Oleson Tracts I and II
of the
Tualatin River National Wildlife Refuge

Five-Year Habitat Restoration
and
Management Plan

November 2004

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Oleson Tracts I and II of the Tualatin River National Wildlife Refuge

Five-Year Habitat Restoration and Management Plan

Prepared for

U.S. Fish and Wildlife Service
Tualatin River National Wildlife Refuge
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1 INTRODUCTION

In response to the rapid rate of urbanization in the Portland metropolitan area, and in keeping with their legal responsibility for the welfare of migratory bird species, anadromous fish, and Federally listed threatened and endangered plants and animals in the United States, the U.S. Fish and Wildlife Service (the Service) has established the Tualatin River National Wildlife Refuge (Refuge) to help protect and enhance nationally significant wildlife habitats within the Portland metropolitan area.

Presently, the Service administers 1,268 acres (513 hectares [ha]) comprising lands held both as fee title and under a long-term management agreement. When fully developed, the Refuge will cover an area of approximately 3,058 acres (1,238 ha) of preserved and restored meadow, wetland, and riparian habitats, as well as oak savanna and coniferous/ deciduous forests. In combination, these plant communities will provide important habitat for migratory birds, native fish, and other wildlife species.

Photo 1. Abandoned Cropland on Oleson Tract I

The recent acquisitions of Oleson Tracts I and II added approximately 230 acres (93 ha) to the then-present 1,098-acre (444-ha) land base of the Refuge (see Figure 1 and Figure 2). The purchase was made possible using funds from the Bonneville Power Administration (BPA) Willamette and Columbia River Fish and Wildlife programs. These funds are earmarked for projects that will provide partial mitigation for impacts associated with construction of Federal Columbia River Power System (FCRPS) hydroelectric facilities. BPA requires that a five-year habitat restoration and management plan be developed for tracts purchased with these funds. BPA also requires that a habitat analysis be completed using habitat evaluation procedures (HEP) to quantify relative habitat values for mitigation crediting. The Service has completed the HEP for the Oleson Tracts.

The Refuge is part of a nationwide system of Federal refuges operated in accordance with the overall mission of the National Wildlife Refuge System. This mission is to:

> *"provide, preserve, restore, and manage a national network of lands and waters sufficient in size, diversity, and location to meet society's needs for areas where the widest possible spectrum of benefits associated with wildlife and wildlands is enhanced and made available."*

The goals of the Refuge (Refuge Management Information System, Service 2002) are to:

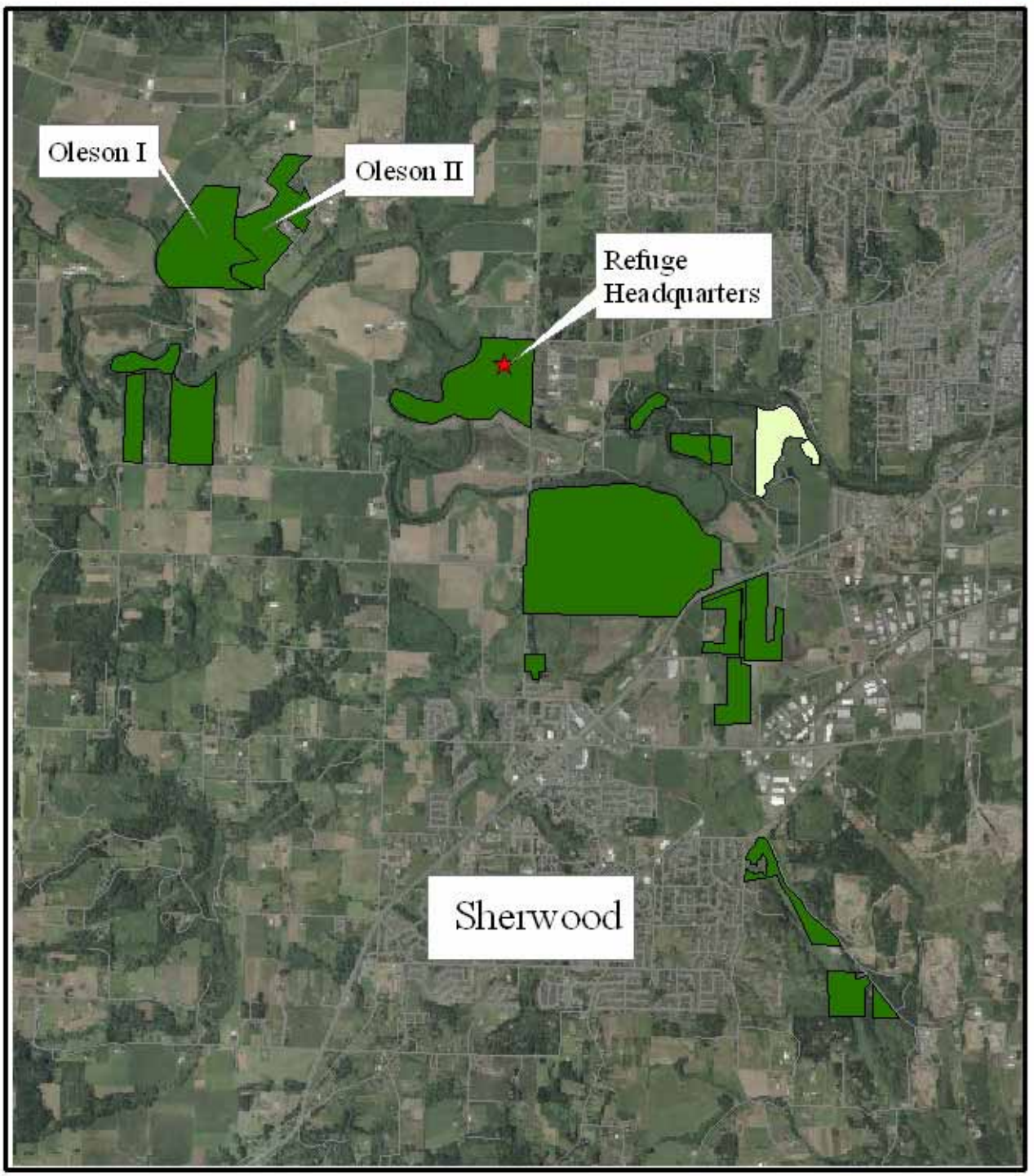
- *Protect and restore a diversity of native habitats and associated populations of indigenous fish, wildlife, invertebrate, and plant species of the Tualatin River basin.*
- *Provide high quality opportunities for wildlands and wildlife-dependent recreation and environmental education to enhance public appreciation, understanding, and enjoyment of the Refuge's fish, wildlife, habitats, and cultural resources, with emphasis towards urban residents.*
- *Protect, restore, and develop a diversity of habitats for migratory birds such as neotropical songbirds, wading birds, and shorebirds with special emphasis on wintering waterfowl.*
- *Protect and restore floodplain type benefits associated with the Tualatin River, including water quality, flood storage, and water recharge.*
- *Protect, restore, develop habitats for, and otherwise support recovery of federally listed endangered and threatened species, and help prevent the listing of candidate species and species of management concern.*

This project plays a critical role in helping the Refuge achieve these goals. When complete, the planned restoration of the Oleson Tracts will meet four of the five Refuge goals. It will restore a diversity of native habitats of the Tualatin River basin that provide for migratory birds, fish, and other resident wildlife. It will also protect and restore floodplain functions to Tualatin River riparian habitats which are important to steelhead trout (listed as federally threatened). The project will also create a mosaic of habitats important to several migratory and resident species of concern.

TUALATIN RIVER NATIONAL WILDLIFE REFUGE

Washington County, Oregon

Land Acquisition Status, September 2004



Metro property managed by USFWS

Refuge owned

0.9 0.45 0 0.9 Miles

N W E S

Figure1

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Oleson Tracts
Boundaries

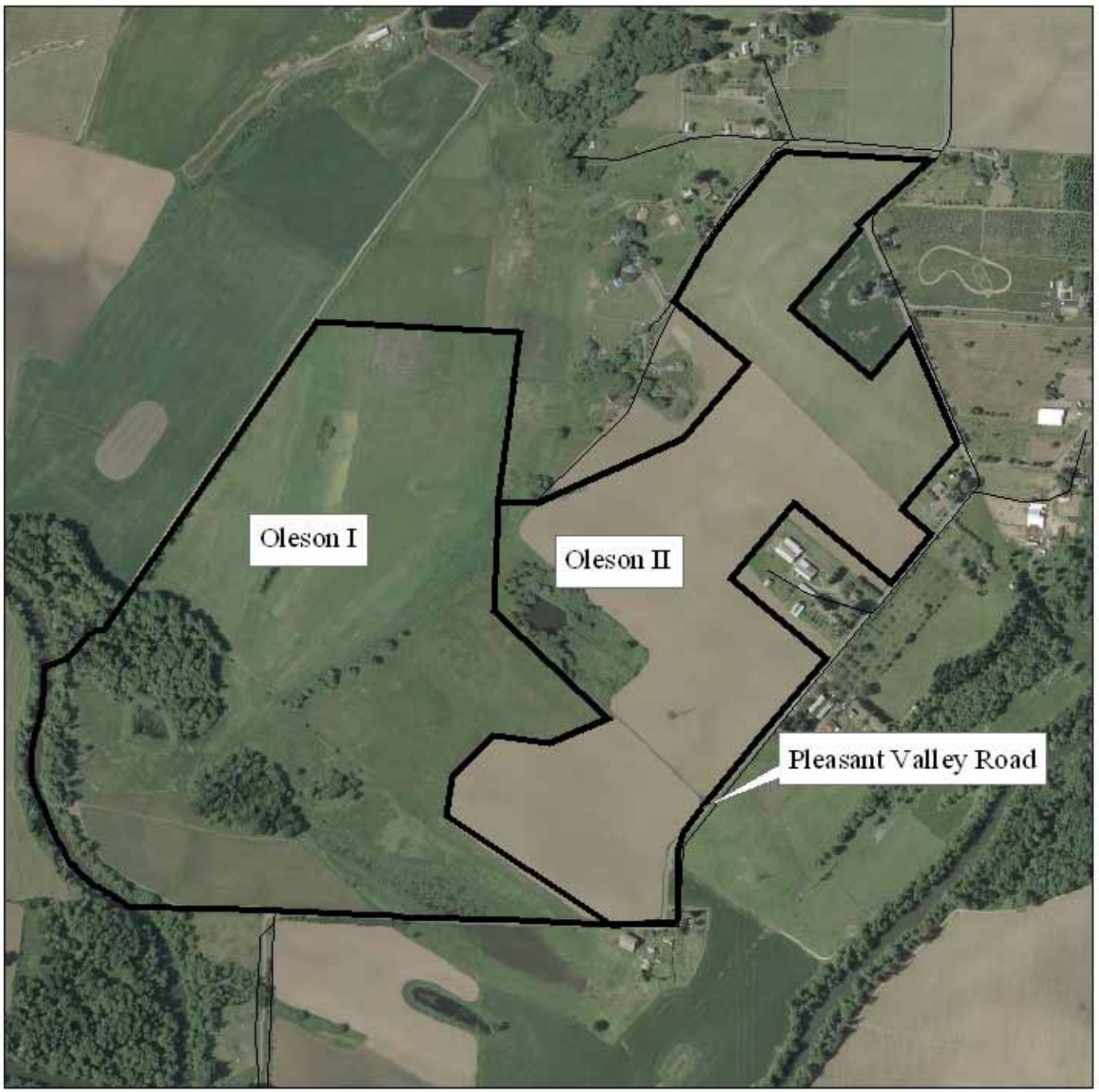

Figure 2

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The Service is in the process of adding to the existing land base of the Refuge by acquiring a variety of interests in lands within the 3,058-acre (1,238-ha) approved acquisition boundary.

The Service has developed a conceptual restoration plan for the Oleson Tracts that includes restoring and enhancing the seasonal wetlands, Oregon ash woodlands, mixed coniferous forests, wet meadow prairie, and oak savannas. Restoration techniques and strategies, as well as long-term monitoring protocols, are described in this document.

2 BACKGROUND

The Refuge was established in 1992 with an approved acquisition boundary to accommodate willing sellers with potentially restorable holdings within the Tualatin River floodplain and adjacent upland terrace. The Refuge's holdings of seasonal emergent wetlands, wet meadow prairie, Oregon ash riparian forests, mixed coniferous/ deciduous forests, and Garry oak communities are representative of remnant plant communities historically common in the Willamette Valley. Restoring these increasingly rare plant communities offers an opportunity to compensate for wildlife habitat losses associated with the FCRPS. The purchase of Oleson Tracts I and II as additions to the Refuge using BPA funds will partially mitigate for wildlife habitat and species losses incurred as a result of construction and inundation activities at Dexter and Detroit Dams.

2.1 ACQUISITION

Since its establishment, the Refuge has been acquiring lands through fee acquisition and conservation easements, from willing sellers or under long-term management agreements. The Service has identified 81 parcels within the acquisition boundary of the Refuge. In all instances, payments to the landowners for rights acquired would be based on real estate appraisals to determine the fair market values. Oleson Tracts I and II were identified as top priority acquisitions in the Refuge Land Protection Plan (Appendix A of the Environmental Assessment – Tualatin River National Wildlife Refuge, Service 1992).

Oleson I (131.5 acres [53.2 ha]) was acquired in October 1999 with Land and Conservation funds in order to hold the property until such time as the Northwest Power Planning Council Fish and Wildlife Program funding process was implemented. Oleson I was acquired from a willing seller (Mr. Larry A. Oleson, as Successor Trustee of the Alden O. Oleson Trust and the Oleta W. Oleson Trust), for $695,000. BPA reimbursed the Service $750,162 (the entire purchase price plus 4.5 percent [%] for Service overhead), paid to the Service's Land and Conservation funds in November 2000. The funds were provided to mitigate for habitat losses incurred through construction and inundation of Detroit Dam in the Willamette Basin.

Oleson II (98.25 acres [39.8 ha]) was purchased from Mr. Larry A. Oleson, as Successor Trustee of the Oleson Trusts, in February 2001, upon his acceptance of the fair market value of $859,210. Prior to the purchase, BPA agreed to contribute approximately 78% of

the purchase price in order to receive proportional credit to mitigate for hydroelectric facility development within the Willamette River basin.

The sale of Oleson II reserved for the Grantor (Mr. Larry A. Oleson) a perpetual easement 20 feet (6.1 meters) wide for an existing water line for the benefit of Tax Lots 1202, 1500, and 1600; a perpetual easement 20 feet (6.1 meters) wide for a drain line for the benefit of Tax Lot 1202; and a 9.7-acre (3.9-ha) well easement, including an easement 20 feet (6.1 meters) wide for a water line, for the benefit of Tax Lot 1500. The well easement grants to Mr. Oleson a perpetual easement over, across, and under the easement area for the purpose of allowing him to install, maintain, repair, and use a domestic well and the necessary water line. Use of water from the well is limited to domestic use, including irrigating a ¼-acre (0.1-ha) lawn. The easement allows the Service to enter the property and utilize the well easement area for such activities as tree planting and habitat restoration, so long as the activities do not interfere or negatively impact the well or waterline.

BPA holds an easement related to power transmission lines over the property. The easement allows BPA rights to enter the property to locate, construct, operate, maintain, repair, reconstruct, upgrade, remove, and patrol the structures and corridor on Oleson Tracts I and II. BPA maintains the right to clear the easement land of all brush, timber, structures, and fire hazards.

2.2 HAZARDOUS MATERIALS

Level 1 Contaminant Surveys (Environmental Site Assessments) were completed for both Oleson Tracts I and II prior to purchase and inclusion into the Refuge. The contaminant surveys were conducted in accordance with Department of Interior policy and guidance in the Departmental Manual, Part 602 DM 2, Public Lands, Land Acquisition, Exchange and Disposal, Real Property Pre-acquisition, Environmental Site Assessments, dated 1996. The methodology outlined in this manual is equivalent to the American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments: Transaction Screen Process (E 1528-93).

The Level 1 Contaminant Survey (Environmental Site Assessment for Tracts 89, 90, and 96 [Oleson I]) was completed on December 9, 1998. The report concluded that no hazardous substances or other environmental problems were identified on these tracts, and there were no obvious signs of any effects of such substances or problems. A dumpsite was noted as occurring immediately adjacent to Tract 90 along the access road to the fishing pond. This site occurs on land in Oleson II. The property owner, Mr. Oleson, used the site as a burn pile for debris from his excavation business (tree limbs, stumps, etc.). An examination of the site found that burning had occurred and fresh household debris was present. No threats to fish and wildlife resources were expected from the dumpsite, but the report recommended that additions to the dump cease and the

area be cleared if the Oleson II Tract were to be purchased by the Service for inclusion into the Refuge.

A Level 1 Contaminant Survey (Environmental Site Assessment for Tract 97 [Oleson II]) was completed on August 4, 2000. The report concluded that no hazardous substances or other environmental problems were identified on this tract, and there were no obvious signs of any effects of such substances or problems. The dumpsite noted in the report for Oleson I was noted again in the report for this Tract. A second dumpsite was noted as occurring immediately northwest of the fishing pond. According to Mr. Oleson, this site was used for dumping household and farm materials. Mr. Oleson also thought that members of the Oregon Fishing Club might have also dumped materials at the site. Inspection of the site revealed the presence of sheet metal, wire, metal cans, scrap wood, and glass. An area adjacent to this site had recently received material from Mr. Oleson's construction business, such as rocks, broken concrete, topsoil, and plastic sheeting.

Three apparent underground storage tanks were located near farm buildings adjacent to the homestead. Each tank has been exposed and was cut open. One was dry at the time and the others had minor accumulations of water, with a definite petroleum odor. The surrounding soil did not appear stained and the report concluded that they did not pose a threat to fish and wildlife resources.

The report concluded that the dumpsites and underground storage tanks constituted solid waste and recommended that they be removed before acquisition.

Each survey report recommendation was completed by Mr. Oleson prior to the Service finalizing the acquisition of either Oleson I or Oleson II.

2.3 CULTURAL RESOURCES

The Oleson Tracts have been subject to two cultural resource investigations. The first, an Archaeological and Historical Identification Effort Report, focused on the acquisition of Tract I and was completed on November 1, 1999. The second effort was a Section 106 Compliance document completed on June 22, 2004, that evaluated the potential effect of certain restoration activities to take place on Oleson II. Additional cultural resource investigations must be conducted by the Service prior to any ground-disturbing activities on Oleson I.

The Archaeological and Historical Identification Effort Report for Oleson I included record searches at the State Historic Preservation Office (SHPO), interviews with individuals with knowledge of the site, and on-site pedestrian surveys. While there were no known historical or cultural sites reported within one mile of Oleson I, a historic debris scatter field was encountered in an area 30 meters [98 feet] in diameter located in the southeast quarter of the project. It consisted of two fragments of purple glass, two shards of white glazed ceramic fragments, a ceramic shard with blue markings, amorphous metal pieces, chunks of red clay tile, and low-fired red brick with coarse

temper. No other archaeological and historical sites were located. The report recommended that a site record be created for the scatter site and formally evaluated for eligibility to the National Register of Historic Places. The site has not yet been formally evaluated.

The Section 106 compliance document was completed by the Service's Region 1 Cultural Resources Team for certain restoration activities to take place on Oleson II. The actions evaluated included herbicide applications, native grass seeding to include discing and cultipacking, and oak plantings to restore 115 acres (46.5 ha) of upland habitat. The Cultural Resources Team concluded that the proposed activities would not affect or impact cultural resources. Cultural Resource clearance will be sought for the remainder of the project on Oleson I when final engineering and design is completed.

3 PHYSICAL ENVIRONMENT

The Tualatin River Watershed is predominantly a low-elevation and low-gradient system covering an area of approximately 712 square miles [1,844 square kilometers (km)] in the northwest corner of the State of Oregon (Tualatin River Watershed Council [TRWC] 2004). The Refuge is situated in the lower watershed near the Urban Growth Boundary (UGB) of rapidly urbanizing areas of Washington County, Oregon. Refuge-owned properties are in areas of a more rural nature, outside of the UGB.

3.1 SITE DESCRIPTION

3.1.1 Tualatin Valley and Surrounding Area

The Tualatin River Watershed is bordered by the Coast Range to the west, the Tualatin Mountains to the north and east, and the Chehalem and Parrett Mountains to the south. The Coast Range, with peaks ranging from 2,900 to over 3,500 feet (884 to 1,067 meters), makes up the headwaters of the Tualatin River, which is approximately 83 miles (134 km) long. The height of other bordering mountain areas range between 1,300 and 2,200 feet (396 to 671 meters). The valley floor, which comprises roughly half of the watershed acreage, ranges in elevation between 120 and 300 feet (37 to 91 meters) above sea level.

The Tualatin River flows out of the Coast Range, dropping roughly 2,700 feet (823 meters) within its first 14 miles (22.5 km). Thereafter it enters the broad Tualatin River Valley and becomes a slower, meandering river throughout the remainder of its length (TRWC 2004). One exception is where the river drains into the Willamette River through a steep-walled canyon, where it drops approximately 50 feet (15 meters) over its last 3 miles (4.8 km) beyond a dam at Lake Oswego (TRWC 2004). Major tributaries to the Tualatin River include Dairy Creek, Fanno Creek, Gales Creek, Rock Creek, and Scoggins Creek.

On average, more than 1.1 million acre-feet (1.357 billion cubic meters) of water flows out of the watershed and into the Willamette River annually (including water imported from the Trask and Bull Run Rivers) (TRWC 2004). Approximately 85% of this flow is discharged during the months of November through March, and less than 3% typically is discharged during June through October (TRWC 2004). Floodplains associated with the Tualatin River and its tributaries are subject to frequent flooding during winter and early spring. The Tualatin River is managed to meet or exceed existing instream water rights. Although flows are generally met in the Tualatin River and larger tributaries because of stored water releases and water imported into the watershed, many smaller streams are not protected by minimum required flows (TRWC 2004).

3.2 CLIMATE

The Tualatin River Watershed, whose western edge is less than 40 miles (64 km) from the Pacific Ocean, has a modified marine climate (TRWC 2004). The prevailing western airflow from the ocean moderates the colder temperatures of the winter and the heat of the summer. Occasional extreme temperatures are associated with outbreaks of dry continental air pushing through the Columbia River Gorge and across the Cascade Mountains (USDA 1982).

The watershed is characterized by cool wet winters and warm dry summers. Seasonal characteristics are well defined, and changes between seasons are gradual. Average annual rainfall decreases from 110 inches (279.4 centimeters [cm]) along the crest of the Coast Range to 38 inches (96.5 cm) in the southeastern valley floor (USDA 1982). Some 28% of the total annual rainfall is received in fall, 46% in winter, 20% in spring, and only 6% in summer. Extremes in rainfall for individual years have varied from 26.11 to 65.88 inches (66.32 to 167.34 cm) at Forest Grove and from 42.68 to 83.30 inches (108.41 to 211.58 cm) at Timber (USDA 1982). Snowfall in the mountainous portion of the basin can be significant, but is normally quite light on the valley floor. However, the snowpack is typically not deep enough to extend melt water contribution to Tualatin River flows beyond early spring (TRWC 2004).

Temperatures in the Tualatin Valley are generally moderate, with the average daily low for January at the valley floor station being 32 degrees F (^{o}F) (0^{o} Celsius [^{o}C]), with an average July maximum of 82 ^{o}F (28^{o}C) (USDA 1982). Record extreme temperatures range from -18^{o}F (-28^{o}C) in 1950 to 108 ^{o}F (42^{o}C) in 1956. Hot afternoons of 90^{o}F (32^{o}C) and above occur about 11 days per year at higher elevations, and about 17 days per year on the valley floor. Temperatures of 100^{o}F (38^{o}C) or more are expected about every other year, and minimums of 0^{o}F (-18^{o}C) or lower about one year in twenty (USDA 1982).

The area can expect an average of 73 clear days, 72 partly cloudy days, and 220 cloudy days a year (USDA 1982). The combined effects of wind, heat, and moisture result in an annual lake evaporation of 23 inches (58.4 cm); 75% of this occurs from May through

October. The months of May through September show an average cumulative moisture deficit of over 13 inches (33 cm) (USDA 1982).

3.3 SITE TOPOGRAPHY AND SOILS

The Oleson Tracts are located in the Tualatin Valley, approximately at River Mile (RM) 25 of the Tualatin River. This section of the river has been characterized as containing "reservoir-like" flow conditions with heavy sedimentation (TRWC 2004). The property slopes towards the southwest and ranges in elevation from 190 to 110 feet (58 to 33.5 meters) above sea level. This change in elevation occurs gradually across an upper terrace, sharply across the narrow slope separating the upper terrace from the floodplain, and then gradually again across a lower terrace and floodplain area, before reaching the bank of the Tualatin River. The property currently consists of floodplain-associated wetlands, wet meadow areas, riparian habitat, and wooded forests, as well as abandoned upland agricultural areas.

Project area soils are composed of McBee-Chehalis and Woodburn-Quatama-Willamette associations. The McBee-Chehalis association consists of very deep, moderately-drained and well-drained, nearly level silty clay loams found on bottom lands of the floodplain. Native vegetation typically associated with this association includes Oregon ash (*Fraxinus latifolia*), cottonwood (*Populus balsamifera*), willows (*Salix* sp.), low shrubs, grasses, and forbs.

The Woodburn-Quatama-Willamette association consists of very deep, moderately well-drained and well-drained silt loams and loams on nearly level to moderately steep terraces. Native vegetation typically associated with this association includes Douglas fir (*Pseudotsuga menziesii*), Garry oak (*Quercus garryanna*), shrubs, grasses, and forbs.

From these two soil associations, a total of 10 soil series are located within the project area. These soil series are summarized in Table 1.

Table 1. Oleson Tract Soil Series

Symbol	Soil Series Name	Drainage Class and Formation Process	Hydric Status
1	Aloha silt loam	Somewhat poorly drained soil formed in alluvium or lacustrine silt on broad valley terraces	Non-hydric
9	Chehalis silty clay loam, occasional overflow	Well-drained soil formed in recent alluvium on bottom lands and smooth floodplains.	Non-hydric
13	Cove silty clay loam	Poorly drained soil formed in recent clayey alluvium in slightly concave floodplain areas associated with large and small steams.	Hydric
14	Cove clay	Poorly drained soil formed in recent clayey alluvium in slightly concave floodplain areas associated with large and small steams.	Hydric

Symbol	Soil Series Name	Drainage Class and Formation Process	Hydric Status
27	Labish mucky clay	Poorly drained soil formed in mixed alluvial or lacustrine material that is high in organic matter and is stratified with lenses of peat or muck. Found on old concave lakebeds.	Hydric
37A	Quatama loam, 0 to 3 percent slopes	Moderately well-drained soils that formed in mixed, loamy alluvium on old terraces.	Non-hydric
37B	Quatama loam, 3 to 7 percent slopes	Moderately well drained soils that formed in mixed, loamy alluvium on old terraces.	Non-hydric
43	Wapato silty clay loam	Poorly drained soils that formed in recent alluvium on bottom lands of small streams and in low-lying areas adjacent to larger streams.	Hydric
45A	Woodburn silt loam, 0 to 3 percent slopes	Moderately well-drained soils that formed in old alluvium on low, broad valley terraces.	Non-hydric
46F	Xerochrepts and Haploxerolls, very steep	Well drained soils formed in a mixture of silt, sand, and an accumulation of material that has moved downslope. Found along steep to very steep escarpments adjacent to streams and associated terraces.	Non-hydric

USDA 1982

4 BIOLOGICAL RESOURCES

Current biological resources of the Oleson Tracts reflect the long history of agricultural use. Though compromised, remnant native plant communities with relatively high wildlife values occur along the Tualatin River. Native plant communities were cleared from the majority of the site long ago and the land used for production of potatoes and other row crops. These areas provided limited habitat values, but have a high restoration potential.

4.1 VEGETATION

Vegetation within the Oleson Tracts is a function of past land uses, with the majority of the property historically having been used for agricultural purposes. Major plant communities are described in detail below and include the following: emergent wetlands dominated by reed canarygrass (*Phalaris arundinaceae*); mixed coniferous forest; forested wetland dominated by Oregon ash; a remnant riparian forest along the banks of the Tualatin River; an excavated pond/shrub community; an abandoned irrigation pond; and abandoned cropland, which dominates the tracts (Figure 3).

4.1.1 Reed Canarygrass Emergent Wetland

Wetlands dominated by reed canarygrass are located in the northwest and south portions of the project area, occupying a total of 66.8 acres (27 ha). The northwest wetland receives flood flows from the Tualatin River as well as surface and subsurface flows from the surrounding hillslopes. The dense growth of reed canarygrass creates near monotypic conditions throughout much of this area, although native species such as Pacific willow (*Salix lucida*) and Douglas hawthorn (*Crataegus douglasii*) are found in several small island-like clusters. The emergent wetland located along the southern edge of the

property is also dominated by dense growth of reed canarygrass and contains some willow along its margins. Hydrology in this area is primarily a function of interception of surface and subsurface flows from the surrounding hillslopes.

4.1.2 Mixed Coniferous Forest

The mixed coniferous forest is located along a topographic transition between lower and upper terrace areas and can be characterized as a mature second-growth forest with distinct and diverse tree, shrub, and herbaceous layers. This area covers approximately 4.5 acres (1.8 ha). Dominant tree species include Douglas fir and Garry oak, with Oregon ash, big-leaf maple (*Acer macrophyllum*), and bitter cherry (*Prunus emarginata*) also present. The shrub layer consists of Indian plum (*Oemleria cerasiformis*), beaked hazelnut (*Corylus cornuta*), serviceberry (*Amelanchier alnifolia*), and lower growing shrubs such as Oregon grape (*Berberis nervosa*) and some Armenian blackberry (*Rubus armeniacus*) (formerly referred to as Himalayan blackberry [*Rubus discolor*]). The herbaceous layer contains Dewey's sedge (*Carex deweyana*) and trailing blackberry (*Rubus ursinus*), with some poison oak (*Rhus diversiloba*).

Photo 2. Mixed Coniferous Forest

Oleson Tracts
Existing Plant Communitits

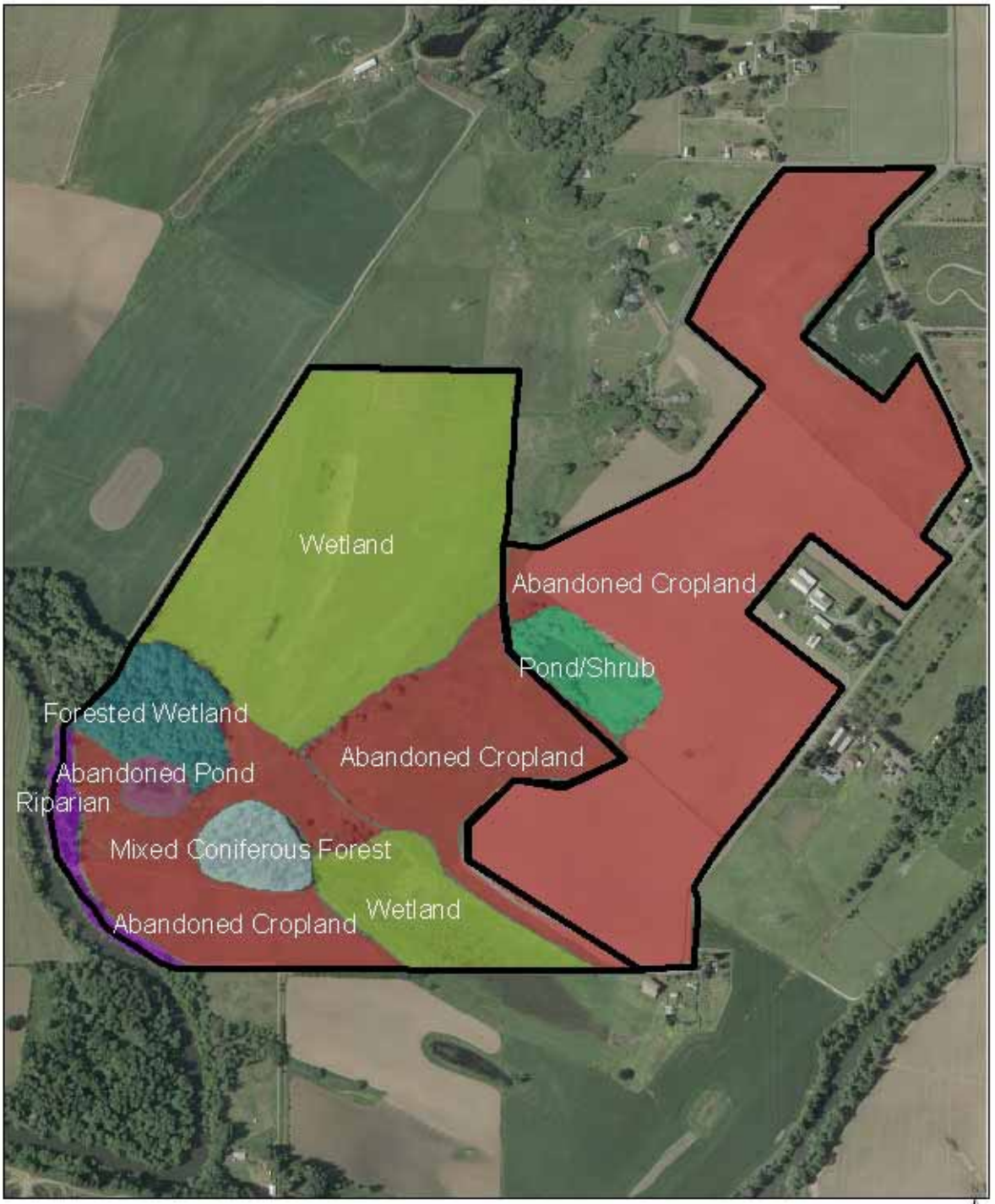

Figure 3

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4.1.3 Forested Wetland

The forested wetland occupies an area of approximately 7.9 acres (3.2 ha) adjacent to the Tualatin River. This area receives flood flows from the river, and ponding of direct precipitation is also likely. The forested wetland is characterized by an overstory of mature Oregon ash, with a shrub layer dominated by Nootka rose (*Rosa nutkana*) and a herbaceous layer dominated by slough sedge (*Carex obnupta*). Other shrub and herbaceous species include serviceberry, snowberry (*Symphoricarpos alba*), Pacific ninebark (*Physocarpus capitatus*), trailing blackberry, stinging nettle (*Urtica dioica*), curly dock (*Rumex crispus*), slender rush (*Juncus tenuis*), spotted touch-me-not (*Impatiens capensis*), and largeleaf avens (*Geum macrophyllum*) among others. Some small patches of non-native and invasive reed canarygrass and bittersweet nightshade (*Solanum dulcamara*) are also present.

4.1.4 Riparian Forest

A narrow strip of riparian forest, consisting of approximately 3.7 acres (1.5 ha), borders the Tualatin River along the southwest property boundary. At its north end the riparian forest transitions into the forested wetland described above. The riparian forest likely receives some overflows from the Tualatin River; however, due to its slightly higher topographic position, it probably does not remain flooded for as long a duration as the forested wetland area. The riparian forest is characterized by a diverse plant assemblage with distinct tree, shrub, and herbaceous strata in more mature areas of forest and less distinct strata in younger areas of forest. Dominant tree species include big-leaf maple, western red cedar, (*Thuja plicata*), Douglas fir, and Oregon ash. Understory shrub species include Indian plum, cascara (*Rhamnus purshiana*), beaked hazelnut, red-osier dogwood (*Cornus sericea*), and snowberry. Dense growth of Douglas spirea (*Spirea douglasii*) occurs along much of the riverbank. Herbaceous species include Dewey's sedge, trailing blackberry, cleavers bedstraw (*Galium aparine*), largeleaf avens, spotted touch-me-not, and twisted stalk (*Streptopus* sp.).

Photo 3. Riparian Forest and the Tualatin River

4.1.5 Pond / Shrub

The pond/shrub community occupies an area of approximately 6.7 acres (2.7 ha) and consists of an excavated pond surrounded by native and non-native tree and shrub species. Tree and shrub species common to this community include pine (*Pinus* sp.), cottonwood (*Populus* sp.), corkscrew willow (*Salix matsudana*), Pacific willow, Scouler's willow (*Salix scouleriana*), and Armenian blackberry. Also present are a wide variety of native and non-native herbaceous species, including reed canarygrass, tufted hairgrass (*Deschampsia cespitosa*), meadow foxtail, brome (*Bromus* sp.), soft rush, teasal (*Dipsacus sylvestris*), common horsetail (*Equisetum arvense*), orchard grass (*Dactylus glomerata*), field bindweed (*Convolvulus arvensis*), Canada thistle (*Cirsium arvense*), and creeping buttercup (*Ranunculus repens*) among others.

4.1.6 Abandoned Irrigation Pond

The abandoned irrigation pond (approximately 1.6 acres [0.65 ha]) consists of an excavated and now abandoned irrigation pond surrounded by a dense thicket of Armenian blackberry. This dense thicket excludes the growth of most other plant species.

4.1.7 Abandoned Cropland

Abandoned cropland covers the greatest extent of area on the Oleson Tracts; approximately 134.6 acres (54.5 ha). Abandoned cropland areas occur on upper and

lower terraces and the floodplain that were previously used for agricultural production. Some areas, particularly the upper terrace areas, are still hayed as a means to control invasive plant species. Plant species typically consist of upland grasses and forbs such as perennial rye (*Lolium perenne*), wheat (*Triticum* sp.), tufted hairgrass (*Deschampsia cespitosa*), common velvetgrass (*Holcus lanatus*), red clover (*Trifolium pratense*), smooth hawksbeard (*Crepis capillaris*), willowherb (*Epilobium* sp.), Canada thistle, and prickly lettuce (*Lactuca serriola*), among other native and non-native species.

Photo 4. Abandoned Cropland

4.2 NOXIOUS WEEDS AND INVASIVE NON-NATIVE SPECIES

It is Service policy to control noxious weeds and invasive non-native species on lands, waters, or facilities under its jurisdiction to the extent economically practicable and as needed for resource/environmental protection and enhancement, as well as for the accomplishment of resource management objectives and the protection of human health (Service 1990).

Programs for the control of noxious weeds and invasive non-native species incorporate Integrated Pest Management (IPM) concepts and practices. IPM involves the use of all suitable techniques, including biological, chemical, physical (mechanical and manual), cultural control measures (environmental manipulation), and public awareness programs (Service 1990). The basis for choice of pest reduction methods is, in order of priority, 1) human safety and environmental integrity, 2) effectiveness, and 3) cost. Physical,

cultural, and biological alternatives, or combinations thereof, will be used unless they are impractical or incapable of reducing pest populations to prescribed target levels or will adversely affect non-target organisms and Service lands (Service 1990).

The Service also administers Pest Management programs in accordance with all applicable local, state, and federal laws and regulations. In the State of Oregon, "noxious weeds" refers to any plant designated by the Oregon State Weed Board that is injurious to public health, agriculture, recreation, wildlife, or any public or private property. The Oregon Department of Agriculture (ODA) sets policy regarding the control of noxious weeds. The ODA Noxious Weed Rating System designates noxious weeds as type "A," "B," and/or "T" according to the following definitions for these designations (ODA 2003).

"A" designated weed – a weed of known economic importance which occurs in the state in small enough infestations to make eradication/containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent.

Recommended Action: Infestations are subject to intensive control when and where found.

"B" designated weed – a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties. Where implementation of a fully integrated statewide management plan is not feasible, biological control shall be the main control approach.

Recommended Action: Limited to intensive control at the state or county level as determined on a case-by-case basis.

"T" designated weed – a priority noxious weed designated by the Oregon State Weed Board as a target on which the Oregon Department of Agriculture will develop and implement a statewide management plan. "T" designated noxious weeds are species selected from either the "A" or "B" list.

Table 2 provides a list of all species found within the project area that occur on the ODA noxious weed list. All species listed in Table 2 are federally classified as noxious. In addition to the ODA-listed noxious weeds that occur in the project area, reed canarygrass is often considered an invasive nuisance species and is federally classified as noxious. Of all the noxious weeds and invasive species found within the project area, reed canarygrass and Armenian blackberry cover by far the largest area. Reed canarygrass dominates existing wetland areas, almost to the complete exclusion of other species. Armenian blackberry is often found as dense thickets surrounding woodland areas.

Table 2. Oregon Department of Agriculture Noxious Weed Designations for Noxious Weeds Identified within the Project Area

Common Name	Scientific Name	ODA Noxious Weed Designation
Armenian blackberry	*Rubus armeniacus*	B
Bull thistle	*Cirsium vulgare*	B
Canada thistle	*Cirsium arvense*	B
Field bindweed	*Convolvulus arvensis*	B
Scotch broom	*Cytisus scoparius*	B
St. John's wort	*Hypericum perforatum*	B
Tansy ragwort	*Senecio jacobaea*	B and T

4.3 WILDLIFE

The Oleson Tracts offer a mosaic of existing habitats, nested alongside the Tualatin River. These land types combine to create a series of important migratory and resident wildlife habitat opportunities. Since acquisition of these tracts, knowledge of the existing wildlife resources on the property is growing through regular monitoring efforts. These results indicate that some units offer unusually high quality habitat for wildlife.

4.3.1 Emergent Wetland

A single species, reed canarygrass, dominates this habitat type. This condition limits habitat structure and function by creating dense stands that limit roosting and foraging opportunities. Species observed in these units are usually limited to avian species. Examples include tree swallows (*Tachycineta bicolor*) and Vaux's swifts (*Chaetura vauxi*) that feed above the herbaceous canopy. Reed canarygrass offers little forage opportunity other than its young shoots. Reed canarygrass thrives on unnatural disturbance patterns. Development of control structures to regulate water levels will dramatically improve the wildlife resources in these units (Lyons, 1998).

4.3.2 Mixed Coniferous Forest

The transition from lowland to upland in Unit 3 provides ecotonal habitat and foraging opportunities for wildlife species. The decline of formerly open grown or woodland Garry oak, as faster-growing conifers out-shade this species, provides cavity nesting opportunities for flickers, owls, woodpeckers, arboreal mammals, and reptiles. Dead and dying trees in this stand also likely support an invertebrate forage base that benefits bark- and foliage-gleaning species. This unit, which is essentially a transitional mixture of westside lowland conifer hardwood forest and westside oak and dry Douglas fir forest, is a combination of increasingly rare habitats in the Willamette Valley (Chappell et al. 2001). The remarkably intact subcanopy and herbaceous layer within this stand provides excellent food resources for wildlife throughout the year. Although its relatively small size may limit nesting opportunities for interior forest species other than cavity nesters,

the improving health of adjacent habitats makes this unit an important part in the life history of local wildlife.

4.3.3 Forested Wetland

The forested wetland in Oleson I is situated alongside the Tualatin River corridor. Westside riparian wetlands have become increasingly marginalized in Oregon and are often in a declining or degraded condition (Chapell et al. 2001). This forested wetland is unusually diverse and intact compared to this regional condition. Forested wetland-associated species require dense forest canopy as well as periodic flooding of herbaceous understory during their life history. Bird guilds closely associated with these conditions include woodpeckers, some duck species (e.g., wood duck [*Aix sponsa*], bufflehead [*Bucephala albeola*], hooded merganser [*Lophodytes cucullatus*]), western screech owls (*Otus kennicottii*) and other owl species, vireos (e.g., warbling vireos [*Vireo gilvus*] and red-eyed vireos [*V. olivaceus*]), flycatchers (e.g, willow flycatchers [*Empidonax traillii*]), warblers (*Dendroica* sp.), and sparrows (e.g., Lincoln's [*Melospiza lincolnii*]) (Ehrlich et al. 1988, Johnson and O'Neil 2001). Some shrew, vole, bat, and wood rat species are also closely associated with forested wetlands. Depending on seasonal saturation, frogs, including chorus frogs (*Pseudacris regilla*), likely also use this shaded water resource (Chappell et al. 2001).

Photo 5. Forested Wetland

4.3.4 Riparian Forest

The riparian forest adjacent to the Tualatin River serves as an important habitat corridor for both aquatic and riparian species, while also providing nesting and breeding habitat for migratory birds. The riparian forest subcanopy and herbaceous layer are typically composed of plant species more adapted to drier rather than saturated soil moisture conditions compared to forested wetlands. Wildlife species closely associated with riparian forests often require broadleaf-dominated closed canopy forests near water during their life history processes (Johnson and O'Neil, 2001). Examples include belted kingfisher (*Ceryle alcyon*), wood duck, bald eagle, beaver (*Castor canadensis*), and river otter (*Lutra canadensis*) (Campbell, 2004). Other bird species associated with riparian forests include the downy woodpecker (*Picoides pubescens*), hairy woodpecker (*P. villosus*), western wood-pewee (*Contopus sordidulus*), yellow warbler (*Dendroica petechia*), common yellowthroat (*Geothlypis trichas*) , and yellow-breasted chat (*Iceteria virens*) (Campbell, 2004). Garter snakes (*Thamnophis* sp.) and chorus frogs are reptiles and amphibians typical of these habitat types (Campbell 2004). As riparian areas become thinner and more isolated, they support a more generalized list of resident and visiting species than in wider, well-connected tracts (Kauffman et al. 2001). Generalist species observed within Oleson riparian areas include American robin, (*Turdus migratorius*), American crow (*Corvus brachyrhynchos*), black-capped chickadee (*Poecile atricapilla*), spotted towhee (*Pipilo maculatus*), and northern flicker (*Colaptes auratus*).

4.3.5 Pond / Shrub

The pond/shrub area is an excavated pond of unknown depth that was once used as a fishing pond by a local fishing club. Non-native fish species were historically stocked in the pond, including white crappie (*Pomoxis annularis*), bluegill (*Lepomis macrochirus*), and bass (*Micropterus* sp.). The high algal content and temperature of the pond may limit fish productivity. Even so, perennial surface water probably serves as an upland watering resource for mammal species residing in or travelling through the tracts. It is anticipated that herons and other predatory wading birds may use this pond throughout the year, as native anurans have been observed using the pond.

Adjacent trees and shrubs surrounding the pond are largely composed of ornamental species that offer limited food resources for foraging wildlife. However, they provide roosting and nesting substrate for a variety of native bird species. Some of the native herbaceous cover, especially the grasses, rushes, and sedges, provide some forage value for species. Edge-associated bird species, including common yellowthroat, American robin, and spotted towhee, reside in the area. Burrow holes have been noted around the periphery of the pond, and both beaver and nutria (*Mayocastor coypus*) have been documented in the vicinity.

4.3.6 Abandoned Irrigation Pond

The abandoned irrigation pond edge is dominated by Armenian blackberry, limiting wildlife access to the surface water. This pond has limited value for wildlife, with the possible exception of swallows and other aerial foragers that may skim above the pond in pursuit of insect prey and occasional waterfowl that use the pond for roosting.

4.3.7 Abandoned Cropland

Abandoned cropland makes up the largest proportion of the existing land base within the Oleson Tracts. Abandoned cropland, while typically supporting more simplified ecosystems, can have important habitat value for wildlife. Duck species (e.g., American wigeon, [*Anas americana*], northern shoveler [*A. clypeata*], green-winged teal [*A. discors*], and gadwall [*A. strepera*]) will nest in fallow agricultural fields if these fields are adjacent to suitable wetland types (Johnson and O'Neil 2001, Ehrlich et al. 1988). Rodents also reside in these fields, and provide foraging habitat for predators like owls and hawks that may nest in nearby woodlands. Other species that occupy transitional areas between agricultural habitats and other adjacent habitats include common yellowthroat and sparrow (*Spizella* sp.) (Johnson and O'Neil 2001); they would likely be found in this area. Introduced game species like ring-necked pheasant (*Phasianus colchicus*) and wild turkey (*Meleagris gallopavo*) are also associated with fallow agricultural ecosystems (Johnson and O'Neil 2001). Larger tracts of this habitat type, although not necessarily observed in the Oleson Tracts, may be used occasionally by grassland-prairie associates like western meadowlark (*Sturnella neglecta*) and bobolink (*Dolichonyx oryzivorus*) (Johnson and O'Neil 2001, Ehrlich et al. 1988).

Photo 6. Abandoned Cropland

4.4 FISH

A wide variety of fish inhabits the Tualatin River mainstem, including warm- and cold-water, anadromous, and resident species. The introduction of non-native warm-water species, in addition to physical and chemical changes of the river, has changed the cold-water and salmonid population structure in the basin (TRWC 2004). Until 1986, ODFW released rainbow trout (*Oncorhynchus mykiss*) and cutthroat trout (*O. clarki*) into the Tualatin River mainstem and several of its tributaries (TRWC 2004). From 1975 to 1995, winter steelhead trout (*O. mykiss*) hatchery fish were released into Gales Creek, a tributary of the Tualatin River. Coho salmon (*O. kisutch*) likely were not present historically; however, the construction of the Willamette Falls fish ladder and stocking by ODFW since 1962 may result in some present-day natural production (TRWC 2004). ODFW maps show the project reach of the Tualatin River as providing a migration corridor for steelhead trout and migratory and rearing habitat for coho salmon. Introduced warm water species probably dominate use of the project reach of the river, particularly during the summer months when water temperatures may preclude use by cold water species. Table 3 provides a list of fish species identified as occurring within the Tualatin River mainstem that may use the project reach of the river during at least some portion of their life cycle.

Table 3. Fish Species Sampled Within the Tualatin River Mainstem

(based on Leader 2002, Service 2002, and unpublished data provided by the Refuge)

Cutthroat trout	*Oncorhynchus clarki*	Common carp	*Cyprinus carpio*
Coho salmon	*Oncorhynchus kisutch*	Threespine stickleback	*Gasterosteus aculeatus*
Winter steelhead	*Oncorhynchus mykiss*	Bluegill	*Lepomis macrochirus*
Pacific lamprey	*Lampetra tridentata*	Pumpkinseed	*Lepomis gibbosus*
Largescale sucker	*Catostomus macrocheilus*	Sculpin	*Cottus* sp.
Largemouth bass	*Micropterus salmoides*	Yellow perch	*Perca flavescens*
Redside shiner	*Richardsonius balteatus*	Warmouth	*Chaenobryttus gulosus*

4.5 THREATENED AND ENDANGERED SPECIES

The Service's Oregon Fish and Wildlife Office sensitive species database was queried to identify animal and plant species that are federally listed, candidate species, or species of concern and that have been documented or have the potential to occur in the project area. Service identified several species of wildlife, fish, and plants as potentially occurring within the project area (Service 2002).

4.5.1 Wildlife

The Service identified 19 species that are federally listed, candidate, or species of concern as potentially occurring within the project area. These consisted of one threatened species, three candidate species, and 15 species of concern. Service-conducted

wildlife surveys have not documented any of these species occurring on the Oleson Tracts.

4.5.1.1 Bald eagle – Federally listed "threatened"

Bald eagles (*Haliaeetus leucocephalus*) are listed as threatened under the Endangered Species Act (ESA), but a proposal to de-list the species is pending. Critical habitat has not been designated. Bald eagles are found along the shores of saltwater and freshwater lakes and rivers. Breeding territories are located in predominately coniferous, uneven-aged stands with old-growth components (Anthony et al. 1982); however, they may also be located in mature deciduous stands in association with water. Wintering bald eagles concentrate in areas where food is abundant and disturbance is minimal (Service 1986). The restored riparian forest and seasonally flooded emergent wetland could provide perch and foraging habitat for bald eagles in the future.

4.5.1.2 Streaked horned lark – Federal candidate for listing

In the Willamette Valley, streaked horned larks (*Eremophila alpestris strigata*) occur in open fields with short herb-dominated ground cover less than one-foot tall, areas of sparse vegetation, and patches of bare ground. Nesting includes a wide variety of agricultural land, including cultivated grass fields, row-crop agriculture, plowed or burned fields, moderate- to heavily-grazed pasture, and non-agricultural lands such as lightly-traveled gravel roads (Marshall et al. 2003). The fallow agricultural lands in the project area could provide habitat for this species, but none have been observed to date. Several habitat types proposed for restoration on the Oleson Tracts could provide habitat in the future for this species.

4.5.1.3 Yellow-billed cuckoo – Federal candidate for listing

The yellow-billed cuckoo (*Coccyzus americanus*) is one of the last neotropical migrants to arrive in North America. It prefers thick, closed-canopy riparian forest with an understory of dense brush. The riparian forest may provide habitat for this species, but none have been observed to date. Restoring and expanding the existing riparian forest could provide habitat for this species in the future.

4.5.1.4 Oregon spotted frog – Federal candidate for listing

Oregon spotted frogs (*Rana pretiosa*) inhabit marshes, permanent ponds, lake edges and slow streams, usually where there is abundant aquatic vegetation. They breed in very shallow water such as flooded meadows beside a pond or stream, or water pooled on top of flattened, dead vegetation at the edge of a pond. Adults live in well-vegetated ponds, marshes or slow weedy streams that meander through meadows (Corkran and Thoms 1996). The restored seasonal emergent wetland and scrub-shrub wetland could provide habitat for this species in the future.

4.5.1.5 Band-tailed pigeon – Federal species of concern

Band-tailed pigeons (*Columba linnaeus*) are found mainly in coniferous or mixed deciduous oak and conifer forests in Oregon. They generally breed in forested mountain areas below 4,000 feet but frequent valleys to exploit mineral sites and forage. Habitat components identified as important for reproduction include closed-canopy forest for nesting, open-canopy forest for foraging and mineral sites (Marshall et al. 2003). The forested habitat currently in the Oleson Tracts is probably too small to provide habitat for this species. However, the restored riparian forest and mixed coniferous and mixed hardwood forests could provide habitat for band-tailed pigeon in the future.

4.5.1.6 Yellow-breasted chat – Federal species of concern

In the Willamette Valley, yellow-breasted chats (*Icteria virens*) are typically in riparian zones consisting of Armenian blackberry, Oregon ash, willow, red-stemmed dogwood, Douglas spirea, and small deciduous trees (Marshall et al. 2003). This species could be found in those forested and wetland communities that contain vegetation preferred by this species. Forested riparian habitat on Oleson I may provide limited habitat for this species. The restored riparian forest and scrub-shrub wetland could provide habitat for yellow-breasted chats in the future.

4.5.1.7 Oregon vesper sparrow – Federal species of concern

The Oregon vesper sparrow (*Pooecetes gramineus*) is associated with two habitat types in the Willamette Valley. It occurs in lightly grazed pastures with scattered shrubs where grass height is less than two feet and in Christmas tree farms, particularly young farms if extensive grasses and weeds are present (Marshall et al. 2003). Habitat for this species may be found in agricultural areas that provide the structural components required by this species. Several habitat types proposed for restoration on the Oleson Tracts could provide habitat in the future for this species.

4.5.1.8 Acorn woodpecker – Federal species of concern

Acorn woodpeckers (*Melanerpes formicivorus*) inhabit conifer-oak woodlands where oak trees are plentiful. They are also found in riparian corridors and conifer forests as long as oaks are available nearby. Nest cavities are drilled into large dead or living limbs in trees or snags, which may contain granaries. Habitat for this species may be found in the mixed coniferous and riparian forest, but the limited number of oak trees in the surrounding area limits overall habitat suitability. Oak savanna restoration may prove especially valuable to this species.

4.5.1.9 Red-legged frog – Federal species of concern

Red-legged frogs (*Rana aurora*) live in moist coniferous or deciduous forests and forested wetlands. They breed in winter to early spring in water 1.6 to 6.6 feet (0.5 to 2 meters) deep in cool, usually well-shaded ponds, lake edges, or slow streams. They attach their eggs to a submerged branch or stem. During the summer, froglets and adults live

along streams, in moist sedge or brush, on shaded pond edges, or under logs and debris. During damp conditions they may occur in forests far from water (Corkran and Thoms 1996). The restored riparian forest, mixed hardwood forest, and scrub-shrub wetland could provide habitat for this species in the future.

4.5.1.10 Long-eared bat – Federal species of concern

In Oregon the long-eared bat (*Myotis evotis*) is widely distributed but is not abundant. This species is associated primarily with forested habitats and forested edges, including Douglas fir and alder and willow along streams. Information about this species' reproduction is lacking. This species forages by picking prey items off the surface of foliage. Moth species are its primary prey (Csuti et al. 1997). The restored riparian forest and mixed coniferous and hardwood forests could provide habitat for this species in the future.

4.5.1.11 Fringed bat – Federal species of concern

Fringed bats (*Myotis thysanodes*) are rare in Oregon. They are found in a variety of habitats, but seem to prefer forested or riparian areas. Their nursery colonies are established in caves, mines, and buildings. This species is thought to forage by picking up food items from shrubs or the ground. It consumes beetles, moths, harvestmen, crickets, and spiders (Csuti et al. 1997). The restored riparian forest and mixed coniferous and hardwood forests could provide habitat for this species in the future.

4.5.1.12 Silver-haired bat – Federal species of concern

Silver-haired bats (*Lasionycteris noctivagans*) are associated with forested areas, but are most abundant in older Douglas fir/western hemlock forests. They forage over ponds and streams in the woods, and typically roost under loose bark during the day (Csuti et al. 1997). Lack of old-growth or mature forests could limit the presence of this species in the project corridor. The restored riparian forest and mixed coniferous and hardwood forests could provide habitat for this species in the future.

4.5.1.13 Long-legged myotis – Federal species of concern

Long-legged myotis (*Myotis volans*) are found in coniferous forests. This species seeks shelter in a variety of roost sites, including crevices in cliff faces, abandoned buildings, caves, and mines (Csuti et al. 1997). They often feed over water and roost in forests, but also forage in the forest canopy. Although the restored mixed coniferous and hardwood forest could provide habitat for this species in the future, there are no caves, mines, or cliffs on the Oleson Tracts, which may limit roosting habitat for this species.

4.5.1.14 Yuma myotis – Federal species of concern

Yuma myotis (*Myotis yumanensis*) are closely associated with water, over which they feed. In western Oregon they are found in older Douglas fir forests. They establish large colonies in buildings, mines, caves, or under bridges, and may be locally abundant. This

species is sensitive to disturbance (Csuti et al. 1997). The restored mixed coniferous forest may provide habitat for this species in the future, but due to the lack of old forest habitat and limited preferred roosting habitat this species may not occur on the Oleson Tracts.

4.5.1.15 Camas pocket gopher – Federal species of concern

Camas pocket gophers (*Thomomys bulbivorus*) are associated with early seral plant communities or agricultural lands that mimic early seral conditions. This species has been found in alfalfa, wheat, orchards, and in weedy lawns and waste-ground areas. It does not occur in wetlands or other areas with poor drainage (Verts and Carraway 1998). The restored oak savanna may provide habitat for this species in the future.

4.5.1.16 Northwestern pond turtle – Federal species of concern

Northwestern pond turtles (*Clemmys marmorata marmorata*) prefer quiet water in small lakes, marshes, and sluggish streams and rivers. They require basking sites, such as logs, rocks, mud banks, or cattail mats. Nests can be several hundred meters from water in a variety of vegetation types. This species usually hibernates in bottom mud. Once quite common in the Willamette Valley, this species has declined by as much as 96% to 98% since the beginning of the 20th century. The restored seasonal emergent wetland and wet meadow prairie may provide habitat for this species in the future. Nesting habitat could also be provided by restored oak savanna.

4.5.2 Fish

The Service identified steelhead trout (Upper Willamette River ESU) and Pacific lamprey as potentially occurring within the project area (Service 2002). At that time, the Service also identified coastal cutthroat trout (Upper Willamette) as potentially occurring in the Tualatin River near the Oleson Tracts. Since that time, the Service has determined that populations of coastal cutthroat trout are secure and has removed the species from any ESA-related listings. Coastal cutthroat trout are therefore not discussed in this section.

4.5.2.1 Steelhead trout – Federally listed "threatened"

The Upper Willamette River Evolutionarily Significant Unit (ESU) of steelhead trout (*Oncorhynchus mykiss*) are federally listed as threatened (NOAA Fisheries 1999). Critical habitat was established for this ESU, but was later vacated due to a court action. ODFW maps the Tualatin River along Oleson I primarily as a migratory corridor used by juveniles and adults to the spawning and rearing habitats further upstream in Gales Creek and the Tualatin River above Scoggins Creek, as well as McKay Creek and the East and West forks of Dairy Creek (ODFW 1992) (Streamnet 2004). There is potential for steelhead to get trapped in existing ponds in the northwest portion of Oleson I during flood events that inundate the site. Restoration of riparian forest should provide high-flow refugia habitat for steelhead and other fish species. Construction of low-flow and discharge channels, and installation of a fish passable water control structure located in

the northwest portion of Oleson I, will provide positive drainage following high-flow events that will reduce the likelihood of fish entrapment.

4.5.2.2 Pacific lamprey – Federal species of concern

Pacific lamprey (*Lampetra tridentata*) are listed by the Service as "Species of Concern" and by the State of Oregon as "Sensitive." Pacific lamprey is an anadromous species that occurs in coastal drainages throughout the U.S. West Coast, as well as in the upper Columbia River and its tributaries. Lampreys typically spawn in gravel-bottom stream riffles during late winter or spring. Juvenile lampreys (ammocoetes) remain in freshwater after emergence, filter-feeding on algae in silt-substrate habitats. After up to seven years as freshwater ammocoetes, lampreys undergo metamorphosis and migrate to the ocean as adult parasitic fish. Pacific lamprey accounted for only 0.07 percent of all fish sampled in seven streams of the Tualatin system by ODFW during summer, fall, winter, and spring of 1999-2000 (Hughes and Leader 2000). These fish were located in lower reaches of Chicken Creek.

4.5.3 Plants

The Service identified 11 plant species that are federally listed, candidate, or species of concern as potentially occurring in the project area. Six were identified as threatened and endangered, and five were species of concern. Service-conducted wildlife surveys have not documented any of these species occurring on the Oleson Tracts. Species nomenclature follows that of the Oregon Natural Heritage Information Center (ONHIC) database.

4.5.3.1 Bradshaw's lomatium – Federally listed "endangered"

Bradshaw's lomatium (*Lomatium bradshawii*) is listed as endangered under both the Federal and Oregon ESAs (Service 1988 and ONHIC 2004). Critical habitat has not been designated for this species under the ESAs. This species is endemic to seasonally wet prairies in central and southern portions of the Willamette Valley. It is known to occur in Benton, Lane, Linn, Marion, and Douglas counties (ONHIC 2004). The majority of Bradshaw's lomatium populations occur on seasonally saturated or flooded prairies. The restored wet meadow prairie may provide habitat for Bradshaw's lomatium in the future.

4.5.3.2 Nelson's checker-mallow – Federally listed "endangered"

Nelson's checker-mallow (*Sidalcea nelsoniana*) is listed as endangered under both the Federal and Oregon ESAs (Service 1993 and ONHIC 2004). Critical habitat has not been designated for this species under the ESAs. This species is reduced to relict remnant populations in four Willamette Valley centers, one population in the Coast Range, and a separate population in Cowlitz County, Washington. Nelson's checker-mallow is known to occur in Clackamas, Linn, Marion, Polk, Tillamook, Washington, and Yamhill counties (ONHIC 2004).

Nelson's checker-mallow occurs on moist, open ground in meadows and occasionally in wooded habitats. The soils range from poorly-drained to well-drained clay, clay loam, and gravelly loam. This species blooms in June and July (Service 1993). The restored wet meadow prairie may provide habitat for this species in the future.

4.5.3.3 Willamette Valley daisy – Federally listed "endangered"

The Willamette Valley daisy (*Erigeron decumbens* var. *decumbens*) is listed as endangered under both the Federal and Oregon ESAs (USFWS 2000 and ONHIC 2004). Critical habitat has not been designated for this species under the ESAs. When the Willamette Valley daisy was proposed for listing, it was known to occupy 28 sites across 286 acres in the Willamette Valley. These sites are scattered in Clackamas, Lane, Linn, Marion, Polk, Washington, and Yamhill counties, Oregon (ONHIC 2004).

The primary habitat for the Willamette Valley daisy is native wetland prairies where flooding creates anaerobic and strongly reduced soil conditions (Service 2000). The restored wet meadow prairie may provide habitat for this species in the future.

4.5.3.4 Golden paintbrush – Federally listed "threatened"

Golden paintbrush (*Castilleja levisecta*) is listed as threatened under the ESA (Service 1997) and the Oregon ESA (ONHIC 2004). Critical habitat has not been designated for this species under the ESA. Golden paintbrush once occurred in the Willamette Valley province in Oregon, but is now believed to be extirpated from this province. Golden paintbrush occurs in the Puget Trough physiographic province in Washington and British Columbia. It is now known in ten extant populations in this province. The Rocky Prairie Natural Area Preserve population in Thurston County, Washington, is the southernmost known population of this species (Service 1997). The restored oak savanna may provide habitat for this species in the future.

4.5.3.5 Howellia – Federally listed "threatened"

Howellia (*Howellia aquatilis*) is listed as threatened under the ESA (Service 1994). Critical habitat has not been designated for this species under the ESA. Historically this species occurred over a large area of the Pacific Northwest and south into California. Populations in Oregon occurred in the floodplains of the lower Columbia and Willamette rivers in Clackamas, Marion, and Multnomah counties. Currently, howellia is thought to be extirpated in Oregon (ONHIC 2004).

Howellia grows in firm consolidated clay and organic sediments that occur in wetlands associated with ephemeral glacial pothole ponds and former river oxbows. These wetland habitats are filled with spring rains and, depending on temperature and precipitation, may exhibit some drying in some years (Service 1994). The restored scrub shrub wetland may provide habitat for this species in the future.

4.5.3.6 Kincaid's lupine – Federally listed "threatened"

Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) is listed as threatened under both the ESA (Service 2000) and Oregon ESA (ONHIC 2004). Critical habitat has not been designated for this species under the ESA. At the time it was proposed for listing, Kincaid's lupine was known to occupy 51 sites throughout the Willamette Valley and one site in southern Washington. The northern limit of this subspecies is Lewis County, Washington, while it ranges south to Douglas County, Oregon (Service 2000).

Kincaid's lupine is generally found in the Willamette Valley native upland prairie sites that are characterized by heavier soils and mesic to slightly xeric soil moisture levels (Service 2000). The restored oak savanna may provide habitat for this species in the future.

4.5.3.7 White-topped aster – Federal species of concern

White-topped aster (*Aster curtus*) is a federal species of concern. It is listed as threatened under the Oregon ESA (ONHIC 2004). White-topped aster is restricted to the Willamette Valley-Puget Lowlands from Lane County, Oregon, north through the Willamette Valley to Thurston, Pierce, and Island counties, Washington, and the southeastern portions of Vancouver Island, British Columbia. In Oregon, it is known to occur in Clackamas, Lane, Linn, and Marion counties, and may exist in Multnomah County (ONHIC 2004).

White-topped aster is a native prairie species (Eastman 1990, Gilkey and Dennis 2001). Most habitats are seasonally mesic but are moisture-stressed in late summer. White-topped aster habitats are dominated by native grasses, often bordered by Douglas fir and Garry oak. The restored oak savanna may provide habitat for this species in the future.

4.5.3.8 White rock larkspur – Federal species of concern

White rock larkspur (*Delphinium leucophaeum*) is a federal species of concern. It is listed as endangered under the Oregon ESA (ONHIC 2004). White rock larkspur is known to occur in Clackamas, Marion, Multnomah, Washington, and Yamhill counties, and in one known site in Lewis County, Washington (ONHIC 2004).

White rock larkspur inhabits undisturbed sites on dry bluffs, cliffs, and rocky areas along the lower Willamette and Columbia rivers (Eastman 1990, Gilkey and Dennis 2001). Suitable habitat for this species does not appear to occur on the Oleson Tracts, nor are restoration actions likely provide suitable habitat in the future.

4.5.3.9 Peacock larkspur – Federal species of concern

Peacock larkspur (*Delphinium pavonaceum*) is a federal species of concern. It is listed as endangered under the Oregon ESA (ONHIC 2004). Peacock larkspur is known to occur in Benton, Clackamas, Lane, Marion, and Polk counties (ONHIC 2004).

Peacock larkspur inhabits moist areas of native prairie, and is found along roadsides that have escaped development (Gilkey and Dennis 2001). The restored wet meadow prairie may provide habitat for this species in the future.

4.5.3.10 Thin-leaved peavine – Federal species of concern

Thin-leaved peavine (*Lathyrus holochlorus*) is a federal species of concern. It is listed as endangered under the Oregon ESA (ONHIC 2004). It is endemic to the Willamette Valley and southwestern Washington. In Oregon, it is known to occur in Benton, Clackamas, Lane, Linn, Marion, Polk, Washington, and Yamhill counties, and may occur in Douglas County (ONHIC 2004).

The species occupies forest borders and openings. It is found along margins of woods and fence rows (Gilkey and Dennis 2001), along roadsides in grassland, or climbing in low shrubby vegetation (Gilkey and Dennis 2001). The restored riparian forest and mixed coniferous and mixed hardwood forests could provide habitat for this species in the future.

4.5.3.11 Shaggy horkelia– Federal species of concern

Shaggy horkelia (*Horkelia congesta* ssp. *congesta*) is a federal species of concern and a candidate for listing under the Oregon ESA (ONHIC 2004). It is a herbaceous perennial with tall, slender, flowering stems extending from a basal tuft of leaves. The flowers are white and borne on a slender raceme (Gilkey and Dennis 2001).

The species occupies dry open hillsides of the Willamette Valley. The restored oak savanna could provide habitat for this species in the future.

5 HABITAT EVALUATION PROCEDURE (HEP)

Lands acquired using BPA Willamette and Columbia River Fish and Wildlife program funds for mitigation of FCRPS impacts to wildlife are evaluated using Habitat Evaluation Procedures (HEP) methodology, in order to quantify the number of Habitat Units (HUs) that are to be credited to BPA. HUs or credits gained lessen BPA's debt, which was formally tabulated in the FCRPS Loss Assessments and adopted as part of the Northwest Power and Conservation Council's Fish and Wildlife Program as a BPA obligation (NWPCC, 2000).

HEP methodology was developed by the Service in the early 1970s for use in impact assessment and project planning. HEP may be used to rate the quality and quantity of habitat in order to quantify the impacts of changes made through land and water development projects and to document baseline habitat information as a gauge for future habitat modification (Stiehl, 1998). HEP may also be adapted for use as a tool in project planning, impact assessment, mitigation and compensation, and habitat management by providing information on the relative value of an area at different points in time.

The Service has completed HEP for the Oleson Tracts which quantified existing HUs for selected wildlife species and forecasts potential HUs for those species that are projected to develop with and without restoration activities over the next 15 years. This information is used to determine how many HUs can be credited to BPA. Another HEP will be conducted in each of the project area units in 2016 to determine changes in wildlife habitat quality and HUs following the restoration efforts. The Oleson HEP was developed for mink, (*Mustela vision*), yellow warbler, black-capped chickadee, wood duck, beaver, western meadowlark, Wilson's snipe (*Gallinago delicata*), mallard (*Anas platyrhynchos*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), ring-necked pheasant, and black-tailed deer (*Odocoileus hemionus columbianus*).

The HEP report concluded that in 2001 the Oleson Tracts provided 179.5 HUs for this suite of species. By 2016, and without proactive restoration, the Tracts will provide 289.7 HUs as existing habitats mature and trees and shrubs invade land currently in agricultural production. With the active restoration discussed in this document, the Oleson Tracts will provide 409.7 HUs, largely as a result of riparian forest, seasonal wetland, and oak savanna restoration (Table 4). BPA would be credited this larger number of HUs, provided BPA funding is received to support completion of all restoration and enhancement activities (MOA, August, 2000, section 3cb). The complete HEP report is included as Appendix A.

Table 4. Baseline and Future Habitat Units for Evaluated Species

Species	Cover Type	Current Condition (in 2001)			Without Restoration (in 2016)			With Restoration (in 2016)		
		Acres	HSI	HUs	Acres	HSI	HUs	Acres	HSI	HUs
Mink	Riverine	3.5	0.6	2.1	3.5	0.6	2.1	15.4	0.9	13.9
Yellow Warbler	Pond/Shrub	6.4	0.2	1.3	6.4	0.2	1.3	6.4	0.2	1.3
Black-Capped Chickadee	Forested Wetland	8.0	0.8	6.4	8.0	0.8	6.4	16.0	0.5	8.0
	Mixed Forest	4.3	0.8	3.4	4.3	0.8	3.4	4.3	0.8	3.4
Wood Duck	Forested Wetland	8.0	0.1	0.8	8.0	0.1	0.8	16.0	0.1	1.6
	Riverine	3.5	0.1	0.4	3.5	0.1	0.4	15.4	0.1	1.5
Beaver	Riverine	3.5	0.5	1.8	3.5	0.5	1.8	15.4	0.5	7.7
Western Meadowlark	Grassland	20.5	0.8	16.4	20.5	0.5	10.3	142.1	0.3	42.6
	Abandoned Cropland	28.4	0.1	2.8	119.3	0.3	35.8	0.0	----	0.0
	Shrub/Grass	2.5	0.5	1.3	4.4	0.3	1.3	2.5	0.3	0.8
Wilson's Snipe	Wetland	11.2	0.7	7.8	11.2	0.7	7.8	11.2	0.8	9.0
	Emergent Wetland	49.9	0.3	15.0	49.9	0.3	15.0	29.6	0.8	23.7

Species	Cover Type	Current Condition (in 2001)			Without Restoration (in 2016)			With Restoration (in 2016)		
		Acres	HSI	HUs	Acres	HSI	HUs	Acres	HSI	HUs
Mallard	Wetland	11.2	0.1	1.1	11.2	0.1	1.1	11.2	0.6	6.7
	Emergent Wetland	49.9	0.1	5.0	49.9	0.1	5.0	29.6	0.6	17.8
	Pond/Shrub	6.4	0.1	0.6	6.4	0.1	0.6	6.4	0.1	0.6
Red-tailed Hawk	Forested Wetland	8.0	0.8	6.4	8.0	0.8	6.4	16.0	0.8	12.8
	Mixed Forest	4.3	0.8	3.4	4.3	0.8	3.4	4.3	1.0	4.3
American Kestrel	Grassland	20.5	0.8	16.4	20.5	0.8	16.4	142.1	1.0	142.1
	Abandoned Cropland	28.4	0.8	22.7	119.3	0.8	95.4	0.0	----	0.0
Ring-necked Pheasant	Grassland	20.5	0.2	4.1	20.5	0.2	4.1	142.1	0.3	42.6
	Abandoned Cropland	28.4	0.2	5.7	119.3	0.2	23.9	0.0	----	0.0
	Cropland	90.9	0.1	9.1	0.0	----	0.0	0.0	----	0.0
Black-tailed Deer	Abandoned Cropland	28.4	0.2	5.7	119.3	0.2	23.9	0.0	----	0.0
	Grassland	20.5	0.2	4.1	20.5	0.2	4.1	142.1	0.2	28.4
	Forested Wetland	8.0	0.2	1.6	8.0	0.2	1.6	16.0	0.3	4.8
	Emergent Wetland	49.9	0.2	10.0	49.9	0.2	10.0	29.6	0.5	14.8
	Wetland	11.2	0.2	2.2	11.2	0.3	3.4	11.2	0.5	5.6
	Mixed Forest	4.3	0.2	0.9	4.3	0.2	0.9	4.3	0.3	1.3
	Riverine	3.5	0.2	0.7	3.5	0.3	1.1	15.4	0.8	12.3
	Shrub/Grass	2.5	0.2	0.5	4.4	0.2	0.9	2.5	0.3	0.8
	Irrigated Pond	1.9	0.2	0.4	0.0	----	0.0	0.0	----	0.0
	Cropland	90.9	0.2	18.2	0.0	----	0.0	0.0	----	0.0
	Pond/Shrub	6.4	0.2	1.3	6.4	0.2	1.3	6.4	0.2	1.3
Total				**179.5**			**289.7**			**409.7**

HSI = Habitat Suitability Index; HUs = Habitat Units (Acres x HIS)

6 COORDINATION AND PUBLIC INVOLVEMENT

Significant public involvement and coordination actions occurred during the planning and initial development stages of the Refuge. These are discussed in the Environmental Assessment (EA) for the Tualatin River National Wildlife Refuge, Washington County, Oregon (Service 1992). Because restoration and management actions proposed for the Oleson Tract are envisioned in that EA, no additional public involvement program is required.

A regulatory and resource agency coordination meeting was held at the Refuge on April 13, 2004, to discuss restoration plans for the Oleson Tracts. Representatives from the Service, U.S. Army Corps of Engineers (USACE), Oregon Department of State Lands

(DSL), Oregon Department of Fish and Wildlife (ODFW), and the National Oceanic and Atmospheric Administration (NOAA) Fisheries attended. Selected stakeholders (BPA, Friends of the Refuge, and Ducks Unlimited) also attended.

7 PROJECT GOALS AND OBJECTIVES

Project goals for restoration and enhancement activities on the Oleson Tracts are embodied in the goals of the Refuge. Specifically, when the project is complete and restored plant communities are mature, the Oleson Tracts will protect and restore a diversity of native habitats and associated populations of indigenous wildlife, invertebrate, and plant species of the Tualatin River basin. It will protect, restore, and develop a diversity of habitats for migratory birds such as neotropical songbirds, wading birds, and shorebirds, with a special emphasis on wintering waterfowl. It will protect and restore floodplain benefits associated with the Tualatin River, including water quality, flood storage, and groundwater recharge. Lastly, the Oleson Tracts will protect, restore, develop habitats for, and otherwise support recovery of federally listed endangered and threatened species, and help prevent the listing of candidate species and species of management concern.

Goals for each habitat type to be restored are provided in Section 8.2. Objectives are provided for each habitat type, rather than for the overall project.

8 FIVE-YEAR MANAGEMENT PLAN

Achieving the goals and objectives of this plan will require implementing an aggressive restoration strategy over the next five years. For some habitat types (emergent wetland) restoration and enhancement actions will largely be complete. For habitats requiring intensive site preparation, such as the oak savanna, restoration actions will be on-going at the end of this period.

8.1 ENHANCEMENT STRATEGY AND METHODS

Ecosystem restoration is a dynamic process that occurs over time. It is not necessarily achieved by a series of prescriptive actions, but rather the actions set into motion ecological processes acting over spatial and temporal scales that ultimately achieve project goals and meet desired future conditions.

The long history of agricultural manipulations of the Oleson Tracts has resulted in large areas currently dominated by non-native and invasive species. Near monotypic stands of reed canarygrass are found in abandoned floodplain agricultural sections of Oleson I. Armenian blackberry creates a dense thicket along the transitional slope between the floodplain and the upland terrace, and around the perimeter of the abandoned pond. To achieve project goals, restoration and enhancement of the Oleson Tracts will require employing the full suite of tools available to the Service. These actions will range from passive techniques such as manipulating the water level and inundation duration of the

seasonal wetland to aggressive techniques involving herbicide applications and mechanical ground-disturbing actions.

The enhancement strategy developed by the Service is predicated on completing intensive site preparation activities prior to installing plant materials in order not only to control the current cohort of non-native plants, but to exhaust their seed bank to the extent practicable. Once plant material is installed, then an aggressive maintenance program will be implemented until trees and shrubs are well established and can out-compete non-native vegetation. Specific site preparation and maintenance actions are outlined in Section 8.28.2.

8.1.1 Water Management Plan

Management of water levels will be used as the primary technique for controlling invasive vegetation and restoring native vegetation to wetlands located in the northwest portion of the property. Water management in this area will also be used to provide habitat for wading birds and shorebirds with a special emphasis on wintering waterfowl. Management of water levels will make use of a proposed water control system, which will include a new water control structure, a new well and pipeline, a containment berm, newly excavated drainage swales, and use of an existing outlet. The Refuge currently holds two primary appropriated water rights (Certificates #23673 and #23148) for pumping a total of approximately 1.12 cubic feet per second (0.03 cubic meters per second) (approximately 500 gallons [1.9 cubic meters] per minute) of water directly from the Tualatin River. These rights will be transferred to a single point of diversion located at the proposed well, which will be installed adjacent to the river. Secondary to these appropriated rights are water rights with the Tualatin Valley Irrigation District. Oleson I holds a right for 31.7 acre-feet of water, while Oleson II carries with it a right of 104.1 acre-feet. Again, both rights are tied to the Tualatin River. The Refuge will also acquire a new reservoir water right from Oregon Department of Water Resources that will allow for the management of water levels behind the proposed water control structure.

The proposed water management scenario for a typical year will involve a gradual flood-up of the proposed seasonal wetland area in the fall, maintenance of water levels through the winter, and a gradual draw-down in spring or summer. Well water will be used to help with management of water levels.

The Tualatin River is known to overtop its banks and flood the proposed emergent wetland area. Fish may use this area for off-channel refugia during such periods. Currently, the potential exists for fish to be trapped in low-lying areas as these floods recede. The control structure will be designed and managed so as to minimize this problem. Internal drainage features will be excavated in the emergent wetland to provide positive drainage to an outlet swale that drains to the Tualatin River. After flood events, and if deemed appropriate by NOAA Fisheries, the water control structure will be opened

to drain the wetland area to allow trapped fish to escape. Once the wetland is dewatered, it will then be refilled by precipitation and surface and subsurface flows.

The timing of spring/summer drawdown will be determined in part by adaptive management principles, which involve monitoring the effects of different water management regimes on the control of reed canarygrass and other potential invasive species. Because impounding and subsequent releasing a large area of shallow water during the summer has the potential to release warmer water into the Tualatin River, which contains listed steelhead, the timing of drawdown releases will be discussed with NOAA Fisheries and the Oregon Department of Environmental Quality during consultation and permitting.

8.1.2 Permits and Surveys

Planned restoration activities described in this document will be subject to a variety of permits and approvals. Activities that require permits or site surveys are discussed here. A list of executive orders, legislative acts and plans with which this project complies is provided in Section 14.

8.1.2.1 Clean Water Act

USACE administers Section 404 of the Clean Water Act, which regulates the discharge of fill material into "Waters of the U.S.," including wetlands. Depending on the impact, restoration activities may qualify for a Clean Water Act Nationwide Permit (NWP) 27. NWP 27 authorizes activities in waters of the U.S. for the purpose of enhancing degraded wetlands and riparian areas. Clean Water Act Section 401 certification has been pre-certified for most projects qualifying for NWP 27. Projects that propose an outlet structure used to modify seasonal water levels are not pre-certified. USACE retains discretionary authority to require an individual permit whenever it believes that a project's environmental impacts or public interest warrant a higher degree of review. USACE will review the permit application to make a final determination whether project activities can be permitted under NWP 27. Should USACE determine that the proposed project is beyond the scope of those covered by NWP 27, an individual Removal/Fill permit would be required.

8.1.2.2 Oregon's Removal-Fill Law

DSL issues individual Removal/Fill permits or General Authorizations (GA) for projects that impact wetlands and State jurisdictional waterways. A GA is available for habitat enhancement projects that do not result in long-term harm to water resources of the State, and will cause only minimal individual and cumulative environmental impacts. Projects that construct water impoundment structures to manipulate water levels that simulate historical conditions, including drying out of the wetland, filling drainage ditches and/or removing drain tiles, or excavating the ground surface to restore or enhance wetlands, are all included in this GA. Should the project not qualify for the GA, an individual Removal/Fill permit would be required.

8.1.2.3 National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires federal agencies to evaluate their actions that significantly affect the quality of the human environment. The Service completed a NEPA document for restoration actions to be conducted on the Oleson Tracts that concluded that restoration actions to be taken will not significantly affect the quality of the human environment and are categorically excluded from further NEPA processes. No further documentation is required. This document is provided in Appendix B.

Under a separate action, BPA also concluded that certain restoration actions planned for 2004 are categorically excluded from NEPA review. Future restoration actions funded by BPA will be subject to additional NEPA review by BPA prior to implementation by the Service. BPA's categorical exclusion document is also provided in Appendix B.

8.1.2.4 National Historic Preservation Act

In order to comply with Section 106 of the National Historic Preservation Act, the Service will complete surveys for cultural and archaeological resources before initiating any ground-disturbing actions on the Oleson Tracts beyond those activities already cleared for restoring 115 acres (48.5 ha) of upland habitat on Oleson II.

8.2 DESCRIPTIONS OF EXPECTED FUTURE HABITAT TYPES AND ASSOCIATED RESTORATION AND ENHANCEMENT ACTIONS

There are seven habitat types to be restored, enhanced, or established on the Oleson Tracts (Figure 4). The pond/shrub plant community (artificial pond) will remain as is until a management plan is developed for that area. Manipulations to this community are not planned within the five-year planning horizon of this plan. The seven habitat types are listed in Table 5 in decreasing order by acreage.

Table 5. Future Habitat Types and Acreage

Habitat Type	Acres	Hectares
Oak savanna	107.24	43.40
Riparian forest	40.64	16.45
Emergent wetland	28.41	11.50
Wet meadow prairie	19.65	7.95
Scrub-shrub wetland	10.69	4.32
Mixed hardwood forest	8.21	3.32
Mixed coniferous forest	4.46	1.81
Artificial pond	6.73	2.72
Totals	**226.03**	**91.47**

8.2.1 Oak Savanna

Historic Willamette Valley oak savanna habitat has largely been invaded by Douglas fir or converted to agricultural uses, leaving only small patches of highly fragmented habitat. Wildlife and plant species dependent on this habitat type have experienced declines, with several species now listed or proposed for listing under the ESA. A main goal of the Oleson Tracts restoration project is to restore Garry oak savanna for the benefit of these species.

Goals

- Restore oak savanna to create late-successional Garry oak savanna that includes a diverse understory of native grasses and forbs. When mature, the oaks will provide approximately 20% to 30% canopy cover. The savanna will provide habitat for neotropical migratory landbirds, raptors, reptiles, and resident mammals.

Objectives

- Control non-native species on abandoned cropland by fall of 2005 in preparation for fall 2005 sowing of native grasses and forbs.
- Restore oak savanna habitat by planting oak trees on approximately 110 acres (44.5 ha) of suitable habitat in fall 2008 and maintain until established.
- Establish herbaceous understory of native grasses and forbs.
- Provide future habitat units (HUs) for target wildlife species through restoration and enhancement actions.

Habitat Restoration and Enhancement Actions

- Control non-native, invasive species, as well as their seed bank by mechanical means such as mowing and discing, and through the applications of Service-approved and appropriately labeled herbicides.
- Seed native grasses and forbs.
- Applications of Service-approved and appropriately labeled herbicides for control of non-native broadleaf weeds.
- Remove existing tile drain and create swale feature to reduce existing erosion hazard.
- Plant native oak trees.
- Reduce herbaceous competition for nutrients and soil moisture by mowing grass around oaks until they overtop the surrounding groundcover
- Maintain oak trees by irrigating as necessary until roots are well established.
- Suppress succession to oak woodland and encroachment of other woody species threatening maintenance of oak savanna habitat through mechanical removal or use of prescribed fire.

Oleson Tracts
Proposed Plant Communities

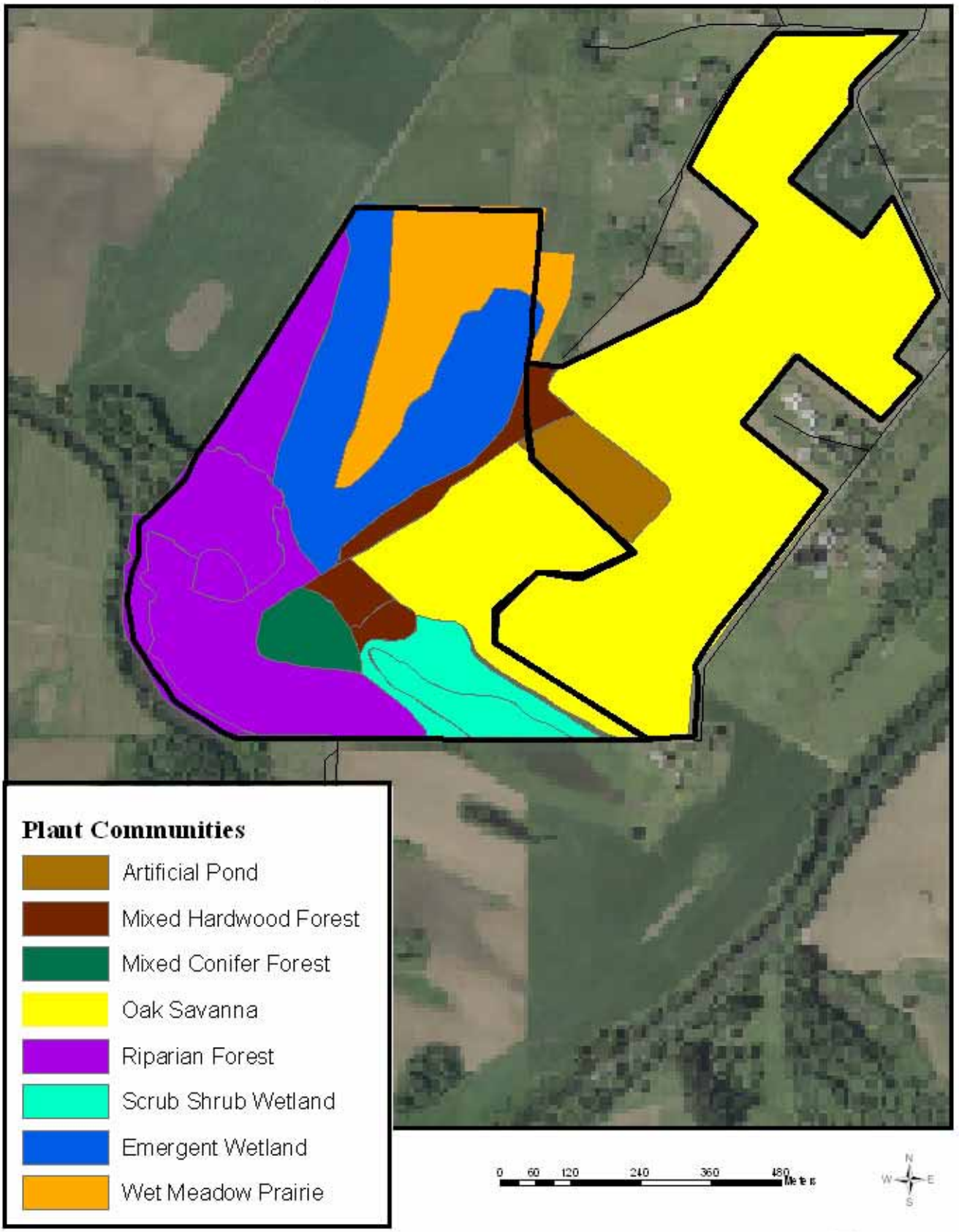

Figure 4

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8.2.2 Riparian Forest

Oleson I retains a remnant patch of the riparian forests that once lined the Tualatin River. Clearing for agricultural production often reduced these forests to narrow ribbons along the river, as was the case on Oleson I. These remnant forests often serve as the last remaining wildlife corridors in the Tualatin River Valley. This project will protect and enhance the existing riparian forest and expand its spatial coverage, restoring critically important wildlife and floodplain functions within the Tualatin River Valley.

Goals

- Protect and expand existing native riparian forest habitat to benefit neotropical migratory landbirds, raptors, cavity nesting waterfowl, reptiles, amphibians, and resident mammals. The forest will be dominated by Oregon ash, but will contain other native hardwood and conifer species as well as a diverse understory of native riparian shrubs.
- Provide riparian forest functions important to the Tualatin River, such as off-channel backwater habitat during high-flow events for sensitive and listed salmonids, stream shading, and large woody debris recruitment.
- Provide long-term breeding habitat for cavity-nesting waterfowl, especially wood ducks and hooded mergansers.

Objectives

- Within three years, control non-native, invasive plant species in the current 12-acre riparian forest.
- Control non-native, invasive species, as well as their seed bank within three years over approximately 27 acres of currently fallow agricultural land.
- Plant currently fallow agricultural land with native riparian forest tree and shrub plantings within five years.
- Maintain current baseline HUs in existing riparian forest for all target wildlife species.
- Provide additional future HUs for target wildlife species through restoration and enhancement actions that expand the existing riparian forest.

Habitat Restoration and Enhancement Actions

- Remove and control non-native species currently found in the existing riparian forest habitat through the use of manual, mechanical, and Service-approved and appropriately labeled herbicides.
- Control non-native, invasive species, as well as their seed bank, in areas currently not supporting riparian forest habitat. Use mechanical means such as mowing and discing, and through the applications of Service-approved, and appropriately labeled herbicides.

- Plant native trees and shrubs in expansion areas.
- Maintain new plantings by mowing grasses and forbs surrounding planted trees and shrubs until they overtop the groundcover.
- Maintain trees and shrubs by irrigating as necessary until roots are well established.
- Fill the existing irrigation pond, seed bare soil, and plant with native species. Fill the existing irrigation pond, seed bare soil, and plant with native species.

8.2.3 Emergent Wetland

Seasonally flooded wetland habitat has been subject to a long history of disturbance in the lower Tualatin River watershed. Drain tiles were installed and ditches were dug in order to drain fields subject to seasonal flooding. The northwest corner of Oleson I is a prime example of this type of conversion. A large drainage ditch was excavated along the west property boundary to drain the field that historically retained flood water each year. This project intends to restore this habitat type.

Goals

- Restore and manage seasonal emergent wetland habitat for the benefit of waterfowl, shorebirds, and other water birds, with an emphasis on wintering waterfowl. The wetland will provide shallow foraging habitat for migrating and wintering waterfowl, and migrating shorebirds in spring.
- Restore and manage seasonal emergent wetland habitat for the benefit of other species, including resident mammals, reptiles and amphibians.
- Improve water quality and quantity entering the Tualatin River via return flow through the restored wetland.
- Utilize and document use of existing appropriated water rights, as well as a new reservoir water right for the benefit of fish and wildlife conservation.

Objectives

- Within two years, restore seasonal emergent wetland habitat by excavating shallow swales and low flow channels in approximately 30 acres (12 ha) of degraded farmed wetland habitat, constructing a water control structure, and installing a new well and water delivery system.
- Provide up to 5 acres (2 ha) of shallow foraging habitat for migrating shorebirds within five years.
- Manage the wetland by means of water level manipulation to produce and make available a diverse composition of annual and perennial wetland plants of high nutrient content to meet nutritional demands of migrating and over-wintering water birds with an emphasis on waterfowl within five years of restoration.

- Provide additional future HUs for target wildlife species through restoration and enhancement actions.

Habitat Restoration and Enhancement Actions

- Using Service funds, install a well and water delivery pipeline to the seasonal emergent wetland.
- Using Service funds, acquire approximately 2 acres (0.8 ha) of neighboring private land (Burchfield parcel), that will be inundated as a result of wetland enhancement.
- Disable existing drain tiles by removing and capping a section near the discharge ends of all mainlines.
- Excavate swales and drainage features to provide positive discharge as required to promote fish passage following a flood event. Retain excavated material for use in constructing a low perimeter berm.
- Construct a low berm with toe drain along north end of the property boundary and along the west ditch to prevent flooding of neighboring properties.
- Construct a fish-passable water control structure to allow for water level manipulation and fish passage.
- Excavate the discharge swale, tying it into the existing drainage ditch located in existing riparian forest habitat.
- Provide long-term maintenance of seasonal emergent wetland by controlling non native plant species by means of water manipulation and mechanical treatment.

8.2.4 Wet Meadow Prairie

Prior to agricultural development, Willamette Valley wet meadow and upland prairies formed a mosaic of habitat types that were home to a wide range of resident wildlife and plant species, as well as to neotropical migratory landbirds. Many resident wildlife and plant species are endemic to the Willamette Valley. These endemic species have suffered population declines, with several species now listed under the ESA and several more either proposed for listing or are candidates for listing. Restoration of wet meadow prairie on Oleson I provides an opportunity for reintroduction of some of these sensitive species in the future.

Goals

- Restore and enhance native Willamette Valley wet meadow prairie habitat to benefit sensitive and listed, and other native plant species, neotropical migratory landbirds, mammals, reptiles, and amphibians. The plant community will include a mixture of native hydrophytic grasses and forbs.
- Reintroduce selected Willamette Valley listed plant species, if appropriate.

Objectives

- Within three years, control non-native species on approximately 20 acres (8 ha) of reed canarygrass-dominated floodplain.
- Increase species diversity over current reed canarygrass-dominated habitat within four years by directly seeding and planting a native herbaceous wet meadow community, including selected listed species, if appropriate.
- Provide additional future HUs for target wildlife species through restoration and enhancement actions.

Habitat Restoration and Enhancement Actions

- Control non-native, invasive species, as well as their seed bank, by mechanical means such as mowing and discing, and through the applications of Service-approved and appropriately labeled herbicides.
- Seed native wet meadow prairie grasses, sedges, rushes, and forbs.
- Plant native shrubs.
- Maintain shrubs by mowing grass around the shrubs until they are well established.
- Suppress succession to Oregon ash woodland, and encroachment by other woody species threatening maintenance of wet prairie habitat, by mechanically removing or mowing invading trees and shrubs.

8.2.5 Scrub-Shrub Wetland

Scrub-shrub wetlands often occur near or along the edge of open bodies of water. As such, they provide an important link between upland and aquatic habitats. They provide habitat for resident aquatic dependent mammals and waterfowl and are also important for migratory neotropical landbirds such as yellow-billed cuckoo and yellow-breasted chats, two species that are now candidates for listing under the ESA. Seasonally wet areas in Oleson I provide an opportunity to restore this habitat type.

Goals

- Restore and enhance native Willamette Valley scrub-shrub wetland habitat for the benefit of migratory neotropical landbirds, marsh birds, cavity-nesting waterfowl, amphibians, and aquatic-associated mammals, reptiles, and amphibians.

Objectives

- Within two years, control reed canarygrass and other non-native species on approximately 10 acres (4 ha) of degraded wetland habitat.
- Increase species and structural diversity by establishing native scrub-shrub species within three years.
- Provide additional future HUs for target wildlife species through restoration and management actions.

Habitat Restoration and Enhancement Actions

- Control reed canarygrass and other non-native invasive species, as well as their seed bank, for two years by mechanical means such as mowing and discing, and through applications of Service-approved and appropriately labeled herbicides.
- Plant native wetland shrub species such as willow, red-osier dogwood, and Douglas spiraea at high densities to out-compete shade intolerant non-native species.
- Control non-native, invasive species following planting until shrub-shrub species can out-compete invasive, non-native vegetation.

8.2.6 Mixed Hardwood Forest

Oleson I retains a remnant patch of mixed hardwood forest. This habitat type was likely much more prevalent in the surrounding area than its limited spatial extent today. This project will protect and enhance the existing mixed hardwood forest and expand its spatial coverage. Species selection to restore this habitat will reflect micro-site conditions, ranging from mesic to hydrophytic dominated communities, creating a complex array of habitat types. This community will serve as the transition from the oak savanna upland to the wetland habitats located in the floodplain.

Goals

- Protect and enhance the existing native mixed hardwood forest and expand its areal coverage along the slope separating the upland terrace from the floodplain to benefit neotropical migratory landbirds, raptors, reptiles, and resident mammals. Oregon ash will dominate the forest in places, but more mesic habitats will support other native hardwood species such as big-leaf maple, red alder, and cascarra. The understory will consist of a diverse assemblage of native shrubs, with native groundcover species.

Objectives

- Control non-natives within and around the approximately 1.4 acre (0.56 ha) mixed hardwood forest within three years.
- Prepare for expanding the mixed hardwood forest by controlling existing non-natives in approximately 6 acres (2.4 ha) of abandoned cropland and 4 acres (1.6 ha) of Armenian blackberry-dominated slopes adjacent to the floodplain.
- Increase structural and species diversity by planting diverse combination of native hardwood species and shrubs on approximately 10 acres (4 ha) of previously prepared ground.
- Maintain existing HUs for all target wildlife species in existing forest and provide additional future HUs through restoration and enhancement actions.

Habitat Restoration and Enhancement Actions

- Control the heavy infestation of Armenian blackberry, as well as its seed bank, along the terrace escarpment for two years by mechanical means such as mowing and

discing, and through the applications of Service-approved and appropriately labeled herbicides.

- Control non-native species in non-native pasture by mowing, especially in areas currently supporting camas (*Camassia* sp.) and other desirable species. Spot treat Armenian blackberry through applications of Service-approved and appropriately labeled herbicides.
- Plant native trees and shrubs.
- Maintain new plantings by mowing grasses and forbs surrounding planted trees and shrubs until they overtop the groundcover.
- Maintain trees and shrubs by irrigating as necessary until roots are well established.

8.2.7 Mixed Coniferous Forest

Oleson I retains a small patch of remnant mixed coniferous forest. Habitat values of this patch have been degraded through its isolation from other habitats through agricultural conversion and invasion of non-native species. This project will increase habitat values by controlling the non-native vegetation and linking the patch to other habitats through the overall restoration strategy.

Goals

- Protect and enhance existing native mixed coniferous forest to benefit neotropical migratory landbirds, raptors, reptiles, and resident mammals.

Objectives

- Increase habitat quality on approximately 4.5 acres (1.8 ha) of existing mixed coniferous forest by controlling non-native plant species within three years.
- Maintain baseline HUs for target wildlife species in existing forest and provide additional future HUs through enhancement actions.

Habitat Restoration and Enhancement Actions

- Control non-native invasive species around perimeter of forest by mechanical means such as mowing, and through spot applications of Service-approved and appropriately labeled herbicides.

8.3 FIVE-YEAR IMPLEMENTATION SCHEDULE

Tasks to implement this five-year habitat restoration and management plan are outlined by year and habitat type. Contingent on securing funding, many tasks are scheduled for 2005. Construction of infrastructure to restore the emergent wetland would largely be completed in 2005. Weed control and other site preparation efforts for the other habitat types would occur primarily over the next two to three years, with plant installation and maintenance after that. Due to intensive site preparation activities, planting oak in the oak savanna habitat would not take place until 2008.

8.3.1 Year 2005

Oak Savanna

- Mow, disc, and/or apply labeled herbicides to control non-native, invasive species and prepare for planting.
- Remove existing tile drain and grade area to create swale.
- Seed native grasses and forbs.

Riparian Forest

- Remove and control non-native invasive species found in the existing riparian forest.
- Mow, disc, and/or apply labeled herbicides to control non-native invasive species in expansion area.
- Seed native grasses and forbs.

Emergent Wetland

- Apply for and secure Corps Clean Water Act Section 404 and DSL Removal-Fill permits. Complete ESA consultation with NOAA Fisheries.
- Complete engineering plans and bid documents.
- Advertise and award construction contract.
- Install well and water delivery pipeline using Service funds.
- Acquire portion of Burchfield parcel using Service funds.
- Apply for water rights permit modification and new reservoir water right.
- Disable existing central drain tile and cap discharge end.
- Excavate wetland drainage feature and construct low berm with toe drain.
- Construct water control structure.
- Excavate discharge swale.
- Disc entire managed basin of wetland.

Wet Meadow Prairie

- Mow, disc, and/or apply labeled herbicides to control non-native, invasive species and prepare for planting.
- Seed native wet prairie grasses, sedges, rushes, and forbs.
- Plant native shrubs in isolated groups at low densities.

Scrub-Shrub Wetland

- Mow, disc, and/or apply labeled herbicides to control non-native, invasive species.

Mixed Hardwood Forest

- Mow, disc, and/or apply labeled herbicides along slope leading to floodplain to control Armenian blackberry infestation.
- Control non-native invasive species in abandoned cropland by mowing, especially in areas currently supporting camas and other desirable species. Spot treat Armenian blackberry with appropriately labeled herbicides.

Mixed Coniferous Forest

- Mow, disc, and/or apply labeled herbicides control non-native, invasive species around perimeter of forest.

8.3.2 Year 2006

Oak Savanna

- Initiate application(s) of labeled herbicides for control of non-native broadleaf weeds.

Riparian Forest

- Plant native trees and shrubs in expansion areas.
- Mow grass around planted trees and shrubs to reduce competition.
- Irrigate planted trees and shrubs as needed.

Emergent Wetland

- Manage flood-up in fall and drawdown in spring or early summer to achieve maximum benefit for waterfowl, shorebirds, and other water birds.
- Continue weed control efforts as necessary.

Wet Meadow Prairie

- Mow grass around planted shrubs to reduce competition.

Scrub-Shrub Wetland

- Continue mowing, discing, and/or applying labeled herbicides to control non-native, invasive species and prepare for planting.

Mixed Hardwood Forest

- Continue Armenian blackberry control methods along slope leading to floodplain.
- Plant native trees and shrubs in abandoned cropland.
- Mow grass around planted trees and shrubs to reduce competition.
- Irrigate planted trees and shrubs as needed.

Mixed Coniferous Forest

- Maintain weed control efforts as necessary.

8.3.3 Year 2007

Oak Savanna

- Continue herbicide applications for control of non-native broadleaf weeds as needed.

Riparian Forest

- Mow grass around seedlings to reduce competition.
- Maintain weed control efforts as necessary.

Emergent Wetland

- Maintain weed control efforts as necessary.

Wet Meadow Prairie

- Mow invading Oregon ash and other woody species.
- Maintain weed control efforts as necessary.

Scrub-Shrub Wetland

- Install cuttings at very high densities.

Mixed Hardwood Forest

- Plant native trees and shrubs along slope leading to floodplain.
- Mow grass around planted trees and shrubs to reduce competition.
- Irrigate planted trees and shrubs as needed.
- Maintain weed control efforts as necessary.

Mixed Coniferous Forest

- Maintain weed control efforts as necessary.

8.3.4 Year 2008

Oak Savanna

- Plant native oak trees.
- Mow grass around planted trees to reduce competition.
- Irrigate planted trees as needed.

Riparian Forest

- Mow grass around seedlings to reduce competition.
- Maintain weed control efforts as necessary.

Emergent Wetland

- Maintain weed control efforts as necessary.

Wet Meadow Prairie

- Mow invading Oregon ash and other woody species.
- Maintain weed control efforts as necessary.

Scrub-Shrub Wetland

- Maintain weed control efforts as necessary.

Mixed Hardwood Forest

- Mow grass around seedlings to reduce competition.
- Maintain weed control efforts as necessary.

Mixed Hardwood Forest

- Maintain weed control efforts as necessary.

Mixed Coniferous Forest

- Maintain weed control efforts as necessary.

8.3.5 Year 2009

Oak Savanna

- Mow grass around planted trees to reduce competition.
- Continue irrigating as needed.
- Maintain weed control efforts as necessary.

Riparian Forest

- Maintain weed control efforts as necessary.

Emergent Wetland

- Maintain weed control efforts as necessary.

Wet Meadow Prairie

- Mow invading Oregon ash and other woody species.
- Maintain weed control efforts as necessary.

Scrub-Shrub Wetland

- Maintain weed control efforts as necessary.

Mixed Hardwood Forest

- Maintain weed control efforts as necessary.

Mixed Coniferous Forest

- Maintain weed control efforts as necessary.

9 MONITORING AND EVALUATION

Project monitoring is crucial for determining the success of the restoration program at meeting project goals and objectives. Quantitative analysis of monitoring data is an integral part of the adaptive management process. Wherever possible, baseline data has been collected prior to initiation of restoration actions so that new monitoring data generated following habitat improvement actions can be used to evaluate project success.

Periodic monitoring and evaluation will be conducted following habitat restoration, enhancement and management efforts to evaluate the degree to which projects have met the goals and objectives established in the habitat restoration and management plan. Monitoring will occur throughout the life of this plan to evaluate changes in vegetative community composition, and use by specific wildlife species or general species guilds.

Long-term monitoring beyond the five-year management plan may also be conducted as part of the long-term maintenance plan, but is beyond the scope of this plan. Implementation of the monitoring and evaluation component during the life of the plan, and beyond, is contingent on available funding, and may be conducted in cooperation with other agencies or organizations.

9.1 BIRDS

9.1.1 Neotropical Migrant and Other Migratory Birds

Providing habitat for neotropical migrant and other migratory songbirds is one of the primary goals of the Refuge. Baseline information collected on songbird species in Refuge lands can be compared against future monitoring data to determine if habitat objectives are being met through restoration efforts. Refuge lands support a variety of habitat types that in turn support dozens of neotropical migrant species, many of which breed in this region.

Songbird monitoring protocols are described in the Tualatin River National Wildlife Refuge Songbird Point Count Survey Procedure (Tualatin NWRa, date unknown). Objectives for these surveys are to: 1) determine species composition of songbirds using the Refuge, 2) determine breeding status of those species, 3) provide information about songbird/habitat relationships, and 4) where possible determine abundance and site specific population changes of songbirds (Tualatin NWRa, date unknown).

Currently, about one year of point count data have been taken in forested units on the Oleson Tracts. These units include Riparian Forest Units (Units 0, 6, and 7), Mixed Coniferous Forest Units (Unit 3), and Oak Savannah Units (Unit 13). Fixed data points for point counts have been randomly selected in each of the habitat units, with a goal of providing as many fixed data points, spaced at least 328 feet (100 meters) apart, as possible for each of the three habitat types. Each set of survey points will be surveyed for

a period of three consecutive years, then revisited after a three-year break for another survey period of three years. (Tualatin NWRa, date unknown).

Survey protocols generally follow Ralph et al. (1993). Surveys will be conducted beginning early to mid-May, depending on weather, and continue until late June. Surveys are conducted from one-half hour before sunrise until 10:00 AM. Surveys are not conducted during rain or windy conditions. Each point is surveyed a minimum of three times per year, and as frequently as once a week, depending on available personnel. Sequence of survey sites (units) and individual points to be sampled are determined randomly. Surveys are conducted at each point for five minutes by listening and scanning the area using binoculars. Birds detected in the first three minutes are recorded separately from birds detected in the subsequent two minutes. Birds detected either within or outside a 164-foot (50-meter) radius of the observer are recorded separately (Tualatin NWRa, date unknown).

Vegetation at each sample point is surveyed at the beginning of each three-year sample period to determine songbird/habitat relationships. Vegetation is also sampled if any major changes to habitat take place, such as severe weather damage. Sampling protocols largely follow Bardolf (as referenced in Tualatin NWRa, date unknown). Herbaceous cover is sampled every five meters along a randomly-selected 197-foot (60-meter) transect using a rectangular quadrat 1.6 feet x 3.2 feet (0.5 meter x 1 meter), alternating between the left and right sides of the transect for a total of 12 plots. Herbaceous cover is estimated to the nearest five percent. The average height of herbaceous cover is determined to the nearest 2 inches (5 centimeters [cm]). Percent cover of shrub, sapling cover, and dead wood over 4 inches (10 cm) in diameter along the length of the transect is also estimated. Canopy closure at point center and both ends of the line transect is estimated. Species, diameter at breast height (dbh), and total species number of all trees and snags over 4 inches (10 cm) dbh within a 71.5-foot (21.8-meter) radius of the plot center is recorded (Tualatin NWRa, date unknown).

9.1.1.1 Data Analysis and Reporting Procedures

Following implementation of the habitat restoration and management plan, data generated from point counts on the Oleson Tracts will be compared against data collected using identical protocol methods at reference stations with similar habitats across the Refuge, outside of the Oleson Tracts. Statistical analysis of the data includes determinations of mean number of songbird species, percentage of total species composition, individual species abundance, and total count. Vegetation statistical analysis includes determinations of mean cover, height, and species composition. A software program such as MS Excel or MS Access is used to provide adequate data handling and storage. Final reports are included in the annual habitat management report (Tualatin NWRa, date unknown).

9.1.2 Migratory Waterfowl

Migrating and wintering waterfowl are a priority guild as stated in Refuge goals. Many species such as northern pintail, (*Anas acuta*), scaup (*Aythya* sp.), dusky Canada goose (*Branta canadensis occidentalis*), and cackling Canada goose (*B. c. minima*) surveyed in this guild are regional or national species of concern due to population levels established by the North American Waterfowl Management Plan (Service 1998). This guild consists mostly of species that are migratory and are not locally represented in large numbers during the breeding season (Tualatin NWRb, date unknown).

Waterfowl monitoring protocols are described in the Tualatin River National Wildlife Refuge Waterfowl Weekly Population Point Count Survey Procedure Form (Tualatin NWRb, date unknown). The objectives for this survey are to determine 1) at what time of year waterfowl arrive and depart, 2) at what time of year the peak migration/wintering period takes place, 3) the composition of species using refuge lands, 4) what trends in population dynamics are occurring, 5) which Refuge units and wetland cells are used more frequently, and 6) whether Refuge units and wetland cells are being used in proportion to their size (Tualatin NWRb, date unknown).

As of September 2004, approximately one year of weekly waterfowl survey data have been collected on the Oleson Tracts during migration season. The restored emergent and scrub-shrub wetland and wet meadow prairie will be surveyed for waterfowl use throughout the life of this plan. Surveys are conducted weekly beginning in September to document arrival of fall migrants and continue through April the following year. From November 1 through January 30 surveys are conducted twice weekly (Tualatin NWRb, date unknown).

Surveys are generally conducted in early morning with good light to obtain the best estimate of goose populations before they disburse for foraging, which generally occurs off the Refuge. Surveys are not conducted during periods of fog or heavy rain due to poor visibility. The observer stands at a survey location point outside the area being monitored and estimates the overall number of birds present in case the birds take flight and leave. Then the observer conducts a single, slow scan of the area for a more complete count (Tualatin NWRb, date unknown). Species observed, as well as numbers of each species, are recorded during this process.

9.1.2.1 Data Analysis and Reporting Procedures

Data are summarized to determine weekly abundance and habitat use of waterfowl; the summary is then used to determine drawdown/flood-up schedules for producing high quality forage and making it available for use. Data are also used to determine long-term trends of waterfowl use on the Refuge and determine success of restoration and maintenance efforts (Tualatin NWRb, date unknown).

Data are summarized for all areas on a weekly basis. Annual data are compared with past year's results to determine trends in arrival date, peak populations and timing, and departure dates. Data are compared by area, by time of year, and by species presence to determine trends in waterfowl use. Summarized annual data are used in the development of the annual habitat management report, which articulates proposed wetland management recommendations (Tualatin NWRb, date unknown).

9.1.3 Other Birds

Birds other than those that have been specifically selected for survey have also been observed on the Oleson Tracts. These observations may be incidental during daily refuge activities, or may result from an existing survey protocol for other bird species. For example, other water-dependent birds sighted during waterfowl surveys are recorded by area during the waterfowl migration season. Non-neotropical migrants that are encountered during point counts are also recorded and entered into the data set. As a result, cumulative species lists have been collected by area since purchase of the Oleson Tracts. These lists will be updated throughout the life of this plan.

9.2 VEGETATION

9.2.1 Vegetation Transects

The restored emergent, scrub-shrub, and forested wetlands, wet meadow prairie, riparian and mixed hardwood forests, and oak savanna on the Oleson Tracts will provide habitat for a variety of migratory birds, especially neotropical songbirds, shorebirds, and migrating and wintering waterfowl. The composition, amount, and vigor of vegetation in these habitats is a key determinant of habitat quality for these species. Since all plant communities are dynamic, they require consistent monitoring in order to determine the degree to which they provide life history requirements of species, especially with respect to nesting and foraging.

Vegetative monitoring protocols are described in the Tualatin River National Wildlife Refuge Annual Vegetative Transects Procedure Form (Tualatin NWRc, date unknown). Monitoring objectives are to determine 1) species and groups (e.g., shrubs, grasses) of vegetation present, 2) density of those species, and 3) percentage of non-desirable or invasive species present.

Currently a minimum of two year's worth of vegetative transect data have been recorded for each unit in the Oleson Tracts. Permanent transects were established using a stratified random sampling technique by unit (Dowdy and Wearden 1991, Krebs 1989, as referenced in Tualatin NWRc, date unknown). Sample points are randomly selected along the transects. At each sample point, a quadrat of 1.6 feet x 3.2 feet (0.5 meter x 1 meter, a "one-half meter quadrat") is used to determine species, frequency of occurrence, percent cover, and height. Herbaceous vegetation, shrubs, and trees are recorded separately. GPS coordinates are stored for each area and transect. Sample plots are photographed for archival purposes. Vegetative sampling is timed during the growing

season to allow for the greatest degree of identification (i.e., robust stems, flowering plants), usually during August/early September (Tualatin NWRc, date unknown).

9.2.1.1 Data Analysis and Reporting Procedures

Data analysis will include sums, means, and percentage calculations. Data analysis is included in the annual habitat management report and is used to determine future management actions necessary to meet Refuge goals and objectives (Tualatin NWRc, date unknown).

9.2.2 Tree and Shrub Survival

Native plantings are an important component of a project restoration and management strategy. Varying conditions and plant species requirements require careful monitoring to determine the success of planting efforts. The Tree and Shrub Survival Survey will help to determine the survival and success of these restoration plantings.

Tree and shrub survival monitoring protocols are described in the Tualatin River National Wildlife Refuge Annual Tree and Shrub Survival Survey Procedure Form (Tualatin NWRd, date unknown). The objectives of this survey are to 1) determine survival rates of trees and shrubs following restoration activities, 2) determine if management objectives are being met, and 3) make recommendations for future restoration efforts. Monitoring results are used to determine if project goals and objectives are being met and to make recommendations for future restoration efforts.

Permanent survey plots are established randomly within each unit. Plots are 105 feet (32 meters) (0.25 acre [0.1 ha]) square. Survey stakes are placed at each corner and flagged. Each corner is GPS surveyed and entered into GIS as polygon data for future tracking. Plots are monitored once each year during summer, and a reference photo is taken from the southeast corner looking toward the northwest corner. Within each plot, species and height of each tree and shrub is recorded (Tualatin NWRd, date unknown).

9.2.2.1 Data Analysis and Reporting Procedures

Data analysis consists of determining mean number of trees and shrubs per unit area, and survival rate by species. This is compared with previous results within each plot, and as an overall average on a particular unit. These data are included in the annual habitat management report (Tualatin NWRd, date unknown).

9.2.3 Noxious Weeds, Invasives, and Other Non-native Species

A Refuge-wide noxious weed and invasive species monitoring program, which will include the Oleson Tracts, is planned. This program will provide a complete annual survey of the Refuge for the presence of noxious weeds and other invasive species. During this survey, all noxious weed and invasive species locations will be marked in the field. Information will be recorded at each location to determine species and spatial extent within management units. A GPS unit will be used to record the location of the

site, gathering point data at a minimum for each site and polygon data if the population is large enough. This information is used to determine the severity of noxious weed and invasive species infestations to and help guide priorities for controlling these species.

9.3 WATER

This restoration and management plan calls for important hydrological alterations to several units inside the Oleson Tracts. Monitoring the hydrological characteristics of these units will be important in order to maximize their physical and biological contributions to the Refuge. Because water is stored and later released, it will be necessary to monitor water temperature, depth, and flow within the emergent wetlands.

Water temperature will be monitored using installed devices within the project area and on the Tualatin River, especially at times when water from the project area is flowing back into the river. Water levels and delivery flows will be measured weekly using staff gauges installed in the emergent wetland and metering gauges at the well pumping site, respectively. During river flood events, water levels will be monitored daily. The Farmington USGS gauge on the Tualatin River is used to monitor 24 hour stage flows during winter and spring to anticipate how river levels may affect water levels in the emergent wetland.

Water level monitoring will also be important for documenting use of the new reservoir water right. All of this information is used to manage seasonally appropriate water levels within the emergent wetland. Duration of flooding and drawdown timing help define the plant communities that can exist within a management unit. Data generated through monitoring will assist in maintaining conditions for desired plant growth, and allow the Refuge to meet its habitat quality goals and objectives within the Oleson Tracts.

9.4 FISH

Monitoring for fish presence/absence on Refuge property will be conducted on an as-needed basis as required by Endangered Species Act Section 7 consultation with NOAA Fisheries. Based on these requirements, impoundments may be monitored for salmonid presence following flood events when salmonids may enter the emergent wetland from the nearby Tualatin River. This monitoring would be conducted by setting fish traps within impoundments and fyke nets at impoundment outlets. Fish recovered from these structures will be recorded by number and species and reported to NOAA Fisheries as required.

9.5 INCIDENTAL AND ADDITIONAL MONITORING

9.5.1 Mammals

There is no formal survey protocol for monitoring mammal occurrences within the Refuge. However, cumulative lists of species incidentally observed while on Refuge

property are kept by unit. These cumulative lists will be maintained by the Refuge on a unit-by-unit basis.

9.5.2 Reptiles and Amphibians

There is no formal survey protocol for monitoring reptiles and amphibian species occurrences within the Refuge. However, cumulative lists of species incidentally observed while on Refuge property are kept by unit. These cumulative lists will be maintained by the Refuge on a unit-by-unit basis.

9.5.3 Listed Species

Currently the only listed species that has been documented within the Oleson Tracts is the bald eagle. This is consistent with baseline monitoring of flora and fauna. If a special status species is observed in any unit within the Oleson Tracts, additional monitoring may be initiated. Data may be collected on individuals to determine species density, habitat use, and other life history and behavioral information. This monitoring would follow standard protocols used in other management areas within the Tualatin River National Wildlife Refuge, or follow other refuge protocols that monitor the particular species in question.

10 INFRASTRUCTURE NEEDS

Because the Oleson Tracts currently are not scheduled to be open to the public in the near future, there are limited infrastructure requirements for the Tracts. Proposed infrastructure improvements are illustrated in Figure 5.

10.1 ACCESS ROADS

The Oleson Tracts contain several dirt roads that provide access to various parts of the property. With the exception of a road leading to the proposed water control structure, no major upgrades or new roads are proposed. No parking areas are proposed. Spot maintenance will occur as necessary and may include grading of deteriorated sections and placement of crushed rock or other appropriate materials.

The new road leading to the proposed water control structure will be surfaced with compacted crushed rock. This will entail grading and placement of new material, some of which may occur in jurisdictional wetlands. Appropriate permits would be obtained from federal and state agencies associated with this action.

10.2 WATER CONTROL FEATURES

In order to manage water levels in the emergent wetland, water control features will need to be installed. These features include excavation of a new water well adjacent to the Tualatin River, a new water control structure at the downslope end of the emergent wetland, and a new water pipeline to direct water from the well to the emergent wetland.

11 ADAPTIVE MANAGEMENT STRATEGY

Adaptive management is the process of continually improving management strategies and actions by incorporating the results of past actions and new knowledge. Adaptive management depends on continuous monitoring, a review of monitoring results, and incorporation of findings into future project management actions. The restoration actions proposed here have been developed based on the current state of knowledge and past successful implementation of similar projects by the Service. However, over time, new restoration technologies and techniques may be developed that have not been previously considered and may be incorporated in the future. The need for future revisions to this plan is expressly acknowledged.

Adaptive management involves six steps:

- Documenting existing conditions, the desired future conditions, and goals and objectives used to determine success
- Developing a plan to achieve the desired future conditions
- Developing a monitoring plan to gauge if goals and objectives are being met
- Implementing the project
- Monitoring and evaluating the success of the project based on achieving the desired future conditions and project goals and objectives
- Adjusting the original plan based on the lessons learned

This five-year restoration and management plan includes the first three steps of an adaptive management program. Evaluating monitoring results and using those results to make adjustments to this plan will complete the adaptive management process.

Reviews of monitoring results involve revisiting project goals and objectives and determining whether they are being achieved. If they are not, a determination must be made that either the base assumptions were wrong, the restoration actions were implemented improperly, site conditions have changed, or the monitoring is faulty and may not be reporting results accurately. An interdisciplinary team of wildlife biologists, plant ecologists, and vegetation management specialists will review monitoring reports, make these determinations, and propose future adaptive actions.

Oleson Tracts
Construction Features

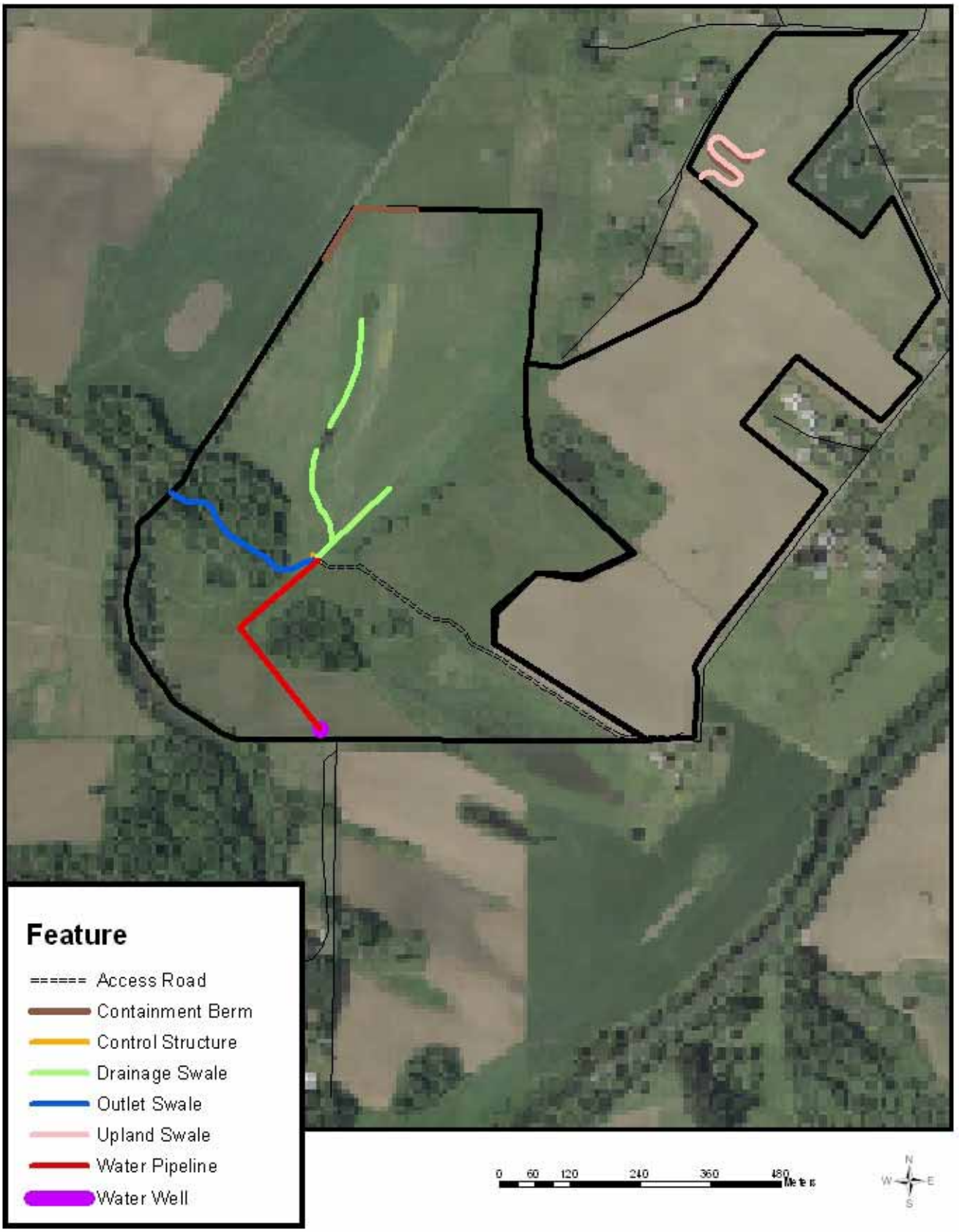

Figure 5

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12 OPERATIONS AND MAINTENANCE

Because restoration actions proposed for the Oleson Tracts do not require large infrastructure investments, operations and maintenance activities are similarly limited. Operations and maintenance activities required to achieve the goals and objectives of this plan will include:

- Operations and maintenance of the water control structure, well and pipeline, the containment berm, newly excavated drainage swales, and the existing outlet swale
- Operations and maintenance of the road leading to the water control structure
- Continued maintenance of restored plant communities as described in Sections 8.2 and 8.3 of this plan

Funding for operations and maintenance activities will be pursued from BPA Willamette and Columbia River Fish and Wildlife programs funds and other sources. Implementation of necessary operations and maintenance activities is contingent upon securing adequate funding.

13 RECOMMENDATIONS

Purchase by the Service of approximately 2 acres (0.8 ha) of the adjacent Burchfield parcel is recommended so that all areas that would be inundated by flooding of the emergent wetland will be administered by the Service. If this purchase is not completed, the Service would be required to construct additional berms to limit the areal extent of flooding, increasing construction, operations, and maintenance costs.

14 CONSISTENCY WITH OTHER PLANS

This Five-year Restoration and Management Plan complies with the following executive orders, legislative acts and plans:

14.1 EXECUTIVE ORDERS

14.1.1 Protection of Wetlands – Executive Order 11990

Restoration actions planned for the Oleson Tracts will result in improved wetland functions and values to the benefit of the Tualatin River ecosystem and a host of sensitive fish, wildlife, and plant species. No detrimental impacts to wetlands are expected.

14.1.2 Protection of Historical, Archaeological, and Scientific Properties – Executive Order 11593

An Archaeological and Historical Identification Effort Report focusing on the acquisition of Oleson Tract I was completed on November 1, 1999. A Section 106 Compliance document that evaluated the potential effect of certain restoration activities to take place on Oleson Tract II was completed on June 22, 2004. The results of these efforts conclude that the project will have no significant effect on historical or archaeological resources.

The Service will comply with Section 106 of the National Historic Preservation Act before initiating any ground-disturbing actions on the Oleson Tracts beyond those already cleared. The Service will also consult with representatives of the Confederated Tribes of the Grand Ronde on the traditional cultural and religious matters before implementing projects on the Oleson Tracts.

14.1.3 Floodplain Management – Executive Order 11988

No structure that could either be damaged by or significantly influence the movement of floodwaters in the project area is planned for construction by the Service.

14.2 LEGISLATIVE ACTS

14.2.1 National Environmental Policy Act

The Service completed the Environmental Assessment (EA) for the Tualatin River National Wildlife Refuge, Washington County, Oregon, in 1992 with a Finding of No Significant Impact (FONSI) signed by the Service on February 13, 1992. Restoration actions planned for the Oleson Tracts are consistent with the findings of the EA and FONSI.

An Environmental Impact Statement (EIS) and Record of Decision (ROD) were prepared for the Wildlife Mitigation Program of the Northwest Power Planning Council (NWPPC) Fish and Wildlife Program (DOE/EIS-0246). BPA concluded that the Service's Tualatin River National Wildlife Refuge EA and FONSI were consistent with NWPPC's EIS and ROD and no further documentation was needed. This conclusion was documented in a CE dated December 20, 1999 (Appendix B).

In a separate action, BPA concluded that purchase of the Oleson Tracts and certain restoration actions planned for 2004 are categorically excluded from National Environmental Policy Act (NEPA) review. BPA has documented these findings in a Categorical Exclusion document dated May 24, 2004 (Appendix B). Restoration actions covered by the CE include:

- removal of exotic grass species through use of approved herbicide application
- preparation of the site for native grass planting, which will include discing the soil surface
- planting of native grass species

Restoration actions funded by BPA not covered by the May 24, 2004, CE are subject to NEPA review by BPA prior to implementation by the Service. The Service has determined that remaining restoration actions fall under a categorical exclusion as provided by 516 DM6, Appendix 1, 1.4B(3)(6).

14.2.2 Endangered Species Act

An internal consultation conducted at the time the Refuge was established concluded that there were no known threatened and endangered plant and wildlife species within the proposed Refuge boundaries. Since Refuge establishment, habitats have been restored which now support use by bald eagles. A biological evaluation will be prepared by the refuge manager prior to carrying out restoration activities. Listed salmonids (steelhead trout) are known to occur within the Tualatin River. Endangered Species Act Section 7 consultation with NOAA Fisheries will occur before projects are implemented that could affect listed salmonids.

14.2.3 Clean Water Act

USACE administers section 404 of the Clean Water Act, which regulates the discharge of fill material into "Waters of the U.S.," including wetlands. The Service will secure either a Nationwide Permit #27 (Wetland and Riparian Restoration) or an individual Section 404 permit from USACE prior to implementing projects that will discharge fill material into any Water of the U.S., including wetlands.

14.2.4 Comprehensive Environmental Responses, Compensation, and Liability Act of 1980

Level 1 Contaminant Surveys (Environmental Site Assessments) were completed for Oleson Tracts I and II prior to purchase and inclusion into the Refuge. The reports concluded that no hazardous substances were identified on these Tracts, and there were no obvious signs of any effects of such on the Tracts.

14.2.5 Emergency Wetland Resources Act of 1986

The proposed action supports the purpose of this act, which is to protect and enhance the wetlands of the Nation.

14.2.6 North American Wetlands Conservation Act of 1989

The restoration and management actions proposed for the Oleson Tracts support the purpose of the North American Wetlands Conservation Act, which is to protect and enhance wetland habitats for migratory birds and other fish and wildlife of the Nation.

14.2.7 Uniform Relocation Assistance and Real Property Acquisition Policy Act

The Oleson Tracts were purchased from a willing seller. No relocations were necessary as part of this action.

14.2.8 Oregon's Removal / Fill Law

DSL issues individual Removal/Fill permits or General Authorizations (GA) for projects that impact wetlands and state jurisdictional waterways. The Wetland Restoration and Enhancement GA is for projects that restore wetland types historically found in the

region; restore or enhance wetland functional attributes such as fish and wildlife habitat, water quality and quantity; and support waterfowl or wetland management within a state or federally designated management area. The Service will secure either this GA or an individual removal/fill permit from DSL prior to implementing projects that will discharge fill material into or remove material from a water of the state, including wetlands.

14.2.9 Washington County Zoning

Land use within the proposed Refuge is consistent with statewide planning goals 5 and 6 and Washington County comprehensive planning goals. The proposed restoration of the Oleson Tracts promotes reasonable and appropriate uses of the land that preserve the natural character and protect the resources and ecology of the area.

15 PREPARERS AND CONTRIBUTORS

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APPENDICES

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APPENDIX A – HABITAT EVALUATION PROCEDURES FOR THE OLESON TRACTS (USFWS, 2001)

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APPENDIX B – NATIONAL ENVIRONMENTAL POLICY ACT CATEGORICAL EXCLUSION DOCUMENTS

U.S. Fish and Wildlife Service Categorical Exclusion Document
BPA Categorical Exclusion Document

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APPENDIX C – BIOLOGICAL EVALUATION