

Wildlife Inventory and Habitat Assessment for Herbert Open Space, City of Corvallis, Oregon

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Submitted to
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Eugene, Oregon

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Wildlife Observation Methods & Data Queries

Fish

No fish or aquatic habitat surveys were conducted for the Herbert Open Space inventory. Instead, the likelihood of federal- or state-listed fish species being present in lower Muddy Creek and its tributaries was assessed by reviewing ODFW fish species distribution data and maps (<http://nrimp.dfw.state.or.us/nrimp/>).

Amphibians & Reptiles

The survey area was visited four times (Feb 3, Feb 13, Feb 24, and Mar 13, 2006) to search for egg masses of red-legged frogs (*Rana aurora*). These visits coincided with the peak of oviposition for the species in the Willamette Valley. The surveyor (D. Vesely) wandered throughout the survey area and carefully examined all ephemeral pools, roadside ditches, and a flooded channel flowing through the grass seed field.

Visual encounter surveys for reptiles and amphibians were conducted on June 30 2006, October 11 2006, and May 10, 2007 for a total sampling effort of 9.5 hours. The surveyor (D. Vesely) selected a variety of locations that were representative of major plant communities in Herbert Open Space (e.g., prairies, oak woodlands, flooded channels for western pond turtles). Search methods included stalking likely basking areas (e.g., dirt roads for snakes, emergent logs in flooded channels for turtles), overturning hiding cover, and listening for calling frogs. Locations of species having special status were recorded with a Garmin GPS 60.

Diurnal Birds

Methods of bird observation and data recording generally followed that of the Breeding Bird Atlas (BBA) program (<http://www.bsc-eoc.org/norac/atlascont.htm>). We selected this survey approach because it does not restrict surveyors to fixed points or transects, rather it allows them to closely investigate bird activity they observe as they visit different habitats in the survey area. The approach does not permit estimates of bird abundance, but does result in a comprehensive list of species using the study area and observations of bird behavior that may confirm breeding or rearing for each species. David Vesely and Joan Hagar performed bird observations during three visits to the survey area on June 9, June 21, and June 26, 2006. Observations were conducted between sunrise and 11:00 am to coincide with the peak of bird activity. During each visit, the surveyor walked throughout Herbert Open Space in a manner most likely to maximize the probability of detecting diurnal bird species in the unit aurally or visually. For each bird observed, we categorized the likely breeding status based on behavior according to a protocol developed by the Breeding Bird Atlas Program. Three levels of breeding probability are defined: Possible (PO), Probable (PR), and Confirmed (CO). Locations of species having special status (i.e., federal or state listed T&E, USFWS Species of Concern, ODFW Sensitive Species) were recorded with a Garmin GPS 60 with a reported positional accuracy of 2-3 meters.

Mammals

No systematic surveys were conducted for mammals. The complexity of inventorying such a diverse class of wildlife made the task prohibitively expensive. However, surveyors did record all direct observations of mammals made during the course of other fieldwork. Indirect signs such as fecal pellets, tracks, and tree stems cut by beavers that could be identified to a species were also recorded.

ONHIC Database Queries

A list of threatened, endangered, and rare plant and animal locations known to be within a two-mile radius of the approximate center of the survey area was acquired from the Oregon Natural Heritage Information Center (ONHIC). Results of this query are attached to this report.

Woodland Habitat Plots

Eight 10-m radius (0.25 ac) vegetation sampling plots were established in representative woodlands and riparian areas to facilitate characterization of wildlife habitats. Data collected included tree density by size class, Oregon white oak regeneration, shrub height and percent cover, and individual tree measurements. Counts of live trees and snags were converted to stems per acre.

Results of Wildlife Observations & Queries

Summaries of wildlife surveys, incidental sightings, and database queries are provided below. For species of special concern¹, a short account of their natural history and habitat management recommendations are offered.

A general recommendation that applies to all wildlife management activities on Herbert Open Space is the need to conduct periodic wildlife surveys to monitor population trends and habitat use. Assessing wildlife response to forest thinning, herbicide applications, and alterations to plant community composition is essential to prevent unintended, negative consequences of human land use, including habitat restoration activities.

Fish

A review of ODFW species distribution data for listed salmonids indicates that only Upper Willamette River Chinook salmon (*Oncorhynchus tshawytscha*) are likely to be present in Muddy Creek. The species is listed as threatened under the federal Endangered Species Act (ESA). ODFW maps indicate that lower Muddy Creek provides rearing and migration habitat for Chinook salmon; spawning habitat does not occur in the watershed.

Query results from the ONHIC database indicate that two Oregon chub (*Oregonichthys crameri*) were captured by ODFW personnel in 2005 within two miles of Herbert Open

¹ Federal- or state-listed T&E species, federal candidate species, USFWS species of concern, and state sensitive species.

Space. The Oregon chub is listed as endangered under the ESA. More precise location information was not provided by ONHIC to protect the site, but the largest known population of the species is in the Muddy Creek watershed (Scheerer, et al. 2005). Habitat improvement projects designed to benefit Oregon chub have been undertaken further upstream in the watershed at the Wm. Finley National Wildlife Refuge (Sheerer, et al. 2005).

Oregon chub are endemic to the Willamette Valley. The species was once widespread through the Valley, but is now only found in a few locations (Sheerer, et al. 2005). Oregon chub use oxbow ponds, river side-channels, beaver ponds, and similar aquatic habitats (Sheerer, et al. 2005). Their habitats are characterized by having abundant aquatic plants, silty substrate, and little or no water flow (Sheerer, et al. 2005). Threats to the Oregon chub include habitat loss and degradation, predation by introduced, warm-water fish, impaired water quality, and illegal water withdrawals (Sheerer, et al. 2005).

Sheerer et al. (2005) also trapped three other species of native, resident fish: threespine sticklebacks, speckled dace, and redbreast shiners in the Muddy Creek watershed. These species may potentially occur in reaches of the stream flowing through Herbert Open Space.

Management Recommendations for Oregon Chub: Herbert Open Space contains several side-channels, oxbows, and small ponds that may potentially provide suitable habitat for Oregon chub. However, it is very likely these aquatic features are inhabited by introduced fish, a major threat to Oregon chub. ODFW can provide further guidance as to the likelihood that the species is present in Herbert Open Space and whether the property meets the agency's criteria for habitat improvement projects or an Oregon chub introduction site.

Reptile and Amphibians

Three species of amphibians and six species of reptiles were detected in Herbert Open Space during surveys (Table 1). Two species, the northern red-legged frog and the western pond turtle, are on the USFWS list of species of concern in Oregon and the ODFW list of sensitive species. A brief summary for these two species is provided below.

Table 1. Herpetofauna species observed in the Herbert Open Space survey area and their status.

Common Name	Scientific Name	Federal Status	State Status
Rough-skinned newt	<i>Taricha granulosa</i>		
Pacific tree frog	<i>Hyla regilla</i>		
Northern red-legged frog	<i>Rana aurora aurora</i>	SOC	SU
Western pond turtle	<i>Emmys marmorata</i>	SOC	SC, SS
Western fence lizard	<i>Sceloporus occidentalis</i>		
Gopher snake	<i>Pituophis catenifer</i>		

Racer	<i>Coluber constrictor</i>
Common garter snake	<i>Thamnophis sirtalis</i>
Northwestern garter snake	<i>Thamnophis ordinoides</i>

Federal Status: C-Candidate Species, SOC-USFWS Species of Concern in Oregon
State Status: SC-Sensitive/Critical, SU-Sensitive/Undetermined, (OAR 635-100-040); SS-Conservation
Strategy Species (Conservation Strategy for Oregon 2006, ODFW)

Northern Red-legged Frog

The northern red-legged frog occurs throughout the Willamette Valley and lower elevations of the Cascades and Oregon Coast Range (Corkran and Thoms 1996). The species is most often found in shaded ponds, side channels in rivers, and herbaceous wetlands (NatureServe 2007). Oviposition usually occurs in late-February to mid-March. Egg masses are attached to emergent vegetation or woody debris in water 0.5- 2.0 m deep. (Corkran and Thoms 1996). Adult red-legged frogs can occasionally be found in woodlands hundreds of meters from any aquatic features (pers. observations).

Northern red-legged frog population declines have been reported across its geographic range (NatureServe 2007). A number of threats to the species have been identified, including: loss of wetland habitats, predation by introduced fish and bullfrogs, introduced diseases, and increases in UV radiation (NatureServe 2007).

One red-legged frog egg mass was discovered in a seasonal pond on February 13, 2006 (See Figure X for location). The egg mass was monitored during subsequent visits and all but a few eggs appeared to remain viable until they hatched. Several red-legged frog larvae were observed in the same pond in early April. An adult red-legged frog was also observed by Dick Brainerd during plant surveys.

Most of the shallow, seasonal ponds were visited at least two times during the red-legged frog breeding season. Other excellent oviposition sites could be seen along some of the major sloughs in the survey area. However, steep banks and dense vegetation prevented egg mass surveys of these areas.

Management Recommendations: Red-legged frogs are likely to use a variety of aquatic and terrestrial habitat types available at Herbert Open Space. Red-legged frogs are suspected of being vulnerable to widely used pesticides (Davidson et al. 2001). Broadcast applications of agricultural and forestry pesticides should be minimized to avoid exposure to larval and adult frogs. There are a number of small, seasonal ponds located in woodland patches at Herbert Open Space suitable for oviposition by red-legged frogs. No active management is currently needed, but these ponds should be monitored to ensure they continue to satisfy the requirements needed for breeding by the species (e.g., emergent vegetation, well-shaded, bullfrog-free).

Red-legged frogs and many other amphibian and reptile species use downed, decayed logs for thermal cover or as a refuge from predators. Retaining (or supplementing)

scattered, large-diameter logs in woodland patches would sustain this important habitat feature for wildlife.

Western Pond Turtle

The western pond turtle occurs in wetlands throughout the major valleys of western Oregon, along the Columbia River, and other isolated locations (Holland 1994). Adamus (2003) reported 448 known localities in the Willamette Valley in which the species has been sighted.

The western pond turtle can be found in large rivers, permanent ponds, and seasonal wetlands (Holland 1994). Eggs are laid in terrestrial nests excavated during late-May to mid-July. Nest sites are in dry, unshaded openings having sparse vegetation or bare ground. Female turtles will move overland for 100's m to find suitable nest sites; very long dispersal movements (up to 5 km) have been recorded (Holland 1994). In most Willamette Valley populations, turtles over-winter on land in deep litter, burrows, or under wood debris.

Western pond turtle populations have reportedly experienced range-wide declines (Holland 1994, NatureServe 2007). Threats include: loss and fragmentation of habitat, introduced fish and bullfrogs, illegal collecting, and traffic-related mortality (Holland 1994, NatureServe 2007).

Western pond turtles were observed during multiple visits to Herbert Open Space. Individuals could be seen basking on logs in the main channel of Muddy Creek and a minor side channel to the stream (Figure X). No more than two individuals were ever seen simultaneously and no estimate of the population size at Herbert Open Space can be made without further study.

The ONHIC database included observations of western pond turtles at 10 different sites within a two-mile radius of Herbert Open Space, including a previous observation of pond turtles at Herbert Open Space. Dates of these sightings ranged between 1991-2004.

Management Recommendations: Aquatic habitat conditions in Muddy Creek and its side channels appear to be generally good for pond turtles. However, the stream channel has down cut through its historic floodplain, as much as 2 m in some locations. This has created steep stream banks along some reaches that are probably impossible for a turtle to climb. Consequently, access may be blocked to nesting and over-wintering areas. A short-term solution to improving connectivity between aquatic and terrestrial habitats would be to re-grade stream banks at strategic locations. The long-term solution is to undertake stream restoration measures that will reestablish hydrological interactions between the active channel and its floodplain.

The commercial grass seed field that is in production in the northwest portion of the property may unintentionally have created a "sink habitat"- an area occupied by a species in which mortality is greater than population recruitment (Pulliam 1988). Female turtles

may find suitable nest sites in the field and oviposit, only to have the eggs destroyed by heavy farm machines passing over the nest later in the summer. The risk of such a situation could be minimized by creating a nesting management area between stream reaches where turtles congregate and agricultural fields. Creating a strip of highly suitable habitat for nesting (i.e., bunchgrasses prairie plant community) near the stream may prevent female turtles from engaging in further exploration within the croplands.

Diurnal Birds

BBA surveys and incidental sightings resulted in observations of 61 avian species in the survey area, or on bordering properties from the survey area (Table 2). Of the species observed during surveys, six species were confirmed to be breeding, 29 species were determined to be probably breeding, and 17 species were possibly breeding in the survey area using BBA determination methods. This is probably a conservative estimate of breeding bird diversity in the survey area; a more intensive survey effort almost certainly would have detected a greater number species confirmed to be breeding in the area.

Table 2. Avian species observed in or near the Herbert Open Space survey area and their status.

Common Name	Scientific Name	Breeding Status	Federal Status	State Status
Canada goose	<i>Branta canadensis</i>	UN		
Blue-winged teal	<i>Anas discors</i>	UN		
Mallard	<i>Anas platyrhynchos</i>	UN		
Wood duck	<i>Aix sponsa</i>	PO		
Common snipe	<i>Gallinago gallinago</i>	UN		
Turkey vulture	<i>Cathartes aura</i>	PO		
Northern harrier	<i>Circus cyaneus</i>	PR		
Red-tailed hawk	<i>Buteo jamaicensis</i>	PR		
California quail	<i>Callipepla californica</i>	PR		
Great blue heron	<i>Ardea herodias</i>	UN		
Band-tailed pigeon	<i>Columba fasciata</i>	PR	SOC	
Mourning dove	<i>Zenaidura macroura</i>	PR		
Rufous hummingbird	<i>Selasphorus rufus</i>	PO		
Belted kingfisher	<i>Ceryle alcyon</i>	PO		
Red-breasted sapsucker	<i>Sphyrapicus ruber</i>	PO		
Downy woodpecker	<i>Picoides pubescens</i>	PR		
Hairy woodpecker	<i>Picoides villosus</i>	PO		
Northern flicker	<i>Colaptes auratus</i>	PO		
Pileated woodpecker	<i>Dryocopus pileatus</i>	UN	SV	
Western wood-pewee	<i>Contopus sordidulus</i>	PR		
Willow flycatcher	<i>Empidonax traillii</i>	PR	SOC	SV
Pacific-slope flycatcher	<i>Empidonax difficilis</i>	PR		
Streaked horned lark	<i>Eremophila alpestris strigata</i>	PR	C	SC
Bank swallow	<i>Riparia riparia</i>	PO		
Violet-green swallow	<i>Tachycineta thalassina</i>	PO		
Tree swallow	<i>Tachycineta bicolor</i>	PR		
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	PR		
Steller's jay	<i>Cyanocitta stelleri</i>	PO		
Scrub jay	<i>Aphelocoma californica</i>	PO		

American crow	<i>Corvus brachyrhynchos</i>	PO	
Common raven	<i>Corvus corax</i>	PO	
Black-capped chickadee	<i>Poecile atricapillus</i>	CO	
Red-breasted nuthatch	<i>Sitta canadensis</i>	PR	
White-breasted nuthatch	<i>Sitta carolinensis</i>	PR	SS
Brown creeper	<i>Certhia americana</i>	PR	
House wren	<i>Troglodytes aedon</i>	CO	
Winter wren	<i>Troglodytes troglodytes</i>	UN	
Bewick's wren	<i>Thryomanes bewickii</i>	PR	
Swainson's thrush	<i>Catharus ustulatus</i>	PR	
American robin	<i>Turdus migratorius</i>	CO	
Cedar waxwing	<i>Bombycilla cedrorum</i>	PR	
European starling	<i>Sturnus vulgaris</i>	PO	
Hutton's vireo	<i>Vireo huttoni</i>	PR	
Orange-crowned warbler	<i>Vermivora celata</i>	PR	
Common yellowthroat	<i>Geothlypis trichas</i>	PO	
Western tanager	<i>Piranga ludoviciana</i>	PO	
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	CO	
Lazuli bunting	<i>Passerina amoena</i>	PR	
Spotted towhee	<i>Pipilo maculatus</i>	PR	
Chipping sparrow	<i>Spizella passerina</i>	PO	
Savanna sparrow	<i>Passerculus sandwichensis</i>	CO	
Song sparrow	<i>Melospiza melodia</i>	PR	
Fox sparrow	<i>Passerella iliaca</i>	UN	
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	PR	
Golden-crowned sparrow		UN	
Dark-eyed junco	<i>Junco hyemalis</i>	PR	
Brown-headed cowbird	<i>Molothrus ater</i>	PR	
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	CO	
Purple finch	<i>Carpodacus purpureus</i>	PR	
House finch	<i>Carpodacus mexicanus</i>	PR	
American goldfinch	<i>Carduelis tristis</i>	PR	

Breeding Status Codes: CO-Confirmed breeding, PO-Possible breeding, PR-Probable breeding, UN-Unknown (incidental sighting)

Federal Status: C-Candidate Species, SOC-USFWS Species of Concern in Oregon

State Status: SC-Sensitive/Critical, SV-Sensitive/Vulnerable, (OAR 635-100-040); SS-Conservation Strategy Species (Conservation Strategy for Oregon 2006, ODFW)

Five of the avian species that were detected in the survey area are provided special conservation status under state or federal law, or by determination of a government agency (i.e., U.S. Fish & Wildlife Service, Oregon Department of Fish and Wildlife). Further details on these species are provided below.

Band-tailed Pigeon

About the same size as its more common relative, the rock pigeon (*Columbia livia*), the band-tailed pigeon is widely distributed across the west coast, southwest U.S., and Mexico. In the Pacific Northwest, the species is associated with mixed conifer-hardwood forest and low-elevation woodlands. Diet is primarily composed of fruits, acorns, and grain crops (Keppie and Braun 2000). Mineral sources are reportedly an important nutritional resource for band-tailed pigeons; individual birds are known to fly more than 10 km to visit "mineral springs" (Leonard 1998). Nests are most commonly constructed

in Douglas-firs, but many other conifer and hardwood species are also used as nest sites (Keppie and Braun 2000).

Band-tailed pigeon populations are thought to have been much larger in the past. Breeding Bird Survey (BBS) data from 1966-1998 show an average decline in abundance of -3.0% each year (Keppie and Braun 2000). Vast numbers of band-tailed pigeons reportedly were killed by sport and market hunters until harvest limits were established in the early 1900's. In Oregon, ODFW has established a daily bag limit of 2 birds during the 2006-07 hunting season (ODFW 2006).

It's not clear what is causing current population declines, but forestry practices that reduce the diversity and abundance of shrubs and hardwoods are suspected (Hagar 2007).

Herbert Open Space appears to have most of the resources needed by band-tailed pigeons for foraging and breeding. Acorns from the mature oaks and the diversity of shrubs offer abundant food during the seasons band-tailed pigeons are present in Oregon (i.e., spring and summer). Elderberry (*Sambucus* spp.), Indian plum (*Oemleria cerasiformis*), and cascara (*Rhamnus purshiana*) are among some of the food plants available to band-tailed pigeons in the survey area. Douglas-firs are the most likely trees to be used by the species for nesting. It remains unknown whether Herbert Open Space has mineral sources needed by band-tailed pigeons.

Management Recommendations: Band-tailed pigeons will nest in a variety of trees; no specific management actions are recommended for maintaining nesting or rearing habitat. The species will benefit from management activities that sustain food sources such as oaks and fruiting shrubs.

Pileated Woodpecker

The pileated woodpecker was considered to be the largest woodpecker in North America, until the rediscovery of an ivory-billed woodpecker population in the SE United States. The pileated woodpecker is widely distributed across Oregon's forests. The species tends to select mature (stand age >80 years) for nesting, but will use younger forests for foraging (Bull and Jackson 1995). Pileated woodpeckers forage on carpenter ants and other wood-boring invertebrates in snags, downed logs, and tree stumps. Home range size of the species averages 1,180 ac (Bull and Jackson 1995).

Pileated woodpecker distribution and abundance is most limited by the availability of very large trees needed for nest cavities. In western Oregon, snags and trees used for nesting average 27 in. dbh and 88 ft in height (Bull and Jackson 1995). The most significant threat to pileated woodpeckers are forest management activities that reduce the availability of large-diameter snags and coarse, woody debris (Bull and Jackson 1995).

Pileated woodpeckers were not directly seen or heard during surveys in Herbert Open Space. However, large, rectangular excavations that are characteristic of the species were observed in snags in the area.

Management Recommendations

Pileated woodpeckers are not often observed in landscapes dominated by intensively managed agriculture fields and developed areas such as the vicinity of Herbert Open Space. There is extensive habitat for pileated woodpeckers along the Willamette River and a perhaps a pair inhabiting these riverine forests has incorporated Herbert Open Space into their territory.

Herbert Open Space does not encompass sufficient close-canopy, mature forest to provide good breeding habitat for pileated woodpeckers. However, sustaining a supply of large diameter snags and downed logs will provide feeding sites for woodpeckers that are nesting in the vicinity of the park.

Willow Flycatcher

The willow flycatcher is a neotropical migrant that winters in southern Mexico and South America. In arid portions of the west, the species is restricted to riparian areas and shrubby wetlands. However, willow flycatchers are commonly observed in upland patches of shrubs in western Oregon (Hagar, pers. comm.). The species is primarily an aerial insect forager, but occasionally will glean prey from plant leaves (Sedgwick 2000). Willow flycatchers construct their nests close to the ground in shrub thickets, most often in willows (Sedgwick 2000).

BBS data indicate a declining trend in abundance of willow flycatcher populations in Oregon (Sauer et al. 1997) and the southwestern subspecies, *Empidonax traillii extimus*, was federally listed as endangered in 1995 (Sedgwick 2000). The most significant limiting factors to willow flycatcher populations are habitat loss and degradation (Remsen 1978, Sedgwick 2000). Land uses such as cattle grazing and forestry practices that reduce the abundance and diversity of shrubs in riparian areas appear to have the greatest negative impacts on willow flycatcher habitats (Remsen 1978, Hagar 2007). Nest parasitism by brown-head cowbirds (*Molothrus ater*) greatly reduces the survival of willow flycatcher eggs and nestlings in some portions of the species' geographic range (Brown 1994, Harris 1991).

Willow flycatchers were detected in shrubby riparian areas and in the understory of Oregon white oak woodlands at Herbert Open Space. Suitable habitat conditions for the species are widespread throughout the survey area. However, brown-head cowbirds were frequently observed during visits to the area and may pose a significant risk to the breeding success of willow flycatchers.

Management Recommendations: Restore native riparian shrubs along Muddy Creek and its associated side-channels and sloughs.

Streaked Horned Lark

The streaked horned lark is a rare, ground-nesting bird found only in a few localities across the Willamette Valley (Altman 2000). Its natural habitats include prairies (especially sites characterized by patches of bare ground interspersed with short

vegetation) and mudflats (Center for Biological Diversity 2002). The species also uses patches of bare ground and short, herbaceous vegetation found in pastures, croplands, and other areas of soil disturbance.

Gabrielson and Jewett (1940) described the streaked horned lark as “a common breeding bird of the open fields in suitable locations throughout western Oregon...particularly abundant in the rolling open hills of Polk and Yamhill Counties and in the great, flat, pasture-land area of Linn, Lane, and Benton Counties...”. Streaked horned lark populations have declined dramatically and it has been estimated that there may be <200 pairs remaining in the Willamette Valley (Altman 2000). Factors causing population decreases include: loss of prairie habitat, nest destruction by agricultural machinery, increases in predator populations, and road-related mortality (Center for Biological Diversity et al. 2002).

As many as 12 streaked horned larks were observed on several visits to Herbert Open Space during 2006 and summer 2007. The center of their activity is a swale running through the grass seed field north of Herbert Ave. (Figure XX). Herbert Ave. forms the property boundary between Herbert Open Space and the privately-owned field in which the swale is located. However, these horned larks have also been observed foraging along Herbert Ave. and in grass seed fields on City land up to 150 m from the swale. No attempt was made to conduct nest searches so as not to risk breeding activity by the birds, however a horned lark nest was discovered next to Herbert Ave. during a Benton county survey for the species in May 2007 (David Phillips, pers. comm.).

The swale, nearby fields, and roadside areas used by the streaked horned larks are characterized by expanses of bare soil interspersed with patches of short vegetation (mostly non-native species). It appears that the scouring action of seasonal flooding is delaying further colonization of the swale by the surrounding plant community. At its widest point, the swale is <3 m in width and perhaps is 150 m in length. The roadside ditches used by the horned larks appear to be disturbed native soils mixed with gravel and rock from the roadbed. The roadside appears to be regularly sprayed with herbicide to prevent vegetation from encroaching.

Given the limited area of suitable nesting habitat (<2 ac) and the close proximity of mechanized agricultural activities and vehicle traffic, it is questionable whether the streaked horned lark population will persist on the site without conservation actions. The potential nesting habitat is so narrow that a single tractor passing along the length of the swale could conceivably destroy all active nests. Horned larks also may be attempting to nest in the adjacent grass seed fields, but any mechanized activity conducted in these fields during late spring / early summer would likely result in nest destruction or abandonment by the adult birds. Habitat conditions in the activity center could also be degraded by changes in the hydrology or vegetation structure along the swale and roadside. For example, interrupting winter drainage through the swale could allow tall grasses to colonize the bare portions of the channel.

The ONHIC database includes a 1996 record of four streaked horned larks observed near the intersection of Hwy 99W and Lewellyn Road, approximately X miles SE of the survey area.

Management Recommendations: The occurrence of a horned lark breeding population so near Herbert Open Space presents a significant wildlife conservation opportunity for the City. Setting aside a special management area on City property south of Herbert Ave would offer a crucial refuge for the species should habitat conditions deteriorate on the private land to the north. The swale running through the grass seed field on the east side of the park is a continuation of the swale on private land to the north. Existing habitat conditions and the proximity of this feature to the current activity center of the horned larks makes this area the best candidate for a special management area (see Figure X) . Restoring conditions similar to that of a native bunch grass community with patches of bare ground would provide optimal nesting and rearing habitat for horned larks.

White-breasted Nuthatch

White-breasted nuthatches are widely distributed across Oregon, but never common in any region of the state. The species is closely associated with mature deciduous trees throughout its geographic range (Pravosudov and Grubb 1993). In the Willamette Valley, white-breasted nuthatches are most abundant in stands of large-diameter Oregon white oaks (Hagar 2007). The species gleans insects from bark furrows in tree stems and large branches. Nuthatches also cache seeds in bark furrows. Nests are constructed in tree cavities excavated by woodpeckers or created by decay.

The white-breasted nuthatch has been listed as “strategy species” by ODFW because population trends appear to be declining (ODFW 2006). The primary factor limiting nuthatch populations in the state is reportedly the loss of mature oaks with which the species is closely associated (ODFW 2006).

White breasted nuthatches were detected in several patches of Oregon white oaks in Herbert Park Open Space. Approximately two hours of search effort was performed to find their nests during the 2006 and 2007 breeding seasons, but without success. The numerous large oaks throughout the survey area provide excellent foraging and breeding habitats for white-breasted nuthatches.

Management Recommendations:

Large diameter oaks, particularly open-form trees, are a critical habitat element for white-breasted nuthatches. Nuthatches often nest in cavities excavated by woodpeckers in large oak branches and glean insects from the deep furrows characteristic of mature oaks. Preserving large oaks and maintaining younger replacement trees will assure the availability of nesting and foraging habitat for white-breasted nuthatches.

Mammals

Eight native species of mammals were directly observed in the survey area or their presence was inferred by evidence such as tracks, burrows, or signs of feeding (Table 3).

Two species: eastern cottontail rabbit and nutria have been introduced into the Willamette Valley. None of the mammalian species detected in Herbert Open Space have special conservation status under federal or state law. However, mammals fulfill crucial ecological functions and

Table 3. Mammals present in Herbert Open Space survey area. Presence was determined by direct animal observation or inferred by recent signs (e.g., scats, tracks, burrows, or evidence of feeding).

Common Name	Scientific Name
Eastern cottontail	<i>Sylvilagus floridanus</i>
Pocket gopher	<i>Thomomys</i> spp. (Most likely <i>T. mazama</i>)
American beaver	<i>Castor canadensis</i>
Gray-tailed vole	<i>Microtus canicaudus</i>
Nutria	<i>Myocastor coypus</i>
Coyote	<i>Canis latrans</i>
Common raccoon	<i>Procyon lotor</i>
Striped skunk	<i>Mephitis mephitis</i>
Roosevelt elk	<i>Cervus elaphus roosevelti</i>
Columbian black-tailed deer	<i>Odocoileus hemionus columbianus</i>

Other Wildlife Species of Concern

Without a doubt, the aquatic and terrestrial plant communities of Herbert Open Space are inhabited by many more vertebrate species than were observed during the reconnaissance wildlife surveys. The oak woodlands, shrubby riparian areas, and prairie remnants provide habitat features that are important to number of species experiencing population declines and habitat loss. However, many of these species are particularly challenging to detect because of their rarity or cryptic habits. It should not be assumed that these species are not present in Herbert Open Space because they were not recorded during our surveys. Park managers could make an important contribution toward the conservation of these wildlife species of concern by preserving habitat elements that are becoming increasingly rare in the Corvallis area.

We have identified seven species of particular concern to conservationists because of their vulnerability or declining population trends. These species were not detected during surveys, but potentially could occur in Herbert Open Space presently or in the future based on their presence in Benton County and their affinity to plant community types found in Herbert Open Space. A short account of the natural history and management recommendations for each species and guild is provided below and is also summarized in Table 4.

Sharptail Snake (*Contia tenuis*)

Background: This elusive snake is found in scattered locations across the Willamette, Umpqua, and Rogue River Valleys and their associated foothills. Sharptail snakes typically are found in savanna-type habitats, oak woodlands, and forest edges; but also in intensively disturbed sites (St. John 1987). Hiding cover used by the species includes, rotten logs, moist talus, and boards (Marshall et al. 1996).

The sharptail snake is listed by ODFW as Sensitive-Vulnerable. Reasons provide for its sensitive status: population isolation; habitat loss and degradation (Marshall et al. 1996).

Management Recommendations: Retain scattered, large-diameter logs in woodland and savanna habitats.

Western Bluebird (*Sialia mexicana*)

Background: Western bluebirds are still locally common residents in some areas of the Willamette Valley, but the species has experienced large-scale population declines since the 1940's (Marshall et al. 1996). Western bluebirds breed in open-canopy conifer or deciduous forests, oak woodlands, clearcuts and pastures with scattered snags, and orchards (Guinan et al. 2000). Bluebird diets vary seasonally, depending on the availability of invertebrate prey, fruits (particularly mistletoe berries), and seeds (Guinan et al. 2000). The species is a secondary cavity nester, using cavities excavated in snags or live trees by woodpeckers (Guinan et al. 2000).

The Western bluebird is listed by ODFW as Sensitive-Vulnerable. The causes for their population decline reportedly include: habitat loss due to urbanization and agriculture, forestry and agricultural practices that have greatly reduced the number of snags in woodland habitats, and increased nest site competition from introduced and native birds such as European starlings, house sparrows, and violet-green swallows (Guinan et al. 2000).

Management Recommendations: Retain large-diameter oaks as a source of cavities for nesting (in large, dead branches) and winter food (mistletoe berries); Retain or create conifer snags (diameter breast height >15 inches, height >10 ft) during stand thinning treatments; install and maintain nest boxes to increase nest site availability.

Western Meadowlark (*Sturnella neglecta*)

Background: The western meadowlark was a once common resident throughout the Willamette Valley, but there is strong evidence species is declining in abundance across the region (Altman 2000). Western meadowlarks are closely associated with large (area >100 ac) upland prairies and savannas (Altman 2000). Prairie-type habitats dominated by relatively short stature (plant height <24 in) grasses with scattered singing perches (e.g., tall shrubs, trees, fence posts) provide optimal conditions (Altman 2000). Pastures and

field crops are used by western meadowlarks, but typically have less desirable vegetation structure than natural grasslands (Altman 2000). Nests are constructed on the ground in dense vegetation (Lanyon 1994).

The western meadowlark is listed by ODFW as Sensitive-Critical. Threats to the future persistence of meadowlark populations include: loss of native prairie and savanna habitat; mechanized agricultural practices that destroy nests and disturb breeding behavior (Lanyon 1994, Altman 2000).

Management Recommendations: Preserve large, contiguous patches of grassland and savanna habitat types; improve nesting habitat by maintaining grasslands in short stature grasses and native forbs; avoid ground-disturbing agricultural practices during the breeding season (Apr 15 – Jul 1) to protect ground nests from destruction; avoid broadcast applications of insecticides to maintain a food supply for meadowlarks; conduct periodic bird surveys to monitor population trends and response to management activities.

Oregon Vesper Sparrow (*Pooecetes gramineus affinis*)

Background: A short-distance migrant species that breeds in the Willamette Valley and eastern Oregon. There were approximately 300 observations of the species on the William Finley National Wildlife Refuge between 1968-1975, and a small number of recorded sightings near Herbert Open Space during the same period (Marshall et al. 1996).

Vesper sparrows use prairies, fallow fields, pastures, and young Christmas tree plantations. Habitat types occupied by vesper sparrows are characterized by a patchy, herbaceous layer interspersed with tall shrubs or small trees (Jones and Cornely 2002). Vesper sparrows nest on the ground.

The Oregon vesper sparrow is listed by ODFW as Sensitive-Critical. The species was a common summer visitor to the Willamette Valley in the 1940's, but it is estimated there are fewer than 200 breeding pairs in the region at present (Altman 2000). Vesper sparrows are vulnerable to many of the same threats causing declines in other grassland bird populations. Factors contributing to their lower abundance include: loss of prairie habitat to development and agriculture; destruction of nests due to tilling and harvesting practices; use of pesticides (Jones and Cornely 2002).

Management Recommendations: Restore patches of upland, bunchgrass prairie; utilize integrated pest management (IPM) strategies and avoid broadcast applications of pesticides on adjacent grass-seed fields.

Yellow-breasted Chat (*Icteria virens*)

Background: A neotropical migrant that breeds in the lowlands of western Oregon and east of the Cascades. Yellow-breasted chats have been observed in the Muddy Creek watershed (Bob Altman, pers. comm.). The species inhabits shrubby riparian areas, wetlands, forest edges, and recently burned areas (Ekerle and Thompson 2001). Large

patches (area > 4 ac) of non-native blackberries are also used (Bob Altman, pers. comm.). Altman (2000) reports the yellow-breasted chat is associated with high-contrast vegetation edges. Chats primarily feed on insects and spiders, but will also eat fruits and seeds (Ekerle and Thompson 2001). Nests are constructed near the ground in dense shrubs (Ekerle and Thompson 2001).

The yellow-breasted chat is listed by ODFW as Sensitive-Critical. Breeding Bird Survey data indicate that the yellow-breasted chat has been declining in abundance in the Willamette Valley since the 1970's (Altman 2000). Contributing factors to population declines include: loss of riparian and wetland habitat due to development and agriculture; habitat degradation due to over-grazing; nest parasitism by brown-headed cowbirds (Ekerle and Thompson 2001).

Management Recommendations: Promote growth and expansion of tall, riparian shrubs (e.g., willow, Douglas spiraea, Douglas hawthorn, Red-osier dogwood) along Muddy Creek and its tributaries. Shrub patches should be densely vegetated and larger than the average territory size of a yellow-breasted chat (approx 2.5 ac, see Ekerle and Thompson 2001).

Western Gray Squirrel (*Sciurus griseus*)

Background: In Oregon, the species occurs in the Willamette Valley, southwestern Oregon, and along the east side of the Cascades. The western gray squirrel is one of the most highly arboreal mammals in Oregon and the species rarely ventures far from closed-contiguous canopy woodlands (Ryan and Cary 1995). Gray squirrels inhabit mixed conifer-hardwood forests and Oregon white oak woodlands (Ryan and Cary 1995). Optimal foraging habitat is characterized by a diversity of tree and shrub species that produce large cones or seeds. Both stick nests and tree cavities are used for den sites. Western gray squirrel populations experience natural fluctuations due to food availability and disease outbreaks (Ryan and Cary 1995).

The western gray squirrel is listed by ODFW as Sensitive-Undetermined. The species is threatened by the loss of Oregon white oak habitat, road-related mortality, and competition from introduced squirrel species (Ryan and Cary 1995).

Management Recommendations: Retain large-diameter oaks to provide acorns and den sites; retain some younger oaks as replacements for dominant trees; Maintain other food sources such as Douglas-fir, big-leaf maple, and western hazel; Maintain or enlarge the size of existing woodland patches to facilitate dispersal movements and population connectivity within the park and surrounding landscape.

Woodland Habitat Structure

Stand measurements and visual observations suggest that trees currently existing in Herbert Open Space grew in woodland and savanna settings quite different than conditions observed in the park today. Many examples of "open-form" oaks (i.e., wide crowns, large-diameter branches, and multiple stems) that could only have developed in

savanna or semi-open canopy conditions were encountered in densely stocked woodlands during surveys. Such trees were observed on Plots A and in the vicinity of Plot B (Figure X). This observation indicates that trees previously were much more widely spaced over much of the park than they are at present.

Plots C and D (Figure X) are representative of even-aged oak patches that are common in the park. These patches are characterized by dominant trees of uniform size, narrow crowns, and the absence of major branches on lower stems. Tree heights and diameters measured on these plots indicate that these stands are less than 150 years old. These findings and the low frequency that open-form trees were observed in the vicinity of these plots suggest that they were most likely covered by treeless prairies at the time of European settlement. Oaks dominating these patches today developed in tightly spaced woodlands that succeeded the open prairies once Native American burning was halted. Current woodland conditions reflect the recent land use history of Native Americans and European settlers along Muddy Creek. Indian tribes of the Willamette Valley prevented forest encroachment onto savannas and prairies by regularly burning these areas to sustain game and plants used for food. Douglas-firs and hardwoods other than oak tended to be concentrated on north slopes of the foothills and along watercourses. Since European settlement and the cessation of Native American prairie burning, tree species not as well adapted to persisting on fire-prone landscapes have been able to extend their distribution and abundance across the Valley floor.

There is evidence that the oak woodlands in Herbert Open Space are in decline and are unlikely to persist more than a few decades into the future. Many open-form oaks now exist as dying relicts under mixed forest canopies. In even-aged oak stands, oak crowns have begun to overlap, shading branches in lower crown positions, and consequently leading to the “vase-shaped” crowns that are symptomatic of severe tree competition. The presence of conifers and shade-tolerant hardwoods in intermediate canopy positions (see Table X) provide evidence that patches once dominated by Oregon white oak are succeeding toward climax forest conditions (i.e., true fir, Douglas-fir, or big-leaf maple depending on intrinsic site factors) in the absence of regularly-occurring fire.

Table X. Structural characteristics of oak woodlands measured at eight 10-meter radius plots at Herbert Open Space.

TPA	Diam.	Plot							
		HA	HB	HC	HD	HE	HF	HG	HH
Oak	2-4	0	0	0	0	0	0	0	0
	4-10	0	0	0	8	0	0	0	0
	10-20	20	16	0	20	0	0	40	8
	>20	24	4	12	0	0	0	4	20
Conifer	2-4	0	0	4	8	0	0	4	12
	4-10	0	0	8	32	0	0	32	40

	10-20	0	0	20	0	0	0	16	20
	>20	0	0	0	0	4	0	0	0
HW	2-4	0	0	0	0	12	48	4	0
	4-10	0	0	0	0	0	28	0	0
	10-20	0	0	0	0	0	0	0	0
	>20	0	0	0	0	8	0	0	0
Snags	2-4	0	0	0	8	0	16	8	16
	4-10	0	0	0	12	0	0	8	0
	10-20	0	0	0	0	0	0	0	0
	>20	0	0	0	0	0	0	0	0
Total TPA		44	20	44	68	24	76	100	100
Canopy		69	75	55	85	62	98	69	102
Regen		yes	no	no	no	no	no	no	no
ShrHt		9	40	2	24	67	71	6	24
Shr%		25	20	10	40	50	50	60	40

Oak: Oregon white oak

Conifer: All conifer species

HW: Hardwoods (other than oak)

Snags: Dead trees, height >4 ft

Total TPA: Trees per acre, all classes combined

Diam: Stem diameter (inches)

Canopy: Canopy height (feet)

Regen: Advanced oak regeneration present?

ShrHt: Shrub layer height (inches)

Shr%: Percent cover of shrubs on plot

Literature Cited

Adamus, P. 2003. Distribution of Western Pond Turtle Populations in the Willamette River Basin, Oregon. Project Report to the Western Pond Turtle Working Group.

Brown, B. T. 1994. Rates of brood parasitism by Brown-headed Cowbirds on riparian passerines in Arizona. *J. Field Ornithol.* 65: 160–168.

Bull, E. L., and J. E. Jackson. 1995. Pileated Woodpecker (*Dryocopus pileatus*). In *The Birds of North America*, No. 148 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Center for Biological Diversity, Friends of the San Juans, Oregon Natural Resources Council, and Northwest Ecosystem Alliance. 2002. Petition to list the streaked horned lark (*Eremophila alpestris strigata*). Dated December 10, 2002.

Davidson, Carlos Davidson, H. Bradley Shaffer, Mark R. Jennings. 2001. Declines of the California Red-Legged Frog: Climate, UV-B, Habitat, and Pesticides Hypotheses. *Ecological Applications*, Vol. 11, No. 2 (Apr., 2001), pp. 464-479.

Eckerle, K. P., and C. F. Thompson. 2001. Yellow-breasted Chat (*Icteria virens*). In *The Birds of North America*, No. 575 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Gabrielson, I.N., And S.G. Jewett. 1940. *Birds of Oregon*. Oregon State College, Corvallis.

Guinan, J. A., P. A. Gowaty, and E. K. Eltzroth. 2000. Western Bluebird (*Sialia mexicana*). In *The Birds of North America*, No. 510 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Hagar, J.C. 2007. Wildlife species associated with non-coniferous vegetation in Pacific Northwest conifer forests: A review. *Forest Ecology and Management* 246:108-122.

Harris, J. H. 1991. Effects of brood parasitism by Brown-headed Cowbirds on Willow Flycatcher nesting success along the Kern River, California. *West. Birds* 22: 13-26.

Holland, D.C., 1994. The western pond turtle: habitat and history. Prepared for U.S. Depart. Of Energy, Bonneville Power Administration.

Jones, S. L., and J. E. Cornely. 2002. Vesper Sparrow (*Pooecetes gramineus*). In *The Birds of North America*, No. 624 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Keppie, D. M., and C. E. Braun. 2000. Band-tailed Pigeon (*Columba fasciata*). In *The Birds of North America*, No. 530 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Lanyon, W. E. 1994. Western Meadowlark (*Sturnella neglecta*). In *The Birds of North America*, No. 104 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Leonard, J. P. 1998. Nesting and foraging ecology of band-tailed pigeons in western Oregon. Ph.D. diss., Oregon State Univ., Corvallis.

Marshall, D.B., M. Chilcote, and H. Weeks. 1996. Species at risk: sensitive, threatened, and endangered vertebrates of Oregon. Oregon Department of Fish and Wildlife, Wildlife Diversity Program. Portland, OR.

NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: July 31, 2007).

ODFW [Oregon Department of Fish and Wildlife]. 2006. 2006-2007 Oregon game bird regulations. Oregon Department of Wildlife. Salem, OR.

Pravosudov, V. V. and T. C. Grubb, Jr. 1993. White-breasted Nuthatch (*Sitta carolinensis*). In *The Birds of North America*, No. 54 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Pulliam, H. R. 1988. Sources, sinks, and population regulation. *American Naturalist* 132:652–661.

Remsen, J. V., Jr. 1978. Bird species of special concern in California. Calif. Dep. Fish Game, Nongame Invest. Rep. 781, Sacramento.

Sauer, J. R., J. E. Hines, G. Gough, I. Thomas, B. G. Peterjohn 1997. The North American Breeding Bird Survey results and analysis. Version 96.4. Patuxent Wildl. Res. Center, Laurel, MD.

Sedgwick, J. A. 2000. Willow Flycatcher (*Empidonax traillii*). In *The Birds of North America*, No. 533 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Scheerer, P.D., P.S. Kavanagh, S. Davis, and S.E. Jacobs. 2005. 2005 Oregon chub investigations. Project numbers E-2-36 and E-2-37. Oregon Department of Fish and Wildlife. Salem, OR.

St. John, A. 1987. The herpetology of the Willamette Valley, Oregon. Oregon Dept. of Fish and Wildlife Tech. Rept. #86-1-02. Portland, OR.

Verts, B.J. and L.N. Carraway. 1998. Land mammals of Oregon. University of California Press. Berkeley, CA.
