



Joint Venture Implementation Plans

Lower Columbia River

1994

Prepared for:

Pacific Coast Joint Venture

Oregon Wetlands Joint Venture
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LOWER COLUMBIA RIVER FOCUS AREA

Description of Area

The Land

The Lower Columbia River Focus Area includes both sides of the river from Bonneville Dam down to the mouth of the Columbia west of Astoria. On the Washington side of the river, the area includes Clark, Cowlitz, and Wahkiakum Counties, portions of Skamania County west of the Cascade Range, and the portions of Pacific County that drain into the Columbia River. In Oregon, the area includes Multnomah, Columbia, and Clatsop Counties. To facilitate planning and public involvement, all portions of Clatsop County, including the coast, are included within the Lower Columbia River Focus Area.

The terrain and climate vary substantially from east to west. The dramatic landscape of the Columbia River Gorge is buffeted by strong winds and extreme temperatures, with cold wet winters (annual precipitation averages 193 centimeters [76 inches]) and hot dry summers. Milder temperatures and moderate precipitation (averaging about 100 centimeters [40 inches] per year around Portland) are the rule in the rolling hills and valleys to the west. Nearer the coast, marine influences produce lower summer temperatures and heavier winter rains (150 to 200 centimeters [60 to 80 inches] per year) in the low mountains of the Coast Range and along the coastal plain. Vegetation is similarly varied. The slopes of the Cascade and Coast Ranges support dense mixed conifer forests while lowland areas are a mosaic of grasslands, oak-ash savannahs, conifer forests, marshes, and riparian woodlands.

The Columbia River emerges from its steep-walled gorge about 32 kilometers (20 miles) east of Portland. Below Washougal and Troutdale, the river valley widens to include a broad floodplain; elongated islands divide the river and form sloughs and side-channels in the formerly marshy lowlands. The floodplain expands around the river's confluence with the Willamette River, where the sloughs and lakes of North Portland, Sauvie Island, and the Vancouver lowlands contain the metropolitan area's last major remnants of the swampy riparian system formerly nourished by annual flooding of the non-dammed rivers. Downstream from St. Helens, the Columbia cuts through the Coast Range, a passage marked by steep-shouldered bluffs and broad alluvial floodplains. The river channel, dotted with low islands of deposited sediments throughout its lower reaches, opens out below Skamokawa into several broad bays that extend more than 48 kilometers (30 miles) to the Pacific Ocean.

With the exception of the Willamette River, most of the lower Columbia's tributaries drain relatively short watersheds. Major streams originating in the Cascades include the Willamette and Sandy Rivers in Oregon and the Washougal, Lewis, Kalama, and Cowlitz Rivers in Washington. Coast Range tributaries include the Elochoman and

Grays Rivers in Washington and the Lewis and Clark, Youngs, and Clatskanie Rivers in Oregon. The Columbia River estuary is one of the West Coast's largest, encompassing more than 32,400 hectares (80,000 acres).

The coast of Clatsop County from the mouth of the Columbia River south to Tillamook Head features a broad coastal plain marked by extensive stabilized dune systems and numerous lakes, small streams, bogs, and other freshwater wetlands. From Tillamook Head south to Cape Falcon, the mountains of the Coast Range rise sharply behind the shoreline and large rock formations dot beaches and offshore waters.

The Necanicium River and Ecola Creek in Clatsop County drain directly into the ocean, forming small estuaries.

Dams, diking, and dredging have dramatically altered the hydrologic processes that historically shaped the wetland ecosystems of the lower Columbia River. Before construction of dams, many of the islands and much of the floodplain were inundated several times a year, typically in December and again in May or June. Operation of the dams on the Columbia's main stem and major tributaries has substantially reduced peak river flows, and construction of dikes and levees has nearly eliminated flooding in many low-lying areas. Dredging of shipping channels has required disposal of massive quantities of sediments, resulting in creation of new islands, filling of many former wetlands, and changing shoreline sediment types.

The People

The population of the Lower Columbia area's counties in 1990 totaled more than one million, the vast majority concentrated in the Portland-Vancouver metropolitan area in Multnomah (Oregon) and Clark (Washington) Counties. Outside of those two counties, the largest population centers are in the Longview-Kelso and Camas-Washougal areas in Washington and the towns of Astoria, Seaside, St. Helens, and Scappoose in Oregon.

The large diversified economy of the Portland-Vancouver area contrasts sharply with those of the more rural counties, which have traditionally depended heavily on forest products, fishing, and agriculture. Barge and vessel traffic is heavy on the Columbia River, and Portland, Vancouver, St. Helens, Longview, and Camas-Washougal all provide significant port facilities. Land use outside the major urban areas is largely dominated by commercial timber production, with most of the low-lying areas along the Columbia and its tributaries devoted to agriculture. However, suburban and rural residential development is increasingly spilling over into farm and forest lands around the metropolitan area. Heavy industry is concentrated in the Portland-Vancouver area but also includes pulp and paper mill operations at Camas, St. Helens, Longview, and

Wauna, and an aluminum mill at Troutdale. The now closed Trojan nuclear power plant is on the Oregon side of the Columbia River near Rainier.

The Wildlife Resources

The Lower Columbia River Focus Area historically supported diverse and abundant populations of wildlife. The moderate climate, abundant food resources, ample water, and diverse array of habitats still make it attractive to many species, despite extensive urbanization and other development in substantial portions of the area. Most of the streams support anadromous fish, and more than 250 species of birds use the area on a regular basis. Elk, bear, black-tailed deer, and a variety of smaller mammals including beaver, river otter, mink, raccoon, and coyote are common.

The Lower Columbia area provides habitat for a number of threatened and endangered species, including the Aleutian Canada goose, northern spotted owl, marbled murrelet, bald eagle, peregrine falcon, brown pelican, northern sea lion, and Columbian white-tailed deer, as well as several Snake River salmon stocks. The western snowy plover, proposed for listing under the Endangered Species Act, historically used coastal portions of the area.

Some of the islands in the lower river support large gull and tern nesting colonies, and large great blue heron colonies are found throughout the river area. Large numbers of shorebirds and songbirds pass through the area on their annual migrations. Bald eagle nesting sites are found along the length of the lower river. Peregrine falcons, hawks, eagles, and owls find abundant prey in the area's diverse habitats. The area provides important migratory and wintering habitat for a number of waterfowl species. Lowland areas are heavily used as resting and staging areas for migratory waterfowl and shorebirds of the Pacific Flyway.

Wintering waterfowl populations in the Lower Columbia area reach peaks of more than 200,000 birds. The most abundant species are mallard, northern shoveler, American wigeon, green-winged teal, canvasbacks, lesser scaup, and northern pintail ducks; the dusky, cackler, western, Vancouver, lesser, and Taverner's subspecies of Canada geese; and tundra and trumpeter swans. The area is particularly important for the dusky Canada goose, a large, dark-breasted subspecies that winters only along the lower Columbia, in the Willamette Valley, and at a few locations on the Oregon coast. Several wildlife refuges, including Ridgefield National Wildlife Refuge and the State of Oregon's Sauvie Island Wildlife Area, contain agricultural lands that are intensively managed to provide feed and resting areas for wintering waterfowl.

The lower Columbia River is one of the most important areas in the Pacific Flyway for migrating shorebirds, with peak counts in the estuary of almost 150,000 birds and

substantial numbers using other areas along the river up to Sauvie Island and the Willamette Valley.

The lower Columbia River area also provides important migratory and breeding habitat for a variety of other neotropical migrant bird species. One survey of a bottomland forest during peak migration recorded some of the highest concentrations of neotropical migrants ever reported.

The Columbia River provides essential habitat for many of the region's most important fisheries and a variety of marine mammals. The tip of the South Jetty at the river's mouth is a haul-out site for the California and northern sea lions. Harbor seals use sandbars and mudflats as haul-out sites at low tides, while seals and California and northern sea lions feed on a variety of fish in the estuary. Estuarine habitats provide important nursery and rearing areas for young salmon and steelhead, and adults use them as temporary holding areas during their return migration from the ocean to upstream spawning areas. Dungeness crabs rear in the estuary, and marine fish such as starry flounder, English sole, and perch use it for rearing and feeding. Shallow subtidal and intertidal areas also support oysters, clams, and mussels. Sturgeon are found throughout the lower river. Shallow lakes and ponds in the upriver floodplain produce a variety of warmwater fish -- most of them introduced species --, including bass, catfish, perch, bluegill, and crappie.

The Columbia River basin's anadromous fish stocks have declined dramatically in recent decades despite major hatchery programs, with overall populations estimated at less than 10% of their historic size. Wild stocks of salmon, steelhead, and sea-run cutthroat trout have been virtually extirpated in some areas. The American Fisheries Society issued a report in 1991 identifying 77 native, naturally spawning stocks or groups of stocks in the Columbia River basin that have a high or moderate risk of extinction or are of special concern because of their vulnerability or unique character. Wild coho salmon stocks above Bonneville Dam have been virtually eliminated and are at very low levels below Bonneville Dam. The Columbia basin's historically large chum salmon stocks have declined to less than 1% of their original level, while sockeye salmon have lost an estimated 96% of their historic habitat. Most wild chinook stocks are very weak, and natural spawning of native fall chinook stocks is believed to be low or non-existent in many Lower Columbia tributaries. Nearly all of the Columbia basin's native steelhead stocks were included in the American Fisheries Society's list.

The extent to which degradation and loss of estuarine and other wetland habitats has contributed to the decline of the Columbia basin's anadromous fish is uncertain. However, pollution, diking of tidal marshes, sedimentation, and dredging have significantly reduced the biological productivity of the estuary and the quantity and value of the habitat it provides for anadromous fish. Loss of tidal and riparian wetlands has probably been a significant factor in the decline of stocks from Lower Columbia tributaries. Other factors, such as diversions and fish passage problems at dams, over

harvest in mixed stock fisheries, and the loss or degradation of spawning and rearing habitat have likely had a more profound impact on upriver stocks.

Wetland Habitats

The most significant large blocks of wetland habitat in the Lower Columbia Focus Area are found in association with the river's estuary and among the freshwater marshes, lakes, riparian woodlands, and pasturelands of the river's many islands and extensive floodplains. Pasture and other lands devoted to open-field agricultural uses are particularly important for wintering waterfowl. The floodplain downriver from Portland to Deer Island (including the Vancouver lowlands, Sauvie Island, and the Ridgefield, Scappoose, and Woodland areas) constitutes an ecological unit of singular importance because of its size, the diversity of high quality habitat it provides, and its extremely high value for waterfowl. The Columbia River estuary below Puget Island provides a similar core area with particular significance for anadromous fish and a wide variety of birds. Although fragmented by urbanization in some areas, the areas outside these two major habitat complexes contain significant blocks of habitat with high value for a broad range of wildlife.

Existing Habitat Protection

The State of Oregon's comprehensive planning requirements and local zoning ordinances provide substantial protection for estuarine wetlands subject to tidal action. The Washington counties of Clark, Cowlitz, Wahkiakum, and Skamania Counties have all adopted Shoreline Management Programs under the state Shoreline Management Act (RCW 90.58). Clark County and its incorporated cities are required to plan under the state Growth Management Act, and have completed critical area management plans. Cowlitz, Wahkiakum, and Skamania Counties, plus their incorporated cities, are voluntarily completing critical area management plans under the Growth Management Act. The Hydraulics Code and Forest Practices Act apply to all non-federal lands and waters in the focus area; the Gifford Pinchot National Forest voluntarily complies with the Hydraulics Code.

The two states collaborated on a joint regional management plan for the Columbia River estuary completed in 1979. More than 6,700 hectares (16,500 acres), 20% of the Columbia River estuary, have been designated "natural." This designation generally limits development to that necessary to maintain existing uses and facilities. Another 24,800 hectares (61,300 acres) (75%) is designated "conservation," which generally prohibits major alterations of the estuary. Approximately 1,200 hectares (2,970 acres), much of it in shipping channels, is designated for "development."

Varying degrees of protection for wetlands outside of the estuary are provided by a variety of federal, state, and local laws and regulations, including:

- Section 404 of the federal Clean Water Act, which regulates filling of wetlands.
- The state of Washington's Shoreline Management Act, which regulates alteration of wetlands associated with the shoreline of lakes 20 acres or larger; streams with flows greater than 20 cubic feet per second; and all lands within 200 feet of Shorelines of the State (ordinary high water mark), plus associated marshes, bogs, and swamps.
- The state of Washington's Growth Management Act of 1990, which requires cities and counties with populations of more than 50,000 to develop plans that designate and protect "critical areas," including wetlands.
- The state of Washington's Hydraulics Code, which protects fish habitat, including wetlands, within the ordinary high water mark of marine water, lakes, ponds, and streams.
- The state of Washington's Forest Practices Act, which regulates forest practices in certain types of forested wetlands.
- The state of Oregon's statewide land use planning program and city and county land use plans, which address wetlands under a number of state policies, including Goals 5 (Open Spaces, Scenic and Historic Areas, and Natural Resources), 16 (Estuarine Resources), and 17 (Coastal Shorelands).
- The state of Oregon's Removal-Fill Law, which regulates removal and filling of material in waters of the state, including wetlands.
- The state of Oregon's Forest Practices Act, which limits timber harvests in "significant wetlands."

The focus area presently contains approximately 26,000 hectares (64,200 acres) of secure habitat.

Some of the most important wetland habitats in the Lower Columbia area have already been accorded formal protection as national wildlife refuges and State wildlife areas. The U.S. Fish and Wildlife Service manages the Lewis and Clark (15,400 hectares - 38,000 acres), Julia Butler Hansen (1,930 hectares - 4,775 acres), Ridgefield (2,000 hectares - 5,150 acres), Franz Lake (215 hectares - 535 acres), Steigerwald Lake (255 hectares - 627 acres), and Pierce (135 hectares - 330 acres) National Wildlife Refuges. The Washington Department of Wildlife owns several small parcels along the Lower

Columbia and approximately 610 hectares (1,500 acres) of former floodplain in the Vancouver Lowlands.

The Oregon Department of Fish and Wildlife's Sauvie Island Wildlife Area encompasses about 4,860 hectares (12,000 acres). The Bonneville Power Administration has also acquired approximately 170 hectares (430 acres) in the Burlington Bottoms area adjacent to Sauvie Island for wildlife mitigation purposes.

The Nature Conservancy has established preserves at Blind Slough in the Columbia River estuary, which includes 270 hectares (670 acres) of tidal spruce swamp, and Pierce Island in the Columbia Gorge.

Approximately half of the Columbia River Gorge National Scenic Area, where the U.S. Forest Service owns about 24,300 hectares (60,000 acres), is within the Lower Columbia River Focus Area. Oregon State parks include extensive wetlands at Fort Stevens State Park near Astoria and in several State parks in the Columbia Gorge. Other public ownerships that provide some degree of protection for wetland habitats include parks owned by Clark County (more than 240 hectares [600 acres] in the Vancouver Lowlands), Metro (Smith and Bybee lakes near the confluence of the Willamette and Columbia), and the City of Portland's 60-hectare [160-acre] Oaks Bottom Wildlife Refuge on the Willamette).

Threats to Wetland Habitats

The Lower Columbia River area historically provided a rich abundance of diverse wetland habitats. Construction of dams and dikes that eliminated annual flooding dramatically altered the ecological processes that shaped the area's floodplains. Urban and industrial development, diking and draining of tidal and freshwater marshes, dredging and river channelization, pollution, and clearing of riparian forests all have played a role in the destruction and degradation of valuable wetland habitats.

Projected population growth will add 500,000 people to the Portland-Vancouver metropolitan area in the next 20 years, increasing pressure for residential development in rural areas of the Columbia River corridor. Industrial and commercial development and expansion of airports and port facilities will continue to pose a threat to wetlands in the Vancouver Lowlands and the Columbia South Shore area. Conversion of pastureland to hybrid cottonwood plantations substantially reduces habitat for wintering waterfowl. Proposals to deepen the Columbia River's main navigation channel from the present 12 meters (40 feet) to 13 meters (43 feet) could create a need for extensive additional dredge spoil disposal sites. Development of additional deep-draft shipping facilities in the Astoria area could have a significant impact on estuarine habitats. Increased recreational boating is also creating pressure for additional marina and transient mooring facilities all along the Lower Columbia River.

Habitat Objectives

Within the Lower Columbia River Focus Area the Joint Venture is dedicated to ensuring that the following habitat objectives are met and sustained. These objectives are based on the recommended actions for individual target areas contained in the draft plan. The figures represent estimates of what the Joint Venture hopes to accomplish, given the resource needs and opportunities identified through the planning process and the financial, political and logistical constraints the Joint Venture will have to deal with.

- Ensure that at least 4,600 hectares (11,500 acres) of low-lying pastureland in private ownership will remain in agricultural production with farm management practices that are compatible with providing needed waterfowl feeding areas.
- Permanently protect, through easements or fee title acquisition, an additional 1,600 hectares (4,000 acres) of tidal wetlands, 1,280 hectares (3,200 acres) of freshwater wetlands, and approximately 500 hectares (1,200 acres) of uplands that are important to maintaining the habitat values of the wetlands that they are associated with.
- Restore or create at least 500 hectares (1,250 acres) of tidal wetlands, and 100 hectares (250 acres) of freshwater wetlands.
- Enhance wildlife habitat values on 270 hectares (680 acres) of tidal wetlands, 1450 hectares (3,600 acres) of freshwater wetlands, and 700 hectares (1,750 acres) of uplands.

Population Objectives

There are no well defined population goals for most wildlife species. The needs are best addressed in terms of habitat goals. The overall waterfowl objective is to maintain populations equal to the greatest population since 1970.

- Maintain habitat capable of supporting a peak population of 6,500 tundra swans.
- Maintain habitat capable of supporting a peak population of 2,000 snow geese.
- Maintain habitat capable of supporting a peak population of 50,000 Canada geese.

- Maintain habitat capable of supporting a peak population of 90,00 ducks.
- Maintain habitat capable of supporting a peak population of 150,000 shorebirds.
- Maintain nesting populations of colonial birds at or above their present numbers.

Recommended Actions

The following discussion is broken down into sections identifying recommendations for specific target areas and broader proposals that are directed toward securement, restoration, enhancement, and management of wetland habitats throughout the Lower Columbia River Focus Area.

Area-wide recommendations

The general actions that would apply to wetland habitats throughout the Lower Columbia River Focus Area include the following recommendations:

- Restore diked former tidelands where feasible and appropriate.
- Secure conservation easements on agricultural lands where necessary to maintain open field habitat for waterfowl and other migratory birds and where landowners are willing participants
- Cooperate in programs to assist in reducing the effects of crop depredations by waterfowl and other wildlife
- Initiate active seasonal management of tidegates to enhance existing wetland habitat where feasible and appropriate.
- Support research to evaluate estuarine habitat needs of anadromous fish and identify criteria and potential sites for habitat rehabilitation.
- Inventory, map, and monitor eelgrass beds in estuaries; establish eelgrass "sanctuaries"; strengthen administrative protection for eelgrass in mariculture and tidelands permit processes.
- Seek changes in State law to eliminate disincentives for wetlands restoration or enhancement by private land owners, including legislation to make lands zoned for exclusive farm use but used for wetland restoration and wildlife habitat conservation eligible for agricultural tax deferral.
- Work with local governments to implement Wetland Conservation Plans.
- Support creation of wetlands for wastewater treatment where feasible and appropriate.
- Encourage public use of publicly owned wetland habitat areas at levels consistent with protection of resource values.
- Secure long-term commitment to active management for waterfowl habitat in appropriate areas.
- Support research on techniques for cost-effective revegetation of dredge spoil islands.

- Monitor status of local diking districts to identify potential opportunities for wetland restoration.
- Participate in planning and review process for river channel deepening proposals and operating procedures for upriver dams to ensure that important wetland habitats are protected.
- Establish a mitigation policy subcommittee through Oregon Coastal Wetlands Joint Venture to review and make recommendations on mitigation policies.
- Support "coordinated resource management planning" and other efforts to control purple loosestrife and other invasive, non-native species.
- Encourage coordination of estuarine resource management policies by state agencies.
- Support active effective enforcement of existing laws and regulations for wetlands protection.

Target areas

PACIFIC COUNTY

Baker Bay - Located just inside the mouth of the Columbia River, the broad salt marshes along the shoreline of Baker Bay and East and West Sand Islands provide feeding habitat for migrating and wintering waterfowl and shorebirds. The area attracts large numbers of migrating shorebirds and is heavily used by loons, grebes, cormorants, gulls, and terns. Canada geese, puddle ducks, bay ducks and sea ducks all use the area, and occasional flocks of brant are attracted by the bay's eelgrass beds. An estimated 5,000-10,000 ducks winter in the area and geese nest on East Sand Island. Gulls and cormorants use East Sand Island for nesting. Brown pelicans and peregrine falcon use the area for feeding and resting. The area is heavily used by wintering bald eagles and two pairs have territories on Baker Bay.

Native grasslands on West Sand Island have been proposed for designation as a Research National Area.

Recommended actions:

- Support designation of Research Natural Area on West Sand Island.

Chinook River - In its 1979 and 1989 concept plans for waterfowl habitat protection, the U.S. Fish and Wildlife Service identified 200 hectares (500 acres) in the Chinook River floodplain area as having high-to-moderate potential for habitat restoration. The agency indicated that the area had moderate potential value for dabbling ducks. Since then, cottonwood plantations have been established on portions of the area, while some private lands have been set aside for goose and elk habitat.

Recommended actions:

- Pursue opportunities for cooperative habitat enhancement efforts with private landowners.

CLATSOP COUNTY

Clatsop Plains - The lakes and marshes scattered across Clatsop County's coastal plain include several thousand hectares of wetland habitats. The U.S. Fish and Wildlife Service has identified 800 hectares (2,020 acres) of lakes as "high" priority for protection of waterfowl habitat. Butterfield Marsh's 400 hectares (1,000 acres) was also included in the agency's 1989 listing of waterfowl habitat protection needs. Invasion of purple loosestrife and increasing urbanization pose threats to wetland habitat values. The City of Warrenton is developing a Wetland Conservation Plan for a portion of the area. Clatsop Plains also provides approximately 400 hectares (1,000 acres) of potential habitat for the endangered Oregon silverspot butterfly. The site is the northernmost viable population for this taxa and offers the only opportunity for protecting and enhancing northern populations. The area is under a variety of ownerships, but there is some local support for resolving land use issues in a manner that would allow for the protection of the Oregon silverspot butterfly and its habitats here.

Recommended actions:

- Support maintenance of existing zoning and regulations to maintain wetland habitat values.
- Work with Clatsop County planners, developers, local residents, Pacific Power and Light Company, and the Camp Rilea facility to develop a Habitat Protection and Management Plan and protect through conservation easements or fee acquisitions habitat needed to support the Oregon silverspot butterfly.

Gearhart Bog - Located northeast of Gearhart, this 200-hectare (500-acre) area is the largest contiguous wetland of its kind left on the west coast. It contains a mosaic of

coastal habitat types, including the southernmost stands of swamp types otherwise found chiefly in British Columbia and southeast Alaska. Development of cranberry bogs, peat extraction, improvement of drainage systems, and logging within the swamps are the primary threats to the area's habitat values. The Nature Conservancy has acquired approximately 20 hectares (50 acres) of the bog area and hopes to create a preserve encompassing at least 130 hectares (325 acres).

Recommended actions:

- Pursue securement through acquisition of lands or easements from willing sellers.

Necanicum-Neawanna Estuary - Surrounded by intensive commercial and residential development, this relatively small 180-hectare (450-acre) estuary retains significant wetland values. The estuary is designated for "conservation" under the Necanicum Estuary Plan. The wetlands include 53 hectares (132 acres) of tidal marsh. A wetland mitigation project in the Stanley Lake area created 17 acres of freshwater marsh that could potentially be enhanced through tidegate manipulation. The City of Seaside has developed a Wetland Concept Plan, and the North Coast Land Conservancy is working to create a wetland preserve around the Neawanna Creek estuary.

Recommended actions:

- Support development and implementation of the Seaside Wetlands Conservation Plan.
- Develop a wetland preserve along Neawanna estuary through acquisition of lands, easements, and cooperative agreements.
- Enhance Stanley Lake wetlands through manipulation of tidegates.

Clatsop Spit - The U.S. Army Corps of Engineers and the Columbia River Estuary Study Taskforce (CREST) have developed several proposals to restore and enhance estuarine wetlands in this area to benefit shorebirds, waterfowl, and other wildlife. A proposal to breach the rock jetty separating Trestle Bay from the river could result in significant benefits for juvenile anadromous fish, diving birds, and other estuarine wildlife.

Recommended actions:

- Breach the rock jetty at Trestle Bay to restore full tidal circulation.

Youngs Bay, Lewis and Clark River, and Youngs River - Youngs Bay has been identified as a high priority for protection of waterfowl habitat by the U.S. Fish and Wildlife Service (1989). The agency also identified 650 hectares (1,600 acres) in the Lewis and Clark River and Youngs River valleys as potential waterfowl habitat restoration areas with high potential value for dabbling ducks . Within the Fort Clatsop National Memorial, the National Park Service identified two areas of diked former wetlands along the Lewis and Clark River where restoration efforts may be undertaken.

Recommended actions:

- Maintain current agricultural use on open wet pastureland.
- Develop cooperative resource management programs with private landowners to enhance existing habitat values.
- Enhance anadromous fish habitat where feasible and appropriate.
- Restore diked former wetlands within Fort Clatsop National Memorial.

Lewis and Clark National Wildlife Refuge - This 15,400 hectare (38,000-acre) refuge encompasses more than 40% of the Columbia River estuary and includes numerous islands and bars and extensive mudflats, tidal marshes, and tidal swamps. The refuge encloses part of the largest marsh in western Oregon and is an important rearing area for anadromous fish. The area is a major stopover for migratory waterfowl, with peak populations of 500-1,000 tundra swans, 5,000 Canada geese, and 50,000 ducks in February and March. Shorebird populations reach peaks of 150,000 birds. The refuge includes a large Caspian tern colony on Rice Island, and provides nesting areas for gulls, cormorants, and herons. The area is also used by peregrine falcons. Cathlamet Bay is the center of activity for wintering bald eagles on the Lower Columbia, and the area also supports a significant resident bald eagle population.

The Oregon Division of State Lands and the U.S. Fish and Wildlife Service have proposed a land exchange that would transfer to State ownership approximately 40 hectares (105 acres) of Federal land at Tongue Point in exchange for State-owned inholdings within the refuge boundaries.

Recommended actions:

- Maintain existing habitat values.
- Support land exchanges to acquire the State of Oregon's inholdings for addition to Lewis and Clark National Wildlife Refuge.

Svensen Island, Blind Slough, and Long Island - Svensen Island has been identified by the U.S. Fish and Wildlife Service as a potential waterfowl habitat restoration area because of its high potential value for dabbling ducks. Restoration of diked former tidelands would also provide major benefits for anadromous fish. Svensen Island is designated as a potential wetland mitigation site in Clatsop County's comprehensive plan, and a portion of the island is designated as a dredged material disposal site.

Like Svensen Island, low-lying agricultural lands in the Knappa-Brownsmead area have high waterfowl values. Blind Slough Swamp, a large native Sitka spruce tidal wetland with small areas of open marsh and winding sloughs, has high value for anadromous fish and supports a diverse array of bird, mammal, reptile, and amphibian species. The Nature Conservancy is developing a preserve that will encompass more than 290 hectares (670 acres) of the Blind Slough Swamp area. Adjacent lands along Warren Creek have historically been managed by the landowner to benefit waterfowl and other wildlife.

Recommended actions:

- Through acquisition of title or easements, secure lands in and adjacent to Blind Slough Swamp to protect native Sitka spruce tidal wetlands and ensure long-term protection of wildlife habitat values.
- Protect, restore, and enhance wetlands on Svensen Island and along Fertile Valley Creek through acquisition of lands or easements or cooperative agreements with private landowners.

WAHAKIYAKUM COUNTY

Grays Bay, Grays River, and Deep River - Grays Bay is an important area for wintering bald eagles and its tidal marshes are used by a wide variety of migratory waterfowl, shorebirds, marsh and water birds, raptors, and semi-aquatic mammals. The bay supports a variety of species of fish and serves as an important feeding area for juvenile salmonids. *Corophium salmonis*, benthic invertebrates that serves as one of the foundations of the estuarine food chain, are found in very high concentrations, with densities of up to 30,000 per square meter. There are a number of bald eagle nest sites adjacent to the bay. Wintering waterfowl numbers include 3,000-6,000 ducks, 200-300 tundra swans, and 400-600 Canada geese in the nearby uplands. The area provides brood habitat for 300-400 western Canada geese. The U.S. Fish and Wildlife Service has identified 200 hectares (500 acres) in the Grays River-Deep River area as a possible waterfowl habitat restoration site because of its high potential value for swans and dabbling ducks. Much of the area's tidelands are in private ownership.

Recommended actions:

- Restore diked tidelands where feasible and appropriate.
- Secure private tidelands where necessary to protect wildlife habitat values.

Julia Butler Hansen Refuge for the Columbian White-tailed Deer (Wahkiakum and Clatsop Counties) - This 1,900 hectare (4,775-acre) refuge is managed primarily to protect the endangered Columbian white-tailed deer, but its shorelines, sloughs, and swamps provide valuable habitat for a wide variety of wetland-dependent wildlife. Enhancement of open field habitat could substantially increase wintering goose populations.

Recommended actions:

- Enhance open field habitat to support expanded wintering goose populations.
- Support securement of additional habitat necessary to carry out the recommendations of the *Revised Columbian White-tailed Deer Recovery Plan*.

Puget Island - Puget Island's agricultural lands and the adjacent undeveloped islands receive extensive waterfowl use and provide habitat for the Columbian white-tailed deer and a variety of wetland-dependent wildlife. Approximately 15% of the island is in cottonwood plantations.

Recommended actions:

- Encourage maintenance of agricultural practices that are compatible with habitat needs of wintering waterfowl.
- Enhance wildlife habitat through cooperative efforts with private landowners.

COLUMBIA COUNTY

Westport Slough/Wallace Island (Columbia and Clatsop Counties) - The floodplain and islands in this area include about 4,000 hectares (10,000 acres) of diked agricultural lands (including about 2,400 hectares [6,000 acres] of cottonwood plantations). The area's forested wetlands and open pastureland have high waterfowl values and, together with local cottonwood plantations, support a viable subpopulation

of the endangered Columbian white-tailed deer. The Corps of Engineers' reconnaissance study for its Columbia River channel deepening proposal identified several areas for large dredge material disposal sites. The study also identified several areas where lands within diking districts could be secured for habitat restoration. Although conversion of pasture lands to cottonwood plantations has resulted in a substantial loss of important habitat for wintering waterfowl in this and other areas along the Lower Columbia River, James River Corp. has taken a number of steps to enhance wildlife values on non-cropped lands within its plantations. There also may be potential for cooperative efforts to plant cover crops for wintering waterfowl on fallow plantation lands between cottonwood rotations.

Recommended actions:

- Encourage maintenance of agricultural practices that are compatible with habitat needs of wintering waterfowl and other wildlife.
- Enhance wildlife habitat values on cottonwood plantations and other private lands through cooperative efforts with landowners.
- Support protection of habitat for Columbian white-tailed deer through securement of lands, easements, and cooperative management agreements from willing landowners.
- Restore diked wetlands to tidal influence where feasible and appropriate.

Crims Island - The large island features a wide variety of habitats in a mixture of woodlands, meadows, marshes, sloughs, and tidelands. The island has an active bald eagle nest site and could potentially support the reintroduction of Columbian white-tailed deer. An interior marsh is a favored feeding area for tundra swans (200-300) as well as several hundred ducks and some geese. The island provides nesting habitat for wood ducks, mallard, and teal; and brooding and loafing areas for western Canada geese. James River Corp., which owns most of the island, has been working to enhance wildlife habitat values on its land in cooperation with the U.S. Fish and Wildlife Service, the Oregon Department of Fish and Wildlife and others.

Recommended actions:

- Protect and enhance habitat through conservation easements or cooperative efforts with private landowners.

Deer Island - Although diked, Deer Island is one of the few remaining large islands (1,235 hectares - 3,051 acres) in the Lower Columbia area that has remained largely undeveloped. The island, which contains sloughs and lakes interspersed with grassy

marshes and pasture, receives heavy use by wintering waterfowl as well as bald eagles, purple martins, and a variety of other wildlife.

Recommended actions:

- Protect existing habitat values through maintenance of current agricultural uses.
- Encourage maintenance of agricultural practices that are compatible with habitat needs of wintering waterfowl and other wildlife.
- Secure lands or easements, from willing sellers, for protection and active management of waterfowl habitat.

Scappoose Lowlands - The diked open pastureland and flooded lowlands interspersed with willows and cottonwoods between Scappoose Bay and the Multnomah Channel provide valuable habitat for wintering waterfowl and bald eagles. The area is particularly important for wintering swans. The area is likely to come under increased development pressure in the future.

Recommended actions:

- Support maintenance of agricultural zoning to protect against more intensive development.
- Encourage maintenance of agricultural practices that are compatible with habitat needs of wintering waterfowl and other wildlife.

COWLITZ COUNTY

Fisher Island, Coal Creek Slough, and Willow Grove - Fisher Island's undiked native black cottonwood/willow wetlands support a variety of marsh and water birds, terrestrial birds, waterfowl, raptors, and furbearers. A great blue heron rookery contains 150-200 nests. The Coal Creek Slough area is the last large undiked wetland in Cowlitz County and contains extensive stands of riparian cottonwood. The Willow Grove area's diked open pasturelands receive substantial use by wintering and migrating waterfowl.

Recommended actions:

- Protect Fisher Island wetlands through acquisition of land or easements.

- Encourage maintenance of agricultural practices that are compatible with habitat needs of wintering waterfowl and other wildlife.

Walker Island and Lord Island - These two islands, 44 hectares (109 acres) and 95 hectares (234 acres) respectively, are adjacent to the city of Longview. They have been used for dredge material disposal but retain significant wildlife values. Both islands, which are connected by a narrow band of sand spoil, are largely forested. Tidal marsh and shallows in a large 40- hectare (100-acre) embayment along the south side of the islands provide feeding and resting areas for waterfowl, and a sizeable cattail marsh bisects the eastern one-third of Lord Island. The area is within the home range of a breeding pair of bald eagles and receives some use by migrant eagles. The islands attract significant numbers of wintering waterfowl (500-1,000 ducks and geese), and support some nesting western Canada geese and dabbling ducks.

Recommended actions:

- Maintain existing habitat values.

Cottonwood Island/Carr Slough (Prescott)/Sandy Island (Columbia and Cowlitz Counties) - Portions of these areas, which feature a mixture of open pasture, grassy marshes, and willow-ash and cottonwood woodlands, have been identified by the U.S. Fish and Wildlife Service as having high value for wildlife. Cottonwood Island, which contains an existing dredge material disposal site, has been identified for potential industrial development. Sandy Island, which supports significant riparian forests, has been identified as a potential dredge material disposal site in initial studies for the Columbia River channel deepening proposal. The Carr Slough area around the Trojan Nuclear Power Plant includes wetlands that receive extensive waterfowl use.

Recommended actions:

- Maintain existing habitat values.

Woodland Lowlands - Diked agricultural lands in this area and undiked farmlands on Martin and Burke Islands are heavily used by wintering waterfowl and are a key element in the larger complex of waterfowl habitat provided by the broad floodplain and river islands downstream from Portland and Vancouver. Located on the outer fringe of the metropolitan area, the area is under increasing development pressure. Martin Island has been identified as a potential dredge material disposal site.

Recommended actions:

- Encourage maintenance of agricultural practices that are compatible with habitat needs of wintering waterfowl and other wildlife.
- Secure lands from willing sellers for protection and active management of waterfowl habitat.

MULTNOMAH COUNTY

Sauvie Island (Columbia and Multnomah Counties) - With more than 4,900 hectares (12,000 acres) managed by the Oregon Department of Fish and Wildlife, and a similar amount of land in private agriculture, the Columbia River's largest island supports a rich abundance of wildlife. The mixture of sloughs, lakes, ponds, marshes, woodlands, and cropland attract peak concentrations of more than 150,000 ducks and geese in the fall, and more than 250 bird species use the area.

Recommended actions:

- Protect and enhance habitat values and biological diversity within Sauvie Island Wildlife Area by implementing moist-soil management practices and creation of native wetland communities.
- Enhance habitat on private lands through cooperative efforts with landowners.
- Secure private inholdings from willing sellers within the project boundary of the Sauvie Island Wildlife Area.

Burlington Bottoms - The bottomlands along the west side of Multnomah Channel adjacent to Sauvie Island feature a mosaic of ponds, wetlands and riparian forest interspersed with grazed pastures that provide high quality habitat for a variety of birds and other wildlife. The Bonneville Power Administration has acquired 430 acres here for wildlife mitigation purposes. Multnomah County Parks has expressed interest in acquiring a 150-acre parcel to the north, and there may be opportunities to acquire additional lands in between to create a block of more than 1,000 acres of habitat in this key area.

Recommended actions:

- Pursue cooperative efforts to acquire lands from willing sellers for protection of wildlife habitat values.

Urban Wetlands (Portland area) - Surrounded by industrial, commercial, and residential development, the few remaining concentrations of significant wetlands in the Portland area provide important islands and corridors of wildlife habitat in an otherwise hostile environment. Examples include the western end of Hayden Island, Smith and Bybee Lakes, Columbia Slough, Oaks Bottom, and riparian areas along Johnson Creek and the lower Willamette and Clackamas Rivers. The Metropolitan Service District's green spaces program is coordinating regional efforts to protect a system of natural areas, open spaces, and greenways within the metropolitan area's four counties. Wetland mitigation policies are a crucial issue in this area because of the continuing intense development pressure.

Recommended actions:

- Work with the Metropolitan Service District's green spaces program to protect, restore, and enhance important wetland habitats.

Government Island - This large 710-hectare (1,760-acre) island owned by the Port of Portland provides a variety of wildlife habitats with stands of willow, ash, and cottonwood interspersed among grasslands, ponds, and lakes. The island could offer significant opportunities for wetland creation or restoration.

Recommended actions:

- Maintain existing habitat values.
- Restore or create wetlands where feasible and appropriate.

Sandy River Delta - The U.S. Forest Service's acquisition of a 560 hectare (1,400 acre) parcel at the mouth of the Sandy River provides significant opportunities for wildlife habitat rehabilitation in the floodplain area, which contains extensive wetlands, pastureland and riparian woodlands. The site is one of the largest potential habitat restoration areas on the lower Columbia River. Located adjacent to Interstate 84, the site serves as a gateway to the Columbia River Gorge National Scenic Area and could become a focal point for public education and interpretive efforts in the area.

Recommended actions:

- Restore and enhance seasonal and permanent wetland habitat.
- Develop facilities for public education and interpretation that are compatible with protection of wildlife habitat values.

- Maintain and enhance some pasture lands for waterfowl use with emphasis on dense nesting cover suitable for waterfowl and other breeding birds.

CLARK COUNTY

Ridgefield National Wildlife Refuge - This 2,000-hectare (5,000-acre) refuge provides a variety of habitats in a mixture of natural floodplain, cropland, lakes, managed marshes, and grasslands dotted with oak, ash, and conifers. Waterfowl populations reach peaks of more than 25,000 geese and 40,000 ducks. More than 180 bird species, and dozens of amphibians, reptiles, and small mammals are found on the refuge, which also supports a variety of warmwater fish species. The refuge is home to the largest great blue heron colony in the northwest (350-500 nests).

Recommended actions:

- Block-up public ownership with Washington Department of Wildlife in Vancouver lowlands to protect and enhance existing habitat values.

Vancouver Lowlands - The agricultural lands, lakes, sloughs, and streams in the floodplain northwest of Vancouver support large populations of wintering waterfowl, nesting bald eagles, and a major great blue heron colony. Substantial portions of the area are already in public ownership, and the Washington Department of Wildlife is working on additional acquisitions in the area.

Recommended Actions:

- Secure lands from willing sellers to block-up public ownership of important habitat areas with Ridgefield National Wildlife Refuge.
- Restore and enhance wetland habitats on lands in public ownership.
- Develop coordinated habitat management strategies for publicly owned lands.

Steigerwald Lake National Wildlife Refuge - Establishment of this 255-hectare (627-acre) refuge in the Columbia River floodplain wetlands has created a variety of opportunities for enhancement of wildlife habitat.

Recommended actions:

- Restore and enhance wetland habitats.

- Secure land from willing sellers to the east of the existing refuge boundary to allow management of the historic lake bed.

SKAMANIA COUNTY

Columbia River Gorge (Skamania and Multnomah Counties) - The lakes, ponds, marshes, and riparian forests of the gorge provide important habitat for many species of wildlife, including bald eagles and peregrine falcons. Geese, swans, and ducks winter in a number of areas. Lakes, streams, and side channels provide important habitat for anadromous and resident fish. In addition to the Columbia River Gorge National Scenic Area, managed by the U.S. Forest Service and the Columbia River Gorge Commission, the area includes Pierce National Wildlife Refuge and Franz Lake National Wildlife Refuge, which contains the largest concentration of wapato (a formerly abundant tuberous plant that is used for feed by tundra swans, geese, and ducks) in the Columbia Gorge. The Nature Conservancy owns Ives Island, and Reed Island is owned by Washington State Parks. Oregon's Rooster Rock State Park contains extensive wetlands.

Recommended actions:

- Protect existing habitat values through acquisition of lands and easements, zoning and land use regulations.
- Restore and enhance wetland habitats where feasible and appropriate.
- Control bank erosion at Pierce and Franz Lake National Wildlife Refuges to protect wetland systems.