponds rarely provide the recreational opportunities advertised prior to the mining process. They usually provide adequate warm-water fishing but are usually inadequate for swimming or boating because of small size and dense growths of aquatic plants that impede passage and entangle outboard motors.

In order to maintain environmental vitality and assure future use by wildlife and humans, decommissioned gravel pits will need enhancement, restoration and recontouring. Mineral and aggregate companies, county and state agencies regulating mining activities, landscape architects, and restoration, wildlife, and wetland ecologists all need to work together to develop strategies that result in restoration or enhancement of some of the wetland benefits lost in the extraction process. A design charrette or informal meeting could be the first step in exploring restoration potential and design for these landforms. We recommend that a meeting of stakeholders be convened for the purposes of discussing long term scenarios for gravel operations in the study area.

### **2. Agriculture**

Fencing, diking, tilling, invasive species and herbicide use are the greatest threats to wetlands in the bottomlands. Agricultural interests, the Soil and Water Conservation District and ecological restorationists can work together to define designs and potential funding sources to help farmers implement fencing and planting projects for wetlands that are located in close proximity to agricultural lands. We recommend that a meeting of stakeholders be convened by the Soil and Water Conservation District to examine conservation opportunities and funding for wetlands and native habitats that exist in close proximity to agricultural lands in the Scappoose Bay Bottomlands area.



### **3. Scappoose Airport**

As the cities of Scappoose and St Helens grow, it is likely that the airport and its supporting facilities will expand. Wetland conservation, restoration and enhancement efforts need to be mindful of potential conflicts between airport safety and birds. Close coordination with airport administrators is essential so that wetland restoration efforts do not work at cross purposes with airport use.

### **4. Residential and Commercial Development**

Residential and commercial development will continue to expand in the Scappoose area. Current zoning may protect many wetland and native habitat resources but the City of Scappoose and Columbia County will need to be vigilant to maintain existing native habitats. We recommend that wetlands and native habitats be designated as county parks or natural areas with the expressed purpose of protecting these habitats in face of increasing development.

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**Appendix 1. Wetland and transitional upland plants in vicinity of Scappoose Bay.**

Layer	Species	ORNHIC Rank for rare species	Native or exotic
Trees	Frangula purshiana		native
	Fraxinus latifolia		native
	Malus (cultivar)		exotic
	Populus (hybrid cottonwood)		exotic
	Populus balsamifera ssp. trichocarpa		native
	Prunus (cultivar)		exotic
	Quercus garryana		native
Shrubs	Cornus sericea		native
	Crataegus douglasii		native
	Crataegus monogyna		exotic
	Malus fusca		native
	Oemleria cerasiformis		native
	Ribes		native
	Rubus armeniacus		exotic
	Rubus laciniatus		exotic
	Rubus ursinus		native
	Salix hookeriana		native
	Salix lucida ssp. lasiandra		native
	Salix sessilifolia		native
	Salix sitchensis		native
	Sambucus racemosa		native
	Spiraea douglasii		native
	Symphoricarpos albus		native
Herbs	Alisma triviale		native
	Alopecurus pratensis		exotic
	Anthoxanthum odoratum		exotic
	Aster chilensis		native
	Athyrium filix-femina		native
	Azolla mexicana		native
	Barbarea orthoceras		native
	Bidens cernua		native
	Bidens frondosa		native
	Bromus mollis		exotic
	Callitriche heterophylla		native
	Carex aperta		native
	Carex deweyana ssp. leptopoda		native
	Carex interrupta		native

Carex obnupta		native
Carex retrorsa	G5S1	native
Carex stipata		native
Ceratophyllum demersum		native
Cicuta douglasii		native
Cirsium arvense		exotic
Cirsium vulgare		exotic
Deschampsia elongata		native
Dipsacus fullonum		exotic
Echinochloa crusgalli		exotic
Elatine		native
Eleocharis acicularis		native
Eleocharis ovata		native
Eleocharis palustris		native
Elodea canadensis		native
Epilobium ciliatum ssp. watsonii		native
Equisetum arvense		native
Equisetum fluviatile		native
Eragrostis hypnoides		native
Galium aparine		native
Galium trifidum		native
Helenium autumnale		native
Hippuris vulgaris		native
Holcus lanatus		exotic
Hordeum brachyantherum		native
Howellia aquatilis	G2S1	native
Hydrocotyle ranunculoides		native
Hypericum perforatum		exotic
Impatiens capensis		native
Iris pseudacorus		exotic
Juncus acuminatus		native
Juncus bufonius		native
Juncus effusus		native
Juncus oxymeris		native
Juncus tenuis		native
Leersia oryzoides		native
Lemna minor		native
Limosella aquatica		native
Lindernia dubia		native
Lotus corniculatus		exotic
Ludwigia palustris		native
Lycopus americanus		native
Lysimachia ciliata		native
Lysimachia nummularia		exotic
Lythrum portula		exotic

	<i>Mentha arvensis</i>		native
	<i>Mimulus guttatus</i>		native
	<i>Montia howellii</i>	G3S2	native
	<i>Myosotis laxa</i>		native
	<i>Myriophyllum hippuroides</i>		native
	<i>Nuphar lutea</i> ssp. <i>polysepala</i>		native
	<i>Oenanthe sarmentosa</i>		native
	<i>Parentucellia viscosa</i>		exotic
	<i>Paspalum distichum</i>		native
	<i>Phalaris arundinacea</i>		exotic
	<i>Polygonum amphibium</i>		native
	<i>Polygonum hydropiperoides</i>		native
	<i>Polygonum persicaria</i>		exotic
	<i>Polystichum munitum</i>		native
	<i>Potamogeton</i>		native
	<i>Potamogeton crispus</i>		exotic
	<i>Potamogeton gramineus</i>		native
	<i>Ranunculus repens</i>		exotic
	<i>Rorippa curvisiliqua</i>		native
	<i>Rorippa palustris</i>		native
	<i>Rumex crispus</i>		exotic
	<i>Sagittaria latifolia</i>		native
	<i>Schoenoplectus tabernaemontani</i>		native
	<i>Scirpus cyperinus</i>		native
	<i>Scirpus microcarpus</i>		native
	<i>Scutellaria lateriflora</i>		native
	<i>Senecio sylvaticus</i>		exotic
	<i>Senecio vulgaris</i>		exotic
	<i>Sium suave</i>		native
	<i>Solanum dulcamara</i>		exotic
	<i>Sparganium angustifolium</i>		native
	<i>Spirodela polyrrhiza</i>		native
	<i>Stachys ajugoides</i> var. <i>rigida</i>		native
	<i>Torilis arvensis</i>		exotic
	<i>Torreyochloa pallida</i> var. <i>pauciflora</i>		native
	<i>Typha latifolia</i>		native
	<i>Urtica dioica</i> ssp. <i>gracilis</i>		native
	<i>Veronica americana</i>		native
	<i>Veronica scutellata</i>		native
Bryophytes	<i>Climacium dendroides</i>		native
	<i>Fontinalis antipyretica</i>		native
	<i>Ricciocarpos natans</i>		native

**Appendix 2. Vertebrate and invertebrate species in vicinity of Scappoose Bay that are tracked by ORNHIC.**

Group	Species	ORNHIC Rank	ORNHIC List
Fish	Chinook salmon	G5T2QS2	1
	Chum salmon	G5T2QS2	1
	Coastal cutthroat	G4T2QS2	1
	Coho salmon	G4T2QS2	1
	Steelhead	G5T2QS2	1
Reptiles	Northwestern pond turtle	G3G4T3T4S2	2
	Painted turtle	G5S2	2
Birds	American peregrine falcon	G4T3S2B	2
	Dusky Canada goose	G5T2T3S2S3N	1
	Streaked horned lark	G5T2S2B	2
	Oregon vesper sparrow	G5T3S2B, S2N	2
	Purple martin	G5S2B	2
	Trumpeter swan	G4S1?B, S3N	2
Mussels	California floater	G3S1	2
	Willamette floater	G2QS1	1
	western ridgemussel	G3S2	2

**Appendix 3. Native wetland plant associations of Scappoose Bay area.**

Ecological System	Association	ORNHIC rank	Current HGM class	Historical HGM class
North Pacific Intertidal Freshwater Wetland	<i>Eleocharis obtusa</i>	G4S3	estuarine	estuarine
	<i>Eleocharis palustris</i>	G5S5	estuarine	estuarine
	<i>Sagittaria latifolia</i>	G3S2	estuarine	estuarine
	<i>Scirpus cyperinus</i>	G4SU	estuarine	estuarine
	<i>Sparganium angustifolium</i>	G4S3	estuarine	estuarine
Temperate Pacific Freshwater Aquatic Bed	<i>Azolla mexicana</i>	G4S4	depressional	riverine
	<i>Bidens cernua</i>	G3S3	depressional or estuarine	riverine or estuarine
	<i>Bidens frondosa</i>	G4S4	depressional	riverine
	<i>Callitriche heterophylla</i>	G4S4	depressional	riverine
	<i>Polygonum amphibium</i>	G5S3	depressional or estuarine	riverine or estuarine
	<i>Ceratophyllum demersum</i>	G5S5	depressional or estuarine	riverine or estuarine
	<i>Elodea canadensis</i>	G5S5	depressional or estuarine	riverine or estuarine
	<i>Fontinalis antipyretica</i>	G5S5	depressional or estuarine	riverine or estuarine
	<i>Lemna minor</i>	G5S5	depressional or estuarine	riverine or estuarine
	<i>Potamogeton natans</i>	G5S5	depressional	riverine
Temperate Pacific Freshwater Emergent Marsh	<i>Eleocharis obtusa</i>	G4S3	depressional	riverine
	<i>Eleocharis palustris</i>	G5S5	depressional or estuarine	riverine or estuarine
	<i>Juncus bufonius</i>	G5S5	depressional	riverine
	<i>Juncus effusus</i>	G5S5	depressional	riverine
	<i>Ludwigia palustris</i> - <i>Polygonum hydropiperoides</i>	G2S2	depressional	riverine
	<i>Paspalum distichum</i>	G3S3	depressional	riverine



	<i>Sagittaria latifolia</i>	G3S2	depressional or estuarine	riverine or estuarine
	<i>Scirpus cyperinus</i>	G4SU	depressional or estuarine	riverine or estuarine
	<i>Sparganium angustifolium</i>	G4S3	depressional or estuarine	riverine or estuarine
Temperate Pacific Freshwater Mudflat	<i>Eragrostis hypnoides</i> - <i>Gnaphalium palustre</i>	G2S1	depressional	riverine
	<i>Lilaeopsis occidentalis</i>	G3S3	depressional	riverine
North Pacific Deciduous Swamp	<i>Salix hookeriana</i> - ( <i>Salix</i> <i>lucida</i> ssp. <i>lasiandra</i> - <i>Salix</i> <i>sitchensis</i> )	G3S3	depressional or estuarine	riverine or estuarine
	<i>Spiraea douglasii</i>	G5S4	depressional	riverine
North Pacific Lowland Riparian Forest and Shrubland	<i>Fraxinus latifolia</i> - <i>Populus</i> <i>balsamifera</i> ssp. <i>trichocarpa</i> / <i>Symphoricarpos albus</i>	G4S4	riverine	riverine
	<i>Fraxinus latifolia</i> / <i>Carex</i> <i>deweyana</i> - <i>Urtica dioica</i> ssp. <i>gracilis</i>	G2SU	riverine	riverine
	<i>Fraxinus latifolia</i> / <i>Carex</i> <i>obnupta</i>	G4S4	riverine, depressional	riverine
	<i>Fraxinus latifolia</i> / <i>Spiraea</i> <i>douglasii</i>	G3S3	riverine, depressional	riverine
	<i>Fraxinus latifolia</i> / <i>Symphoricarpos albus</i>	G4S4	riverine, depressional	riverine
	<i>Salix lucida</i> ssp. <i>lasiandra</i> / <i>Salix x fluviatilis</i>	G3S3	riverine	riverine
	<i>Salix lucida</i> ssp. <i>lasiandra</i> / <i>Urtica dioica</i> ssp. <i>gracilis</i>	G2S2	riverine, depressional	riverine
	<i>Spiraea douglasii</i>	G5S4	riverine, depressional	riverine
Willamette Valley Wet Prairie	<i>Camassia quamash</i>	G4S4	flats	flats
	<i>Carex aperta</i>	G1S1	depressional	riverine
	<i>Triteleia hyacinthina</i>	G2S2	flats	flats

**Appendix 4. Wildlife species known or expected to currently or formerly be present in the vicinity of the Scappoose Bottomlands**

[Note: C= confirmed present based mainly on field observations provided by Mark Nebeker, Eric Horvat, Sue Beilke, Karen Bachman, Jeff Gilligan, Paul Adamus, and John Riutta, and wildlife area checklists. For many non-bird species a lack of “C” probably does not indicate absence, only limited information and survey effort. Species entirely in parentheses are known with certainty to no longer inhabit the Scappoose Bottomlands. List was initially adapted from a list for Portland area provided by Metro and a list generated using species models developed by Paul Adamus.

Common Name	Scappoose	Sauvie Is./ Burlington Bottoms	Ridgefield	Migratory Status	Federal Status	ODFW Status
<b>AMPHIBIANS</b>		C				
Northwestern Salamander		C		R	None	None
Long-toed Salamander		C	C	R	None	None
Rough-skinned Newt		C	C	R	None	None
W. Red-backed Salamander		C	C	R	None	None
Ensatina		C	C	R	None	None
Western Toad	C	C		R	None	SV
Pacific Chorus Frog (tree frog)	C	C	C	R	None	None
Northern Red-legged Frog	C	C	C	R	SoC	SV/ None
(Oregon Spotted Frog)				R	C	SC
Bullfrog	C	C	C	R	N/A - alien	N/A - alien
<b>REPTILES</b>						
Painted Turtle	C	C	C	R	None	SC
Western Pond Turtle		C		R	SoC	SC
Red-eared Slider		C		R	N/A - alien	N/A - alien
Northern Alligator Lizard		C	C	R	None	None
Southern Alligator Lizard				R	None	None
Western Fence Lizard		C		R	None	None
Western Skink				R	None	None
Rubber Boa		C	C	R	None	None

Common Name	Scappoose	Sauvie Is./ Burlington Bottoms	Ridgefield	Migratory Status	Federal Status	ODFW Status
Racer		C		R	None	None
Sharptail Snake				R	None	SV
Ringneck Snake				R	None	None
Gopher Snake		C		R	None	None
W. Terrestrial Garter Snake				R	None	None
Northwestern Garter Snake		C	C	R	None	None
Common Garter Snake	C	C	C	R	None	None
<b>BIRDS</b>						
Red-throated Loon		C	C	W / M	None	None
Pacific Loon		C	C	W / M	None	None
Common Loon	C	C	C	W / M	None	None
Pied-billed Grebe	C	C	C	R	None	None
Horned Grebe	C	C	C	W / M	None	SP
Eared Grebe	C		C	W	None	None
Western Grebe	C	C	C	W	None	None
Clark's Grebe		C	C	W / M	None	None
Doubled-crested Cormorant	C	C	C	R	None	None
American Bittern	C	C	C	R / S	None	None
Great Blue Heron	C	C	C	R	None	None
Great Egret	C	C	C	W / M	None	None
Green Heron	C	C	C	N / S	None	None
Black-crowned Night Heron	C	C	C	M / W	None	None
(California Condor)				R	LE	None
Turkey Vulture	C	C	C	N	None	None
Greater White-fronted Goose	C	C	C	W / M	None	None
Snow Goose	C	C	C	W / M	None	None
Ross's Goose		C	C	W / M	None	None
Canada Goose	C	C	C	R	None	None
Trumpeter Swan		C	C	W / M	None	None
Tundra Swan	C	C	C	W / M	None	None
Wood Duck	C	C	C	R	None	None
Gadwall	C	C	C	W / M	None	None
Mallard	C	C	C	R	None	None
Eurasian Wigeon	C	C	C	W / M	None	None
American Wigeon	C	C	C	W / M	None	None

Common Name	Scappoose	Sauvie Is./ Burlington Bottoms	Ridgefield	Migratory Status	Federal Status	ODFW Status
Blue-winged Teal	C	C	C	W / M	None	None
Cinnamon Teal	C	C	C	R / S	None	None
Northern Shoveler	C	C	C	W / M	None	None
Northern Pintail	C	C	C	W / M	None	None
Green-winged Teal	C	C	C	R / S	None	None
Canvasback	C	C	C	W / M	None	None
Redhead	C	C	C	W / M	None	None
Ring-necked Duck	C	C	C	W / M	None	None
Greater Scaup		C	C	W / M	None	None
Lesser Scaup	C	C	C	W / M	None	None
Bufflehead	C	C	C	W / M	None	None
Common Goldeneye	C	C	C	M	None	None
Barrow's Goldeneye	C	C	C	W / M	None	None
Hooded Merganser	C	C	C	W / M	None	None
Common Merganser	C	C	C	W / M	None	None
Red-breasted Merganser	C	C	C	W / M	None	None
Ruddy Duck	C	C	C	W / M	None	None
Osprey	C	C	C	N	None	None
White-tailed Kite	C	C	C	W / M	None	None
Bald Eagle	C	C	C	R	LT	LT
Northern Harrier	C	C	C	N	None	None
Sharp-shinned Hawk	C	C	C	R	None	None
Cooper's Hawk	C	C	C	R / S	None	None
Red-shouldered Hawk	C	C	C	W / M	None	None
Red-tailed Hawk	C	C	C	R	None	None
Rough-legged Hawk	C	C	C	W / M	None	None
American Kestrel	C	C	C	R	None	None
Merlin	C	C	C	W / M	None	None
Peregrine Falcon (American)	C	C	C	R	None	LE
Prairie Falcon	C	C	C	W / M	None	None
Ring-necked Pheasant	C	C	C	R	N/A - alien	N/A - alien
Ruffed Grouse		C	C	R	None	None
Northern Bobwhite	C	C		R	N/A - alien	N/A - alien
California Quail	C	C	C	R	None	None
Virginia Rail	C	C	C	R / S	None	None
Sora	C	C	C	S / N	None	None
American Coot	C	C	C	R / S	None	None

Common Name	Scappoose	Sauvie Is./ Burlington Bottoms	Ridgefield	Migratory Status	Federal Status	ODFW Status
Sandhill Crane (Lesser)	C	C	C	W / M	None	None
Black-bellied Plover	C	C	C	M	None	None
Semipalmated Plover		C	C	M	None	None
Killdeer	C	C	C	R	None	None
Greater Yellowlegs	C	C	C	W / M	None	None
Lesser Yellowlegs	C	C	C	W / M	None	None
Solitary Sandpiper	C	C	C	W / M	None	None
Spotted Sandpiper	C	C	C	R / S	None	None
Sanderling	C	C	C	W / M	None	None
Western Sandpiper	C	C	C	W / M	None	None
Least Sandpiper	C	C	C	W / M	None	None
Baird's Sandpiper		C	C	W / M	None	None
Pectoral Sandpiper	C	C	C	W / M	None	None
Dunlin	C	C	C	W / M	None	None
Short-billed Dowitcher		C		W / M	None	None
Long-billed Dowitcher	C	C	C	W / M	None	None
Wilson's Snipe	C	C	C	R / W	None	None
Wilson's Phalarope	C	C	C	W / M	None	None
Red-necked Phalarope	C	C	C	W / M	None	None
Bonaparte's Gull	C	C	C	M / W	None	None
Mew Gull	C	C	C	W / M	None	None
Ring-billed Gull	C	C	C	W / M	None	None
California Gull	C	C	C	R / S	None	None
Herring Gull	C	C	C	W / M	None	None
Thayer's Gull	C	C	C	W / M	None	None
Western Gull	C	C	C	R / S	None	None
Glaucous Gull	C	C	C	W / M	None	None
Glaucous-winged Gull	C	C	C	W / M	None	None
Caspian Tern	C	C	C	N	None	None
Common Tern		C		W / M	None	None
Rock Dove	C	C	C	R	N/A - alien	N/A - alien
Band-tailed Pigeon	C	C	C	S	SoC	None
Mourning Dove	C	C	C	S	None	None
Barn Owl	C	C	C	R / S	None	None
Western Screech-Owl	C	C	C	R	None	None
Great Horned Owl	C	C	C	R	None	None

Common Name	Scappoose	Sauvie Is./ Burlington Bottoms	Ridgefield	Migratory Status	Federal Status	ODFW Status
Northern Pygmy-Owl	C	C	C	R	None	SC
Barred Owl				R	None	None
Long-eared Owl		C		W / M	None	None
Short-eared Owl	C	C	C	W / M	None	None
Northern Saw-whet Owl	C	C		R / S	None	None
Common Nighthawk	C	C	C	N	None	SC
Vaux's Swift	C	C	C	N	None	None
Anna's Hummingbird	C	C	C	R	None	None
Rufous Hummingbird	C	C	C	N	None	None
Belted Kingfisher	C	C	C	R / S	None	None
Lewis's Woodpecker	C	C	C	W / M	SoC	SC
Red-breasted Sapsucker	C	C	C	R / W	None	None
Downy Woodpecker	C	C	C	R	None	None
Hairy Woodpecker	C	C	C	R	None	None
Northern Flicker	C	C	C	R	None	None
Pileated Woodpecker	C	C	C	R	None	SV
(Yellow-billed Cuckoo)				N	SoC	SC
Olive-sided Flycatcher	C		C	M	SoC	SV
Western Wood-Pewee	C	C	C	N	None	None
Willow Flycatcher	C	C	C	N	None	SV
Hammond's Flycatcher	C		C	M	None	None
Pacific-slope Flycatcher	C	C	C	N	None	None
Say's Phoebe		C	C	W / M	None	None
Western Kingbird	C	C	C	M	None	None
Eastern Kingbird	C	C	C	M		
Northern Shrike	C	C	C	W / M	None	None
Cassin's Vireo	C	C	C	N	None	None
Hutton's Vireo	C	C	C	R / S	None	None
Warbling Vireo	C	C	C	N	None	None
Red-eyed Vireo	C	C	C	N	None	None
Steller's Jay	C	C	C	R	None	None
Western Scrub-Jay	C	C	C	R	None	None
American Crow	C	C	C	R	None	None
Common Raven	C	C	C	R	None	None
Horned Lark	C	C	C	W / M	SoC	SC

Common Name	Scappoose	Sauvie Is./ Burlington Bottoms	Ridgefield	Migratory Status	Federal Status	ODFW Status
Purple Martin	C	C	C	N	SoC	SC
Tree Swallow	C	C	C	R / S	None	None
Violet-green Swallow	C	C	C	N	None	None
N. Rough-winged Swallow	C	C	C	N	None	None
Cliff Swallow	C	C	C	N	None	None
Barn Swallow	C	C	C	N	None	None
Black-capped Chickadee	C	C	C	R	None	None
Chestnut-backed Chickadee	C	C	C	R	None	None
Bushtit	C	C	C	R	None	None
Red-breasted Nuthatch	C	C	C	R	None	None
White-breasted Nuthatch	C	C	C	R	None	None
Brown Creeper	C	C	C	R	None	None
Bewick's Wren	C	C	C	R	None	None
House Wren	C	C	C	N	None	None
Winter Wren	C	C	C	R	None	None
Marsh Wren	C	C	C	N	None	None
Golden-crowned Kinglet	C	C	C	R	None	None
Ruby-crowned Kinglet	C	C	C	W / M	None	None
Western Bluebird	C		C	S	None	SV
Swainson's Thrush	C	C	C	N	None	None
Hermit Thrush	C	C	C	W / M	None	None
American Robin	C	C	C	R	None	None
Varied Thrush	C	C	C	W / M	None	None
European Starling	C	C	C	R / S	N/A - alien	N/A - alien
American Pipit	C	C	C	W / M	None	None
Cedar Waxwing	C	C	C	R / S	None	None
Orange-crowned Warbler	C	C	C	N	None	None
Nashville Warbler	C	C	C	N	None	None
Yellow Warbler	C	C	C	N	None	None
Yellow-rumped Warbler	C	C	C	M / W	None	None
Black-throated Gray Warbler	C	C	C	M / N	None	None

Common Name	Scappoose	Sauvie Is./ Burlington Bottoms	Ridgefield	Migratory Status	Federal Status	ODFW Status
Townsend's Warbler	C	C	C	S / N	None	None
MacGillivray's Warbler	C	C	C	N	None	None
Common Yellowthroat	C	C	C	N	None	None
Wilson's Warbler	C	C	C	N	None	None
Yellow-breasted Chat	C		C	N	SoC	SC
Western Tanager	C	C	C	N	None	None
Spotted Towhee	C	C	C	R	None	None
Chipping Sparrow	C	C	C	N	None	None
Vesper Sparrow (Oregon)		C	C	S / N	SoC	SC
Savannah Sparrow	C	C	C	R	None	None
Fox Sparrow	C	C	C	W / M	None	None
Song Sparrow	C	C	C	R	None	None
Lincoln's Sparrow	C	C	C	W / M	None	None
Swamp Sparrow	C	C		W / M	None	None
White-throated Sparrow	C	C	C	W / M	None	None
Harris's Sparrow		C	C	W / M	None	None
White-crowned Sparrow	C	C	C	R	None	None
Golden-crowned Sparrow	C	C	C	R	None	None
Dark-eyed Junco	C	C	C	R	None	None
Black-headed Grosbeak	C	C	C	N	None	None
Lazuli Bunting	C	C	C	N	None	None
Red-winged Blackbird	C	C	C	R	None	None
Western Meadowlark	C	C	C	W / M	None	SC
Yellow-headed Blackbird	C	C	C	N	None	None
Brewer's Blackbird	C	C	C	R / S	None	None
Brown-headed Cowbird	C	C	C	R / S	None	None
Bullock's Oriole	C	C	C	N	None	None
Purple Finch	C	C	C	R	None	None
House Finch	C	C	C	R	None	None
Red Crossbill	C	C	C	R / S	None	None
Pine Siskin	C	C	C	R	None	None
Lesser Goldfinch		C		R / S	None	None



Common Name	Scappoose	Sauvie Is./ Burlington Bottoms	Ridgefield	Migratory Status	Federal Status	ODFW Status
American Goldfinch	C	C	C	R	None	None
Evening Grosbeak	C	C	C	W / M	None	None
House Sparrow	C	C	C	R	N/A - alien	N/A - alien
<b>MAMMALS</b>						
Virginia Opossum	C	C	C	R	N/A - alien	N/A - alien
Vagrant Shrew		C	C	R	None	None
Pacific Water Shrew				R	None	None
Trowbridge's Shrew		C	C	R	None	None
Shrew-mole		C	C	R	None	None
Townsend's Mole		C	C	R	None	None
Coast Mole		C		R	None	None
Yuma Myotis				R / S	SoC	None
Little Brown Myotis		C	C	R / S	None	None
Long-legged Myotis				R / S	SoC	None
Fringed Myotis				R / S	SoC	SV
Long-eared Myotis				R / S	SoC	None
Silver-haired Bat		C		L	SoC	None
Big Brown Bat		C		R / S	None	None
Hoary Bat		C		L	None	None
Pacific Western Big- eared Bat				R / S	SoC	SC
Brush Rabbit	C	C		R	None	None
Eastern Cottontail	C	C	C	R	N/A - alien	N/A - alien
Mountain Beaver				R	None	None
Townsend's Chipmunk		C	C	R	None	None
California Ground Squirrel	C	C		R	None	None
Eastern Fox Squirrel		C		R	N/A - alien	N/A - alien
Western Gray Squirrel	C	C	C	R	None	None
Douglas' Squirrel	C	C	C	R	None	None
Northern Flying Squirrel		C		R	None	None
(Western pocket gopher)				R	None	None
Camas Pocket Gopher		C		R	SoC	None
American Beaver	C	C	C	R	None	None

Common Name	Scappoose	Sauvie Is./ Burlington Bottoms	Ridgefield	Migratory Status	Federal Status	ODFW Status
Deer Mouse		C	C	R	None	None
Bushy-tailed Woodrat		C		R	None	None
Western Red-backed Vole				R	None	None
White-footed Vole				R	SoC	None
Gray-tailed Vole				R	None	None
Townsend's Vole		C	C	R	None	None
Long-tailed Vole				R	None	None
Creeping Vole		C	C	R	None	None
Common Muskrat	C	C	C	R	None	None
Black Rat				R	N/A - alien	N/A - alien
Norway Rat		C		R	N/A - alien	N/A - alien
House Mouse		C		R	N/A - alien	N/A - alien
Pacific Jumping Mouse		C	C	R	None	None
Common Porcupine				R	None	None
Nutria	C	C	C	R	N/A - alien	N/A - alien
Coyote	C	C	C	R	None	None
Red Fox	C	C	C	R	None	None
Gray Fox	C			R	None	None
(Gray Wolf)				S	None	None
Black Bear				S	None	None
(Grizzly Bear)				R	LT	None
Common Raccoon	C	C	C	R	None	None
Ermine		C		R	None	None
Long-tailed Weasel	C	C	C	R	None	None
Mink	C	C	C	R	None	None
Striped Skunk	C	C	C	R	None	None
Western Spotted Skunk				R	None	None
Northern River Otter	C	C	C	R	None	None
Mountain Lion (Cougar)			C	S	None	None
Bobcat		C	C	S	None	None
Domestic Cat (feral)	C	C		R	N/A - alien	N/A - alien
California Sea Lion		C		S	None	None
Roosevelt Elk		C		S	None	None

Common Name	Scappoose	Sauvie Is./ Burlington Bottoms	Ridgefield	Migratory Status	Federal Status	ODFW Status
(Columbian White-tailed Deer)				R	LE	SV
Black-tailed (Mule) Deer	C	C	C	R	None	None

*Migratory Status:* N= confirmed nesting, R= resident, M= migration, W= winter, S= summer, R / S = resident but more individuals in summer

*Federal & ODFW Status:* LE= endangered, LT= threatened, C= candidate for listing, SoC= species of concern,

SC= sensitive-critical, SV= SV= sensitive vulnerable

## Appendix 5. Birds detected in Scappoose Bottomlands during early winter

Data are from the annual Christmas Bird Count at Sauvie Island, covering the years 1968-2003. With a radius of 7.5 miles, the count area includes all of the Scappoose Bottomlands as well as Sauvie Island. Trends were approximated by calculating the correlation of counts with years after applying partial correlation to adjust for the annually-varying number of observers. “Clear” trends were considered to be those with an adjusted correlation coefficient of greater than 0.50 whereas “Possible” trends were those with a coefficient of 0.11 to 0.50 and “No Trend” included coefficients of 0.10 or less. Species found in fewer than 5 years are not included.

Species	Number of Years Found (of 36)	Trend Estimate	Maximum Count
American Kestrel	36	Clear Negative	114
American Widgeon	36	Clear Negative	111,000
Blue-winged Teal	9	Clear Negative	9
California Quail	35	Clear Negative	109
Cedar Waxwing	14	Clear Negative	140
Chestnut-backed Chickadee	34	Clear Negative	92
Common Loon	21	Clear Negative	14
Glaucous-winged Gull	36	Clear Negative	4600
House Finch	36	Clear Negative	11000
Northern Bobwhite	5	Clear Negative	7
Northern Pintail	36	Clear Negative	87000
Northern Pygmy-Owl	11	Clear Negative	3
Red-breasted Nuthatch	34	Clear Negative	51
Ring-necked Pheasant	35	Clear Negative	89
Ruffed Grouse	24	Clear Negative	12
Spotted Sandpiper	10	Clear Negative	6
White-breasted Nuthatch	35	Clear Negative	53
Wilson's Snipe	33	Clear Negative	460
Bald Eagle	35	Clear Positive	48
Belted Kingfisher	36	Clear Positive	37
Bufflehead	33	Clear Positive	140
Double-crested Cormorant	36	Clear Positive	601
Gadwall	36	Clear Positive	486
Golden-crowned Sparrow	36	Clear Positive	838
Great Blue Heron	35	Clear Positive	279
Great Egret	28	Clear Positive	155
Greater Yellowlegs	16	Clear Positive	73
Hooded Merganser	33	Clear Positive	60
Lesser Scaup	33	Clear Positive	970
Lincoln's Sparrow	31	Clear Positive	67
Pied-billed Grebe	36	Clear Positive	54

Species	Number of Years Found (of 36)	Trend Estimate	Maximum Count
Red-shouldered Hawk	8	Clear Positive	2
Red-tailed Hawk	36	Clear Positive	164
Ring-necked Duck	36	Clear Positive	1337
Rock Dove	30	Clear Positive	427
Sandhill Crane	28	Clear Positive	2036
Song Sparrow	36	Clear Positive	1016
Steller's Jay	36	Clear Positive	101
Tundra Swan	36	Clear Positive	5946
Virginia Rail	25	Clear Positive	12
White-crowned Sparrow	36	Clear Positive	285
White-throated Sparrow	29	Clear Positive	14
American Crow	36	No Trend	5699
Band-tailed Pigeon	10	No Trend	32
Black-bellied Plover	9	No Trend	20
Black-crowned Night-Heron	5	No Trend	1
Brown Creeper	35	No Trend	48
California Gull	34	No Trend	368
Canvasback	29	No Trend	260
Dark-eyed Junco	36	No Trend	831
European Starling	36	No Trend	29306
European Wigeon	34	No Trend	14
Glaucous Gull	18	No Trend	5
Great Horned Owl	36	No Trend	18
Hermit Thrush	28	No Trend	10
Long-billed Dowitcher	34	No Trend	480
Pileated Woodpecker	29	No Trend	11
Prairie Falcon	5	No Trend	6
Red-breasted Merganser	7	No Trend	3
Red-breasted Sapsucker	33	No Trend	19
Red-throated Loon	18	No Trend	16
Savannah Sparrow	33	No Trend	87
Tree Swallow	6	No Trend	4
White-fronted Goose	30	No Trend	340
Wood Duck	29	No Trend	320
American Coot	35	Possible Negative	3200
American Goldfinch	34	Possible Negative	470
American Pipit	33	Possible Negative	227
Barn Owl	35	Possible Negative	17
Bewick's Wren	36	Possible Negative	140
Bonaparte's Gull	9	Possible Negative	8

Species	Number of Years Found (of 36)	Trend Estimate	Maximum Count
Brewer's Blackbird	36	Possible Negative	8185
Brown-headed Cowbird	35	Possible Negative	594
Bushtit	36	Possible Negative	564
Cooper's Hawk	36	Possible Negative	9
Downy Woodpecker	36	Possible Negative	71
Dunlin	35	Possible Negative	6208
Evening Grosbeak	19	Possible Negative	114
Golden Eagle	9	Possible Negative	2
Golden-crowned Kinglet	36	Possible Negative	667
Green Heron	12	Possible Negative	3
Hairy Woodpecker	33	Possible Negative	11
Herring Gull	36	Possible Negative	856
Horned Grebe	15	Possible Negative	9
Horned Lark	6	Possible Negative	50
House Sparrow	36	Possible Negative	390
Hutton's Vireo	16	Possible Negative	12
Killdeer	35	Possible Negative	2340
Least Sandpiper	23	Possible Negative	98
Lewis's Woodpecker	7	Possible Negative	38
Long-eared Owl	5	Possible Negative	1
Mallard	36	Possible Negative	31000
Mew Gull	36	Possible Negative	713
Northern Flicker	36	Possible Negative	237
Northern Saw-whet Owl	15	Possible Negative	3
Northern Shrike	29	Possible Negative	12
Orange-crowned Warbler	21	Possible Negative	4
Pacific Loon	8	Possible Negative	3
Pine Siskin	34	Possible Negative	2163
Purple Finch	35	Possible Negative	78
Red Crossbill	8	Possible Negative	56
Rough-legged Hawk	36	Possible Negative	31
Sanderling	11	Possible Negative	700
Short-eared Owl	30	Possible Negative	68
Townsend's Warbler	16	Possible Negative	28
Varied Thrush	36	Possible Negative	131
Western Sandpiper	9	Possible Negative	131
Western Screech-Owl	14	Possible Negative	6
Winter Wren	36	Possible Negative	112
Yellow-rumped Warbler	34	Possible Negative	284
American Bittern	14	Possible Positive	2

Species	Number of Years Found (of 36)	Trend Estimate	Maximum Count
American Robin	36	Possible Positive	830
Anna's Hummingbird	25	Possible Positive	6
Barrow's Goldeneye	7	Possible Positive	17
Black-capped Chickadee	36	Possible Positive	685
Canada Goose	36	Possible Positive	48366
Cinnamon Teal	6	Possible Positive	10
Common Goldeneye	25	Possible Positive	22
Common Merganser	36	Possible Positive	374
Common Raven	11	Possible Positive	5
Fox Sparrow	36	Possible Positive	201
Greater Scaup	22	Possible Positive	50
Green-winged Teal	36	Possible Positive	20437
Harris's Sparrow	7	Possible Positive	3
Marsh Wren	35	Possible Positive	73
Merlin	35	Possible Positive	3
Mourning Dove	15	Possible Positive	74
Northern Harrier	36	Possible Positive	93
Northern Shoveler	36	Possible Positive	13000
Peregrine Falcon	20	Possible Positive	4
Redhead	7	Possible Positive	5
Red-winged Blackbird	36	Possible Positive	11274
Ring-billed Gull	35	Possible Positive	2560
Ruby-crowned Kinglet	36	Possible Positive	303
Ruddy Duck	33	Possible Positive	260
Sharp-shinned Hawk	35	Possible Positive	9
Snow Goose	35	Possible Positive	2700
Spotted Towhee	36	Possible Positive	213
Swamp Sparrow	8	Possible Positive	5
Thayer's Gull	29	Possible Positive	785
Trumpeter Swan	16	Possible Positive	8
Western Grebe	30	Possible Positive	132
Western Gull	23	Possible Positive	23
Western Meadowlark	36	Possible Positive	228
Western Scrub-Jay	36	Possible Positive	230

## Appendix 6. Birds detected in Scappoose Bottomlands during breeding season

### Notes:

Species in bold font are Neotropical migrants. Species with asterisk may be declining in the Willamette Lowlands ecoregion according to regional BBS data.

BBS = number of Breeding Bird Survey stops along Dike Rd. and Honeyman Rd. where Henry Horvath detected the species during June, multiplied by number of years found at the stop, 1995-2003. This comprises an index of relative abundance in the Scappoose area. All other observations are by Paul Adamus during 2004.

Airport = public trail on south side of airport adjacent to Janke's, surveyed 6/27 @ 0930-1030

Armstrong = all accessible parts of Armstrong property, surveyed 6/27 @ 0700-0900

Bernet = all accessible parts of Bernet property, surveyed 6/14 @ 1100-1145

Dike = pond on public land on N. Honeyman Rd., near dike, surveyed 6/14 @ 1200-1215 and 6/27 @ 0500-0530

Janke = portion of Janke property within about 100 m of house, via ATV. Surveyed 6/14 @ 0900-0945

Malarkey = road into Malarkey Ranch B&B, plus gated road about 2 mi E. of these from Rt. 30, plus riparian and pasture. Surveyed 6/15 @ 1930-2100

Wenker = two gated roads mainly through poplar plantations on Wenker-Smith property. Surveyed 6/14 @ 0500-0700 and 6/27 @ 1000-1130

	BBS	Airport	Armstrong	Bernet	Dike	Janke	Malarkey	Wenker
American Bittern	0					X		
American Coot	1							
American Crow	164	X	X	X				X
American Goldfinch**	201	X	X	X		X	X	X
American Kestrel*	8							
American Robin*	210	X	X	X	X	X	X	X
Band-tailed Pigeon*	1							
<b>Barn Swallow**</b>	<b>252</b>		<b>X</b>	<b>X</b>		<b>X</b>	<b>X</b>	
Belted Kingfisher	1					X	X	
Bewick's Wren	7	X	X	X	X		X	
Black-capped Chickadee*	27	X	X	X	X		X	X
<b>Black-headed Grosbeak*</b>	<b>18</b>		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Brewer's Blackbird**	54							
Brown Creeper	0		X				X	
Brown-headed Cowbird*	30	X	X	X			X	
<b>Bullock's Oriole</b>	<b>12</b>		<b>X</b>				<b>X</b>	
Bushtit**	0	X		X			X	



	BBS	Airport	Armstrong	Bernet	Dike	Janke	Malarkey	Wenker
California Quail*	25		X			X		X
Canada Goose	14							
<b>Cassin's Vireo*</b>	<b>1</b>							
Cedar Waxwing*	56	X	X	X		X	X	X
Cinnamon Teal	7							
<b>Cliff Swallow</b>	<b>94</b>							
Common Raven	1							
Common Snipe	11							
<b>Common Yellowthroat**</b>	<b>116</b>		X	X	X	X	X	X
Downy Woodpecker	4		X	X				
European Starling	965	X	X	X		X	X	
Great Blue Heron	34		X	X		X	X	X
Great Egret	0					X	X	
Great Horned Owl	0				X			X
House Finch	100	X			X	X	X	X
House Sparrow*	55							
<b>House Wren**</b>	<b>27</b>		X				X	
Killdeer	34			X		X	X	
<b>Lazuli Bunting</b>	<b>6</b>						X	X
Mallard	18			X		X	X	X
Marsh Wren	15	X				X	X	X
Mourning Dove	15	X	X	X		X	X	X
Northern Flicker	11		X				X	X
Northern Harrier	0					X		
<b>N. Rough-winged Swallow</b>	<b>3</b>							
Orange-crowned Warbler*	4							
Osprey	1		X			X	X	
Pied-billed Grebe	0	X				X		
Purple Finch*	2		X					
Red-breasted Nuthatch	3		X		X		X	
<b>Red-eyed Vireo</b>	<b>0</b>							X
Red-tailed Hawk	16			X		X	X	X
Red-winged Blackbird*	163			X		X	X	
Ring-necked Pheasant**	14							
Rock Dove*	26							
<b>Rufous</b>	<b>7</b>						X	

	BBS	Airport	Armstrong	Bernet	Dike	Janke	Malarkey	Wenker
<b>Hummingbird*</b>								
Savannah Sparrow	43						X	
Song Sparrow*	152	X	X	X	X	X	X	X
Spotted Towhee	50		X	X		X	X	X
Steller's Jay	0		X					
<b>Swainson's Thrush*</b>	<b>12</b>		<b>X</b>		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Tree Swallow*</b>	<b>20</b>		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	
Turkey Vulture	7			X			X	
<b>Vaux's Swift</b>	<b>5</b>			<b>X</b>			<b>X</b>	
<b>Violet-green Swallow*</b>	<b>147</b>					<b>X</b>	<b>X</b>	<b>X</b>
W. Scrub-Jay	56	X	X	X		X	X	
<b>Warbling Vireo</b>	<b>1</b>		<b>X</b>					<b>X</b>
<b>Western Flycatcher</b>	<b>4</b>							
<b>Western Tanager</b>	<b>0</b>		<b>X</b>					
<b>Western Wood-Pewee</b>	<b>47</b>		<b>X</b>	<b>X</b>	<b>X</b>		<b>X</b>	<b>X</b>
White-breasted Nuthatch*	1		X		X		X	
White-crowned Sparrow	3						X	
<b>Willow Flycatcher*</b>	<b>25</b>		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Wilson's Warbler</b>	<b>8</b>							
Winter Wren	1							
Wood Duck	5	X				X	X	X
<b>Yellow Warbler*</b>	<b>1</b>						<b>X</b>	<b>X</b>
Yellow-rumped Warbler*	2						X	

\* BBS data indicate a decline in Willamette Lowlands region generally, 1968-2003