

PORT OF PORTLAND

GOVERNMENT ISLAND MANAGEMENT PLAN

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Government Island Management Plan

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1 INTRODUCTION

Government, Lemon and McGuire Islands are located in the Columbia River northeast of Portland International Airport between River Mile 111.5 and River Mile 119 (Figure 1). The island complex, consisting of approximately 2,200 acres, is owned by the Port of Portland (Port) with the exception of a 224 acre parcel at the east end of Government Island which is owned by Metro Regional Parks and Greenspaces Department (Metro). The islands have been under Port ownership since 1969 when they were purchased from the Oregon State Game Commission for a proposed expansion of Portland International Airport. Although the runway expansion project was canceled, the Port has continued to maintain ownership of the islands as open space to ensure that no conflicting uses (e. g. housing) are developed under this section of the primary flight path east of the airport.

The escalation of island use by boaters and campers prompted the Port to enter into a Ground Lease with Oregon Parks and Recreation Department (OPRD) in 1999. The Ground Lease helped resolve recreational use and management issues such as daily operations, sanitation, dock and vegetation maintenance, and funding.

The Port's long-term management objectives for the island complex are to:

- preserve the natural character and quality of the natural resources of the islands
- ensure that island uses are compatible with airport operations
- provide opportunities for recreational boating use and appropriate access to the islands
- manage through cooperative agency agreements.

The Management Plan (MP) establishes management goals, standards and guidelines against which all present and future activities within the island complex will be managed. The MP provides a mechanism to facilitate agency coordination and resource protection and enhancement.

2 GENERAL DESCRIPTION

The Government Island complex is typical of lower Columbia River islands that have had multiple uses since the influx of European settlers in the nineteenth century. The island complex has been used in the past for agriculture and livestock operations, dredged material disposal, and recreational activities. Present uses include wetland mitigation, recreation (boating and camping), and livestock operations. The wetland, riparian and upland habitats are a mixture of native and non-native plant species; some of these vegetation communities, such as the cottonwood forest, are relics of historic conditions (i. e. pre-dam hydrology).

Island configuration and habitat are influenced by Columbia River levels, which are typically higher during the winter and spring. Higher river levels inundate island edges, a narrow low-lying area through the downstream end of Government Island, and the interior Jewett Lake, which is now the site of a Port of Portland wetland mitigation project. This seasonal inundation

Figure 1. Site Location



supports certain wetland habitats on the island, and provides seasonal habitat for fish and waterfowl species.

Human use of the island is presently restricted to the edges with access for boaters, and to a managed livestock (cattle) operation on the interior. The island is a popular boating destination and camping area during the summer.

3 REGULATORY AND MANAGEMENT FRAMEWORK

3.1 Environmental Regulatory Framework

3.1.1 Multnomah County

The island complex is currently zoned by Multnomah County as Parks and Open Space (POS) and Commercial Forest Use (CFU). The CFU zoning base includes overlays for areas of Significant Environmental Concern (SEC), Noise Impact (NI), Flood Fringe (FF), and Community Service Recreational Use (CS). The purpose of the CFU District is to conserve and protect wildlife habitat and scenic value; to provide agricultural uses; to provide recreational opportunities and other uses which are compatible with forest use; and to minimize potential hazards or damages from fire, pollution, or erosion.

3.1.2 Regional-Metro

Title 3 of the Urban Growth Management Functional Plan (Metro Code 3.07.310-370) requires local jurisdictions to adopt code to address development in Water Quality and Floodplain Management Areas, as defined by adopted maps. Title 3 setbacks from streams and wetlands vary from 15 to 200 feet, based on site-specific conditions. The program developed for the study area sets a minimum Title 3 setback of 50 feet, and protects steep slopes adjacent to streams and floodplains. Riparian and wildlife components are currently under development. Multnomah County will be required to adopt a program complying with these additional portions of Title 3 once they are adopted by Metro council. The island complex includes mapped Title 3 resources and is subject to Title 3 requirements.

3.1.3 State

Activities on and around the islands are regulated by state rules. Excavation or dredging and filling in wetlands and the river are regulated by the Oregon Division of State Lands (ODSL) under the Removal/Fill Law (ORS 196.800 - 196.990). Lease agreements may also be required with ODSL for structures or moorings in state waters around the islands. Oregon Department of Fish and Wildlife (ODFW) regulates hunting and fishing activities.

3.1.4 Federal

The Federal Clean Water Act applies to water resources on the islands. The Act's primary objective is to maintain and restore physical, chemical and biological integrity of the nation's waters, including wetlands. The US Army Corps of Engineers (COE) requires a permit for the dredge or fill of material into these "waters" through the Section 404 permit process. The COE also has jurisdiction over permits required for impacts below the ordinary high water line of all navigable waters of the U. S. under Section 10 of the Rivers and Harbors Act.

The National Environmental Policy Act (NEPA) requires that for any project undertaken by a Federal Agency or with the assistance of money from the Federal Government a determination of impacts must be made. If the impacts are determined to be significant then an Environmental Assessment or an Environmental Impact Statement must be conducted to clearly define the impacts and notify the public of these impacts.

The Federal Endangered Species Act (ESA) applies to any Federally listed threatened or endangered plant or animal. When listed species occur in the project area and impacts to their habitats or a “take” may occur, consultation with the US Fish and Wildlife Service (USFWS) for wildlife, resident fish, and plant species or with the National Marine Fisheries Service (NMFS) for anadromous or marine fish species, is required through the submission of a Biological Assessment.

The Federal Aviation Administration (FAA) regulates airport safety and standards and provides guidance on reducing hazardous wildlife attractants on or near airports. The FAA recommends that wildlife attractants should not be created within 10,000 feet of the outer ends of aircraft runways.

3.2 Ownership

The Port owns the majority of the island complex including Lemon Island, McGuire Island and most of Government Island. Metro owns approximately 224 acres on the eastern tip of Government Island (Figure 2).

3.3 Responsibilities

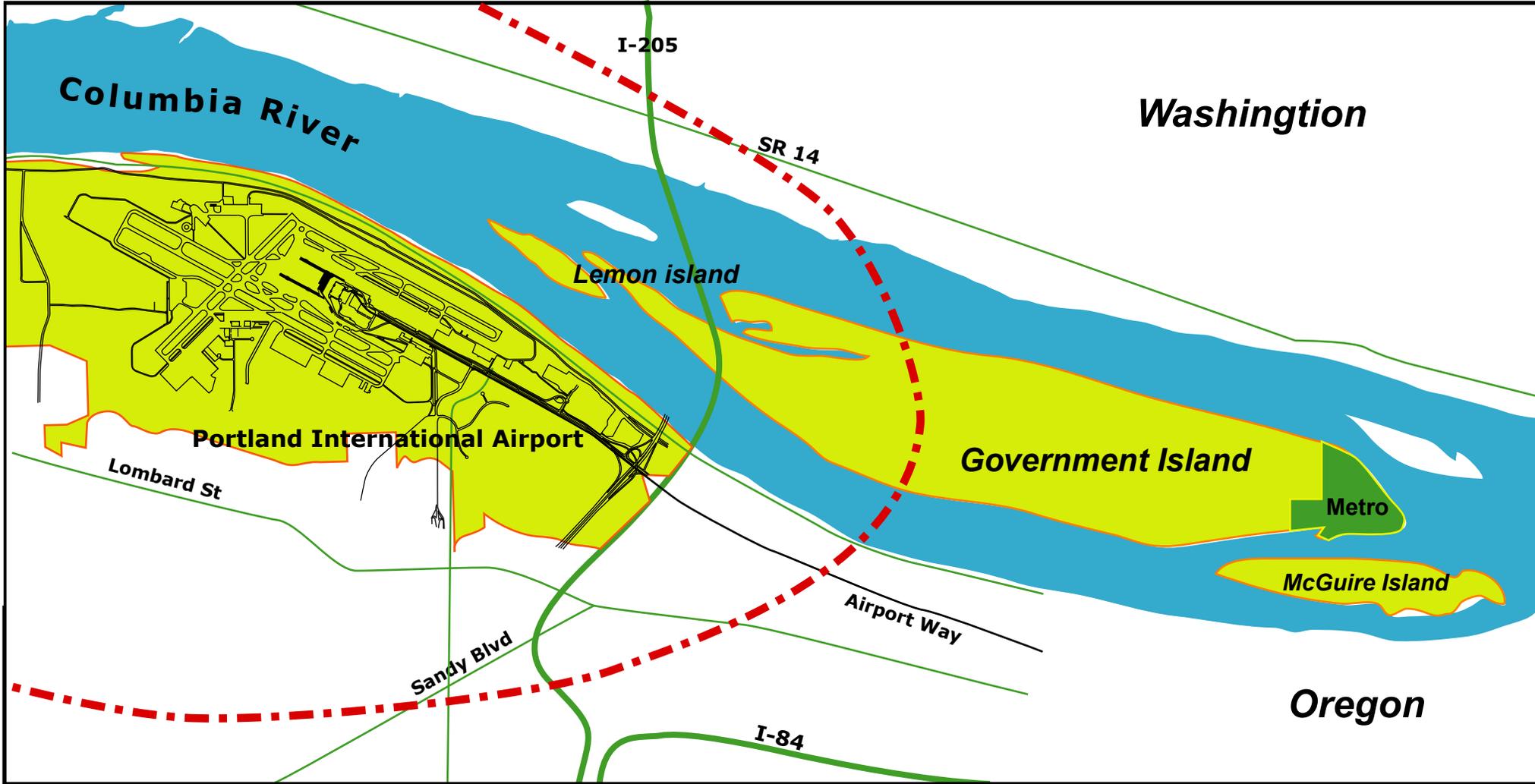
3.3.1 Port of Portland

The Port has overall authority for their property and can access the islands as needed. The Port allows recreational use, which is managed by OPRD, as long as it preserves the natural character and quality of natural resources and is compatible with airport operations. The Port also supports Multnomah County to manage and control mosquitoes at Jewett Lake to prevent the potential spread of diseases through carrier mosquitoes. Within the Port, the Property and Development Services department (PDS) is responsible for coordination with other Port departments with respect to island management and for all aspects of developing and carrying out the management plan. Contracts Administration within PDS is the primary contact for all Government Island communication coming into the Port (See Appendix A for list and contact numbers of responsible parties).

3.3.2 Oregon Parks and Recreation Department (OPRD)

The Port entered into a 99 year Ground Lease Agreement with OPRD that began March 1, 1999 (Appendix B). The Agreement states permitted uses and responsibilities. The main points include uses consistent with maintaining the natural character of the islands and prevention of potential aviation hazards. OPRD is responsible for daily management of the island complex; specifically to manage outdoor recreational activities, enforce State Park rules, maintain toilets, keep the islands free of litter and debris, and to manage in a manner which prevents and controls wildland fires. OPRD must (in consultation with the Port) develop a long range (20 year) Outdoor Recreation Master Plan consistent with Port objectives (Appendix C). OPRD is allowed

Figure 2. Ownership and FAA Aviation Hazard Zone



-  Port Properties
-  Metro
-  FAA 10,000 foot hazard area

to enter into agreements with Multnomah County Sheriff's River Patrol for assistance with enforcement of safety regulations. OPRD can also enter into agreements with third parties to provide for grazing, mowing, and weed control. At the end of the boating season, OPRD must submit a report to the Port summarizing the state of the islands, significant incidents, and management issues for the past year. OPRD is allowed to install interpretive, directional or warning signs to inform users of site information but no advertising, major attractions, concerts, sports tournaments or similar events are allowed. OPRD is not allowed to create habitat that would support bird hazards to aviation within 10,000 feet of Portland International Airport as recommended by the FAA (Figure 2).

OPRD has established a land rental agreement with Strasheim Farms, Inc. that is effective until January 1, 2003 when it can be renewed. Strasheim pays \$4.80 per animal unit month to graze up to 500 cattle between April 15 and November 15 annually on the premises. Strasheim is responsible for maintaining out buildings, fences and gates, preventing livestock from entering interior bodies of water or wetlands, keeping livestock off the roads and adhering to farm conservation practices to prevent overgrazing and erosion.

3.3.3 Metro

Metro purchased approximately 224 acres on the eastern end of Government Island in 1999 as part of implementing the open spaces bond measure passed in 1995. The purpose of buying the land was to consolidate public ownership on the island and preserve wildlife habitat along the Columbia River. Metro has expressed interest in partnering with the Port and OPRD to restore native vegetation communities on its property. This management plan does not include management of the Metro property.

3.4 Integration with Other Port Programs

The Port of Portland is developing a Natural Resources Assessment and Management Plan (NRAMP) which will be a planning tool designed to facilitate management of Port natural resources utilizing an ecosystem-based approach. The NRAMP will provide the overall strategy for managing development goals with natural resource goals. Site-specific management plans which have been developed prior to the completion of the NRAMP, such as this plan for Government Island, will need to be reviewed following completion of the NRAMP to ensure consistency with Port policies and strategies.

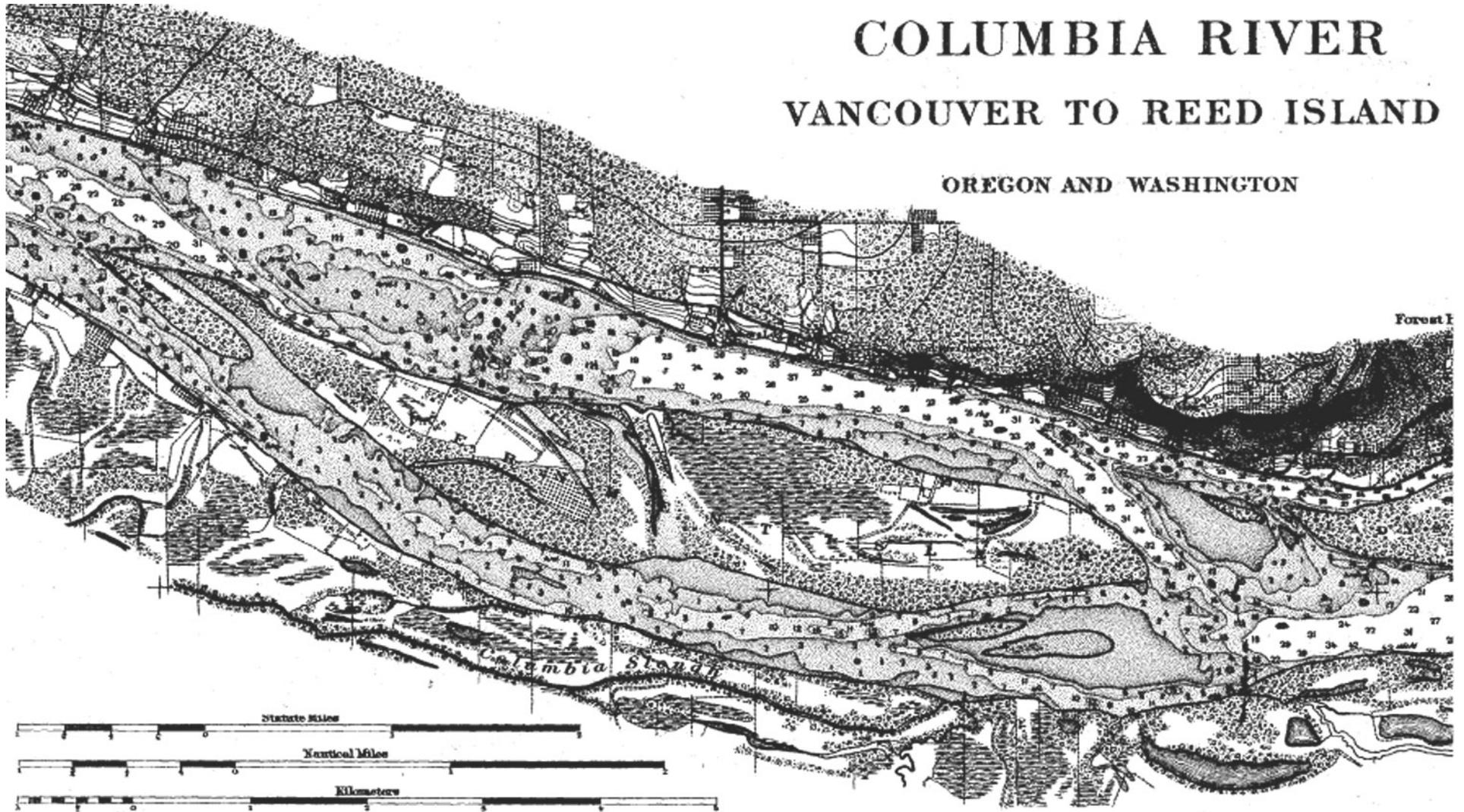
4 HISTORY

On November 3, 1805, Lewis and Clark camped on Government Island which they called Diamond Island because of its shape. They described it in their journals as "mostly prairie with a large pond full of swans, geese and ducks." The islands were surveyed in 1841 by the U. S. government (Figure 3a); at that time Lemon Island was called Smiths Island, and Government Island was divided into three separate islands called Romer, Sandy and Douglass; McGuire was not visible on the survey. In February 1850 the Government reserved Romer, Sandy and Douglass Islands for military purposes and raised hay; from then on they were called Government Island. In the 1902 the US Coast and Geodetic Survey surveyed the island complex; by that time natural sedimentation processes had merged the three islands and forest and marsh habitat were configured similar to current conditions (Figure 3b).

COLUMBIA RIVER

VANCOUVER TO REED ISLAND

OREGON AND WASHINGTON



5 EXISTING NATURAL RESOURCES

5.1 Natural History / Geology

Prior to the diking, dredging and damming of the Columbia River, the adjacent floodplains and islands were inundated annually during winter floods and spring freshets. The islands were higher areas on the numerous shoals in the Columbia River. Survey maps from the mid-1800s show that the river in the Portland-Vancouver reach was a complex of shallow shoals and bars, with no clear navigable channel. The average depth of the river was 8 feet prior to the formation of a channel dredging association by citizens of Vancouver; this association became the Port of Vancouver. The channel was initially dredged to an average depth of 20 feet in the Vancouver reach by the Vancouver group. The Port of Portland was created in 1891 to dredge a shipping channel from Portland to the ocean.

The seasonally inundated depositional areas, or fluvial surfaces, represented by in-channel bars, shoals, islands, and floodplains adjacent to the channel, provided the conditions required for establishment of floodplain vegetation communities dominated by cottonwood, willows, Oregon ash and other species. These extensive floodplain areas provided abundant habitat for the fish and wildlife communities of the lower Columbia River. These areas were important rearing habitats for juvenile salmonids, and may have provided spawning habitat for some salmonid species.

Damming, diking, and dredging the Columbia River and disposing dredge materials on island shores have altered island ecology. Island ecology has also been impacted by historical agricultural activities. At present, the lower Columbia River has a greatly reduced area of functional floodplain that provides the habitat described above. Former fluvial surfaces are now typically above high water as a result of changes to the annual river hydrograph resulting from river regulation via dams, and isolation of former floodplains by diking and filling. Seasonally wet fluvial surfaces in and along the river are scarce now compared to 150 years ago and more. Large areas of non-native invasive plant species, such as Himalayan blackberry and reed canarygrass now occupy areas once dominated by native floodplain vegetation.

5.2 Hydrology

5.2.1 Columbia River

The historic hydrology of the lower Columbia River is best illustrated by the following quotation from the writings of Rev. Gustavus Hines in 1868, discussing the Columbia River bottomlands:

These [bottomlands], extending from Astoria to the Cascades, the distance of one hundred and thirty miles, are subject to an annual inundation in the month of June. Naturally rich and productive beyond description, when they overflow they seem to lose much of their value. There is, however, a redeeming consideration in reference to these bottom lands. They enjoy two spring seasons. Early in April the grass, which grows most luxuriantly upon them, shoots forth from the rich soil, and from that time until the period of inundation affords an abundance of feed for the immense number

of cattle that seek their living here. While the flood is on, these herds retreat to the highlands, and the water remains so long upon the grass that it dies, and is good for nothing. In July the water recedes, the grass comes up afresh, and grows with great vigor and rapidity; the ground is soon covered with a heavy coating of nutritious herbage, the cattle and horses again rush to their favorite range, where during the rest of the year they revel with delight in the most luxuriant meadows.

What Rev. Hines considered to be “good for nothing” for livestock was in reality the situation that benefited salmonid fishes and other fish and wildlife species - annual inundation of the floodplain.

The record of river surface elevations, or hydrograph, shows the nature of annual Columbia River flows (Figure 4). A winter freshet (flood or high-water period) typically occurs during the December-February period; a spring freshet occurs during the period April-June. The winter freshet is a response to increased rainfall; the spring freshet represents the period of snow-melt in the mountains of the Columbia Basin. Regulation of the river for flood control and power generation has greatly altered the historic hydrology of the Columbia River.

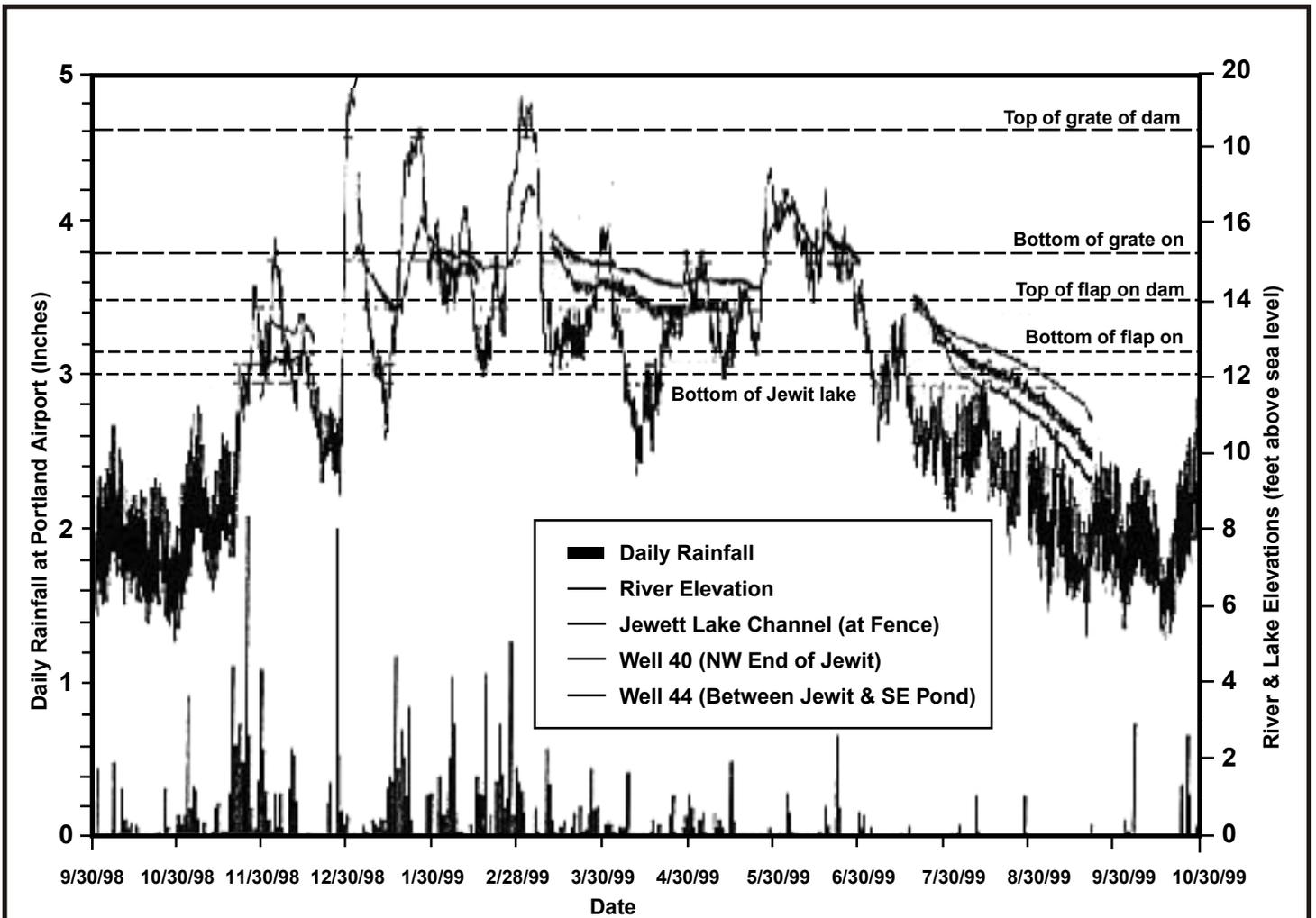
5.2.2 Government Island

The surface and groundwater hydrology on Government Island relies on rainfall and river elevations. There are four main water features on Government Island: Jewett Lake, SE Pond, West Pond and Commodore Inlet (Figure 5). Jewett Lake is the largest and is connected to the Columbia River through a forested, human-made inflow-outflow channel. A water level control structure was constructed across the mouth of the channel in 1993 as part of the Port’s SW Quadrant Wetland Mitigation Project. It allows Columbia River water to enter the lake at river stages between 12.5-15.0 feet (National Geodetic Vertical Datum). Flap gates on the control structure allow water levels above 15 feet to flow out of the lake. River water typically enters the lake during the winter and late spring. Prior to the installation of the water control structure, Jewett Lake water level was subject to both rapid and/or seasonal fluctuations since it was closely tied to Columbia River stage and rainfall from local events. In 1993 the channel was widened and screened to prevent passage of fish in or out of Jewett Lake according to agreements with the National Marine Fisheries Service (NMFS).

Jewett Lake can have year round water in wet years as evidenced in 1996 but typically water is present for 11 months. Water depths range up to 6.5 feet. SE Pond is connected to Jewett Lake at water levels above 15.4 feet NGVD and its hydroperiod is similar to Jewett Lake. The third feature is West Pond which is a seasonal pond located west of Jewett Lake and is used for watering cattle during the spring. It contains shallow water which typically dries out by the end of August. The fourth water feature is Commodore Inlet which is a channel connected to the Columbia River that flows into West Pond at high water levels. Lemon and McGuire Islands have some depressional features that might support seasonal ponds.

5.3 Vegetation Communities

The island complex contains a mosaic of vegetation communities typical of the Columbia River floodplain (Figure 5). Vegetation communities were mapped in 2000 on an aerial photograph and digitized. Mapping was based on vegetation signatures on the aerial (Scale: 1 inch = 800



Hourly river elevation at Government Island (upper graph) and hourly rainfall data from Oregon Climate Center's Portland Station (lower bar graph) from 1 October 1998 to 30 September 1999. Lake and river elevations are shown as feet above mean sea level.

Source: 1999 Government Island Wetland Mitigation Monitoring Report Port of Portland: Portland State University Research and Science Education Collaborative, 2000.



Fishman Environmental Services, LLC

CONSULTANTS IN ECOLOGY AND NATURAL RESOURCE MANAGEMENT

Island Complex Management Plan

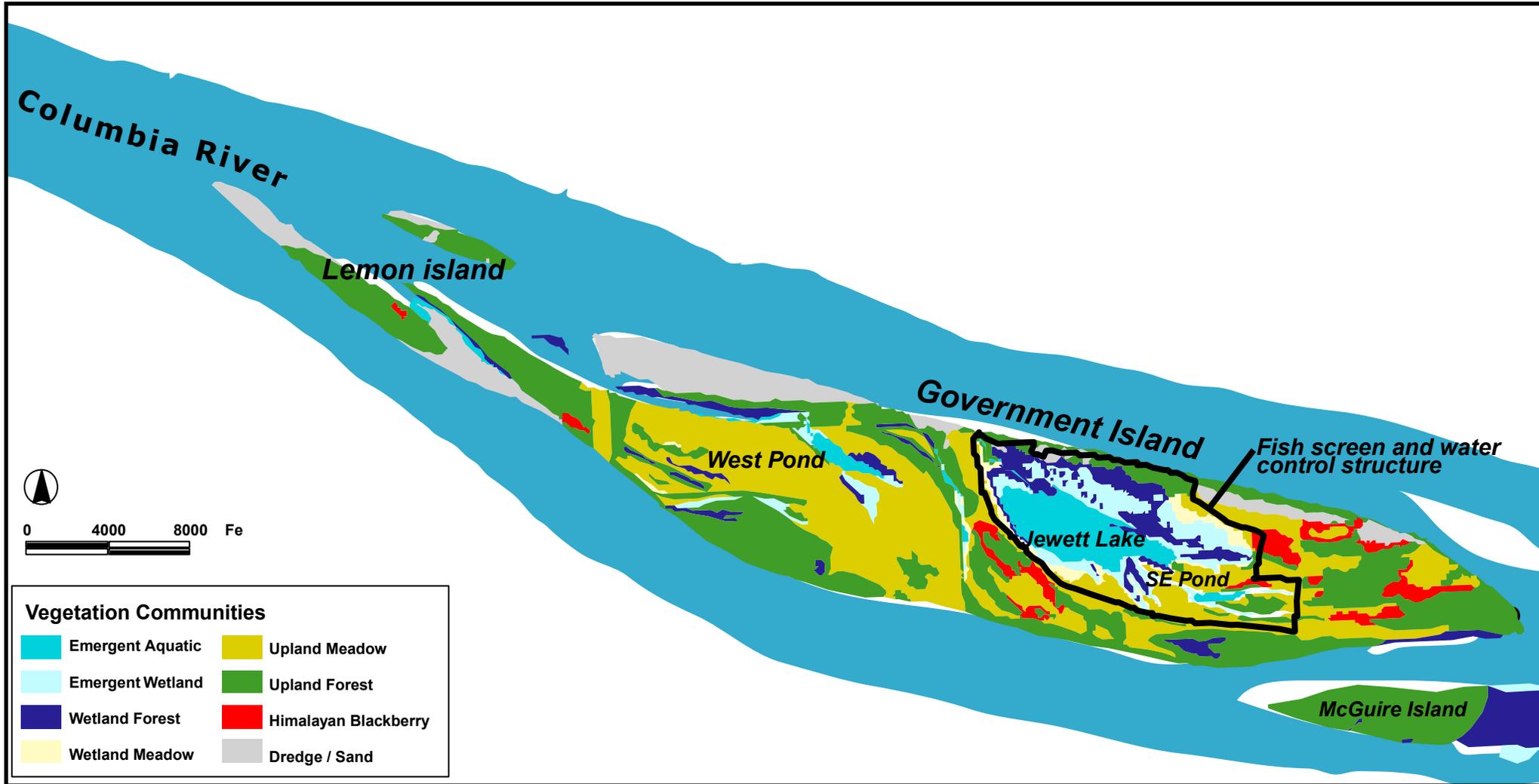
Columbia River and Jewett Lake Surface Water Elevations (1998/1999)

Figure # 4

March 2001

Project # 77020

Figure 5. Vegetation Communities of Island Complex



feet) and field verification where possible. A National Wetlands Inventory map was also used to identify potential wetland areas. Due to the size of the island complex and project constraints it was not possible to field verify every polygon for the purposes of the Management Plan. Community types are generally correct but may include pockets of smaller plant communities that were not discernible in the aerial photograph. For example, in forested areas pockets of wetlands may be hidden beneath the canopy. A vegetation species list is included in Appendix D (Table1).

There are eight vegetation communities including: emergent/aquatic, emergent, wetland meadow, wetland forest, upland forest, upland meadow, blackberry and dredge/sand. Each community is described in the following sections and is expressed as the existing, dominant plant species of each layer. A hyphen separates dominant species within each layer and a slash separates names of species in different layers. Acreages are approximate and were calculated from an ortho-rectified aerial photograph that included most of the islands with the exception of the eastern end of McGuire which was not available.

5.3.1 Emergent / Aquatic

water smartweed (Polygonum coccineum) - creeping spikerush (Eleocharis palustris); approximately 123 acres

The emergent / aquatic community contains surface water for approximately 9-12 months of the year that reaches approximately 6.5 feet deep. Water gradually becomes shallower to dry from August through October or until the fall rainy season begins. Vegetation is dominated by water smartweed, creeping spikerush, water milfoil (*Myriophyllum* species) and pondweed (*Potamogeton* species). It also includes softstem bulrush (*Scirpus validus*), wapato (*Sagittaria latifolia*), bur-reed (*Sparganium emersum*), pepperwort (*Marsilea vestita*), broad-leaf cattail (*Typha latifolia*), water-purslane (*Ludwigia palustris*) and common cocklebur (*Xanthium strumarium*).

5.3.2 Emergent Wetland

reed canarygrass (Phalaris arundinacea); approximately 118 acres

The emergent community is dominated by reed canarygrass. This community contains surface water for approximately 7-9 months of the year that is up to approximately 4 feet deep. Other common species include Columbia sedge (*Carex aperta*), slough sedge (*Carex obnupta*), knotgrass (*Paspalum distichum*), spotted lady's thumb (*Polygonum persicaria*), and sneezeweed (*Helenium autumnale*).

5.3.3 Wetland Meadow

reed canarygrass - colonial bentgrass (Agrostis tenuis) - white clover (Trifolium repens) - pennyroyal (Mentha pulegium); approximately 46 acres

The herbaceous wetland community is located on higher ground in saturated soils surrounding emergent areas; vegetation is dominated by reed canarygrass, colonial bentgrass, white clover and pennyroyal.

5.3.4 Wetland Forest

Pacific willow (Salix lucida var. lasiandra) / reed canarygrass; approximately 171 acres

Forested wetlands are dominated by Pacific willow in the canopy with reed canarygrass dominating understory. Other common constituents include stinging nettle (*Urtica dioica*), Oregon ash (*Fraxinus latifolia*), cow parsnip (*Heracleum lanatum*) and smartweed (*Polygonum sp.*). Lower elevation forests contain surface water for 7-9 months of the year that reaches approximately 4 feet deep.

5.3.5 Upland Forest

black cottonwood (Populus balsamifera) / snowberry (Symphoricarpos albus) / stinging nettles (Urtica dioica); approximately 795 acres

Drier upland riparian forest communities are dominated by black cottonwood in the canopy with snowberry and stinging nettle in the understory. Other common species include wild rose (*Rosa* species), trailing blackberry (*Rubus ursinus*), and Indian plum (*Oemleria cerasiformis*).

5.3.6 Upland Meadow

perennial ryegrass (Lolium perenne) - roughstalk bluegrass (Poa trivialis) – bentgrass (Agrostis stolonifera) -sweet vernal grass (Anthoxanthum odoratum) - tall fescue (Festuca arundinacea) - clover - English plantain (Plantago lanceolata) - common dandelion (Taraxacum vulgare); approximately 649 acres

The herbaceous upland community is dominated by pasture grasses including perennial ryegrass, roughstalk bluegrass, bentgrass, sweet vernal grass and tall fescue with scattered forbs including white clover, English plantain and common dandelion. It also includes large weedy patches of thistle (*Cirsium arvense*), teasel (*Dipsacus sylvestris*), and Himalayan blackberry (*Rubus discolor*). With the exclusion of cattle from the mitigation site, invasive species have thrived in upland meadow areas.

5.3.7 Himalayan Blackberry

(approximately 73 acres)

Himalayan blackberry forms dense thickets throughout the herbaceous upland community and forest margins. Populations were mapped according to areas visible in the 1999 aerial photograph and may underestimate populations hidden by tree cover and may overestimate some areas that have been mowed and possibly controlled since that time.

5.3.8 Dredge / Sand

hare's-foot clover (Trifolium arvense) - rattail fescue (Vulpia myuros); approximately 222 acres

Dominant vegetation in the dredge sand community includes hare's foot clover and rattail fescue. Other common species include sheep sorrel (*Rumex acetosella*), tumble knapweed (*Centaurea diffusa*), Himalayan blackberry, black cottonwood and evening primrose (*Oenothera biennis*).

5.4 Fish and Aquatic Habitat

Fish and aquatic habitat in the Columbia River adjacent to the island complex is typical of the variety of aquatic habitats found in the lower Columbia River. The aquatic habitat along the South Channel is primarily sandy beaches. The river overtops the steep 15-20 foot high banks only during extreme high tides and/or peak river stage. Along the North Channel, the eastern half of Government Island has very little exposed sandy beach and a well-developed riparian fringe. Benefits to fish habitat include shade provided by the riparian vegetation on the banks and cover provided by fallen trees. The western half of the North Channel is primarily exposed sandy beaches.

Water depths in the South Channel are generally less than 10 feet depending on the tidal cycle and river stage. The north shore of Government Island is adjacent to the navigation channel that is considerably deeper and as a consequence is subject to erosive wind-driven wave action. Both shorelines are subject to erosive wave action from pleasure and commercial boat traffic. Nearshore areas of the South Channel are somewhat protected from the stronger currents present in the navigation channel, however the south shore of Lemon Island has suffered some erosion from wave action, particularly during the flood of 1996 (OPRD, personal communication, 2001)

Prior to 1993, Jewett Lake supported a dense population of carp which entered the lake through the inlet/outlet channel. Carp typically entered during high water, spawned, and then left the lake when the water level subsided during the summer. A fish exclusion structure was installed in the channel during 1993 to prevent juvenile salmonids from entering Jewett Lake. Generally, fish can only enter the lake during very high river levels (24 feet) when water overtops the control structure and dikes. The screen mesh (1/8 inch) prevents all except the smallest larval fishes from entering the lake under typical river conditions.

Although the fish exclusion structure has rendered the channel to Jewett Lake impassable to all but the smallest larval fishes, the Columbia River overtopped the screen during the high flow events of 1996 (River Stage reached 26 feet). FES conducted a fish survey of Jewett Lake and the channel connecting Jewett Lake with the Columbia River with beach seines and a backpack electro-fisher in June 1998 to determine which species of fish were present (FES 1998). Six species were found including 2 native species (sucker, three-spined stickleback) and 4 non-native species (common carp, black crappie, pumpkin seed, black bullhead). Jewett Lake dried completely in 1999 and resulted in fish mortalities. Monitoring of the fish stranding indicated that most were carp; no salmonids were noted.

Fish surveys of the northern shoreline of Government Island in the Columbia River were conducted in various habitat types on a monthly basis in 1998 and during the winter and spring of 1999 by Ellis Ecological Services (Ellis 1999). A total of 26 species were encountered during electrofishing surveys. Half of these species are native and half are introduced warm water species (Table 2, Appendix D).

The benthic invertebrate community in the vicinity of the islands is likely similar to the assemblage of taxa found adjacent to Hayden Island where invertebrate diversity was found to be low and dominated by 2-4 taxa. The dominant species included midge flies (chironomidae), Asian clams (*Corbicula fluminea*), amphipods (*Corophium salmonis*), and tubificid worms.

5.5 Wildlife and Habitat Values

5.5.1 *Wildlife*

A variety of migratory and resident wildlife species typical of the Columbia River Corridor have been observed on Government Island and reflect species that inhabit the island complex. The cumulative list of species observed on Government Island from 1995 through 2000 includes 162 species based on data collected by Portland State University (PSU 2000), FES (2000) and Bob Altman (personal communication, e-mail 2000): 145 bird, 12 mammal, 4 amphibian, and 2 reptile (Table 3, Appendix D).

Water and emergent wetlands attract waterfowl, waders, shorebirds and wetland associated species. In the winter and early spring the high water levels in Jewett Lake and the protection afforded by the riparian canopy attract a variety of waterfowl including large numbers of Canada goose, mallard, northern shoveler, northern pintail, bufflehead, and ring-necked duck, and smaller amounts of wood duck, pied-billed grebe, lesser scaup, common goldeneye, American wigeon, green-winged teal, gadwall, hooded merganser, ruddy duck and American coot. Some waterfowl remain to nest (mallard, Canada goose, hooded merganser, cinnamon teal and wood duck). In May large numbers of aerial insectivores arrive and forage over ponds and the Columbia (barn swallow, tree swallow, cliff swallow, Vaux's swift, purple martin). The tree and violet green swallows remain and nest in cavities in snags and dead branches of willow and cottonwood trees surrounding pondings; purple martin nest in nest boxes installed on docks. Great blue heron are present year-round attracted by a plentiful food source in the shallow waters of Jewett Lake and West Pond. As the pondings dry out, mudflats attract migrating shorebirds such as greater yellowlegs, least sandpiper, killdeer, dowitchers, and snipe.

The riparian community provides habitat for other species. Raptors are attracted to the tall tree perches that they use for roosting or stalking prey; red-tailed hawk, red-shouldered hawk, northern harrier, Cooper's hawk, great horned owls, osprey, merlin, American kestrel, and peregrine falcons have been observed. Many songbirds utilize the islands during spring and fall migration including: olive sided flycatcher, Hammond's flycatcher, western kingbird, solitary vireo, Nashville warbler, western tanager, black-throated sparrow, Lincoln's sparrow, golden-crowned sparrow, purple finch, pine siskin, American pipits, white-throated sparrow, and chipping sparrow. They find important forage and water resources to replenish energy reserves to continue their migration. Others are likely to nest on the island in riparian and riparian/edge habitat. These include cavity nesters (downy, hairy and pileated woodpecker, flicker, black-capped chickadee, brown creeper, house wren), sparrows (savannah, song, white crowned), crow, bushtit, Swainson's thrush, robin, starling, cliff swallow, warbling vireo, orange-crowned warbler, common yellowthroat, red-winged blackbird, brown-headed cowbird, Bullock's oriole, black-headed grosbeak, lazuli bunting, house finch, purple finch, spotted towhee, osprey, bald eagle, great-horned owl, red-tailed hawk, common merganser and American crow.

Observations of mammals include nutria, beaver, meadow vole, squirrel, cottontail, mole, white-tailed deer, black-tailed deer, striped skunk, coyote, opossum, raccoon, river otter, harbor seal, feral cat, deer mouse gopher and shrew ((PSU 2000; OPRD, personal communication, 2001).

5.5.2 *Habitat Value*

The large size of the island complex, limited human disturbance, and interspersed riparian canopy, grassland, wetland and water resources provides habitat diversity that supports species richness. Forest habitat provides protective cover close to wetlands and water resources. It also provides diverse opportunities for nesting, roosting, and perching. Snags and downed large woody debris are abundant in both upland and wetland forest communities. Dead branches and snags provide potential cavity nesting sites for over 10 cavity nesting species. Large woody debris from tree fall provides abundant refugia for small wildlife species (e. g. red-legged frog, salamander, vole) and provides important nutrients for plants to absorb.

The wildlife values of the island complex are also related to its ecological and landscape context. The islands are part of a larger network of natural resource areas in the lower Columbia River corridor and are positioned to be used by wildlife moving upstream-downstream along the corridor between the Sandy River and Sauvie Island. The larger natural resource units along the corridor provide increased habitat diversity and space to accommodate a variety of migrant and resident wildlife species. Figure 6 shows the locations of these regional wildlife resources.

5.6 Special-Status Species

Special-status species include plant and wildlife species that are federally or state listed as threatened or endangered, candidate species for listing, or other species of concern that do not currently have legal status but are being monitored by regulatory agencies because their populations have declined or are declining. A table of special status species, status, primary habitat and potential occurrence in the management plan area is included in Appendix D (Table 4).

5.6.1 *Special-Status Fish Species*

The lower Columbia River in the vicinity of Government Island is utilized by anadromous salmon and steelhead and cutthroat trout primarily as a migratory route between upstream spawning areas and the Pacific Ocean. The following information provides a brief overview of potential salmonid use in the vicinity of Government Island area and when these species would be expected to be present. Estimated timing for occurrence of juvenile and adult salmonids is presented in Table 5 (Appendix D).

Four evolutionarily significant units (ESUs) of chinook salmon migrate past the island complex. These include the upper Columbia River Spring-run ESU, the Snake River Fall-run ESU, the Snake River Spring/Summer-run ESU and the Lower Columbia River ESU. Adult chinook generally enter the lower Columbia River from March through July with the exception of the Snake River fall chinook ESU which enter the river from August through September. They generally occupy the deeper water offshore near or adjacent to the navigation channel. Juvenile chinook, particularly sub-yearling chinook, generally orient closer to shore in shallow water. Juvenile chinook of certain ESUs may reside and rear in the lower Columbia River or the estuary prior to entering the ocean. Most juvenile chinook have passed Government Island by June with the exception of Snake River fall chinook and the lower Columbia River chinook ESUs. The Snake River salmonid ESUs exhibit a high degree of variability but are thought to pass through the lower Columbia River in the summer months. The lower Columbia River chinook salmon ESU consists of Oregon and Washington populations of mostly hatchery-based production.

Figure 6. Regional Wildlife Areas

This figure is currently not available.

Populations within this ESU exhibit wide variation in out-migration timing due to variation in spawning timing (fall and spring runs) and water temperatures. The majority of juveniles migrate downstream as subyearlings following emergence which may occur as early as December. Two peaks in juvenile outmigrants through the islands would likely occur in mid-March to mid-April and late August through September.

Juvenile upper Columbia River ESU spring chinook salmon generally pass the upriver dams in early April and reach a peak in mid-May. It is likely that these fish occur in the vicinity of Government Island from late April through late June.

Juvenile chum salmon from the Columbia River chum salmon ESU likely move past Government Island between early March and late April since they begin their out-migration immediately upon emergence from the gravel. Adults can be found in the river from October through December. In recent years, spawning chum salmon have been observed near the Washington shore of the Columbia River north of Government Island at approximately river mile 115.

Coho salmon (Lower Columbia River/Southwest Washington ESU) are currently under review by NMFS as a candidate species. Listing has not been warranted because of apparent widespread dilution of native coho populations with hatchery fish. Any remaining native coho populations probably enter the lower Columbia River in late November and December. The downstream juvenile migration past Government Island likely begins in April, peaks in May and declines in early June.

Four ESUs of steelhead trout migrate past Government Island. Juveniles from the upper Columbia River ESU migrate downstream past Bonneville Dam between mid May and late June. These juveniles would be expected to pass Government Island within a week of passing the dam. Juveniles from the Snake River Basin steelhead ESU move downstream in a similar timing pattern. The lower Columbia River steelhead ESU includes juveniles moving out of major tributaries below Bonneville Dam including the Wind and Washougal Rivers on the Washington side and the Hood and Sandy Rivers on the Oregon side. Downstream migration typically peaks in late April/early May and declines through late June. The Middle Columbia River steelhead ESU juvenile downstream migration occurs from late March through June peaking from late April through mid May.

Snake River sockeye salmon have been listed as endangered since 1991. Adult sockeye salmon migrating upstream past Government Island can occur from late May through mid-August. Juveniles from this ESU would be expected to occur from mid-May to mid-July peaking in early June.

Coastal cutthroat trout from the southwest Washington/lower Columbia River ESU are proposed for federal listing as a threatened species. Although not currently listed, the southwest Washington/lower Columbia River ESU has been found by the NMFS's Biological Review Team (BRT) to be at significant risk to become endangered. The primary risks to this ESU are habitat degradation in the tributary streams and negative effects of hatchery-origin cutthroat trout on the naturally-produced populations through competition and hybridization. Juvenile cutthroat could potentially be found migrating past Government Island from March through mid May with

peak numbers occurring in April. Cutthroat typically utilize the upper and lower reaches of small tributary streams and usually spend from one to three years in fresh water prior to migrating to the ocean.

5.6.2 *Special-Status Wildlife Species*

Special-status wildlife species, which have been observed on Government Island, include red-legged frog, bald eagle, peregrine falcon, pileated woodpecker, little willow flycatcher, olive-sided flycatcher, western meadowlark, horned grebe, red-necked grebe, bufflehead, purple martin, and Columbia white-tailed deer (PSU 2000). Other potential species include the northwestern pond turtle, tri-colored blackbird, yellow-billed cuckoo, and bats.

The northern red-legged frog (*Rana aurora*) is a federal species of concern and a state sensitive species of undetermined status. It inhabits wetlands and slow moving streams. It breeds in seasonal ponds where it deposits large egg masses in January/February. Red-legged frog breed in seasonal ponds throughout Government Island and are abundant in the Jewett Lake area as well as forested wetland pockets within the riparian forest community.

The bald eagle (*Haliaeetus leucocephalus*) is a federal and state threatened species. It is associated with rivers and lakes with nearby tall trees or cliffs for nesting. It feeds mainly on fish and also eats a variety of carrion (Csuti 1997). The bald eagle is often observed perching in trees on Government Island throughout the year and an active nest was observed in 2000 (Sharon Gordon, Port of Portland, personal communication 2001). The Columbia River provides food for eagles and a travel corridor.

The peregrine falcon (*Falco peregrinus annatum*) is a state endangered species. Its most critical habitat component includes suitable nest sites, which are usually cliffs overlooking fairly open areas where they hunt their prey (waterfowl) but also can be tall buildings or bridges. Peregrine feed on avian prey including waterfowl, shorebirds and passerines (Csuti 1997). The peregrine falcon has occasionally been observed in June and in the fall on Government Island.

The pileated woodpecker (*Dryocopus pileatus*) is a state vulnerable species. It is associated with mature coniferous and deciduous forest habitat and requires large snags, for nesting and foraging. Optimum nest snags are at least 20 inches in diameter and 31 feet tall (Marshall 1996). Other habitat components include dense forest, high snag densities, stumps, large woody debris and tall shrub cover. It has been observed throughout the year on Government Island.

The little willow flycatcher (*Empidonax trailii brewsteri*) is a federal species of concern and a state vulnerable species. It is found in willow thickets at the edges of streams or forest clearings. It eats mostly flying insects. It is a summer resident that typically arrives in Oregon in mid-May (Csuti 1997). It is common during the summer in the island complex and is expected to nest in riparian habitat.

The olive-sided flycatcher (*Contopus cooperi*) is a federal species of concern and a state vulnerable species. It nests in coniferous forest and passes through the island complex as a spring migrant. It forages primarily on flying insect(Csuti 1997)s. Olive-sided flycatchers have been observed on Government Island in June 1995 and May 1999.

Bufflehead (*Bucephala albeola*) are state sensitive species of undetermined status. They nest near mountain lakes surrounded by open woodlands containing snags. They eat both animal (snails in inland waters) and plant material (Marshall 1996). Bufflehead are common on Jewett Lake in March and April.

The western meadowlark (*Sturnella neglecta*) is a state sensitive critical species. It inhabits open grasslands and is adapted to agricultural operations. During the breeding season it dines primarily on insects and during the winter on seeds (Csuti 1997). It was observed on Government Island during the fall.

The red-necked grebe (*Podiceps grisegena*) is a state sensitive critical species. It typically inhabits open water over 5 feet deep with bulrush. It primarily feeds on aquatic insects, crustaceans, mollusks, amphibians and annelids (Csuti 1997). It was observed on Jewett Lake during the fall.

Purple martin (*Progne subis*) is a state sensitive critical species. It is a summer resident that nests in nest boxes placed on the docks on the north shore of Government Island. Its diet consists mainly of flying insects ants, wasps, bees, mosquitoes, beetles, dragonflies, moths, butterflies, and grasshoppers (Csuti 1997). It forages for insects over the Columbia River.

Columbia white-tailed deer (*Odocoileus virginianus leucurus*) is a federal threatened and a state sensitive species of undetermined status. It inhabits a few islands in the Columbia River. It is a grazing animal with about 80% of its diet consisting of grasses and forbs and the rest of branches of woody vegetation (Csuti 1997). It grazes in grasslands and takes shelter in cottonwood /willow riparian community. Deer have been observed on the island throughout the year by PSU students when they were monitoring the mitigation site (PSU 2000). OPRD staff have only observed black-tailed deer and question the occurrence of white-tailed deer (OPRD personal communication 2001).

The northwestern pond turtle (*Clemmys marmorata*) is a federal species of concern and a state critical species. It inhabits a variety of permanent and seasonal pondings including lakes, streams, rivers, sloughs and ponds; basking areas, in-water and bank refugia, and aquatic and emergent vegetation are important. Nearby terrestrial habitats are used for egg laying, dispersal and overwintering. There is potential turtle habitat on Government Island in Commodore Inlet and various interior pondings.

The tri-colored blackbird (*Agelaius tricolor*) is a federal species of concern and a state peripheral species. It primarily breeds along the coast and valleys of central and southern California but can breed in Oregon. Nesting habitat includes emergent vegetation or scrub-shrub thickets that border wetlands; often with red-winged blackbird. In Oregon nesting colonies have been associated with cattail or Himalayan blackberry (Marshall 1996). It eats mostly animal food during the breeding season (e. g. grasshoppers, damselflies, snails, small tadpoles). Tri-colored blackbird have not been observed on the island complex but as the emergent community develops potential habitat will improve.

The yellow-billed cuckoo (*Coccyzus americanus*) is a state critical species. Although it was formerly a common breeding species along the Columbia River, it has declined in the western U. S. since the 1930s. It inhabits large riparian forests, particularly those with cottonwood canopies and dense willow understories (Csuti 1997). The last confirmed record was at Smith and Bybee Lakes in 1985. Government Island forests could provide cuckoo habitat if their understories were enhanced.

A variety of federal species of concern and state sensitive bat species potentially roost and/or forage on the island complex. Bats most likely utilize the island complex but have not been studied.

5.6.3 Special-Status Vegetation Species

No special-status vegetation species have been observed on the island complex. Potential habitat is not present for most species or native plant communities have been disturbed by past land use activities and species are not expected to occur. However, potential habitat is present for two species: Columbia cress (*Rorippa columbiae*) is a state candidate species which inhabits shorelines, and water howellia (*Howellia aquatilis*) is a federal threatened species which inhabits seasonal ponds. Surveys for these species are needed to determine presence or absence of these species.

6 MITIGATION

6.1 Jewett Lake Mitigation Area

The Jewett Lake site (432 acres) was selected for wetland mitigation to replace the loss of winter waterfowl habitat resulting from the fill of 65 acres of emergent wetlands at PDX SW Quadrant in 1993. Prior to the mitigation project, Jewett Lake was heavily trampled and grazed by cattle; vegetation was sparse and provided limited food and cover for wildlife. Mitigation included enhancement of Jewett Lake by excluding cattle and installing a water control structure to retain water longer in Jewett Lake. Vegetation diversity, food, and cover have increased significantly since 1993. In 2000 vegetation in the lake basin was dominated by water smartweed, creeping spikerush and reed canarygrass. Detailed descriptions of dominant vegetation are included in Section 5.3 Vegetation Communities above. The mitigation project was successful in enhancing existing wetlands, creating an additional 58 acres of wetlands and providing wildlife habitat values lost at SW Quad. Performance criteria were met and proven by Habitat Evaluation Procedure (HEP) results (Appendix D). Regulatory agency staff participated on the HEP review team and concurred with the results. HEP calculations demonstrated that the mitigation site provided more than the predicted amount of Average Annual Habitat Units (AAHUs) and improved wildlife habitat values (FES 2000).

6.2 Future Mitigation

In the future the Port may pursue additional natural resource mitigation projects on the island complex for unavoidable impacts on their properties located near the Columbia River. Mitigation would include habitat enhancement of wetlands and/or uplands and would be designed to mimic historic plant assemblages for the Columbia River floodplain. It would be consistent with FAA regulations and concerns regarding bird hazards at PDX and would promote

native plant communities to support state sensitive species. Mitigation would target replacing disturbed, non-native communities (e. g. Himalayan blackberry) with native communities. Cattle would be excluded from mitigation areas.

7 EXISTING ACTIVITIES

7.1 Weed Control

Invasive weeds are common on the island complex. Himalayan blackberry, thistle, and teasel are widespread in grasslands and forest margins and have been very difficult to control. Additional weed species occur outside of the grassland and wetland areas. Scot's broom, knapweed and blackberry have invaded bare sandy dredge disposal areas. Controlling invasive weeds is a long-term problem that will require an aggressive pro-active management program.

The Port and OPRD are currently utilizing biological, physical and chemical methods to control weed populations. Biological controls (Biocontrol) use natural enemies such as insects that target specific plants. For example, Cinnabar moths were introduced on Government Island years ago by USDA to control the spread of tansy ragwort. Cattle are also used as a “Biocontrol” to assist in vegetation management by lightly grazing meadows; if the cattle were removed completely without weed management, weeds would proliferate as is evident on portions of the Jewett Lake mitigation site. Physical methods include mowing, hand pulling, and flooding. Chemical methods include herbicide treatments targeted to specific plant species. The Port is responsible for managing weeds on the Jewett Lake mitigation site while OPRD is responsible for the remainder of Port owned property. Control measures used for each species are discussed in Section 8 Management of Key Issues.

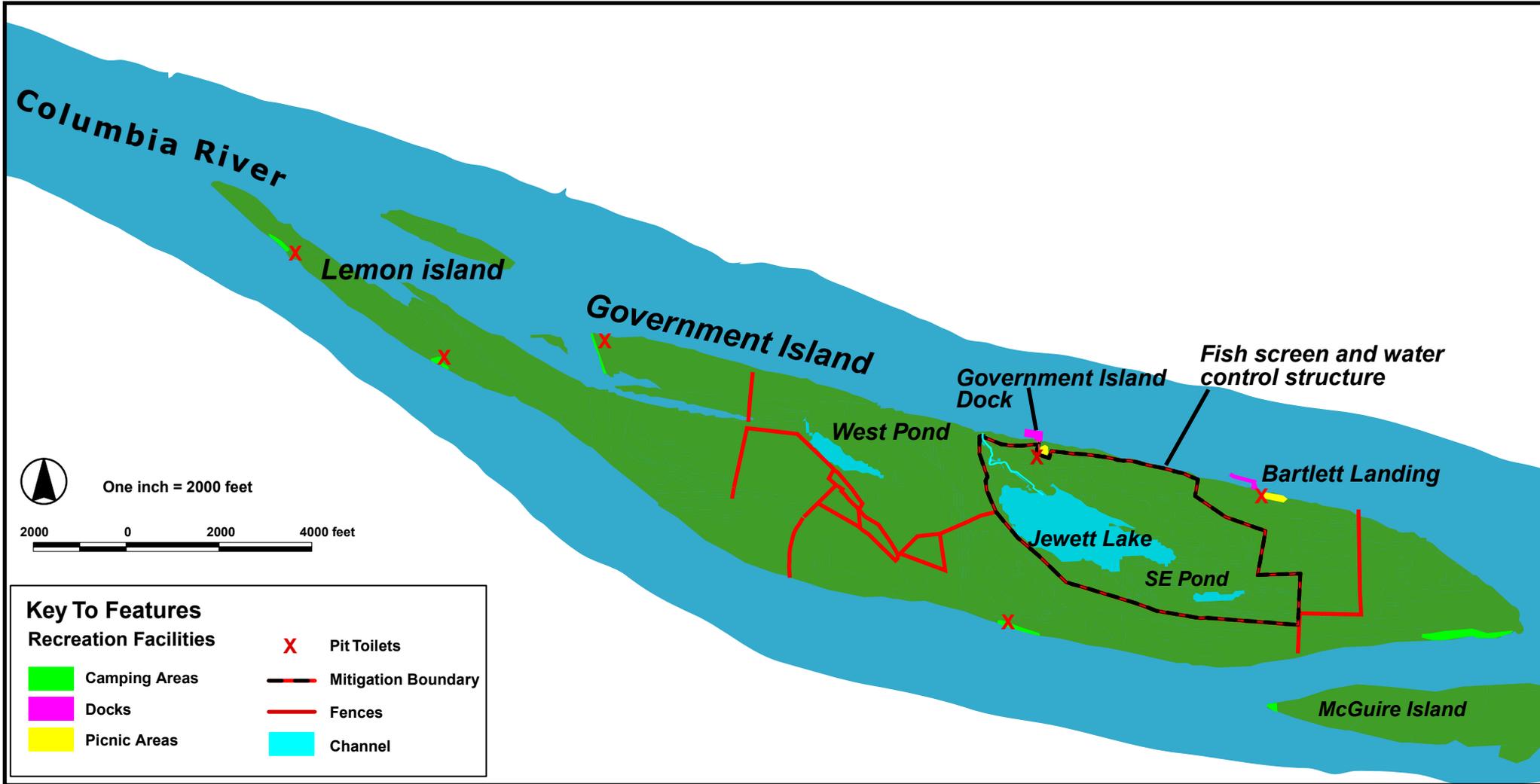
7.2 Recreation

Recreational uses are managed and regulated by OPRD with assistance by the Multnomah County Sheriff’s River Patrol as needed. Rules and regulations are currently posted at five main camping areas (west and southeast Lemon Island, Commodore Cove, south Government Island, and McGuire Island) and the two docks on the north side of Government Island (Figure 7). OPRD monitors recreational use from June through December with boat and tent counts; occupancy is based on 3 people per boat and 2 people per tent. Counts were done on weekends and adjusted for the rest of the week based on spot checks. In 1998 use was estimated at 5000 people; in 1999, 5,800 and in 2000 it was estimated to be 4,200 people.

7.2.1 Boating

The Columbia River is the most used waterbody for fishing, sailing and cruising in Oregon. Government Island is the most popular cruising destination in the Portland metropolitan area according to an Oregon State Marine Board (OSMB) survey. Boater activity is highest from Memorial Day weekend to Labor Day weekend. Utilization of the island complex as a boating destination and day use area is facilitated by four public launch sites in the vicinity including Parker Landing (Camas-Washougal) located at river mile 121, Chinook Landing, located at river mile 118.5 in Troutdale, M. James Gleason Ramp located at river mile 109.4 in Portland, and Vancouver Marine Park, located at river mile 108.

Figure 7. Recreation Facilities on the Island Complex



Recreational improvements on Government Island include two moorage facilities for large boats located on the north shore: Government Island Dock and Bartlett Landing (Figure 7). Bartlett Landing dock is protected with a log boom and both docks have shore access where toilets and picnic tables are located. Bartlett Landing also has a small pavilion for picnicking. OPRD estimates that about 670 boats, or 40% of recreational users, utilize the two docks; however, both facilities are typically filled to capacity on most weekends during the boating season. There is also a floating dock located in Commodore Cove at the mouth of Commodore Inlet. The docks are posted as public docks by the Port of Portland. They require regular maintenance and have a remaining life expectancy of approximately 10 years (2010). The Oregon Marine Board (OMB) has recommended improvements for both of the north shore docks and awarded grant funds for the 2001-2003 biennium, in conjunction with federal grant funds from the Boating Infrastructure Grant (BIG) program targeted for boats 26 feet in length and over, for construction of an improved transient tie-up facility at Bartlett Landing. They have also proposed moving Government Island Dock approximately one-half mile downstream from its current location to better serve recreational users (DEA & McKeever/Morris, Inc. 1997).

High volumes of day and overnight use occur on beaches throughout the island complex where small boats land and anchor. High use areas on Government Island include the south shore across from NE 148th Avenue and McGuire Island and the north shore east of I-205. High use areas on Lemon Island occur on the west and southeast shores. The west and east ends of McGuire Island are also used.

7.2.2 *Camping*

Camping is regulated by OPRD. Users must limit stay to 14 days and no permanent shelters are allowed. Camping is only allowed on beaches to protect vegetation; no tree cutting or damage to trees is allowed. Major camping areas are equipped with pit toilets (Figure 7). Campfires are limited to beaches; in heavy use areas, such as the beach at Commodore Inlet, OPRD has installed fire rings. Campers are responsible for hauling out garbage including burnt items and ensuring that campsites are left clean and in a natural state. Dogs must be leashed at all times to protect wildlife, cattle, visitors and staff.

7.2.3 *Toilets*

Eleven toilets are located at boat docks and popular camping areas throughout the island complex: two (pit) on the west end and one (pit) on the southeast end of Lemon Island, one (chemical) at the east end of McGuire Island, and seven on Government Island, one (pit) by Government Island Dock, two (composting) by Bartlett Landing dock, two (pit) at the entrance to Commodore Inlet, and two (pit) on the south shore. The toilets are anchored with concrete and are not intended to be moved. Disposal is on site, except the chemical toilet which is taken to marine pump-out facilities for disposal. The environmentally friendly composting toilet block at Bartlett Landing was constructed through a facility grant provided by the OMB. OPRD maintains and monitors toilets regularly for sanitation purposes and evaluates the need for additional toilets.

7.2.4 *Trails and Roads*

Deer trails are scattered throughout the islands and cattle trails are common on Government Island. OPRD has constructed an access trail from the existing transient tie-up dock to the composting toilet block at Bartlett Landing and is proposing to construct another access trail

from the proposed transient tie-up docks to the picnic shelter. Soft-path trails, located between docks and toilets, as well as some other trails are maintained regularly by OPRD; other trails are not maintained. Bikes and motorized vehicles are prohibited on trails except for emergency or maintenance access. Existing unpaved roads on Government Island are maintained for maintenance vehicle and emergency access, and movement of cattle.

7.2.5 Hunting

The island complex is posted as a “no hunting” area which means no hunting is allowed in the interior of the islands. DSL allows waterfowl hunting below the vegetation line (Ordinary High Water) surrounding the islands, and this occurs mostly at Commodore Cove and McGuire Island.

7.3 Agriculture / Grazing

Government Island has been used as a cattle pasture for at least thirty years. During the early grazing history there were up to 1000 cattle on the island at one time and vegetation was severely over grazed (Bierly 1981). This created the present weed problem by disturbing native soils and vegetation and allowing weeds a foothold. Cattle numbers have decreased considerably since that time. OPRD currently has a lease agreement with Strasheim Farms, Inc. allowing them to graze up to 500 animal units for 1800 acres from April 15 through mid-November; in 2000 they grazed 350 head (OPRD personal communication 2001). The number of cattle allowed on the island depends on the carrying capacity of current ecological conditions; the 2001 lease agreement was based on consultation with the Oregon State University Extension Service representatives who evaluated stocking rates, range conditions, capacity, ability to manage, fencing and local conditions of the Government / Lemon Island site. Cattle have access throughout Government Island / Lemon Island with the exception of the Jewett Lake mitigation site. Watering of cattle is uncontrolled and they have free access to West Pond, the Columbia River and other interior ponds. Cattle are used to assist in vegetation management by controlled grazing methods; controlled grazing helps prevent weed proliferation which typically occurs when cattle are removed completely without viable weed control measures in place.

7.4 Riverfront

The Columbia River navigation channel is located north of Government Island. The US Army Corps of Engineers is responsible for maintaining the channel to a depth of -17 feet (Columbia River Datum) by periodically removing restricting shoals. The channel is generally dredged to a depth of -19 feet CRD to ensure that a depth adequate for current users is maintained between dredging operations. Dredged material used to be placed on the north shore of Government Island, from the west end east to the Jewett Lake inlet/outlet channel; now it is placed within the flow lane, where the navigation channel is greater than 20 feet deep, or it is removed by commercial aggregate mining companies. No material has been placed on the island in the past 20 years.

The Corps also maintains river control structures (pile dikes) to focus flow in navigation channels, provide bank protection and reduce erosion. On the eastern end of Government Island there are a series of timber pile dikes. The pile dikes restrict boat access from the south channel to the navigation channel between McGuire and Government Island during low summer flows.

The Division of State Lands (DSL) permits log raft moorages adjacent to Government Island. Log rafts are now rarely moored along the island but the Oregon State Marine Board staff have documented 8 abandoned mooring dolphins on the north side; 3 at Government Island Dock and 5 at Bartlett Landing. Some of these dolphins are used by osprey as nesting platforms; others have become derelict and their broken or submerged piles are a navigational concern.

8 MANAGEMENT OF KEY ISSUES

The key issues in this plan were identified from a review of ongoing activities on the islands. The focus is on the Port of Portland's responsibilities on the mitigation site and its coordination with OPRD on activities covered in the lease agreement. Specific management objectives and actions of OPRD are not addressed in any detail in this plan apart from the 20-Year Plan for Government Island (Appendix C).

Each of the following sections presents Port management objectives, background narrative and management actions. The sections cover the following activities:

- vegetation management
- mosquito control
- fish management
- mitigation
- recreation
- education
- agriculture
- riverfront

8.1 Natural Resources

PORT MANAGEMENT OBJECTIVES:

<i>Preserve the natural character and quality of the natural resources of the islands.</i>
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8.1.1 Vegetation Management

Weed management has received significant attention from both the Port and OPRD. The Port has a maintenance program for blackberry, teasel and thistle in the upland areas of the mitigation site which includes mowing, chemical spraying and reseeding. In wetland areas of the site, reed canary grass is being addressed by increasing native woody plant densities to develop the overhead canopy. OPRD has proposed weed control measures as part of their 20-Year Plan (see Appendix C) and has been implementing a regular program of weed removal using OPRD staff, volunteers and inmates on selected areas of both Government and Lemon Islands. OPRD continues to use grazing as a tool in weed management outside the mitigation site.

Control measures for each weed species are discussed in the following paragraphs. All managed patches of invasive plants should be monitored annually to determine the most effective treatments. After treatment, areas should be seeded with more desirable species.

Himalayan blackberry is widespread throughout the historically over-grazed upland habitats on the islands. It is the dominant understory plant on forest margins and narrow linear woodlands; it also forms massive clumps in grasslands. Himalayan blackberry spreads from seeds and tip runners and is extremely persistent. A combination of mowing and herbicide spraying has been used to control well-established thickets. Each year more areas show improvement but it will take several years of pro-active management to control the large blackberry population. The best strategy for dense thickets in grasslands is to mow in the summer (late July) when the berries are green and again in the late fall; this weakens roots by reducing energy storage. In the spring when regrowth begins, spray leaves with a broadleaf herbicide; Crossbow is currently used by the farmer and is applied with a tractor mounted boom. In forest margins the best strategy is to spray the blackberry in September and remove dead canes in the spring. Bare areas in grasslands and forests should be seeded with desirable native species. It takes repeated mowing, spraying and seeding to control blackberry.

Tansy ragwort has been controlled with biocontrols. Cinnabar moths and flea beetles were released on Government Island by the Oregon Department of Agriculture several years ago and appear to be keeping tansy ragwort under control.

Thistle is clustered in patches throughout the grassland habitat. When grazing was curtailed on the Jewett Lake mitigation site, thistle spread dramatically in upland grasslands. The best method for controlling thistle is a combination of herbicide spraying and mowing. Spray rosettes in the spring with Curtail™, or a comparable broad-spectrum herbicide classified as a clopyralid+24D amine. Spraying should occur in the spring (May) as early as possible before the rosettes become hidden by other vegetation. In dense areas spray can be applied with a tractor-mounted boom; otherwise it should be spot-sprayed. For plants that survive spraying, mow during flower bud stage and at the first sign of purple bloom but before full bloom and seed production to prevent seed production and further invasion. Thistle management requires diligent pro-active monitoring and maintenance.

Teasel is located in a large patch at the eastern end of the Jewett Lake mitigation site. Control measures are similar to thistle. Spray rosettes with herbicide in the early spring and mow when the flowering stalk is mature and flowering begins. If mowing occurs too early, the plant may send up another flower shoot; if too late, seeds may be viable. Teasel management requires diligent pro-active monitoring and maintenance.

Scot's broom is located on dredge material on the north side of the island east of the I-205 bridge and should be monitored in all dredge disposal sites. The population is small and has been controlled by hand pulling and cutting. OPRD has organized volunteers to hand pull this population with great success on Lemon Island; approximately 20 acres remain in the vicinity of Commodore Inlet.

Diffuse knapweed is also located on dredge material and occurs on Lemon Island at this time. Knapweed should be hand pulled and monitored in dredge disposal areas to prevent its spread. Gloves must be used to protect hands from the sap which can cause inflammation.

Reed canarygrass has become increasingly dominant on the edges of Jewett Lake since cattle have been removed. It has been weakened by flooding and increasing the hydro-period. On

other sites in the Pacific Northwest it has been eradicated by using a combination of glyphosate herbicide application, prescribed fire, and tillage (Wilson and FES 1994). Tillage and prescribed burning are not allowed on Jewett Lake mitigation site; tillage could disrupt soil structure and surface water ponding capacity of the wetlands and burning is not allowed due to Port regulations. Control of reed canarygrass has focused on flooding and increasing native plant densities.

Actions:

1. The Port will continue to implement its maintenance and monitoring program to manage invasive weed species in the mitigation site.
2. The Port will investigate grazing opportunities for weed management in upland areas of the mitigation site.
3. OPRD will work towards implementing its vegetation management proposals for the island as outlined in Appendix C.

8.1.2 Mosquito Control Program

Multnomah County operates a mosquito control program throughout the entire county to prevent nuisance species and the transmission of diseases. They utilize an integrated pest management approach and target mosquito larvae and their habitats. The Port has contracted with the county to monitor and control mosquitoes in the Jewett Lake area since 1999; the county conducted 3 applications of mosquito larvicide in 2000 (4/26, 6/27, 7/26) with helicopters covering approximately 500 acres. The larvicides (Vectobac G, Vectolex CG) target floodwater and summer mosquito larvae and kill them before they reach adulthood. Use of larvicides avoids toxic spraying for adult mosquitoes that can poison and contaminate natural resources. Spraying in 2000 successfully reduced the mosquito population by greater than 67% (Turner 2000).

Actions:

1. The Port will continue to work with Multnomah County to manage mosquitoes around Jewett Lake and other areas of the island as the need arises.
2. The Port will investigate the feasibility and potential effectiveness of installing bat and purple martin boxes to assist in mosquito control.

8.1.3 Fish Management

The Jewett Lake mitigation project requires regular maintenance of the trash rack, the fish screen and the control structure, which allows water to enter Jewett Lake at elevations between 12.5 and 15 feet NGVD. The trash rack deflects large debris and small organic matter (i. e. leaves) from the screen surface and also serves as a velocity barrier in front of the screen. The fish exclusion design was constructed to prevent juvenile salmonids from entering Jewett Lake and becoming stranded. The Port inspects the condition of these structures throughout the year and undertakes repairs as needed. In addition the Port regularly inspects the fish screen and cleans it as needed when river levels reach 12.5 feet NGVD and above. After high flow events (above 24 feet) that overtop the fish exclusion structure, Jewett Lake needs to be sampled to determine if salmonids have entered the system. During drying events, Jewett Lake needs to be surveyed to document fish mortalities.

The Port also monitors and maintains the channel leading from the control structure to Jewett Lake. Maintenance includes removal of vegetation, debris and silts which accumulate on the bottom.

Actions:

1. The Port will continue to carry out inspections and maintenance of the water control structure, fish screen, trash rack and ditch.
2. The Port will sample Jewett Lake following high flow events to determine if salmonids have entered the Lake.
3. The Port will survey Jewett Lake following drying events to document fish mortalities.
4. The Port will confer with NMFS to establish a plan for addressing potential fish stranding issues.

8.2 Mitigation

PORT MANAGEMENT OBJECTIVES:
<i>Manage the mitigation site to ensure that the mitigation objectives are achieved and preserved</i>
<i>Ensure mitigation activities are compatible with airport operations</i>

The Port has successfully completed its mitigation objectives and five years of monitoring as specified in its permit requirements. The HEP analysis completed in 1999 indicated that more than the predicted amount of habitat units had been achieved and approximately 28 acres of additional wetlands had been created above the 30 acres that were originally required. The Port has implemented blackberry control, monitored plant succession, evaluated wetlands, monitored wildlife usage, conducted a HEP and taken steps to control mosquitoes. The Port is currently evaluating long-term management options for the site.

The Port has identified Government Island as a potential mitigation area for future Port activities. Mitigation opportunities may focus on habitat creation or enhancement for sensitive species.

Actions:

1. The Port will explore long-term management alternatives which will continue to protect and preserve the natural character of the site for wildlife.
2. The Port will continue to identify mitigation opportunities on Government Island to mitigate for unavoidable resource impacts on historic Columbia River floodplain property. These opportunities will be consistent with FAA regulations and concerns regarding bird hazards at PDX.

8.3 Recreation

PORT MANAGEMENT OBJECTIVES:
<i>Ensure recreational use is consistent with maintaining the natural character of the islands</i>

The Port entered into a long-term agreement with OPRD in 1999 that authorized OPRD to manage recreation on the island complex as long as it maintains the natural character of the islands. Their responsibilities include, but are not limited to, enforcing State Park rules, controlling public use, regulating camping, maintaining toilets and fences and policing garbage. As recreational use increases, OPRD must be able to ensure that the natural character of the islands will not be jeopardized. Adequate policing, enforcement and sanitation must be provided. As part of the agreement, OPRD has developed a 20-Year Plan for Government Island that addresses long-term management for the island complex (Appendix C).

OPRD issues an annual report to the Port detailing activities and management issues over the year. Dogs and litter have been noted as requiring enforcement measures. Fires have also occurred, and these have been attributed to careless campers and possibly vandalism.

The Port prohibits hunting in the interior of the islands, but the shore lands, which are owned by the Division of State Lands, are open to hunting. Although no user conflicts have been reported by OPRD, hunting can cause aviation hazards if flocks of birds on the west end of Government Island fly into aircraft movement areas.

Actions:

1. The Port will continue to work with OPRD to ensure that recreational use is consistent with maintaining the natural character of the islands.
2. The Port will continue to prohibit all hunting and/or the discharge of firearms on the island above ordinary high water.
3. OPRD and the Port will work with DSL and/or ODFW to restrict hunting below ordinary high water to prevent aviation hazards.
4. The Port will initiate an internal communication procedure to track activities being proposed by OPRD and ensure a timely response when appropriate.

8.4 Education

PORT MANAGEMENT OBJECTIVES:
<i>Encourage day use of the islands by schools or educational research</i>

No educational programs currently exist on the island complex. In *A 20-Year Plan for Government Island*, OPRD proposes to conduct market analysis to help determine demand and appropriate level of amenities and development options. The Port supports future educational opportunities such as educational signage and low impact activities which minimize disturbance to the islands' natural resources.

Actions:

1. The Port encourages OPRD to provide educational opportunities which minimize disturbance to the islands’ natural resources.

8.5 Agriculture

PORT MANAGEMENT OBJECTIVES:
<i>Ensure cattle management techniques minimize impacts to wetlands and other natural resources</i>

Grazing is used as a management tool to control noxious weeds; when cattle are removed completely without other vegetation management in place, invasive species can proliferate. Cattle are excluded from the Jewett Lake mitigation site but are free to roam the remainder of Government Island including West Pond and the river front. In these areas they have compacted soils and prevented the development of an emergent community. It is important to regulate grazing in wetlands (e. g. West Pond) to protect water resources and wetland communities by establishing specific watering areas. Impacts to the river front from cattle grazing has not been investigated.

Actions:

1. The Port will encourage OPRD to implement cattle management practices that minimize impacts to wetland.
2. The Port will encourage OPRD to evaluate the impacts of cattle grazing on the island beaches and to implement measures to minimize impacts if found.
3. The Port will encourage OPRD to investigate other grazing management opportunities, such as goats, for weed control.

8.6 Riverfront

PORT MANAGEMENT OBJECTIVES:
<i>Ensure navigational related activities are consistent with maintaining the natural character of the island</i>

The US Army Corps of Engineers is responsible for channel maintenance and dredged material disposal. They maintain the Columbia River channel to a depth of -17 feet (Columbia River Datum) downstream of Bonneville Dam by periodically removing restricting shoals consisting of naturally occurring sedimentary material. They also maintain the upper entrance to the Oregon Slough, near RM 109 to a depth of -10 feet CRD. The channel is generally dredged to a depth of -19 feet CRD to ensure that a depth adequate for current users is maintained between dredging operations. Dredged material used to be placed on islands such as Government Island but now is placed within the flow lane, where the navigation channel is greater than 20 feet deep, or it is removed by commercial sand mining companies.

DSL permits log raft moorages adjacent to Government Island, however log rafts are rarely used and log raft leases for the island complex have expired. The Oregon State Marine Board staff

has documented 8 abandoned dolphins on the north side of Government Island. Five of these dolphins are proposed to be removed as part of the Bartlett Landing dock improvement project.

Actions:

1. OPRD and the Port will work together to remove abandoned dolphins during improvement projects to Bartlett Landing and Government Island docks.

9 OVERALL MANAGEMENT: REPORTS, REVIEWS AND UPDATES

Annual review reports will be conducted by OPRD and the Port. OPRD will provide the Port with an end-of-season activity report summarizing the incidents of interest during the prior year. Reports will include a summary of recreation activities, use, and management issues, notable plant or wildlife occurrences, vegetation management successes and failures, cattle management issues, and any additional activities that OPRD has initiated on the island as well as any deviations from the existing plan

The Port will produce a yearly update summarizing the Port’s activities on the islands and will review OPRD’s annual report and lease agreement. This Management Plan will be reviewed by the Port on an annual basis to evaluate its effectiveness and will be updated every 5 years.

10 SUMMARY OF IMPLEMENTATION ACTIONS AND RESPONSIBILITIES

The following actions will be undertaken by the designated responsible organizations in order to ensure timely implementation of the above policies and to address the issues raised in this plan. Organizations include: Port of Portland (Port), Oregon Parks and Recreation Department (OPRD), Multnomah County (MC), Division of State Lands (DSL), Oregon State Marine Board (OSMB), Oregon Department of Fish and Wildlife (ODFW), and National Marine Fisheries Service (NMFS).

Section	Action	Lead	Coordination	Timescale
8.1.1 Vegetation Management	1. Continue to implement maintenance and monitoring program to manage invasive weed species in the mitigation site	Port		ongoing
	2. Investigate grazing opportunities for weed management in upland areas of the mitigation site	Port		2001-2002
	3. OPRD will work towards implementing its vegetation management proposals for the island	OPRD	Port	ongoing
8.1.2 Mosquito Control	1. Continue to work with Multnomah County to manage mosquitoes around Jewett Lake and other areas of the island as the need arises	MC	Port	ongoing
	2. Investigate the feasibility and potential effectiveness of installing bat and purple martin boxes to assist in mosquito control	Port		2001-2002
8.1.3 Fish Management	1. Continue to carry out inspections of the	Port		ongoing

	water control structure, fish screen, trash rack and channel			
	2. Sample Jewett Lake following high flow events to determine if salmonids have entered the Lake	Port	NMFS	ongoing
	3. Survey Jewett Lake following drying events to document fish mortalities	Port		ongoing
	4. Confer with NMFS to establish a plan for addressing potential fish stranding	Port	NMFS	ongoing
8.2 Mitigation	1. Explore long-term management alternatives which will continue to protect and preserve the natural character of the site for wildlife	Port		ongoing
	2. Identify mitigation opportunities on Government Island to mitigate for unavoidable resource impacts on historic Columbia River floodplain property	Port		ongoing
8.3 Recreation	1. Ensure recreational use is consistent with maintaining the natural character of the islands	OPRD	Port	ongoing
	2. Continue to prohibit all hunting and/or the discharge of firearms on the island above ordinary high water	Port	OPRD	ongoing
	3. Work to restrict hunting below ordinary high water to prevent aviation hazards	Port	OPRD, DSL, ODFW	ongoing
	4. Initiate an internal communication procedure to track activities being proposed by OPRD and ensure a timely response when appropriate	Port	OPRD	ongoing
8.4 Education	1. Encourage educational opportunities that minimize disturbance to the islands' natural resources	OPRD	Port	ongoing
8.5 Agriculture	1. Encourage OPRD to implement cattle management practices that minimize impacts to wetland.	OPRD	Port	2001-2002
	2. Encourage OPRD to evaluate the impacts of cattle grazing on the island beaches and to implement measures to minimize impacts if found.	OPRD	Port	ongoing
	3. Encourage OPRD to investigate other grazing management opportunities for weed control.	OPRD	Port	ongoing
8.6 Riverfront	1. OPRD and the Port will work together to remove abandoned dolphins during dock improvement projects.	OPRD	Port, OSMB	2001-2002
9 Management	OPRD to submit annual report to Port	OPRD	Port	annual
	Port to produce annual report of activities	Port		annual
	Management Plan to be reviewed	Port		annual
	Management Plan to be updated	Port	OPRD	every 5 years

REFERENCES

- Altman, Bob. July 12, 1999. Personal Communication: Bird List from a day trip to Government Island.
- Bierly and Associates, Walker and Macy. 1981. *Government Island Resource Management Analysis*. Technical Report prepared for the Port of Portland. 35pp.
- Burr, Susan. 1993. *Recreational Boating on the Mid-Columbia River (St. Helens to The Dalles); Planning for a Network of Public Transient Tie-up Facilities*. Sponsored by Oregon Extension Sea Grant Program and Oregon State Marine Board.
- Busby, P., T. Wainwright, G. Bryant, L. Lierheimer, R. Waples, F. Waknitz and I. Lagomarsino. 1996. Status Review of West Coast Steelhead from Washington, Idaho, Oregon and California. NOAA, National Marine Fisheries Service, Northwest Fisheries Center, Seattle, Washington. 261 pp.
- David Evans and Associates, Inc. and McKeever/Morris, Inc. 1997. *Recreation Feasibility Study for Government, Lemon, McGuire, and Tri-Club Islands*. Prepared for the Port of Portland, ODSL, Oregon Marine Board, OPRD, and Metro Regional Parks and Greenspaces Department.
- Ellis, R.H. 1999. *Draft Biological Assessment for Listed and Proposed Threatened and Endangered Fish Species: Phase I West Hayden Island Port Facilities Development, Port of Portland, Oregon*.
- Fishman Environmental Services. July 1992a. *Portland International Airport SW Quadrant Wetland Mitigation Plan*. FES Project 439. Port of Portland, Oregon.
- Fishman Environmental Services. October 1992b. *Habitat Evaluation of the Port of Portland PDX SW Quadrant Wetland Fill Site and Government Island Mitigation Site*. FES Project 408/439. Port of Portland, Oregon.
- Fishman Environmental Services & Port of Portland. April 1996. *Government, Lemon, and McGuire Islands Management Plan Draft*. Port of Portland, Oregon.
- Fishman Environmental Services. 1998. *Government Island Jewett Lake Water Control Structure Fish Screen Flow Monitoring and Jewett Lake Fish Sampling Report*. Port of Portland, Oregon.
- Hines, Rev. Gustavus. 1868. *Oregon and Its Institutions; Comprising a Full History of the Willamette University, the First Established on the Pacific Coast*. Carlton & Porter, New York.
- Johnson, O.W., M.H. Ruckleshaus, W.S. Grant, F.W. Waknitz, F.M. Garrett, G.J. Bryant, K. Neeley and J.J. Hard. 1999. *Status Review of Coastal Cutthroat Trout From Washington, Oregon, and California*. National Marine Fisheries Service, Northwest

- Fisheries Science Center. NOAA Technical Memorandum. NMFS-NWFSC-37. 320 pp + appendices.
- Johnson, O., W. Grant, R. Kope, K. Neely, F. Waknitz and R. Waples. 1997. *Status Review of Chum Salmon From Washington, Oregon, and California*. National Marine Fisheries Service Northwest Fisheries Science Center, NCAA Tech. Memorandum NMFS-NWFSC-32 255 pp. + appendices.
- Matthews, G.M. and R.S. Waples. 1991. *Status review for Snake River spring and summer chinook salmon*. U. S. Dept. Commer. , NCAA Tech. Memo. NMFS F/NWC-200, 49pp.
- McArthur, Lewis. 1992. *Oregon Geographic Names* 6th edition. Oregon Historical Society Press.
- Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grand, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. Commer. , NOAA Tech. Memo. NMFS-NWFSC-35, 443 p.
- National Marine Fisheries Service. 1997. Endangered and threatened species: listing of several Evolutionary Significant Units (ESUs) of west coast steelhead. Fed. Reg. 61 (155): 41541-51461. U.S. Government Printing Office, Washington, D. C. August 18, 1997.
- Oregon State Marine Board. 1993. *Six-Year Statewide Boating Facilities Plan: 1993-1999*.
- Portland State University. 2000. *1999 Government Island Wetland Mitigation Monitoring Report*.
- Port of Portland. 1994. *Integrated Vegetation Management for Multnomah County Drainage District No. 1*.
- Turner, Dave. 2000. News Release: *County's new mosquito control plan is successful*.

APPENDICIES

APPENDIX A: PORT OF PORTLAND AND OPRD CONTACT LIST

Port of Portland

Correspondence and communications/Lease Interpretation:

Loralie Sinnen, contracts Section, sinnel@portptld.com

Office: 503-944-7538 fax: 503-944-7466

Mitigation Program Manager:

Denise Rennis, Property and Development, rennid@portptld.com

Office: 503-944-7527 fax: 503-944-7466

Emergencies:

First Level of Contact:

Gerry Meyer, Property and Development, meyerg@portptld.com

Office: 503-944-7532 fax: 503-944-7466

Second Level of Contact:

Scott Carter, Property and Development, cartes@portptld.com

Office: 503-944-7510 fax: 503-944-7466

Oregon State Parks

Lease Interpretation/Policy, Management Planning:

Jack Wiles, Area Manager, jack.wiles@state.or.us

Office: 503-872-5288 fax: 503-731-3296

Public Inquiries/Park Management:

Kevin Price, Assistant Area Manager, kevin.price@state.or.us

Office: 503-695-2261 x222 cell: 503-969-8254 fax: 503-695-2226

Emergency after-hours number: 503-695-2253

Park Maintenance & Operations:

John Cowan, Park Ranger, john.cowan@state.or.us

Office: 503-280-6844 cell: 503-969-8304 fax: 503-280-6924

Emergency after-hours: 503-297-5889

Emergencies:

First Level of Contact:

Kevin Price, Assistant Area Manager – Columbia River Gorge Management Unit

Second Level of Contact:

John Cowan, Park Ranger (while on duty will be in radio contact with Park office and Sheriff's Marine Patrol and will monitor the marine radio distress channel)

Native Class: I = Introduced N = Native

APPENDIX B: GROUND LEASE AGREEMENT

This appendix is not available.

Native Class: I = Introduced N = Native

APPENDIX C: OREGON STATE PARKS: A 20-YEAR PLAN FOR GOVERNMENT ISLAND



A 20-Year Plan for Government Island

OPRD's Vision for Government Island

A vision consistent with the Port's ground lease for the Island complex

- Preserve and enhance the natural character and quality of the islands
- Manage to be compatible with airport operations
- Manage to ensure a viable environmental and mitigation area
- Provide opportunities for recreation boating and appropriate access to the islands
- Manage through cooperative agency agreements

A vision for recreation

- Promote passive activities that have minimum impact on the island resources
- Better accommodate existing users
- Promote educational opportunities that minimize disturbance to the islands' natural resources
- Provide opportunities for interpretation and wildlife viewing

A vision for the environment

- Preserve and enhance open meadows and pasture areas with upland forests – restored wetland areas
- Implement large scale weed control
- Focus actions on targeted restoration areas
- Complete a cattle management plan to aid in the control of weeds

Native Class: I = Introduced N = Native

New and continued partnerships

- Enlist partners to help complete a consistent weed management program throughout the island.
- Enlist educational groups to interpret and learn from enhancement of the islands natural resources
- Continue grazing and weed management agreement with rancher
- Work with DSL towards a management agreement for recreation management of the shoreline
- Identify potential funding sources such as fees, boat mooring permits, primitive camping, metropolitan waterway fees and other options to help fund necessary recreation and natural resource management

RECREATION PROPOSALS

Developed Marine Facilities

- Target overnight use on north side of the island– cruisers who primarily stay on their boats
- Target day use on south side of the island– floating docks, composting toilet, – accommodate smaller boats and jet skis
- Confine development near shoreline areas
- Replace existing restrooms as needed

Proposal Descriptions

REDEVELOP BARTLETT LANDING

- Facilities upgraded and expanded as per OMB standards
- Upgrade the existing dock by adding 500 feet of floating breakwater structure that can function as a dock on its interior side.
- Add transient boat tie – ups
- Tables and shelters would be added to support day-use
- Greater protection will be provided to marine structures by installing wave attenuating structures

GOVERNMENT ISLAND DOCK

- Maintain in current configuration
- Do not expand

PROPOSED OVERNIGHT MOORAGE #1 – SANDY BEACH

- Add transient boat tie – ups
- Add composting toilet
- Add floating breakwater structure that can function as a dock on its interior side
- Add deflection Boom - Greater protection will be provided to marine structures by installing wave attenuating structures
- Boaters prefer sandy beach area
- Accommodates larger boats

PROPOSED OVERNIGHT MOORAGE #2

- Add transient boat tie – ups
- Add composting toilet
- Add floating breakwater structure that can function as a dock on its interior side
- Add deflection boom - Greater protection will be provided to marine structures by installing wave attenuating structures

Proposed Day Use Facility - #1

- Replace existing and add additional composting toilet
- Consider as potential area landing site for ferry to be associated with outdoor education programs.

Proposed Day Use Area Alternative - #2 Lemon Island

- Replace existing and add additional composting toilet

COMMODORE'S COVE

- Do not improve Commodore's Cove due to shoaling. Remove or relocate

Urban-based Outdoor Education

- Conduct market analysis to help determine demand and appropriate level of amenities and development options. Options may include both land and water based facilities.
- Develop primitive overnight group camp with dining/meeting facilities to be used by groups with potable water and composting toilets. The facility could serve as an Outdoor School and or primitive retreat for groups.
- Construct an education center on the island. This may include an indoor facility providing display space and meeting areas.

Outdoor Education Facility Alternative Location #1

- Controlled access via Government Island Dock. Associated facilities will located near-by.
- Construct maintenance and storage area

Outdoor Education Facility Alternative Location #2

- Controlled access via Bartlett Landing. Associated facilities will located near-by.
- Construct maintenance and storage area

Wildlife Viewing Platform

- Controlled access via Cross Island Trail views into mitigation area

Trails

- Develop perimeter trails that circumnavigate the islands avoiding sensitive areas
- Develop Cross Island Trail connecting the Day Use Area #1 to the perimeter trail

Administrative Areas

- Maintain and rehab existing structures at ranch complex for storage as needed

- Develop host site at the ranch site
- Maintain presence at the Sea Scout base as a base of operation or pursue boat house at the 42nd St. boat access. New boathouse would include shop space, office and vehicle storage area.

RESOURCE MANAGEMENT PROPOSALS

Vegetation Management

- Maintain and enhance the pastures and meadows
- Concentrate restoration efforts in sensitive areas
- Use the principles of Integrated Pest Management (IPM) to control exotic invasive plant species such as blackberry, thistle and tansy ragwort)
- Seed with desired grasses, mow and graze as necessary
- Use cross fencing and cattle rotation to prevent over grazing and damage to sensitive areas
- Use convict crews to assist with vegetation management activities
- Coordinate with Metro. Work together to attain successful weed control.
- Continue grazing operation on the island
- Maintain ranch structure for storage of farm equipment and work crew housing to aid in vegetation management

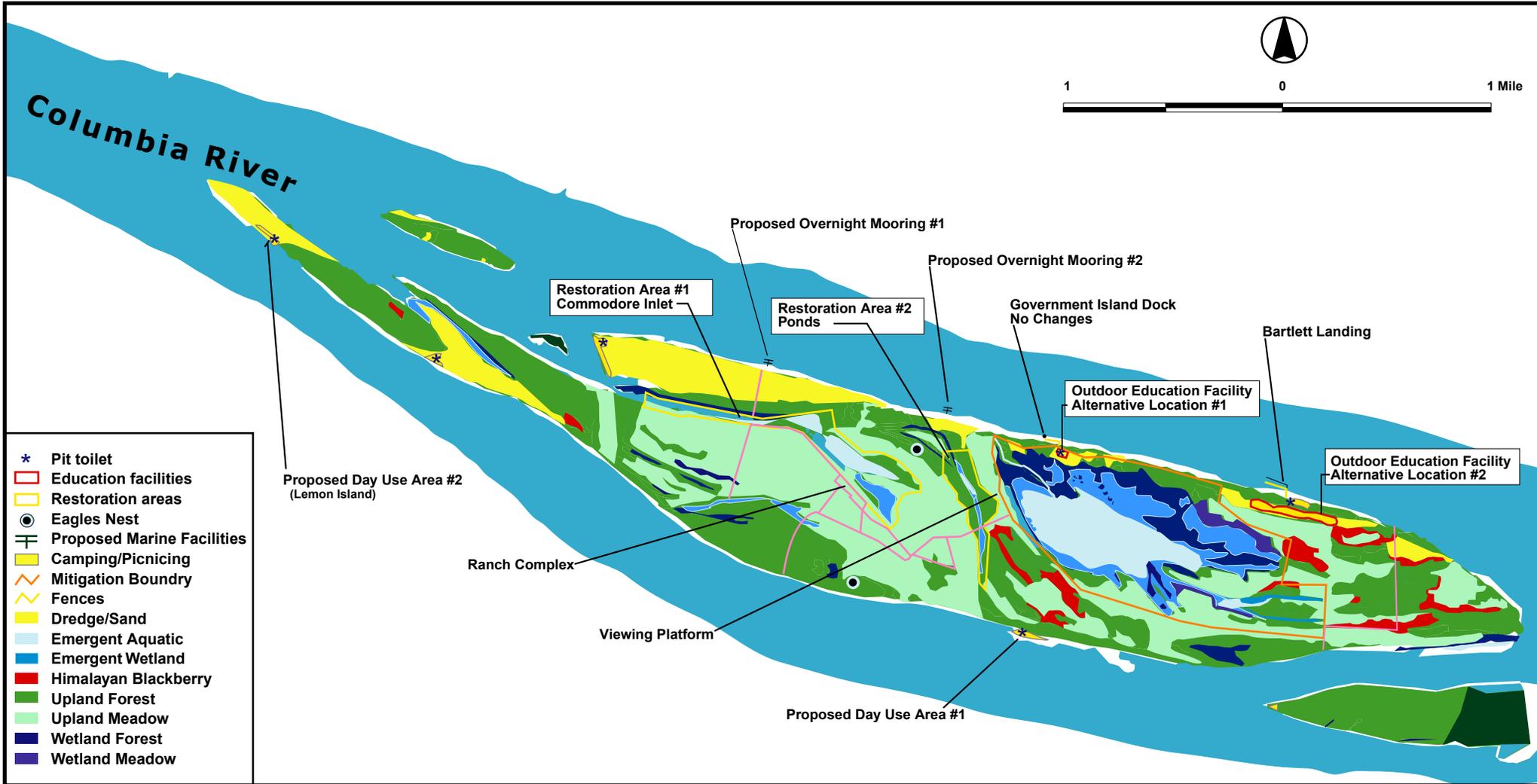
Restoration Area #1 – Commodore Inlet

- Plant to establish a riparian edge – Minimum 100 ft from water's edge
- Plant willows, cottonwoods and alders in grid to allow mowing
- If upland areas are present plant Ponderosa Pine or Doug Fir to establish future Bald Eagle nesting sites
- Aggressive weed control in these areas
- Keep cows out of areas through the use of cross-fencing
- Enhance wetland areas

Restoration Area #2 - Ponds

- Plant to establish a riparian edge - Minimum 100 ft from water's edge
- Plant willows, cottonwoods and alders in grid to allow mowing
- If upland areas are present plant Ponderosa Pine or Doug Fir to establish future Bald Eagle nesting sites
- Aggressive weed control in these areas
- Keep cows out of areas through the use of cross-fencing
- Enhance wetland areas

Government Island



APPENDIX D: NATURAL RESOURCE TABLES

Table 1 Vegetation Species of Island Complex

Table 2 Fish Species Collected from Waters Around Island Complex

Table 3 Wildlife Census Summary

**Table 4 Potential Special Status Species Within Island Complex Management
Plan Area**

Table 5 Timing of Occurrence of Salmonids in the Columbia River

Table 6 Government Island HEP Comparison

Native Class: I = Introduced N = Native

Table 1. Vegetation Species of Island Complex

(information from Fishman Environmental Services and Oregon Parks and Recreation Department)

COMMON NAME	SCIENTIFIC NAME	NATIVE CLASS
big-leaf maple	<i>Acer macrophyllum</i>	N
box-elder	<i>Acer negundo</i>	I
quack grass	<i>Agropyron</i> [[<i>Elytrigia</i>]] <i>repens</i>	I
redtop	<i>Agrostis alba</i>	I
colonial bentgrass	<i>Agrostis tenuis</i> [[<i>capillaris</i>]]	I
tree-of-heaven	<i>Ailanthus altissima</i>	I
western lady's mantle	<i>Alchemilla occidentalis</i>	N
American water plantain	<i>Alisma plantago-aquatica</i>	N
short-awn foxtail	<i>Alopecurus aequalis</i>	N
water foxtail	<i>Alopecurus geniculatus</i>	N
mayweed	<i>Anthemis cotula</i>	I
sweet vernalgrass	<i>Anthoxanthum odoratum</i>	I
common burdock	<i>Arctium minus</i>	I
mugwort, sagewort	<i>Artemisia</i> spp.	
water-fern	<i>Azolla mexicana</i>	I
paper birch	<i>Betula papyrifera</i>	N
leafy beggars-tick	<i>Bidens frondosa</i>	N
soft cheat grass	<i>Bromus mollis</i>	I
water-starwort	<i>Callitriche</i> species	I
Columbia sedge	<i>Carex aperta</i>	N
tumble knapweed	<i>Centaurea diffusa</i>	I
spotted knapweed	<i>Centaurea maculosa</i>	I
chaffweed	<i>Centunculus minimus</i>	N

Native Class: I = Introduced N = Native

COMMON NAME	SCIENTIFIC NAME	NATIVE CLASS
common chickweed	<i>Cerastium vulgatum</i>	I
Canada thistle	<i>Cirsium arvense</i>	I
short-styled thistle	<i>Cirsium brevistylum</i>	N
bull thistle	<i>Cirsium vulgare</i>	I
horseweed	<i>Conyza canadensis</i>	I
red-osier dogwood	<i>Cornus stolonifera</i> [[<i>sericea</i>]]	N
black hawthorn	<i>Crataegus douglasii</i>	N
ornamental hawthorn	<i>Crataegus monogyna</i>	I
rough hawksbeard	<i>Crepis setosa</i>	I
Scot's broom	<i>Cytisus scoparius</i>	I
orchard grass	<i>Dactylis glomerata</i>	I
teasel	<i>Dipsacus sylvestris</i>	I
large barnyard grass	<i>Echinochloa crusgalli</i>	I
ovoid spikerush	<i>Eleocharis ovata</i>	N
creeping spikerush	<i>Eleocharis palustris</i>	N
medusahead rye	<i>Elymus caput-medusae</i>	I
blue wildrye	<i>Elymus glaucus</i>	N
Watson's [hairy] willow-herb	<i>Epilobium watsonii</i> [<i>ciliatum</i>]	N
common scouring-rush	<i>Equisetum hyemale</i>	N
filaree	<i>Erodium cicutarium</i>	I
barren fescue	<i>Festuca</i> [<i>Vulpia</i>] <i>bromoides</i>	I
tall fescue	<i>Festuca arundinacea</i>	I
rattail fescue	<i>Festuca myuros</i>	I
Oregon ash	<i>Fraxinus latifolia</i>	N
catchweed bedstraw	<i>Galium aparine</i>	N
cut-leaf geranium	<i>Geranium dissectum</i>	I

COMMON NAME	SCIENTIFIC NAME	NATIVE CLASS
lowland cudweed	<i>Gnaphalium palustre</i>	N
English ivy	<i>Hedera helix</i>	I
sneezeweed	<i>Helenium autumnale</i>	N
heleochloa	<i>Heleochloa alopecuroides</i>	I
cow parsnip	<i>Heracleum lanatum</i>	N
common velvetgrass	<i>Holcus lanatus</i>	I
spotted cats-ear	<i>Hypochaeris radicata</i>	I
orange balsam	<i>Impatiens capensis</i>	I
toad rush	<i>Juncus bufonius</i>	N
rush	<i>Juncus species</i>	N
slender rush	<i>Juncus tenuis</i>	N
nipplewort	<i>Lapsana communis</i>	I
lesser duckweed	<i>Lemna minor</i>	N
hairy hawkbit	<i>Leontodon nudicaulis</i>	I
perennial ryegrass	<i>Lolium perenne</i>	I
water-purslane	<i>Ludwigia palustris</i>	N
pepperwort	<i>Marsilea vestita</i>	N
Japanese mazus	<i>Mazus japonicus</i>	I
field mint	<i>Mentha arvensis</i>	N
pennyroyal	<i>Mentha pulegium</i>	I
yellow & blue forget-me-not	<i>Myosotis discolor</i>	I
small-flowered forget-me-not	<i>Myosotis laxa</i>	N
Eurasian water-milfoil	<i>Myriophyllum spicatum</i>	I
Indian plum	<i>Oemleria cerasiformis</i>	N
water parsley	<i>Oenanthe sarmentosa</i>	N
evening primrose	<i>Oenothera species</i>	I

COMMON NAME	SCIENTIFIC NAME	NATIVE CLASS
yellow parentucellia	<i>Parentucellia viscosa</i>	I
knotgrass	<i>Paspalum distichum</i>	N
reed canarygrass	<i>Phalaris arundinacea</i>	I
timothy	<i>Phleum pratense</i>	I
English plantain	<i>Plantago lanceolata</i>	I
common plantain	<i>Plantago major</i>	I
water smartweed	<i>Polygonum coccineum</i>	N
marshpepper smartweed	<i>Polygonum hydropiper</i>	I
swamp smartweed	<i>Polygonum hydropiperoides</i>	N
willow-weed	<i>Polygonum lapathifolium</i>	N
spotted ladysthumb	<i>Polygonum persicaria</i>	I
dotted smartweed	<i>Polygonum punctatum</i>	N
black cottonwood	<i>Populus trichocarpa [balsamifera]</i>	N
self-heal	<i>Prunella vulgaris</i>	N
Douglas fir	<i>Pseudotsuga menziesii</i>	
downy buttercup	<i>Ranunculus hebecarpus</i>	?
creeping buttercup	<i>Ranunculus repens</i>	I
celery-leaf buttercup	<i>Ranunculus scleratus</i>	N
black locust	<i>Robinia pseudoacacia</i>	I
rose	<i>Rosa species</i>	N
Himalayan blackberry	<i>Rubus discolor</i>	I
Pacific blackberry	<i>Rubus ursinus</i>	N
sheep sorrel	<i>Rumex acetosella</i>	I
clustered dock	<i>Rumex conglomeratus</i>	I
curly dock	<i>Rumex crispus</i>	I
broad-leaf arrowhead	<i>Sagittaria latifolia</i>	N

COMMON NAME	SCIENTIFIC NAME	NATIVE CLASS
Pacific willow	<i>Salix lasiandra</i>	N
softstem bulrush	<i>Scirpus validus</i>	N
tansy ragwort	<i>Senecio jacobaea</i>	I
bittersweet nightshade	<i>Solanum dulcamara</i>	I
giant bur-reed	<i>Sparganium eurycarpum</i>	N
chickweed	<i>Stellaria media</i>	I
snowberry	<i>Symphoricarpos albus</i>	N
dune tansy	<i>Tanacetum bipinnatum</i>	N
common dandelion	<i>Taraxacum officinale</i>	I
hare's-foot clover	<i>Trifolium arvense</i>	I
yellow clover	<i>Trifolium dubium</i>	I
red clover	<i>Trifolium pratense</i>	I
white clover	<i>Trifolium repens</i>	I
western hemlock	<i>Tsuga heterophylla</i>	N
broad-leaf cattail	<i>Typha latifolia</i>	N
stinging nettle	<i>Urtica dioica</i>	N
moth mullein	<i>Verbascum blattaria</i>	I
thyme-leaved speedwell	<i>Veronica serpyllifolia</i>	I
common vetch	<i>Vicia sativa</i>	I
common cocklebur	<i>Xanthium strumarium</i>	N

Table 2. Fish Species Collected from Waters Around the Island Complex (Ellis 1999)

Common Name	Scientific Name	Native (N) / Introduced (I)
largescale sucker	<i>Catostomus macrocheilus</i>	N
chinook salmon	<i>Oncorhynchus tshawytscha</i>	N
three-spine stickleback	<i>Gasterosteus aculeatus</i>	N
carp	<i>Cyprinus carpio</i>	I
smallmouth bass	<i>Micropterus dolomieu</i>	I
peamouth	<i>Mylocheilus caurinus</i>	N
sculpin	<i>Cottus</i> sp.	N
northern pikeminnow	<i>Ptychocheilus oregonensis</i>	N
yellow perch	<i>Perca flavescens</i>	I
steelhead trout	<i>Oncorhynchus mykiss</i>	N
American shad	<i>Alosa sapidissima</i>	I
pumpkinseed	<i>Lepomis gibbosus</i>	I
black crappie	<i>Pomoxis nigromaculatus</i>	I
banded killifish	<i>Fundulus diaphanus</i>	I
largemouth bass	<i>Micropterus salmoides</i>	I
bluegill	<i>Lepomis macrochirus</i>	I
white sturgeon	<i>Acipenser transmontanus</i>	N
starry flounder	<i>Platichthys stellatus</i>	N
white crappie	<i>Pomoxis annularis</i>	I
chiselmouth	<i>Acrocheilus alutaceus</i>	N
mountain whitefish	<i>Prosopium williamsoni</i>	N
sockeye salmon	<i>Oncorhynchus nerka</i>	N
brown bullhead	<i>Amieurus nebulosus</i>	I
coho salmon	<i>Oncorhynchus kisutch</i>	N
walleye	<i>Stizostedion vitreum vitreum</i>	I

Table 3. Wildlife Census Summary

This table is currently not available.

Table 4. Potential Special Status Species Within Island Complex Management Plan Area

Scientific Name	Common Name	Fed	State	Habitat	Potential Habitat
<i>Lampetra tridentata</i>	Pacific lamprey	SOC	SC	spawning and rearing in low gradient, muddy bottom streams, backwater areas	yes
<i>Oncorhynchus clarki clarki</i>	coastal cutthroat trout (Columbia River/SW Washington ESU)	PT	SV	small trib. streams with large woody debris, pools, riffles, and backwater	yes (migration)
<i>Oncorhynchus keta</i>	chum salmon (Lower Columbia River)	T	SC	spawns in tributaries of lower Columbia River in Oct/Nov; may rear in freshwater for up to a month before outmigrating	yes (migration, rearing)
<i>Oncorhynchus kisutch</i>	coho salmon (Lower Columbia River/SW Washington ESU)	C	E	spawn in coastal streams and shallow tribs; rear in slack freshwater 1+ years	yes (migration, rearing)
<i>Oncorhynchus mykiss</i>	steelhead trout (Lower Columbia River ESU Middle Columbia River ESU Snake River ESU Upper Willamette R. ESU)	T T T T	SC SV SV SV	spawn in small to medium gravel in swift flowing streams; rear in streams 1-4 years	yes (migration)
<i>Oncorhynchus nerka</i>	sockeye salmon	E	-	spawn in lakes or tributaries; young migrate downstream within 1-4 years	yes (migration)

Scientific Name	Common Name	Fed	State	Habitat	Potential Habitat
<i>Oncorhynchus tshawytscha</i>	Chinook salmon (Lower Columbia River/SW Washington ESU)	T	SC	spawn in mainstem of streams in large gravel where water flow is high; rear in streams 1+years	yes (migration, rearing)
<i>Clemmys marmorata</i>	Northwestern pond turtle	SOC	SC	marshes, sloughs, ponds oxbows; slow moving sections of river	yes (Com. Inlet)
<i>Rana aurora aurora</i>	red-legged frog	SOC	SU	meadows and woodlands near ponds, marshes & streams; seasonal ponds for breeding	yes

<i>Rana pretiosa</i>	spotted frog	C	SC	waters and vegetated shorelines of ponds, springs and marshes	no (no known location w. of Cascades)
<i>Bucephala albeola</i>	bufflehead	-	SU	open water	yes (winter)
<i>Agelaius tricolor</i>	tri-colored blackbird	SOC	SP	freshwater marshes with emergent vegetation or willow thickets	yes (unlikely)
<i>Contopus cooperi</i>	olive-sided flycatcher	SOC	SV	coniferous forest	yes (migrant) 5/99; 6/95
<i>Progne subis</i>	purple martin	-	SC	riparian along rivers	yes (nest)
<i>Empidonax traillii brewsteri</i>	little willow flycatcher	SOC	SV	riparian scrub-shrub	yes (June-early August)
<i>Falco peregrinus enatum</i>	American peregrine falcon	-	E	potential perches and prey on islands	yes(perch/prey)

Scientific Name	Common Name	Fed	State	Habitat	Potential Habitat
<i>Haliaeetus leucocephalus</i>	bald eagle	T	T	tall trees near open water; eat fish and carrion	yes (perches in trees)
<i>Odocoileus virginianus leucurus</i>	Columbia white-tailed deer	E	SU	islands in Columbia River; grazes in pastures and takes shelter in willow thickets	yes (year round)
<i>Anodonta californiensis</i>	California floater (mussel); Columbia pebble snail	SOC	-	shallow areas of larger rivers in soft, silty, substrates	unknown
<i>Fluminicola columbiana</i>	great Columbia River spire snail	SOC	-	cold clear springs of the Columbia River	unknown
<i>Corynorhinus townsendii townsendii</i>	Pacific western big-eared bat	SOC	SC	roosts in caves, buildings, and bridges	yes
<i>Myotis evotis</i>	long-eared bat	SOC	SU	Forest and Riparian	yes
<i>Myotis thysanodes</i>	fringed bat	SOC	SV	Caves, buildings, structures w/ limited human disturbance	yes
<i>Myotis volans</i>	long-legged bat	SOC	SU	coniferous forest; abandoned buildings	no
<i>Myotis yumanensis</i>	Yuma bat	SOC	-	urban, riparian and mature coniferous forest	yes
<i>Castilleja levisecta</i>	golden paintbrush	T	E	native prairie	no
<i>Erigeron decumbens</i>	Willamette daisy	E	E	native prairie	no

<i>Howellia aquatilis</i>	water howellia	T	-	shallow ponds that dry seasonally	yes
<i>Lomatium bradshawii</i>	Bradshaw's lomatium	E	E	wet prairie	no

Scientific Name	Common Name	Fed	State	Habitat	Potential Habitat
<i>Lupinus sulphureus</i>	Kincaid's lupine	T	T	native prairie	no
<i>Sidalcea nelsoniana</i>	Nelson's checker-mallow	T	T	native prairie	no
<i>Aster curtus</i>	white top aster	SOC	T	wet prairie	no
<i>Cimicifuga elata</i>	tall bugbane	SOC	C	moist coniferous forest	no
<i>Delphinium leucophaeum</i>	pale larkspur	SOC	E	native prairie	no
<i>Delphinium pavonaceum</i>	peacock larkspur	SOC	E	native prairie	no
<i>Montia howellii</i>	Howell's montia	SOC	C	wet prairie; blooms March-April	no
<i>Rorippa columbiae</i>	Columbia cress	SOC	C	Columbia River shoreline; blooms June-Sept	yes
<i>Sullivantia oregana</i>	Oregon sullivantia	SOC	C	wet cliffs; blooms early July	no

Status Codes: E: Listed Endangered, T: Listed Threatened, P: Proposed, SC: Species of Concern, C: Candidate, SC: Sensitive Critical, SV: Sensitive Vulnerable, SU: Sensitive Undetermined, SP: Peripheral Or naturally rare.

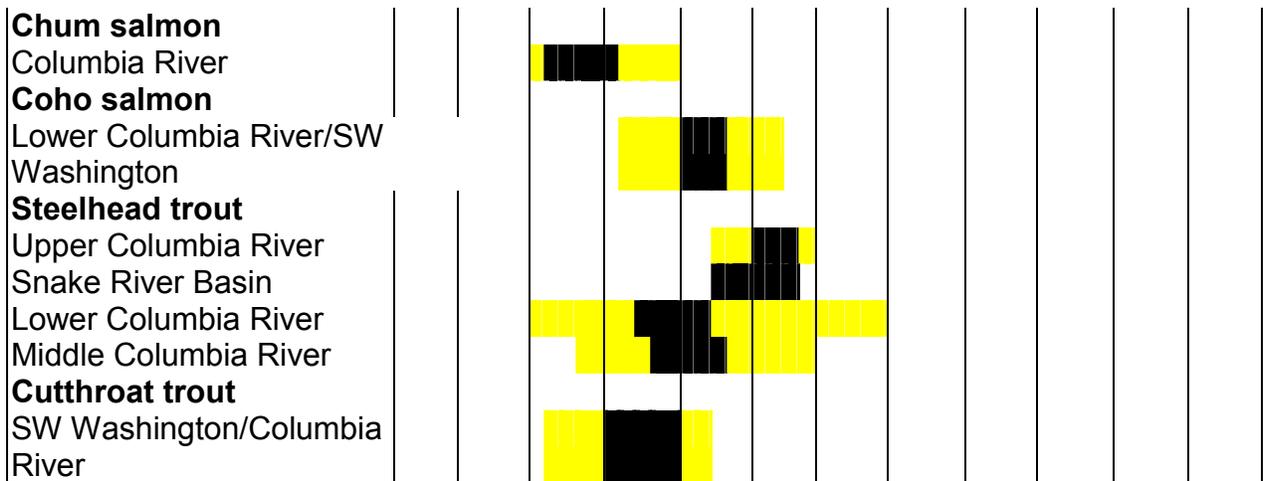
Table 5. Timing of Occurrence of Salmonids in the Columbia River in the Vicinity of the Island Complex.

Timing of upstream adult salmonid migrations in the lower Columbia River (Ellis 1999)

SPECIES/ESU	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Chinook salmon												
Snake River Fall								█	█	█		
Snake River			█	█	█	█	█					
Spring/Summer			█	█	█	█	█					
Upper Columbia River			█	█	█							
Spring			█	█	█							
Lower Columbia River			█	█	█			█	█	█	█	█
Sockeye salmon												
Snake River						█	█	█	█			
Chum salmon												
Columbia River										█	█	█
Coho salmon												
Lower Columbia River/SW											█	█
Washington											█	█
Steelhead trout												
Upper Columbia River							█	█	█	█	█	
Snake River Basin						█	█	█	█	█	█	
Lower Columbia River												
Middle Columbia River			█	█	█	█	█	█	█	█	█	█
Cutthroat trout												
SW Washington/Columbia								█	█	█	█	█
River								█	█	█	█	█

Timing of downstream juvenile salmonid migrations in the lower Columbia River (Ellis 1999)

SPECIES/ESU	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Chinook salmon												
Snake River Fall							█	█	█	█		
Snake River				█	█	█	█					
Spring/Summer				█	█	█	█					
Upper Columbia River				█	█	█	█					
Spring				█	█	█	█					
Lower Columbia River	█	█	█	█	█			█	█	█	█	█
Sockeye salmon												
Snake River						█	█	█	█			



Black bars represent peak periods of migration
 Gray bars represent estimated total period of occurrence

Table 6. Government Island HEP: 1999 Acreage Habitat Unit Comparison

Species	Baseline Acres	TY 5 Acres	1999 Acres	Baseline AAHU	TY 5 HU (Orig.HEP)	1999 AAHU
Muskrat	81	190	105	9.72	60.8	61.2
American Wigeon	134	236	294	133.56	169.92	175.58
Common Snipe	235	194	191	112.8	114.46	155.11
Northern Harrier	158	152	197	53.72	56.24	63.49
Great Blue Heron	160	237	295	97.6	168.27	200.32
Cinnamon Teal	0	225	261	0	101.25	159.09
Western Pond Turtle	1	73	0	0.36	43.07	0
Total AAHUs (Habitat Units)				407.76	714.01	814.79