



# **Oregon Department of Fish and Wildlife's Vector Control Guidance For Sensitive Areas**

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# I. Introduction

The Oregon Department of Fish and Wildlife's (ODFW) mission is "To protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations." The statutory mandates in ORS 496.012 and 506.109 (Wildlife Policy and Food Fish Management Policy; Appendix A) allow ODFW to comment and provide recommendations on actions that may threaten Oregon's fish, wildlife, or their habitats.

One duty of ODFW, as required under ORS 452.140 and ORS 452.245 (Vector Control; see **Background**, page 4), is to annually review and approve vector control plans for mosquito abatement which includes applications of insecticides, oil or other chemicals to water. Comments on vector control plans are made in order to minimize effects on fish, wildlife and their habitats while not significantly interfering with disease prevention and containment. ODFW expresses concerns over direct impacts from pesticide applications to fish, wildlife, or their habitats, as well as indirect, chronic and long-term impacts.

ODFW staff consider mosquitoes to be an important part of the ecosystem, as they provide a prey base for many of Oregon's native fish and wildlife during critical life stages. Natural predators of mosquitoes include many birds, bats, fish, amphibians, and insects, and targeted reduction of mosquitoes can have an impact on native species through disruption of the food web. Treatment of mosquito species that are found in natural, sensitive habitats during the spring and early summer are of most concern to ODFW because mosquitoes provide an important food source during this time for migrating and nesting birds and bats as well as rearing juvenile fish and amphibians.

This document is intended to provide ODFW staff with background on vector control practices and treatments and recommend treatment protocols for mosquito abatement on sensitive areas in Oregon to Vector Control Districts (VCDs) and Counties performing vector control activities. As recognized in this guidance, pesticides used for vector control have already been approved by the Environmental Protection Agency (EPA) as not having unreasonable adverse effects on humans, the environment and non-target species when used according to product labels. However, the use of pesticides in natural habitats is a concern for ODFW, as even low concentrations of pesticides may have the potential to directly and indirectly affect fish, wildlife and their habitats. As noted already, impacts to the food web and changes to the ecosystem over time are of special concern, and a topic not widely studied by EPA or other entities. Disturbance to wildlife as a result of frequent surveillance or treatments is an additional concern. Therefore, this Guidance Document will outline ODFW's recommended treatment

protocol for sensitive areas of the State in order to provide protections for ODFW's statutory mandates. As a result, ODFW encourages least harmful alternatives for vector control as part of an Integrated Pest Management (IPM) Plan while recognizing that, given a disease outbreak, additional means of control may be used to contain it and prevent any escalated harm to human health. ODFW is committed to reducing mosquito habitat and implementing an IPM plan on ODFW-owned or managed land and will actively participate in the Integrated Pest Management Coordinating Committee established in 2013 under House Bill 3364<sup>1</sup>.

Although not directly addressed in this document, ODFW shares the increased concern for native bees and other pollinators in relation to pesticide applications. Recent changes in many pesticide product labels<sup>2</sup> reflect EPA's concern for pollinators and aims to protect bees and other pollinators from pesticide risks through regulatory actions, voluntary changes to pesticide use by registrants and research programs aimed at increasing the understanding of factors associated with declining pollinator health<sup>3</sup>. ODFW advises VCDs and Counties to use current Best Management Practices to protect pollinators in Oregon.

## II. Background

By statute, ODFW must approve Pesticide Use Plans (PUPs) prior to application of pesticides for the purpose of vector control. ODFW's goal in approval of vector control plans is to minimize effects on fish, wildlife and their habitats while not significantly interfering with disease prevention and containment. The statutes directing ODFW involvement in PUPs are as follows:

452.140 Pesticide use; consent of State Fish and Wildlife Commission. The board of trustees of a district:

(1) May not apply pesticides to waters in the district that are frequented by waterfowl or that contain any game fish without obtaining annual approval of the State Fish and Wildlife Commission.

(2) May not apply pesticides for public health vectors without first obtaining approval of the State Fish and Wildlife Commission. [Amended by 1959 c.600 §8; 1981 c.640 §2; 2007 c.258 §5]

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<sup>1</sup> Oregon State Legislature 2013 Regular Session. House Bill 3364.

At: <https://olis.leg.state.or.us/LIZ/2013R1/Measures/Text/HB3364/Enrolled>

<sup>2</sup> Environmental Protection Agency. The New EPA Bee Advisory Box.

At: <http://www.epa.gov/pesticides/ecosystem/pollinator/bee-label-info-graphic.pdf>

<sup>3</sup> Environmental Protection Agency. Pollinator Protection.

At: <http://www.epa.gov/opp00001/ecosystem/pollinator/>

452.245 Pesticide use; consent of State Fish and Wildlife Commission. In exercising its powers under ORS 452.210 to 452.250, a county court:

- (1) May not order the application of pesticides to waters in the county that are frequented by waterfowl or that contain any game fish without obtaining annual approval of the State Fish and Wildlife Commission.
- (2) May not order the application of pesticides for public health vectors without first obtaining the approval of the State Fish and Wildlife Commission. [1981 c.640 §5; 2007 c.258 §10]

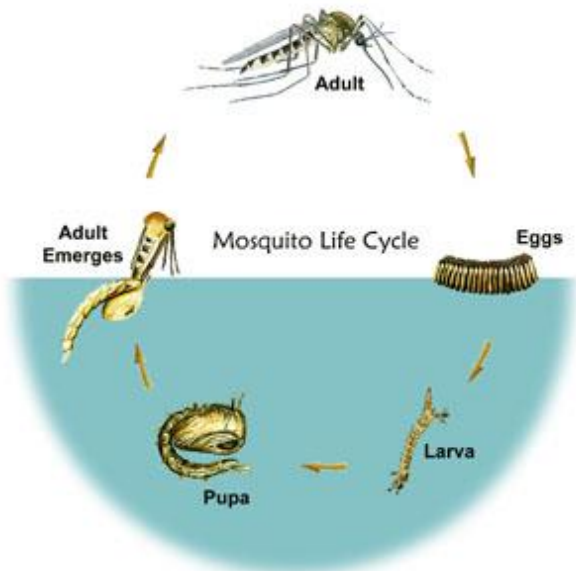
These statutes only apply when a formal Vector Control District has been formed or a County is performing vector control activities. A City or other entity can legally hire a consultant or perform vector control activities without ODFW approval, though staff can always provide recommendations, if requested. Other State and federal requirements for pesticide use are still pertinent and apply to their use.

The Fish and Wildlife Commission officially delegated approval of PUPs to the Director in 2005. A Memorandum of Understanding (MOU) was also developed in 2005 between ODFW, the Oregon Vector Control Association, and Vector Control Districts and County Vector Control Programs (November 2005; Appendix B) to help guide the approval process. ODFW's statutory responsibility was clarified in the MOU, which states: "ODFW will...work with Districts at the ODFW field staff level to identify sensitive habitat areas and species, including sensitive timing needs (e.g. nesting time periods). In order to do this, ODFW will develop an internal process and general criteria for identifying sensitive habitat areas." To date, ODFW has implemented our responsibility by identifying "sensitive areas" at the field staff level along with our comments on treatment concerns for fish, wildlife, and their habitats which has resulted in varied definitions of "sensitive areas" and the types of treatments acceptable to ODFW. This guidance is intended to provide more consistency across the state in defining sensitive areas and in recommending treatment options for vector control on sensitive areas. These recommendations are based on the best available science, expert opinions and other state and federal guidelines and requirements. This consistency and transparency also is intended to further promote a positive working relationship and better understanding between ODFW and VCDs.

### III. Vector Control Overview

This section is intended to provide background information on mosquitoes and vector control practices in Oregon. It covers: the basics of mosquito biology and common species found in Oregon; the benefits of mosquito reduction; control methods and techniques employed by vector control districts; and EPA’s role in product testing and registration. Finally, treatments used in Oregon are listed with links to current labels and Material Safety Data Sheets (MSDS).

#### A. Mosquito Life History



The mosquito goes through four distinct stages during its life cycle:

- **egg** – hatches when exposed to water
- **larva** – (plural – larvae) lives in the water; molts 4 times; most species surface to breathe air
- **pupa** – (plural – pupae) does not feed; stage just prior to emerging as adult
- **adult** – flies short time after emerging and after its body parts have hardened

Leon County Mosquito Control, Tallahassee, FL

#### B. Common Mosquitoes in Oregon

There are over 2,500 different species of mosquitoes throughout the world, with about 200 species occurring in the United States and 45 species occurring in Oregon<sup>4</sup>. Table 1 lists examples of the most common mosquito species in Oregon, their typical habitat, and why they are a health concern.

<sup>4</sup> West Umatilla Mosquito Control District. At: <http://www.wumcd.org/mosquito/>

Table 1. Common mosquitoes found in Oregon, their habitats, and potential disease transmission.

<b>Species</b>	<b>Typical Habitat</b>	<b>Disease Transmission or Concern<sup>1</sup></b>
<i>Aedes communis</i>	Pools of melted snow in mountains	Pest
<i>Aedes dorsalis</i>	Brackish and saline waters	WEE; Pest
<i>Aedes increpitus</i>	Floodwaters along streams; small pools in woods or meadows	Pest
<i>Aedes nigromaculis</i>	Intermittently irrigated crops	Pest
<i>Aedes sierrensis</i>	Rain-filled cavities of oaks, madrones, and maple trees	Canine Heartworm
<i>Aedes sticticus</i>	Brushy bottomlands in floodplain; rain-filled pools	WNV, WEE, SLE
<i>Aedes vexans</i> <sup>2</sup>	Floodwaters; irrigated areas and pastures	WNV, WEE; Canine Heartworm; Pest
<i>Anopheles freeborni</i>	Rain pools, seepage areas, marshes, swamps, semi-permanent or permanent ponds in irrigated pastures; drainage ditches	WEE
<i>Coquillettia perturbans</i>	Swamps, marshes, or log ponds with heavy vegetation	WNV
<i>Culex pipiens</i> <sup>2</sup>	Polluted water of open septic drains and cesspools; artificial containers	WNV, WEE, SLE; Canine Heartworm
<i>Culex stigmatasoma (peus)</i> <sup>2</sup>	Moderately polluted water; sewage and dairy ponds; culverts; ornamental pools	WNV
<i>Culex tarsalis</i> <sup>2</sup>	Containers; standing pasture water; ditches, marshes, wetlands	WNV, WEE, SLE
<i>Culiseta incidens</i>	Natural depressions filled with rain or irrigation water; artificial containers; catch basins	Pest
<i>Culiseta Inornata</i>	Woodland pools, Marshes, Ponds, and Containers	WNV, WEE

<sup>1</sup> WNV = West Nile Virus; WEE = Western Equine Encephalitis; SLE = St. Louis Encephalitis

<sup>2</sup> Significant concern for West Nile Virus transmission

## C. Benefits of Mosquito Reduction

Broadly speaking, the benefits of mosquito control can be divided into three classes: nuisance benefits, economic benefits, and public health benefits<sup>5</sup>.

- Nuisance benefits include relief from biting to people around homes or in parks and recreational areas and can even be said to extend to pets and to wildlife. It is important to note that the World Health Organization defines health as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity,<sup>6</sup>” which prompts VCDs to minimize mosquito populations based on complaints of pestiferous biting. These complaints from the public, or “service calls”, are one method used to monitor adult mosquito populations.
- Economic benefits include increased real estate values, enhanced tourism and related business interests, or increased livestock or poultry production. Particularly in Baker County, ranchers historically noticed a remarkable increase in cattle weight gain following adulticide applications due to the decrease in mosquito irritation to cattle.
- Public health benefits include the reduction of infectious disease agents.

To address public health benefits, mosquito abatement in Oregon is designed to suppress mosquito populations to a level not likely to support disease transmission. The EPA and Centers for Disease Control and Prevention (CDC)<sup>7</sup> state that mosquito-borne diseases are among the world's leading causes of illness and death today. Despite great strides over the last 50 years, mosquito-borne illnesses continue to pose significant risks to parts of the population in the United States. Disease-carrying mosquito species are found throughout the U.S., especially in urban areas and coastal or inland areas where flooding of low lands frequently occurs. Current challenges posed by the presence of West Nile virus in the Western hemisphere illustrate the importance of cooperation and partnership at all levels of government to protect public health. EPA and the CDC are working closely with each other and with other federal, state, and local agencies to protect the public from mosquito-borne diseases.

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<sup>5</sup> From the University of Florida’s Institute of Food and Agricultural Sciences: Integrated Mosquito Management. At: [http://mosquito.ifas.ufl.edu/Integrated\\_Mosquito\\_Management.htm](http://mosquito.ifas.ufl.edu/Integrated_Mosquito_Management.htm)

<sup>6</sup> From the World Health Organization Constitution. 1946. At: <http://apps.who.int/gb/bd/PDF/bd47/EN/constitution-en.pdf>

<sup>7</sup> From EPA: Joint Statement on Mosquito Control in the United States from the U.S. Environmental Protection Agency (EPA) and the U.S. Centers for Disease Control and Prevention (CDC). At: <http://www.epa.gov/pesticides/health/mosquitoes/mosquitojoint.htm>

Mosquito-borne diseases include viral encephalitis, dengue, yellow fever, malaria, and filariasis. Most of these diseases have been prominent as endemic or epidemic diseases in the United States in the past, but today, only the insect-borne (arboviral) encephalitides occur annually and dengue occurs periodically in this country. The major types of viral encephalitis in the United States include St. Louis, LaCrosse, Eastern equine and Western equine. Oregon currently monitors West Nile Virus, Dengue, St. Louis Encephalitis, and Western Equine Encephalitis<sup>8</sup>. These viruses are normally infections of birds or small mammals. During such infections, the level of the virus may increase in these infected animals, facilitating transmission to humans by mosquitoes. The West Nile virus, which can also cause encephalitis, was found in the northeastern United States for the first time in 1999, and is a good example of this mode of transmission. Human cases of encephalitis range from mild to very severe illnesses that, in a few cases, can be fatal. Dengue is also a viral disease transmitted from person to person by mosquitoes. It is usually an acute, nonfatal disease, characterized by sudden onset of fever, headache, backache, joint pains, nausea, and vomiting. While most infections result in a mild illness, the severe forms of the disease can occur in some cases. Not only can mosquitoes carry diseases that afflict humans, but they also can transmit several diseases and parasites to which dogs, horses, and select species of wildlife (e.g., greater sage grouse) are very susceptible. These include dog heart worms, western equine encephalitis and West Nile virus.

## **D. Integrated Pest Management**

Vector control for disease prevention and containment is a vital function for human health. Vector control is aimed at reducing mosquito vectors rather than eliminating them, which in turn reduces risk of disease transmission. The State of Oregon endorses an integrated pest management approach (IPM)<sup>9</sup>. Integrated Pest/Mosquito Management is a comprehensive mosquito prevention and control strategy that utilizes available mosquito control methods singly or in combination to exploit the known vulnerabilities of mosquitoes in order to reduce their numbers to tolerable levels while maintaining a quality environment. This includes education of the public and pest control strategies aimed at larval and adult mosquitoes, while minimizing public and environmental exposure to substances used for control. Reducing mosquito vectors involves four steps:

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<sup>8</sup> From the US Geological Survey's Disease Maps. At: <http://diseasemaps.usgs.gov/index.html>

<sup>9</sup> Public Health West Nile Virus Emergency Response Plan, September 11, 2007. OR Dept. of Human Services. 18 pp. At: [http://public.health.oregon.gov/DiseasesConditions/DiseasesAZ/WestNileVirus/Documents/WNV\\_Response\\_Plan\\_Sept07.pdf](http://public.health.oregon.gov/DiseasesConditions/DiseasesAZ/WestNileVirus/Documents/WNV_Response_Plan_Sept07.pdf)

## 1. Habitat Reduction

Habitat reduction generally does not involve extensive changes to natural habitats, but rather focusing on modifying or eliminating standing water breeding areas near inhabited areas. These actions include: minimizing standing water in irrigated areas, eliminating water-filled containers, such as buckets and old tires, cleaning roof gutters, and ensuring water troughs and bird baths are managed to eliminate mosquito breeding.

However, habitat management can be a useful tool in managed wetlands that have been altered or are impaired. In these cases, the techniques outlined in the “Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands<sup>10</sup>” by the Central Valley Joint Venture can be utilized to reduce mosquito habitat. These techniques include water management, vegetation management, infrastructure maintenance, and improvements during restoration or enhancement of sites.

## 2. Avoidance/Education

Individuals can reduce their exposure to biting mosquitoes by limiting time spent outdoors at dawn or dusk when mosquitoes are most active, consider wearing lightweight long-sleeved shirts and pants, install or repair window screens and doors to keep mosquitoes out, and use a mosquito repellent that contains either DEET, Picaridin, Oil of Lemon Eucalyptus or PMD or IR3535<sup>11</sup> (use according to the package directions). Pond owners can also consider adding aeration, such as a fountain head, or thinning vegetation around pond margins to reduce mosquitoes. Vector Control staff often provide education programs to children and adults on these topics, and ODFW promotes these habitat reduction and avoidance measures on our website (<http://www.dfw.state.or.us/fish/water/index.asp> and [http://www.dfw.state.or.us/fish/diseases/docs/backgrounder\\_WNV\\_gambusia.pdf](http://www.dfw.state.or.us/fish/diseases/docs/backgrounder_WNV_gambusia.pdf)).

## 3. Larval and Pupal Control

When water management and water source reduction is not feasible or has not adequately controlled mosquito populations, biological or chemical controls may be required. Each VCD or County has programs for monitoring mosquito larvae. Monitoring involves sampling

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<sup>10</sup> Central Valley Joint Venture. Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands. At: <http://www.centralvalleyjointventure.org/assets/pdf/CVJV-Mosquito-BMP.pdf>

<sup>11</sup> Centers for Disease Control and Prevention. West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control. 2013. At: <http://www.cdc.gov/westnile/resources/pdfs/wnvguidelines.pdf>

different mosquito habitats using a dip cup or fine mesh net to determine mosquito presence or population levels. Triggers for treatment are generally one larva per 10 dips, but can change based on a potential health threat. Triggers are not usually species-specific, as larval control aims to reduce nuisance mosquitoes as well as vectors of disease.

Biological control involves the use of natural mosquito predators. Natural predators of mosquitoes include many native birds, bats, fish, amphibians, and insects; creating and promoting healthy habitats is supported by ODFW as an important part of an IPM Program for mosquito control (see **Biological Mosquito Controls**, page 13). VCDs can also distribute mosquito-eating fish (*Gambusia affinis*) to approved locations or types of sites (see **Fish**, page 13), but ODFW discourages use of this non-native fish.

Larviciding involves treating breeding habitats to kill mosquito larvae and prevent these areas from becoming breeding grounds for infection. Breeding areas of *Culex* spp. often occur in the storm drainage systems of metropolitan areas, such as catch basins, and regular surveillance and larviciding of these structures keep mosquito populations in check. Treatments that target pupae, such as insect growth regulators, must be timed accurately for this specific life stage to prevent emergence. Killing mosquito larvae and pupae before they emerge as adults can reduce or eliminate the need for ground or aerial application of pesticides to kill adult mosquitoes and helps reduce the adult mosquito population in nearby areas<sup>12</sup>. An additional benefit is that these types of treatments allow the mosquito prey base to be maintained.

#### 4. Adult Control

Vector control districts also monitor the level of adult mosquitoes within their districts. During surveillance, a certain number of landings (either on vector control personnel or other devices attractive to mosquitoes) per minute initiate treatment. Examples of adult triggers are “25 pestiferous mosquitoes in a trap”, “10 disease transmitting mosquitoes in a trap”, or “1 mosquito per minute landing rate”. Complaints (service calls) can also trigger treatment to reduce nuisance mosquito populations.

For mosquito control, adulticides are typically applied at dusk when mosquitoes are most active. They kill only adult mosquitoes that contact the insecticide droplets in flight, which

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<sup>12</sup> From EPA, Controlling Mosquitoes at the Larval Stage, February 22, 2013 update. At: <http://www2.epa.gov/mosquitocontrol/controlling-mosquitoes-larval-stage>

are applied as an ultra-low volume (ULV) spray either by truck- or aircraft-mounted sprayers. ULV sprayers dispense very fine aerosol droplets that stay aloft; the droplet must then contact the mosquito in flight in order to be effective. Once the insecticide fog or spray dissipates, no effective control is present. The local mosquito population will be reduced for a day or two, but mosquitoes from other locations may enter the area. This is why the state of Oregon<sup>13</sup> recommends larviciding as the most effective method of mosquito control.

A responsible IPM program also takes chemical resistance into account. Just as bacteria evolve resistance to antibiotics, mosquitoes evolve resistance to insecticides used for their control. Selection for resistance can result from the repeated use of the same insecticide exclusively and from slow-release formulations of insecticides. To avoid or delay resistance, a variety of different insecticides and other control methods must be used in rotation. Reliance on a single insecticide frequently or over large contiguous areas is likely to produce resistance to that control agent and can also cause cross-resistance to other insecticides. Larvicides with a separate molecular mode of action and significant difference in detoxification mechanisms are ideal for use in rotations. For adulticiding, malathion is the least likely to trigger evolution of resistance and synergized pyrethroids the most likely<sup>14</sup>.

“Because the selection of chemicals available for both larviciding and adulticiding is becoming increasingly limited without many new products in development, and because of the possibility of non-target insecticide effects, it is incumbent that mosquito control pesticides be applied wisely in integrated pest management programs. It is also important that new, more environmentally acceptable methods are developed, tested, and used as they become available, and that research continues to document non-target and human health effects of the pesticides used<sup>15</sup>.”

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<sup>13</sup> DeBess, Emilio, DVM, MPVM, et al. 2003. Mosquito Control Chemical Guide: 2003 West Nile Virus Response Plan. Oregon Dept. of Human Services. 9 pp. At: <http://public.health.oregon.gov/DiseasesConditions/DiseasesAZ/WestNileVirus/Documents/wnvrevue.pdf>

<sup>14</sup> New Jersey Agricultural Experiment Station. INSECTICIDES RECOMMENDED FOR MOSQUITO CONTROL IN NEW JERSEY IN 2012. At: <http://www-rci.rutgers.edu/~insects/bmpmcnj.pdf>

<sup>15</sup> University of Florida's Institute of Food and Agricultural Sciences Extension. Integrated Mosquito Management. At: [http://mosquito.ifas.ufl.edu/Integrated\\_Mosquito\\_Management.htm](http://mosquito.ifas.ufl.edu/Integrated_Mosquito_Management.htm)

## E. Biological Mosquito Controls

Ecosystems that contain a complete aquatic and terrestrial food web often harbor fewer mosquitoes. An intact food web, including fish, amphibians, and aquatic insects that prey on larval mosquitoes and bats, birds and dragonflies that prey on adult mosquitoes, play a natural part in suppressing mosquitoes.

ODFW recognizes the limitations of using just native predator species in mosquito control and that a functional natural environment that supports predator habitat will not always be present or sufficient to prevent or suppress the transmission of mosquito-borne diseases. ODFW supports the entire suite of IPM options, when applicable to prevent or contain disease, but does and will continue to promote native fish and wildlife diversity as an integral part of any IPM program.

### 1. Fish

Fish are the primary human-controlled biological control for mosquito larvae and pupae. Fish species with a preference for still water are one of the primary predators on mosquitoes. Vector Control Districts and Counties utilize *Gambusia affinis* (western mosquitofish), a species not native to Oregon, for mosquito control in some instances. Though their name implies that they only eat mosquitoes, mosquitofish are highly opportunistic and will eat other appropriately-sized prey. Mosquitofish are known to eat or harm fish eggs, small or young fish, frog and salamander eggs, and beneficial aquatic insects. As they grow larger, their preferences switch to larger-sized prey, and they no longer offer significant mosquito control. They may also compete with native species for available food and habitat. In addition, mosquitofish may reduce the natural mosquito control provided by native fish, wildlife and aquatic insects. Mosquitofish predation and competition have contributed to the elimination or decline of federally threatened and endangered fish species in the western United States. Use of mosquitofish can be effective, however, in aquaria-type habitats, such as confined ponds or troughs with minimum vegetation, where they can readily feed at the surface. Because of the negative impacts of mosquitofish, native fish species, such as Oregon, blue and Tui chubs, three-spine stickleback and juvenile trout, should also be considered and may be just as effective for mosquito control. Restoring or enhancing habitat for native fish is recommended to landowners. Stocking of these native fish needs prior approval and appropriate permits, so local fish biologists should be contacted for further information.

According to OAR 635-007-0600, transport, holding or release of live fish, including *Gambusia*, requires a fish transport permit, except when transporting aquaria species intended for aquaria use. "Aquaria" are any tanks, pools, ponds, bowls or other containers intended for and capable of holding or maintaining live fish and from which there is no outfall to any waters of this state (OAR 635-007-0501). Therefore, ponds with an outlet or ones located within the floodplain are not an acceptable location for *Gambusia* use. *Gambusia* utilized for vector control are considered an aquaria species and can be distributed by a County or VCD to "aquaria" without a permit.

However, OAR 635-007-0620 requires an annual permit for the use of *Gambusia* for vector control when released to waters of the County or District (i.e., waters of the State). If a VCD or County obtains a fish transport permit for stocking waters of the State, it may provide individuals with *Gambusia* for stocking in ODFW-approved locations or types of sites. The local ODFW fish biologist must be contacted for issuance and approval of the permits and for approval of locations for release of *Gambusia*. The VCD must provide the person receiving *Gambusia* a receipt and provide an information sheet on where *Gambusia* may be stocked (ODFW's Backgrounder on *Gambusia* can be found at: [http://www.dfw.state.or.us/fish/diseases/docs/backgrounder\\_WNV\\_gambusia.pdf](http://www.dfw.state.or.us/fish/diseases/docs/backgrounder_WNV_gambusia.pdf)). The VCD or County must maintain records of *Gambusia* distribution that are available for inspection by ODFW or the Oregon State Police.

## 2. Bats, Birds, Amphibians and Insects

ODFW encourages restoration and enhancement of habitats that promote native species of fish, bats, birds, amphibians, and insects that prey on mosquitoes, though we recognize that many predators are opportunistic and a diverse ecosystem will not entirely eliminate mosquitoes. Promoting natural predators should be considered one part of a successful IPM approach that can reduce the need for chemical controls. For example, bats are primary predators of vast numbers of insects that fly at night, and some species consume large numbers of mosquitoes<sup>16</sup>. Providing additional roosts can provide some relief from mosquitoes, but the impacts are highly dependent on the species and location. Many native bird species consume mosquitoes to some degree, and some are specifically known as foliage gleaners because they pick resting insects off of foliage during the day. Amphibians can play a key role in mosquito control, especially in ephemeral water bodies where fish are typically absent<sup>17</sup>. Dragonflies, damselflies, water striders, backswimmers,

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<sup>16</sup> From Bat Conservation International. Tuttle, Merlin D. Bats, Artificial Roosts, and Mosquito Control. At: <http://www.batcon.org/pdfs/bathouses/mosquitocontrol.pdf>

<sup>17</sup> From "Amphibian Predation on Larval Mosquitoes". DuRant, Sarah E. and William A. Hopkins. 2008.

and predacious diving beetles are also natural enemies of mosquitoes, some even preying solely on mosquito larvae, but they need healthy wetlands to survive and thrive. Wetland restoration projects, as well as construction of storm water retention ponds, should be designed to foster predator diversity as one means to address mosquito issues. In areas where natural habitat is not sufficient to support predator wildlife species, focusing design to support insect predators that consume mosquito larvae may be more successful. IPM programs will increase the mosquito control benefit from larvae predators by being aware of what chemicals negatively affect their populations (i.e. water surface tension disruptors). Local wildlife biologists will be the point of contact for information on improving habitats and providing nesting and roosting sites that encourage mosquito-eating wildlife and insect species.

It should be noted that the Department of Human Services has expressed opposition to promoting bat boxes based on concerns for potential rabies transmission from bats. However, placing bat boxes away from inhabited areas can reduce this concern.

## F. EPA Regulation

All chemicals used for mosquito control in Oregon have been approved for use under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). According to EPA<sup>18</sup>, “The objective of FIFRA is to provide federal control of pesticide distribution, sale, and use. All pesticides used in the United States must be registered (licensed) by EPA. **Registration assures that pesticides will be properly labeled and that, if used in accordance with specifications, they will not cause unreasonable harm to the environment.** Use of each registered pesticide must be consistent with use directions contained on the label or labeling.” Pesticide labels and uses can be reviewed or challenged during consultation with federal agencies concerning potential impacts to Endangered Species Act-listed species or through court proceedings brought by third party lawsuits.

The EPA also periodically re-evaluates product registrations under two different procedures. In 2008, EPA completed a review of older pesticides (those initially registered prior to November 1984) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) to ensure that they

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At: [http://ecophys.fishwild.vt.edu/wordpress/wp-content/uploads/2012/09/durant-and-hopkins\\_mosquitoes\\_2008.pdf](http://ecophys.fishwild.vt.edu/wordpress/wp-content/uploads/2012/09/durant-and-hopkins_mosquitoes_2008.pdf)

<sup>18</sup> From EPA, Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). At: <http://www.epa.gov/agriculture/lfra.html>

met current scientific and regulatory standards. This process, called reregistration<sup>19</sup>, considered the human health and ecological effects of pesticides and resulted in actions to reduce risks of concern. EPA also reassessed existing tolerances (pesticide residue limits in food) to ensure that they met the safety standard established by the Food Quality Protection Act (FQPA) of 1996. EPA integrated reregistration and tolerance reassessment to most effectively accomplish the goals of both programs. Through product reregistration, EPA is implementing reregistration eligibility decisions (REDs) by ensuring that required risk mitigation measures are reflected on pesticide product labels.

In addition, the Food Quality Protection Act mandated a new program: registration review<sup>20</sup>. Through registration review, EPA is reviewing each registered pesticide every 15 years to determine whether it still meets the FIFRA standard for registration. All pesticides distributed and sold in the United States must be registered by EPA, based on scientific data showing that they will not cause unreasonable risks to human health, workers, or the environment when used as directed on product labeling. The new registration review program makes sure that, as the ability to assess risk evolves and as policies and practices change, all registered pesticides continue to meet the statutory standard of no unreasonable adverse effects.

Changes in science, public policy, and pesticide use practices will occur over time. Through the new registration review program, the Agency periodically reevaluates pesticides to make sure that as change occurs, products in the marketplace can still be used safely. The registration review program challenges EPA to continuously improve its processes, science, and information management while maintaining a collaborative and open process for decision-making.

## 1. Toxicity Categories<sup>21</sup>

The EPA uses four Toxicity Categories to identify a product's toxicity as it relates to six different types of exposures (acute oral, acute dermal, acute inhalation, primary eye irritation, primary skin irritation, and dermal sensitization). Categories I to III are required to carry a Signal Word on the label. Signal words are found on pesticide product labels, and they describe the acute (short-term) toxicity of the formulated pesticide product.

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<sup>19</sup> From EPA, Pesticides: Reregistration. At: <http://www.epa.gov/pesticides/reregistration/index.htm>

<sup>20</sup> From EPA, Pesticides: Registration Review. At: [http://www.epa.gov/oppsrrd1/registration\\_review/](http://www.epa.gov/oppsrrd1/registration_review/)

<sup>21</sup> From EPA, Label Review Manual. Chapter 7, Precautionary Statements. At: <http://www.epa.gov/oppfead1/labeling/lrm/chap-07.pdf>

**a. Toxicity Category I**

- most toxic;
- requires Signal Word: "Danger-Poison", with skull and crossbones symbol, possibly followed by:

"Fatal if swallowed", "Poisonous if inhaled", "Extremely hazardous by skin contact--rapidly absorbed through skin", or "Corrosive--causes eye damage and severe skin burns"

**b. Toxicity Category II**

- moderately toxic
- Signal Word: "Warning", possibly followed by:  
"Harmful or fatal if swallowed", "Harmful or fatal if absorbed through the skin", "Harmful or fatal if inhaled", or "Causes skin and eye irritation"

**c. Toxicity Category III**

- slightly toxic
- Signal Word: Caution, possibly followed by:  
"Harmful if swallowed", "May be harmful if absorbed through the skin", "May be harmful if inhaled", or "May irritate eyes, nose, throat, and skin"

**d. Toxicity Category IV**

- practically nontoxic
- no Signal Word required

**2. Environmental Fate and Ecotoxicity of Products**

Federal law requires that before selling or distributing a pesticide in the United States, a person or company must obtain registration, or license, from EPA. Before registering a new pesticide or new use for a registered pesticide, EPA must first ensure that the pesticide, when used according to label directions, can be used with a reasonable certainty of no harm to human health and without posing unreasonable risks to the environment. To make such determinations, **EPA requires more than 100 different scientific studies and tests from applicants. These tests evaluate whether a pesticide has the potential to cause adverse effects on humans, wildlife, fish, and plants, including endangered species and non-target organisms, as well as possible contamination of surface water or ground water from leaching, runoff, and spray drift**<sup>22</sup>.

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<sup>22</sup> USEPA. Pesticides: Regulating Pesticides. At: <http://www.epa.gov/pesticides/regulating/>

EPA estimates the toxicity or hazard of a pesticide by evaluating ecological effects tests that vary from short-term (acute) to long-term (chronic) laboratory studies and may also include field studies. In these tests, animals and plants are exposed to different amounts of pesticides, and their responses to these varying concentrations are measured. The results of these tests may be used to establish a dose-response or cause-and-effect relationship between the amount of pesticide to which the organism is exposed and the effects on the organism<sup>23</sup>. A common measure of acute toxicity is the lethal dose (LD50) or lethal concentration (LC50) that causes death (resulting from a single or limited exposure) in 50 percent of the treated animals. Chemicals are considered highly toxic when the LD50/LC50 is small and practically non-toxic when the value is large. Some of the impacts or ecological effects that are measured in ecotoxicity tests include:

- mortality,
- reduction in growth,
- reproductive impairment,
- changes in numbers of species,
- bioaccumulation of residues in non-target organisms, and
- disruption of community and ecosystem-level functions.

According to the Xerces Society for Invertebrate Conservation, however, these “tests are done on only a small suite of aquatic organisms, and they do not examine sublethal effects or the effects of chronic exposure to low doses of the compounds, nor do they examine the effects of other ingredients that are present in commercial formulations of the pesticide (many of which are considered proprietary by the pesticide companies and are protected as trade secrets) or potential interactions of multiple pesticides present in the environment<sup>24</sup>.” One example of a practice in need of further testing is the use of piperonyl butoxide (PBO). PBO is a synergist used primarily in mosquito control with pyrethrins and pyrethroids to increase toxicity by inhibiting the breakdown of the specific pesticide by insects. Although relatively non-toxic on its own, PBO acts as a synergist not only with the direct product, but also with pesticides already found in the environment.

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<sup>23</sup> USEPA. Pesticides: Environmental Effects. At: [http://www.epa.gov/oppefed1/ecorisk\\_ders/toera\\_analysis\\_eco.htm](http://www.epa.gov/oppefed1/ecorisk_ders/toera_analysis_eco.htm)

<sup>24</sup> Mazzacano, C. and S.H. Black. 2013. Ecologically Sound Mosquito Management in Wetlands. An overview of mosquito control practices, the risks, benefits, and nontarget impacts, and recommendations on effective practices that control mosquitoes, reduce pesticide use, and conserve wetlands. The Xerces Society for Invertebrate Conservation. At: <http://www.xerces.org/mosquito-management-wetlands/>

In addition to the toxicity studies, a pesticide applicant is required by EPA to conduct and submit a wide range of environmental laboratory and field studies that examine the chemical fate and transport of a pesticide (how it behaves and where it goes) in soil, air, and water resources<sup>25</sup>. This data is expressed as a half-life, which is the amount of time it takes for half of the product to degrade. EPA scientists review all the available fate and transport information for a pesticide. Based on this review, EPA prepares:

- a fate assessment that interprets the chemical behavior information of the pesticide in the environment, and
- a hazard or ecological effects assessment that interprets the relevant toxicity information for the pesticide and its degradation products.

Using environmental fate data and exposure models, EPA scientists estimate exposure of different animals to pesticide residues in the environment. Finally, they integrate the toxicity information with the exposure data to determine the ecological risk from the use of the pesticide, or whether it is safe for the environment and wildlife. Examples of environmental fate and ecotoxicity information for products proposed for use in Oregon during 2013 can be found in Appendix C.

### 3. Ecological Risk Assessments<sup>26</sup>

The process of comparing toxicity information and the amount of the pesticide a given organism may be exposed to in the environment is called risk assessment. The EPA conducts ecological risk assessments to determine what risks are posed by a pesticide and whether changes to the use or proposed use are necessary to protect the environment. **Before allowing a pesticide product to be sold on the market, EPA ensures that the pesticide will not pose any unreasonable risks to wildlife and the environment by evaluating data submitted in support of registration regarding the potential hazard that a pesticide may pose to non-target fish and wildlife species.** In an ecological risk assessment, they evaluate the likelihood that exposure to one or more pesticides may cause harmful ecological effects based on scientific measurements and on scientific judgment. The studies used define the chemical properties of the pesticide, how the pesticide behaves in the environment, and its impact on plants and animals not targeted by the pesticide. To

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<sup>25</sup> From USEPA. Pesticides: Environmental Effects. At: <http://www.epa.gov/pesticides/ecosystem/index.htm>

<sup>26</sup> From USEPA, Ecological Risk Assessments. At: <http://www.epa.gov/pesticides/ecosystem/ecorisk.htm>

evaluate a pesticide's environmental risks, EPA looks at all the data together. A pesticide can be toxic at one exposure level, and have little or no effect at another. Thus, the risk assessor's job is to determine the relationship between possible exposures to a pesticide and the resulting harmful effects. When EPA issues a registration for a pesticide, they make sure it is in compliance with all health and safety requirements, including that use according to label directions will not cause unreasonable harmful effects on wildlife or the environment.

## **G. Treatments Used for Mosquito Control**

**The following information only outlines treatments proposed for use in Oregon for mosquito abatement during 2013. For information on ODFW's specific concerns related to potential impacts to fish, wildlife, and their habitats from these treatments, refer to Section V (General Guidance for Treatment in Sensitive Areas, page 34). ODFW's preferred treatments can be found in "Treatment Preferences on Sensitive Areas" (page 39).**

### **1. Larvicide Treatments**

There are several active ingredients, sold under different trade names, which are used as larvicides for mosquito abatement. Larvicides are separated into 5 categories: 1) Biological, 2) Insect Growth Regulator, 3) Monomolecular Film, 4) Surface Oil, and 5) Organophosphate. Table 2 lists the category, active ingredient, and associated trade names of products proposed for use by VCDs and Counties in 2013. Details of each active ingredient are discussed in more detail in the following paragraphs.

Table 2. Larvicide products proposed for use by VCDs and Counties in Oregon during 2013.

Category	Active Ingredient	Trade Names
Biological	Bacillus thuringiensis israelensis (Bti)	Aquabac FourStar Mosquito Dunks Summit Briquets Teknar Vectobac
Biological	Bacillus sphaericus (Bs)	Fourstar Spheratax Vectolex Vectomax
Biological	Spinosad	Natular
Insect Growth Regulator	Methoprene	Altosid MetaLarv
Monomolecular Film	Poly (oxy-1,2-ethanediyl), a-(C16-20 branched and linear alkyl)-w-hydroxy	Agnique MMF
Surface Oil	Aliphatic Petroleum Hydrocarbons Petroleum Distillate Petroleum Hydrocarbon	BVA 2 Golden Bear Oil
Organophosphate	Temephos	Abate 5% Tire Treatment Clarke Skeeter Abate ProVect

**a. Biological Larvicides<sup>27</sup>**

*Bacillus thuringiensis israelensis (Bti)* is a naturally occurring soil bacterium registered for control of mosquito larvae. *Bti* was first registered by EPA as an insecticide in 1983. Mosquito larvae eat the *Bti* product that is made up of the dormant spore form of the bacterium and an associated pure toxin. The toxin disrupts the gut in the mosquito by binding to receptor cells present in insects of the order Diptera (true flies, including mosquitoes, gnats, and midges), but not in mammals.

<sup>27</sup> From EPA, Controlling Mosquitoes at the Larval Stage, February 22, 2013 update. At: <http://www2.epa.gov/mosquitocontrol/controlling-mosquitoes-larval-stage>

Fact Sheet:

<http://npic.orst.edu/factsheets/BTgen.pdf>

Label and MSDS examples:

[http://www.myadapco.com/product\\_larvicides.jsp](http://www.myadapco.com/product_larvicides.jsp)

[http://www.clarke.com/index.php?option=com\\_content&view=category&layout=blog&id=78&Itemid=156](http://www.clarke.com/index.php?option=com_content&view=category&layout=blog&id=78&Itemid=156)

Products containing *Bacillus sphaericus* (Bs) are microbial mosquito larvicides registered for use where mosquitoes live and lay eggs, e.g. storm water and drainage systems, marine and coastal areas, freshwater bodies such as lakes and streams, water that collects in discarded tires, manmade and natural bodies of water, dormant rice fields, and water in agricultural sites<sup>28</sup>. It was initially registered by EPA in 1991<sup>29</sup> for use against various kinds of mosquito larvae. Mosquito larvae ingest the bacteria, and as with *Bti*, the toxin disrupts the gut in the mosquito by binding to receptor cells present in insects of the order Diptera (true flies, including mosquitoes, gnats, and midges), but not in mammals. Granules that contain the active ingredient are mixed with water and other substances, and then sprayed from the air or from the ground. Pesticide products containing *Bacillus sphaericus* remain active up to four weeks after spraying. The length of time varies, depending primarily on the species of mosquito larvae, environmental conditions, water quality, and exact form of the granules.

*Bacillus sphaericus* is currently (March 2013) undergoing Registration Review by EPA that will last through 2018.

Label and MSDS examples:

[http://www.myadapco.com/product\\_larvicides.jsp](http://www.myadapco.com/product_larvicides.jsp)

[http://www.clarke.com/index.php?option=com\\_content&view=category&layout=blog&id=78&Itemid=156](http://www.clarke.com/index.php?option=com_content&view=category&layout=blog&id=78&Itemid=156)

**Spinosad**<sup>30</sup> is a biologically derived insecticide produced via fermentation culture of the

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<sup>28</sup> From EPA, *Bacillus sphaericus*, EPA-HQ-OPP-2013-0116, Case 6052, Preliminary Work Plan and Summary Document Registration Review: Initial Docket. March 2013. At: <http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2013-0116-0002>

<sup>29</sup> From EPA, *Bacillus sphaericus* serotype H5a5b strain 2362 (128128) Fact Sheet. At: [http://www.epa.gov/opp00001/chem\\_search/reg\\_actions/registration/fs\\_PC-119801\\_01-Nov-99.pdf](http://www.epa.gov/opp00001/chem_search/reg_actions/registration/fs_PC-119801_01-Nov-99.pdf)

<sup>30</sup> From California Department of Pesticide Regulation. ENVIRONMENTAL FATE OF SPINOSAD. At: [http://www.cdpr.ca.gov/docs/emon/pubs/fatememo/spinosad\\_fate.pdf](http://www.cdpr.ca.gov/docs/emon/pubs/fatememo/spinosad_fate.pdf)

actinomycete *Saccharopolyspora spinosa*, a bacterial organism isolated from soil. Spinosad insecticide contains a mix of two spinosoids, Spinosyn A, the major component, and Spinosyn D (the minor component). Products containing spinosad were first registered for use in 1997. Spinosad is a naturally occurring insecticide with stomach poison and contact activity. It activates the central nervous system of insects through interaction with the nicotinic acetylcholine receptors. Immediately after application, insect pests exhibit irreversible tremors, prostrate trembling, paralysis, and death. **Spinosad is classified by the U.S. Environmental Protection Agency as an environmentally and toxicologically reduced risk material** (Saunders and Bret, 1997). Because it is a naturally-derived, low- impact pesticide, spinosad labels carry the signal word “Caution”, the lowest human hazard signal word assigned by the U.S. EPA. Registration review by EPA began in 2011 and completion is anticipated in 2017.

Label and MSDS:

[http://www.clarke.com/index.php?option=com\\_content&view=category&layout=blog&id=78&Itemid=156](http://www.clarke.com/index.php?option=com_content&view=category&layout=blog&id=78&Itemid=156)

## b. Chemical Larvicides and Pupacides

### (1) Insect Growth Regulators

**Methoprene**<sup>31</sup> (toxicity category IV; must bear the Signal Word CAUTION) is a compound first registered by EPA in 1975. The active ingredients prevent insect larvae from developing into adults. The chemicals interfere with the normal function of insect juvenile hormone, which controls the growth, development, and maturation of insects. It is applied to water to kill mosquito larvae, and it may be used along with other mosquito control measures in an IPM program. Methoprene used in mosquito control is applied as briquets (similar in form to charcoal briquets), pellets, sand granules, and liquids. The liquid and pelletized formulations can be applied by helicopter and fixed-wing aircraft. The residual activity varies with the formulation, with the “XR Briquets” providing effective levels of control for 150 days.

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<sup>31</sup> From EPA, Controlling Mosquitoes at the Larval Stage, February 22, 2013 update. At: <http://www2.epa.gov/mosquitocontrol/controlling-mosquitoes-larval-stage>

Fact Sheet:

<http://npic.orst.edu/ingred/methoprene.html>

Label and MSDS examples:

[http://www.myadapco.com/product\\_larvicides.jsp](http://www.myadapco.com/product_larvicides.jsp)

[http://www.clarke.com/index.php?option=com\\_content&view=category&layout=blog&id=78&Itemid=156](http://www.clarke.com/index.php?option=com_content&view=category&layout=blog&id=78&Itemid=156)

## (2) Monomolecular Films<sup>32</sup>

Some vector control districts use a **monomolecular film** (an ethoxylated alcohol), which forms a thin membrane on the water's surface that can remain effective for 7 to 21 days. It interrupts the critical air/water interface (surface tension) in the mosquito's larval and pupal development cycle, causing them to drown. It also drowns adult mosquitoes that try to land on water treated by the compound.

AGNIQUE<sup>®</sup> MMF, the only monomolecular film product currently available, has been discontinued by the manufacturer. It will not be produced after 2013, but existing product can be used as supply lasts.

Label and MSDS examples:

[http://www.myadapco.com/product\\_larvicides.jsp](http://www.myadapco.com/product_larvicides.jsp)

## (3) Surface Oils<sup>33</sup>

Surface Oils, like films, are pesticides used to form a coating on top of water to drown larvae, pupae, and emerging adult mosquitoes. They are specially derived from **petroleum distillates** and have been used for many years in the United States to kill aphids on crops and orchard trees, and to control mosquitoes. They may be used along with other mosquito control measures in an IPM program.

Label and MSDS examples:

[http://www.myadapco.com/product\\_larvicides.jsp](http://www.myadapco.com/product_larvicides.jsp)

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<sup>32</sup> From Adapco: AGNIQUE MMF. At: <http://www.myadapco.com/viewproduct.jsp?id=Agnique%20MMF&cat=larvicides>

<sup>33</sup> EPA. FOR YOUR INFORMATION Larvicides for Mosquito Control. At: <http://www.cmmcp.org/larvfs.pdf>

<http://tirmsdev.com/Clarke-Mosquito-Control-Products-Mosquito-Larvicide-GB-1111-p36320>

<http://www.biconet.com/botanicals/exemptIC.html>

#### (4) Organophosphates

**Temephos**<sup>34</sup> (toxicity category III; must bear the Signal Word WARNING) is a broad-spectrum organophosphate (OP) pesticide registered by EPA in 1965 to control mosquito larvae, and it is the only organophosphate with appreciable larvicidal use. Typical of other OP insecticides, temephos inhibits the action of the group of enzymes called cholinesterases. These enzymes are most important in the nervous system, the brain, and the musculoskeletal systems in controlling nerve signal transmission.

It may be used along with other mosquito control measures in an IPM program. It is often used as a resistance management tool for mosquito control programs; its use can help to prevent mosquitoes from developing resistance to the bacterial larvicides. Temephos is authorized for areas of non-potable water, standing water, moist areas, woodland pools, shallow ponds, edges of lakes, swamps, marshes, tidal waters, intertidal zones of sandy beaches, waters high in organic content, highly polluted water, and catch basins. Temephos is applied most commonly by helicopter but can be applied by backpack sprayers, fixed-wing aircraft, and right-of-way sprayers in either liquid or granular form.

Temephos is currently being phased out of use, so unless the registrant submits required data to EPA, all remaining pesticide registrations containing temephos will be cancelled on December 30, 2015.

Label and MSDS examples:

[http://www.clarke.com/index.php?option=com\\_content&view=category&layout=blog&id=78&Itemid=156](http://www.clarke.com/index.php?option=com_content&view=category&layout=blog&id=78&Itemid=156)

## 2. Adulticide Treatments

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<sup>34</sup> From EPA, Controlling Mosquitoes at the Larval Stage, February 22, 2013 update. At: <http://www2.epa.gov/mosquitocontrol/controlling-mosquitoes-larval-stage>

There are several active ingredients, sold under different trade names, which are used as adulticides in mosquito abatement. Adulticides are separated into 4 categories: 1) Natural Pyrethrin, 2) Synthetic Pyrethroid, 3) Synthetic Ether Pyrethroid, and 4) Organophosphate. Table 3 lists the category, active ingredient, and associated trade names of products proposed for use by VCDs and Counties in 2013. Details of each active ingredient are discussed in more detail in the following paragraphs.

Table 3. Adulticide products proposed for use by VCDs and Counties in Oregon during 2013.

<b>Category</b>	<b>Active Ingredient</b>	<b>Trade Names</b>
Natural Pyrethrin	Pyrethrins	Pyrenone Pyrenone Crop Spray Pyrethrins ULV 525-VS Pyrocide Pyronyl Crop Spray Pyronyl Oil Concentrate 525 Riptide ULD BP-100
Synthetic Pyrethroid	Bifenthrin	Talstar Wisdom
Synthetic Pyrethroid	Deltamethrin	Suspend SC/Polyzone
Synthetic Pyrethroid	Permethrin	Aqua-Kontrol Aqualuer 20-20 Aqua Reslin Biomist FLIT 10 EC Kontrol Omen Permanone Permethrin
Synthetic Pyrethroid	Resmethrin	Scourge
Synthetic Pyrethroid	Sumithrin	Anvil
Synthetic Pyrethroid	Lambda-cyhalothrin	Demand CS
Synthetic Pyrethroid	Tau-fluvalinate	Mavrik Perimeter
Synthetic Ether Pyrethroid	Etofenprox	Zenivex
Organophosphate	Malathion	Atrapa Fyfanon
Organophosphate	Naled	Dibrom Trumpet

### a. Pyrethrins and Pyrethroids<sup>35</sup>

**Pyrethrins** are natural insecticides produced by certain species of the chrysanthemum plant. The flowers of the plant are harvested shortly after blooming and are either dried and powdered or the oils within the flowers are extracted with solvents. The resulting pyrethrin-containing dusts and extracts usually have an active ingredient content of about 30%. These active insecticidal components are collectively known as pyrethrins.

The natural pyrethrins are contact poisons that quickly penetrate the nerve system of the insect. A few minutes after application, the insect cannot move or fly away. But, a "knockdown dose" does not mean a killing dose. Natural pyrethrins are swiftly detoxified by enzymes in the insect. Thus, some pests will recover. To delay the enzyme action so a lethal dose is assured, organophosphates, carbamates, or synergists may be added to pyrethrins. In the case of vector control pesticides, piperonyl butoxide (PBO) is usually the synergist.

Fact Sheets:

<http://npic.orst.edu/factsheets/pyrethrins.pdf>

<http://npic.orst.edu/factsheets/pbogen.pdf>

Label and MSDS examples:

[http://www.clarke.com/index.php?option=com\\_content&view=category&layout=blog&id=78&Itemid=156](http://www.clarke.com/index.php?option=com_content&view=category&layout=blog&id=78&Itemid=156)

[http://www.myadapco.com/product\\_adulticides.jsp](http://www.myadapco.com/product_adulticides.jsp)

<http://www.mgk.com/Misting/Riptide%20Waterbased%20Pyrethrin%20ULV.aspx>

<http://pestcontrol.basf.us/products/uld-bp-100-contact-insecticide.html>

Semi-synthetic derivatives of the chrysanthemumic acids have been developed as insecticides. These are called **pyrethroids** and tend to be more effective insecticides than natural pyrethrins while they are less toxic to mammals. PBO's are also typically added to pyrethroids as synergists. Common synthetic pyrethroids (and sample labels and MSDS sheets) used in vector control are:

**Bifenthrin** (toxicity category II; must bear the Signal Word WARNING)

Fact Sheet: <http://npic.orst.edu/ingred/bifenthrin.html>

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<sup>35</sup> NPTN (National Pesticide Telecommunications Network) Fact Sheet on Pyrethrins and Pyrethroids. Dec. 1998. At: <http://npic.orst.edu/factsheets/pyrethrins.pdf>

<http://www.fmcprosolutions.com/Portals/pest/Content/Docs/Labels/Talstar%20P%20Professional%2007-18-11%20Comm%20BPPE.pdf>

[http://www.myadapco.com/product\\_barriersprays.jsp](http://www.myadapco.com/product_barriersprays.jsp)

<http://www.amvac-chemical.com/contactus/proddet/tabid/103/default.aspx?pid=210>

**Deltamethrin** (toxicity category I to III; must bear the Signal Words DANGER-POISON, WARNING or CAUTION)

Fact Sheet: <http://npic.orst.edu/ingred/deltamethrin.html>

[http://www.myadapco.com/viewproduct.jsp?id=Suspend\\_SC&cat=barriersprays](http://www.myadapco.com/viewproduct.jsp?id=Suspend_SC&cat=barriersprays)

**Deltamethrin is considered the most powerful of the synthetic pyrethroids.** It is up to three orders more active than some pyrethroids<sup>36</sup>.

**Permethrin** (toxicity category rating of II or III; must bear the Signal Word WARNING or CAUTION)

Fact Sheet: <http://npic.orst.edu/ingred/permethrin.html>

[http://www.myadapco.com/product\\_adulticides.jsp](http://www.myadapco.com/product_adulticides.jsp)

[http://www.clarke.com/index.php?option=com\\_content&view=category&layout=blog&id=78&Itemid=156](http://www.clarke.com/index.php?option=com_content&view=category&layout=blog&id=78&Itemid=156)

<http://masterline.com/product-documents>

[http://www.allprovector.com/labels/Aqualuer\\_specimen.pdf](http://www.allprovector.com/labels/Aqualuer_specimen.pdf)

**Resmethrin** (toxicity category III; must bear the Signal Word CAUTION)

Fact Sheet: <http://npic.orst.edu/ingred/resmethrin.html>

<http://www.myadapco.com/viewproduct.jsp?id=Scourge&cat=adulticides>

Resmethrin is currently being phased out of use, and all remaining pesticide registrations containing resmethrin will be cancelled on December 31, 2015. Use of existing product will be allowed until the supply is exhausted.

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<sup>36</sup> EXT O X N E T. Pesticide Information Profiles. Deltamethrin. 1996.  
At: <http://extoxnet.orst.edu/pips/deltamet.htm>

**Sumithrin** (toxicity category IV; must bear the Signal Word CAUTION)

[http://www.clarke.com/index.php?option=com\\_content&view=category&layout=blog&id=78&Itemid=156](http://www.clarke.com/index.php?option=com_content&view=category&layout=blog&id=78&Itemid=156)

**Lambda-cyhalothrin** (toxicity category II; must bear the Signal Word WARNING)

<http://greencastonline.com/Labels/LabelSearch.aspx>

**Tau-fluvalinate** (toxicity category II; must bear the Signal Word DANGER)

[http://www.myadapco.com/viewproduct.jsp?id=Mavrik\\_Perimeter&cat=barriersprays](http://www.myadapco.com/viewproduct.jsp?id=Mavrik_Perimeter&cat=barriersprays)

**Etofenprox** is an **ether pyrethroid** (different than the ester pyrethroids listed previously), and as such, the chemistry is different than that of conventional pyrethroids. **It does not contain the synergist piperonyl butoxide (PBO) that is included in other pyrethroid mosquito products. The EPA has given etofenprox a reduced risk classification.**

Label and MSDS example:

<http://www.myadapco.com/viewproduct.jsp?id=Zenivex&cat=adulticides>

## **b. Organophosphates**

**Malathion**<sup>37</sup> (toxicity category III; must bear the Signal Word CAUTION) is an organophosphate (OP) insecticide that has been registered for use in the United States since 1956. It is used in agriculture, residential gardens, public recreation areas, and in public health pest control programs. It was one of the earliest OP insecticides developed.

For mosquito control, malathion is applied as an ultra-low volume (ULV) spray, either by truck- or aircraft-mounted sprayers. For mosquito control, malathion is applied at a maximum rate of 0.23 pounds (or about 2.5 fluid ounces) of active ingredient per acre, which minimizes exposure and risks to people and the environment.

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<sup>37</sup> USEPA, On-line fact sheets: Pesticides – Topical and Chemical Fact Sheets: EPA and Mosquito Control. At: [www.epa.gov/pesticides/factsheets/malathion4mosquitos.htm](http://www.epa.gov/pesticides/factsheets/malathion4mosquitos.htm)

EPA is currently reviewing malathion as part of its reregistration process. The review of malathion was scheduled for completion in 2002, but is currently incomplete. A risk assessment covering all uses of malathion is currently available to the public for review at <http://www.epa.gov/oppsrrd1/op/malathion.htm>.

Fact Sheet:

<http://npic.orst.edu/ingred/malathion.html>

Label and MSDS examples:

<http://www.myadapco.com/viewproduct.jsp?id=Fyfanon&cat=adulticides>

<http://www.cdms.net/LDat/ld93A006.pdf>

**Naled**<sup>38</sup> (toxicity category I; must bear the Signal Word DANGER – POISON) is an organophosphate (OP) insecticide that has been registered since 1959 for use in the United States. It is used primarily for controlling adult mosquitoes, but naled is also used on food and feed crops, and in greenhouses.

In mosquito control programs, naled is applied by truck- or aircraft-mounted sprayers as an ultra-low volume (ULV) spray. For mosquito control, the maximum rate for ground and aerial application is 0.1 lb of active ingredient per acre that minimizes exposure and risks to people and the environment.

Label and MSDS examples:

[http://www.myadapco.com/product\\_adulticides.jsp](http://www.myadapco.com/product_adulticides.jsp)

## IV. Sensitive Areas

The term “sensitive area”, as used in this document, is defined only for purposes of reviewing and approving Pesticide Use Plans per our obligations under ORS 452.140 and ORS 452.245. ODFW will only make recommendations for mosquito control treatment protocols on sensitive areas, as identified in this document or confirmed by the local fish and wildlife biologists utilizing the guidelines in this document. **In general, a sensitive area is any area where fish and wildlife and their habitats are rare or of local importance due to their special nature or role in the ecosystem.** The sensitive area categories defined in this section are a refinement of

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<sup>38</sup> USEPA. Pesticides: Topical and Chemical Fact Sheets – Naled. August 16, 2002. At: <http://www.epa.gov/pesticides/factsheets/naled4mosquitos.htm>

many local, state, and federal sensitive habitat definitions and processes aimed at protecting fish, wildlife, and their habitats (Appendix A).

**ODFW generally will not recommend treatment protocols for areas that are not identified as sensitive in this document, but close coordination with VCDs and Counties is necessary as habitats and use patterns change over time.** Areas not identified as sensitive may have been excluded from this document based on known or assumed lower numbers of species present or limited habitat utilization (including seasonal variations), but all natural areas should nonetheless be treated with caution.

## **A. Sensitive Area Categories**

ODFW has identified three categories of sensitive areas for the purposes of this document: 1) Wildlife Areas, 2) Wetlands of Concern, and 3) Unique, Rare, or Vulnerable Habitats. These categories will be utilized in Section V as the basis for ODFW's recommended treatment protocol for mosquito abatement in Oregon. ODFW's Wildlife Areas and identified Wetlands of Concern are considered to be equally important ecologically, but have slight procedural differences for treatment (*see* Section V, Table 5, page 38). Unique, Rare, or Vulnerable Habitats are considered the most biologically sensitive areas of the State, reflected by the more stringent treatment protocols.

Although **rivers and streams** are home to many native species that may be vulnerable to pesticides, product label restrictions provide some protection in addressing drift of products, and direct applications to flowing waters are ineffective and rare for mosquito control. Therefore, flowing water habitat, like rivers and streams, are not included as a sensitive area category and are not addressed in this document. ODFW supports label requirements regarding protection of surface waters through required buffers and drift and runoff prevention. That being said, ODFW reserves the right to include specific areas in special cases or if specific protection of a species or life-stage is warranted. This is especially true when riparian habitat is of particular importance or disturbance of a nesting site or rookery is of concern. **These special cases will be updated by local fish and wildlife biologists on an annual basis prior to or during the PUP approval process.**

### **1. Wildlife Areas**

#### **a. ODFW-Owned or Managed Wildlife Areas and Small Dispersed Properties**

Wildlife Areas are managed first and foremost for the protection of wildlife. IPM for mosquito control should not conflict with habitat management actions that fulfill the purposes and goals of the Wildlife Area. ODFW will increase mosquito habitat reduction, where applicable, while still meeting wildlife area management goals. Techniques outlined in the “Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands<sup>39</sup>” by the Central Valley Joint Venture will be followed to the extent practical. We will also strive to enhance natural predator diversity within these areas as another means of reducing mosquitoes.

Each Wildlife Area that falls within an established VCD has a section of the Management Plan devoted to a vector control management plan. These Plans will be updated to reflect recommendations in this Guidance Document and will include a table showing species timing by season, particularly during March - October. The timing tables are also available in Appendix D. As outlined in this guidance, the entire Wildlife Area is considered sensitive habitat. However, if a Wildlife Area manager chooses, he/she may allow treatment on the Wildlife Area following the previously established management plan for vector control. This agreement should be discussed prior to or during the mosquito season, and as requested, requires a high level of communication. Allowable treatments may include treating only upland areas or known “hot spots” in standing water, but could include other measures.

**Surveillance and treatment on Wildlife Areas shall be coordinated with local ODFW staff prior to entering the area.** This prior coordination will minimize impacts to nesting birds, hunting activities, special events, etc. Local staff can also advise VCD staff on current road conditions, prescribed burns or other work in the area. In addition, Wildlife Areas now require a parking permit, but an Administrative Pass will be issued, upon request, to Vector Control personnel conducting District business.

Dispersed properties owned by ODFW are small, unofficial wildlife areas that have no Oregon Fish and Wildlife Commission-approved management plan or dedicated budget. Management of these properties is at the local level, and knowledge of the species and habitat varies between sites. Therefore, VCD or County staff should contact local wildlife biologists to discuss locations of these dispersed sites. Treatment of these properties may be allowed and shall be discussed with the local wildlife biologist prior to any activity.

## **b. National Wildlife Areas/Refuges**

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<sup>39</sup> Central Valley Joint Venture. Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands. At: <http://www.centralvalleyjointventure.org/assets/pdf/CVJV-Mosquito-BMP.pdf>

ODFW recognizes federal wildlife areas and refuges as sensitive areas, but does not recommend treatment protocols on these lands. The lands are regulated through the US Fish and Wildlife Service (USFWS), and VCDs and Counties should coordinate with USFWS staff on current protocols.

## 2. Wetlands of Concern

Wetlands are biologically significant due to their high habitat value to fish and wildlife, particularly for the presence of Threatened, Endangered, or Sensitive species, diversity of flora and fauna, or high concentrations of wildlife. All wetlands play a special role in the ecosystem because the interface between water and land is highly productive and utilized by a disproportionate number of species for part or all of their life history requirements. They contain a high biomass of aquatic invertebrates, which provide a prey base for many of Oregon's fish and wildlife species. In addition, wetlands are a Strategy Habitat throughout Oregon, as identified in the Oregon Conservation Strategy (OCS)<sup>40</sup>. The Strategy states: "Wetlands provide important habitat for migrating and breeding waterfowl, shorebirds, water birds, songbirds, mammals, amphibians and reptiles. In addition to being critical for birds and many kinds of wildlife, floodplain wetlands and backwater sloughs and swamps are important rearing habitats for juvenile salmon<sup>41</sup>."

For purposes of this document, ODFW has identified wetland types that have a greater conservation concern or are naturally rare. ODFW understands that VCDs treat all wetlands with care and has identified a subset of wetlands across the State to receive an additional level of consideration when being treated for mosquitoes. ODFW relied on the Department of State Lands' (DSL) definition of Wetlands of Conservation Concern<sup>42</sup> as well as a selection of wetlands with high conservation significance, as identified by the Wetland Restoration Planning Tool on the Oregon Wetlands Explorer<sup>43</sup>. This tool was jointly developed by The Wetlands Conservancy and the Institute for Natural Resources.

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<sup>40</sup> Oregon Department of Fish and Wildlife. Oregon Conservation Strategy. At: <http://www.dfw.state.or.us/conservationstrategy/>

<sup>41</sup> Oregon Department of Fish and Wildlife. Oregon Conservation Strategy. At: [http://www.dfw.state.or.us/conservationstrategy/docs/document\\_pdf/b-habitat\\_13.pdf](http://www.dfw.state.or.us/conservationstrategy/docs/document_pdf/b-habitat_13.pdf)

<sup>42</sup> Oregon Department of State Lands. Wetlands of Conservation Concern. At: [http://www.oregon.gov/DSL/PERMITS/docs/wetland\\_cons\\_concern.pdf](http://www.oregon.gov/DSL/PERMITS/docs/wetland_cons_concern.pdf)

<sup>43</sup> Oregon Wetlands Explorer. At: <http://oe.oregonexplorer.info/wetlands/restoration/>

Wetlands of Conservation Concern include bogs, fens, playas, salt flats, alkaline lakes, hot springs, native wet prairies, vernal pools, inter-dunal wetlands, mature forested wetlands, ultramafic soil wetlands, wooded tidal wetlands, and un-diked tidal freshwater wetlands. Descriptions of these wetlands can be found in Appendix E.

Wetlands with high conservation significance are those identified with the highest conservation value scores, as determined by the Wetland Restoration Planning Tool. The tool scores wetlands for their current conservation value, summarizing geospatial factors such as:

- Proximity (100 ft.) to DSL-designated Essential Salmonid Habitat.
- Occurrence in or 100-ft proximity to USFWS-designated Critical Habitat or within known habitat of USFWS or ODFW-listed or sensitive wetland-dependent species.
- Within or adjacent to designated critical habitat and modeled habitat for USFWS or ODFW-listed species.
- Proximity (300 ft) to a hot spring.
- Occurrence in an ODFW-designated Conservation Opportunity Area with wetlands or riparian areas designated as a key habitat.
- Occurrence in DSL-designated Wetland of Conservation Concern (formerly Special Area of Concern, SAC)."

As a starting point in mapping Wetlands of Concern, **ODFW chose a subset of wetlands mapped in the Wetland Explorer with a conservation significance of  $\geq 70$ .** ODFW will annually provide GIS coverage (paper or electronic) of the selected areas utilizing the GIS layers. Maps and/or coordinates will be developed to include in PUPs, as time allows. **On an annual basis, local fish and wildlife biologists will have the ability to identify and add any Wetlands of Concern that are not identified in the GIS layers but are of local importance.**

### **3. Unique, Rare, or Vulnerable Habitats**

Unique, rare, or vulnerable habitats are significant habitat areas that are of local importance for their individual qualities or provide protection for a susceptible life history stage of fish or wildlife. They may include specific "Wetlands of Concern" that warrant increased protection (e.g., vernal pools). **These sites will be identified to the extent possible based on the professional judgment and knowledge of local fish and wildlife biologists and updated on an annual basis.** As this may not be a real-time list, each County or VCD is responsible for protecting locations covered by federal laws (e.g., raptor nests)

that may not be listed by ODFW, should a federally-regulated site be encountered. Examples of unique, rare or vulnerable habitats may include but are not limited to:

- vernal pools (also a wetland of concern)
- rookeries, roosts, and nesting locations
- grouse rearing areas (particularly during July/August)
- band-tailed pigeon mineral springs
- waterfowl breeding and nesting sites
- areas of high concentrations of wildlife
- calving areas
- known locations for state or federal Threatened, Endangered, and Sensitive or candidate species, excluding rivers and streams
- Oregon Conservation Strategy “Specialized and Local Habitats”
- mitigation sites or conservation easements

## **B. Species Timing**

A table (Appendix D) showing known species present and seasonal use patterns will be completed for each Wildlife Area, and as time allows, for identified Unique, Rare, and Vulnerable sites and Wetlands of Concern or by ODFW Districts. As many sensitive areas may include private lands, these tables may not be a complete list of species present and may only include indicator species for the local area, as applicable.

## **V. General Guidance for Treatment in Sensitive Areas**

ODFW is committed to supporting VCDs in their goals while simultaneously meeting our mandates to protect fish, wildlife, and their habitats. This document outlines ODFW’s recommendations for mosquito control on sensitive areas and includes different treatment protocols in different sensitive area categories and with increasing health threats. **This document provides ODFW’s recommendations only, so we recognize that the VCDs and Counties may choose to implement an IPM plan that varies from our recommendation. Their authority to do so comes from a source other than our PUP approval, such as label restrictions (EPA and FIFRA), NOAA and USFWS rules, ODA’s pesticide rules, DEQ’s Pesticide General Permit, and OHA’s annual PUP approval. Variation from ODFW’s recommendations does not constitute a violation of the PUP approval as long as all other State and Federal regulations are followed. We do, however, reserve the ability to more strictly implement our**

**statutory authority at any time new research reveals threats to fish, wildlife, or their habitats or new products become available for use.**

ODFW supports the use of an IPM program for mosquito control, but recognizes that any external influence that potentially threatens the flora, fauna, or natural systems under our management must be considered with caution. Research on the short and long term impacts of specific uses (products, frequency, and duration) are limited in scope and only indirectly reflect true IPM practices for mosquito control; therefore ODFW conservatively recommends higher triggers for treatment on sensitive areas than is the general practice. ODFW also encourages partnerships and efforts to increase research regarding the direct, indirect, and cumulative effects of mosquito control treatments on fish, wildlife, and their food base and increase monitoring of effects to non-target populations. This research should include impacts of disturbance from treatments and repeated surveillance. In addition, ODFW supports more studies concerning the potential impacts of synergists and inert ingredients, as well as how product ingredients may interact with other chemicals in the environment.

In addition to following product label restrictions and other applicable laws, ODFW recommends the following general practices for VCDs and Counties:

- Increase communication with ODFW staff
  - Immediate communication with Wildlife Area staff concerning issues on the Wildlife Area and in advance of any planned treatments on or properties bordering a Wildlife Area
  - Communicate frequently with ODFW field biologists, especially if the chosen IPM treatment differs from ODFW's recommendations
- Contact the USFWS on an annual basis to learn of new raptor nest sites and discuss issues surrounding disturbance to active raptor nests to minimize the potential for incidental take
  - Suitable nest sites should be surveyed prior to potential disturbance (surveillance or application) per USFWS protocol
- Conduct surveillance that includes multiple samples across the breeding habitat (10 dips/5 acres of breeding habitat)
  - Use surveillance for identification of microhabitats or "hot spots" and target treatments accordingly
- Eliminate treatment with broad-spectrum insecticides/adulticides unless there is an existing documented arboviral health threat
  - Identify mosquito populations to specific vector species prior to treatment with broad-spectrum insecticides/adulticides

- Apply ULV treatments only in a defined area that is targeted at controlling adult populations of a vector species
- Reduce treatments for pestiferous biting
  - ODFW understands that pestiferous biting does have an impact on community livability, but stresses a balance must be made to conservatively protect Oregon’s native fish and wildlife
  - See thresholds in Table 4 (page 36) concerning considerations for pestiferous mosquitoes in and around sensitive areas absent a health threat

## A. Health Threat Levels and Recommended Treatment Protocols

Table 4 lists ODFW’s recommended treatment protocol for the three sensitive area categories (i.e., Wildlife Areas, Wetlands of Concern, and Unique, Rare or Vulnerable Habitats), which changes with an increasing threat to public health. For areas where habitat manipulation and biological control is not suppressing arboviral disease, ODFW understands that chemical use may play an important role in protecting public health. ODFW’s preferred chemicals are listed under “Treatment Preferences on Sensitive Areas” (page 39). ODFW recommends the following protocol and preferences be incorporated into the IPM program for identified sensitive areas in Oregon. However, ODFW understands that one protocol will not always be appropriate for all situations; we value the opinion of vector control professionals and will rely on their training and professionalism in proposing alternate treatments for specific locations or current situations as part of the IPM program. **ODFW is open to alternate treatments when justified, but requests coordination with local ODFW staff when proposed treatments differ from the recommended protocol listed below.**

In addition to IPM programs implemented by VCDs and Counties throughout Oregon, ODFW will strive to enhance natural predator diversity ODFW-owned or managed property and promote this practice throughout the State. ODFW is also committed to reducing mosquito habitat on ODFW-owned or managed property, and will increase our efforts, where applicable, while still meeting wildlife area management goals. Techniques outlined in the “Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands<sup>44</sup>” by the Central Valley Joint Venture will be followed to the extent practical. These techniques include water management, vegetation management, infrastructure maintenance, and improvements during restoration or enhancement of sites.

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<sup>44</sup> Central Valley Joint Venture. Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands. At: <http://www.centralvalleyjointventure.org/assets/pdf/CVJV-Mosquito-BMP.pdf>

Table 4. Recommended triggers and treatment protocols for sensitive areas in Oregon<sup>45</sup>.

Threat Level	Threat Category <sup>1</sup>	Recommended Triggers	Sensitive Area Category	Recommended Treatment Protocol <sup>2</sup>
1	No Current Health Threat	<p><b>Larvae:</b> ≥ 2 larvae per 10 dips</p> <p><b>Adult:</b> Treatment may be considered for pestiferous biting with ≥ 200 total mosquitoes and/or 25 known vector species trapped per night in proximity<sup>3</sup> to the site</p>	Wildlife Areas	Biological control <sup>4</sup> and habitat management <sup>5</sup> by ODFW that does not conflict with wildlife area goals; site-specific larviciding (excluding oils and films) as determined by prior monitoring and in coordination with ODFW
			Wetlands of Concern	Biological control <sup>4</sup> , habitat management <sup>5</sup> , and larviciding (excluding oils and films) in coordination with landowner and ODFW
			Unique, Rare, or Vulnerable Sites	Biological control <sup>4</sup> and habitat management <sup>5</sup> in coordination with landowner and ODFW
2	Existing Health Threat (arbovirus detected in mosquitoes, birds, or wildlife; disease detection in humans) or Health Advisory	<p><b>Larvae:</b> ≥ 0.5 larvae per 10 dips</p> <p><b>Adult:</b> 10 known vector species trapped per night or any positive pool in proximity<sup>3</sup> to the site</p>	Wildlife Areas	Site-specific treatment as determined by prior monitoring and in coordination with ODFW; adulticide application must be <b>coordinated</b> with ODFW in advance
			Wetlands of Concern	Treatment as determined by prior monitoring
			Unique, Rare, or Vulnerable Sites	Site-specific larviciding as determined by prior monitoring and in coordination with ODFW
3	Officially Declared Health Emergency	<p><b>Larvae:</b> ≥ 0.1 larvae per 10 dips</p> <p><b>Adult:</b> Any known vector species trapped per night in proximity<sup>3</sup> to the site</p>	Wildlife Areas	Treatment as determined by prior monitoring and in coordination with ODFW; ODFW must be <b>notified</b> of adulticide application 24 hours in advance
			Wetlands of Concern	Treatment as determined by prior monitoring
			Unique, Rare, or Vulnerable Sites	Treatment as determined by prior monitoring and in coordination with ODFW

<sup>1</sup> Health Threat/Advisory/Emergency within the entire County or VCD boundary as determined by Federal and/or State/local public health or wildlife management authorities

<sup>2</sup> See “Treatment Preferences on Sensitive Areas” for product and application preferences

<sup>3</sup> “In proximity” means within the known flight range of vector species documented at the site in question

<sup>4</sup> Biological control is the enhancement of natural mosquito predator diversity.

<sup>5</sup> Habitat management includes water management, vegetation management, infrastructure maintenance, and improvements during restoration or enhancement of sites.

<sup>45</sup> Adapted from USFWS. USFWS Interim Guidance for Mosquito Management on National Wildlife Refuges. 2005. At: [http://www.fws.gov/cno/refuges/donedwards/CCP-PDFs/Appendix-K1\\_InterimGuidFinal.pdf](http://www.fws.gov/cno/refuges/donedwards/CCP-PDFs/Appendix-K1_InterimGuidFinal.pdf)

## B. Treatment Preferences on Sensitive Areas

ODFW offers the following preferences to be utilized in conjunction with Table 4 on sensitive areas of the State and provides general rationale for the preferred treatments. A more detailed overview of potential impacts to non-target species from mosquitocides can be found in “Ecologically Sound Mosquito Management in Wetlands” by the Xerces Society for Invertebrate Conservation<sup>46</sup>.

ODFW understands that one protocol will not always be appropriate for all situations; ODFW values the opinion of vector control professionals and will rely on their training and professionalism in proposing alternate treatments for specific locations or current situations as part of the IPM program. **ODFW is open to alternate treatments when justified, but requests coordination with local ODFW staff when proposed treatments differ from the preferences listed below.**

ODFW did not conduct a risk assessment for each individual treatment proposed by VCDs and Counties due to limited information regarding toxicity (especially for terrestrial species) and actual exposure at vector control application rates, but rather based the following preferences on available toxicity information. ODFW understands that the application rates used in Oregon for mosquito abatement are much lower than those used in toxicity tests approved by EPA, but must be conservative in our recommendations based on the lack of data surrounding long-term impacts for fish and wildlife following repeated chemical exposure. **ODFW would like to see further research and long-term field studies on all products proposed for use and their potential impacts to non-target species resulting from application rates used for mosquito control.** Field studies should focus on: chronic, long term exposure; effects of repeated applications; sub-lethal effects on reproduction, development, or feeding; effects of multiple pesticides in the environment; sediment accumulations; and effects of inert ingredients or synergists.

In general, ODFW prefers the use of larvicides and pupicides over that of adulticides in all sensitive areas. Broad spectrum insecticide and adulticide applications on sensitive areas should be coordinated with ODFW, and only considered when source reduction and larviciding

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<sup>46</sup> Mazzacano, C. and S.H. Black. 2013. Ecologically Sound Mosquito Management in Wetlands. An overview of mosquito control practices, the risks, benefits, and nontarget impacts, and recommendations on effective practices that control mosquitoes, reduce pesticide use, and conserve wetlands. The Xerces Society for Invertebrate Conservation. At: <http://www.xerces.org/mosquito-management-wetlands/>

is insufficient to manage increasing populations of infected mosquitoes and surveillance data indicate a significant risk of disease transmission to humans or wildlife.

## 1. Larvicides

### a. Biological Larvicides

Extensive testing prior to registration shows that microbials can be used without posing unreasonable risks to humans, wildlife, nontarget species, or the environment, when used according to label directions. However, ODFW would still like to see long-term field studies on the impacts to non-target organisms from product use related to mosquito abatement. **ODFW supports the use of microbial larvicides as part of an IPM program** and as first response in mosquito abatement. Bti, Bs, and spinosad can be used freely on most areas of the State.

### b. Insect Growth Regulators

**Methoprene and S-methoprene** are not harmful to birds or mammals, but show some toxicity to certain fish and aquatic invertebrates in laboratory tests<sup>47</sup>. For example, significant acute toxicity and/or chronic effects of methoprene, including developmental disorders, morphological defects, and reproductive anomalies, have been documented for lab and field studies in crustaceans, non-biting midges, dragonflies, and predatory bugs and beetles<sup>48</sup>.

ODFW recognizes that application rates for mosquito control in Oregon are generally much lower than those used in laboratory studies. Risk assessments show that the concentrations of the active ingredient in aquatic environments, if the products are used according to label directions, are well below the levels that are harmful in laboratory toxicity tests. For example, impacts to crustaceans in the laboratory were reported at application rates over 100 times allowed by the label for mosquito control<sup>49</sup>.

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<sup>47</sup> From EPA, Insect Growth Regulators: SHydroprene (128966), SKinoprene (107502), Methoprene (105401), SMethoprene (105402) Fact Sheet. At: [http://www.epa.gov/opp00001/chem\\_search/reg\\_actions/registration/fs\\_G-107\\_06-Dec-01.pdf](http://www.epa.gov/opp00001/chem_search/reg_actions/registration/fs_G-107_06-Dec-01.pdf)

<sup>48</sup> Mazzacano, C. and S.H. Black. 2013. Ecologically Sound Mosquito Management in Wetlands. An overview of mosquito control practices, the risks, benefits, and nontarget impacts, and recommendations on effective practices that control mosquitoes, reduce pesticide use, and conserve wetlands. The Xerces Society for Invertebrate Conservation. At: <http://www.xerces.org/mosquito-management-wetlands/>

However, ODFW would still like to see long-term field studies on the impacts to non-target organisms from product use related to mosquito abatement.

**ODFW supports the use of methoprene as the first line of chemical defense in mosquito abatement, following or in unison with biological larvicides.** Use of insect growth regulators allows for the continuation of a prey base for native fish and wildlife while minimizing the emergence of adult mosquitoes. Methoprene can be used in most areas of the State, as needed. ODFW understands that methoprene is utilized to reduce risk of resistance and supports this use, as appropriate. **Extended release formulations should be used with increased caution on sensitive areas, in close coordination with ODFW, and with an understanding of life stage-specific presence of non-target species.**

### c. Monomolecular Films

Monomolecular films are considered non-toxic to fish, *non-surface breathing* aquatic life, and wildlife. They are best used to control pupae in breeding habitats such as artificial containers, standing water caused by human activities, and old tires. They can be used in standing water around the edges of marshes and wetlands, but treatment is not very effective in windy conditions or where emergent and floating vegetation, algae and debris are present<sup>50</sup>.

Films can disrupt non-target aquatic invertebrate life cycles, including smothering *surface breathing* invertebrates and emerging insects and drown flying adults that land on the surface of the water to lay eggs. Impacted species include nonbiting midges, water boatmen, diving beetles, backswimmers, ostracods, copepods, and some mayfly nymphs. Few studies have been conducted to examine the long-term effects or effects of multiple applications at a single site, so ODFW cautiously recommends limiting the use. ODFW would like to see long-term field studies on the impacts to non-target organisms from product use related to mosquito abatement.

**ODFW reiterates that monomolecular films should only be used when there is an existing health threat and prefers that films be used as a spot treatment on breeding areas of vector species and limited to sites with little or no water bird use.**

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<sup>49</sup> EXT OXNET. Pesticide Information Profile. Methoprene. 1995. At: <http://pmep.cce.cornell.edu/profiles/extoxnet/haloxypop-methylparathion/methoprene-ext.html>

<sup>50</sup> Stark, J.D., Environmental and Health Impacts of the Mosquito Control Agent Agnique, a Monomolecular Surface Film. June 2005, Revised October 2005. At: <http://www.health.govt.nz/system/files/.../agniquereport-october2005.pdf>

#### d. Surface Oils<sup>51</sup>

Surface oils are labeled as being toxic to fish and other aquatic organisms, and may cause some matting of the downy feathers of waterfowl and other young birds, resulting in hypothermia and sometimes death. Application of oils over extensive areas could impact bird prey and possibly reduce nesting success. One field study of actual rates used in vector control showed no substantial effects, but recognized that exceeding the maximum recommended rates of field application as much as three times, which might occur under conditions of larvicide drift, spray overlap, or over spray, could be harmful. For that reason, EPA has established specific precautions on the label to reduce such risks. However, ODFW would still like to see long-term field studies on the impacts to non-target organisms from product use related to mosquito abatement.

**ODFW advises to not use surface oils unless there are no other alternatives (such as other preferred larvicides and pupacides). Field application of oils should be avoided in early spring and during peak hatching of waterfowl in wetlands, particularly if daily low temperatures are below about 15 C<sup>51</sup>. Oils should also be limited during the bird-nesting season (April 1 – June 30) in areas with nesting native birds.** Please contact locally-based ODFW staff if any treatments are needed in or near these areas.

#### e. Organophosphates

The most recent ecological risk assessment for temephos was completed in October 1999 to support the temephos Reregistration Eligibility Review (RED). In this screening level assessment, the Agency identified acute and endangered species risk concerns for freshwater invertebrates, marine/estuarine invertebrates, and freshwater fish. The Agency also identified endangered species risk concerns for birds indirectly exposed to temephos (such as fish-eating birds). Acute risk and endangered species Levels of Concern (LOC) are exceeded for freshwater and marine/estuarine invertebrates and freshwater fish. The 1999 risk assessment did not specifically evaluate risk to birds and mammals from residues on vegetation or insects. However, the endangered species LOC for birds was exceeded, based on a scenario for a fish-eating bird. The EPA

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<sup>51</sup> U.S. Geological Survey and University of California, Davis. Experimental Assessment of the Toxicity of the Mosquito Larvicide Golden Bear Oil (GB-1111): (1) Field Evaluations on Duckling, Target, and Non-Target Prey Survival; (2) Laboratory Evaluations on Reared Mallard and Bobwhite Eggs, and Wild Redwing Blackbird Eggs. Draft Final Report.

At: <http://www.fws.gov/pacific/ecoservices/envicon/pim/reports/Sacramento/SacramentoBearOil.pdf>

specified precautionary labeling to mitigate the ecological risks of concern, including use limitations, general application restrictions, environmental hazard statements, and spray drift language.

**Temephos should be used with caution.** It is broad-spectrum in nature, posing potential negative impacts to many non-target species of fish and wildlife. ODFW would like to see long-term field studies on the impacts to non-target organisms from product use related to mosquito abatement. **ODFW does recognize the need for product rotation to prevent resistance; if this need occurs on sensitive areas, temephos should be used in close coordination with ODFW.**

## 2. Adulticides:

Since adulticiding is not highly selective and non-target species can be adversely affected, ODFW is concerned about potential short and long term impacts from adulticiding to fish, wildlife, and habitats in sensitive areas. Control methods that minimize the occurrence of adults, such as increasing predator diversity or larviciding with more target-specific products, are preferable.

### a. Synthetic Pyrethroid-like

**Etofenprox is the preferred adulticide for use on sensitive areas and ODFW requests its use when the label allows and the product is available.** The EPA has given etofenprox a reduced risk classification, and it does not contain the synergist piperonyl butoxide (PBO) that is included in other pyrethroid mosquito products. In addition, non-ester pyrethroids, such as etofenprox, have approximately 2% of the toxicity to fish of conventional pyrethroids, but they maintain high potency to insects with a characteristic low mammalian toxicity<sup>52</sup>. However, ODFW would still like to see long-term field studies on the impacts to non-target organisms from product use related to mosquito abatement.

### b. Natural Pyrethrins

Compared to many other pesticides, most notably the synthetic pyrethroids, pyrethrins have a favorable profile. Pyrethrins demonstrate different environmental fate

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<sup>52</sup> Schleier III, J.J. and Robert K.D. Peterson. Chapter 3. Pyrethrins and Pyrethroid Insecticides. At: [http://www.afpmb.org/sites/default/files/pubs/dwfp/publications/FY11/Schleier\\_Peterson\\_2011.pdf](http://www.afpmb.org/sites/default/files/pubs/dwfp/publications/FY11/Schleier_Peterson_2011.pdf)

characteristics than synthetic pyrethroids, including lower aquatic toxicities, lesser persistence, and a lower affinity for soil and sediments<sup>53</sup>. Consequently, pyrethrins are not expected to accumulate to toxic levels in stream bed sediments as synthetic pyrethroids have done. Studies have shown that the risk of pyrethrins applied aerially as a ULV treatment for mosquito control is negligible for aquatic vertebrates and invertebrates<sup>54</sup>. However, ODFW would still like to see long-term field studies on the impacts to non-target organisms from product use related to mosquito abatement.

**Natural pyrethrins are preferred over synthetic pyrethroids and organophosphates for adult control.**

### **c. Synthetic Pyrethroids<sup>55</sup>**

Synthetic pyrethroids were developed with the goal of persisting in the environment longer than pyrethrins, with persistence and insecticidal activity increasing with each generation of product developed. As expected, synthetic pyrethroids are also much more toxic than pyrethrins to aquatic organisms, with surface-dwelling insects, mayfly nymphs, and some larger crustaceans being the most susceptible. The nonlethal effects of pyrethroids on fish include damage to the gills and behavioral changes. The use of pyrethroids can have a devastating effect on aquatic invertebrates, and in some cases, mosquito predators may be susceptible to a lower dose than the mosquito itself, disrupting the vital predator-prey relationship of the food web. Because pyrethroids are toxic to all insects, both beneficial insects and pests can be affected by applications.

Although pyrethroids used for mosquito control generally are low in toxicity to birds, they can have indirect effects based on a reduction of their food supply. Waterfowl,

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<sup>53</sup> California Environmental Protection Agency Department of Pesticide Regulation Memorandum. BRIEF COMPARISON OF PYRETHRIN AND SYNTHETIC PYRETHROID FATE CHARACTERISTICS. At: <http://www.cdpr.ca.gov/docs/emon/surfwtr/swanalysismemo/swanal05.pdf>

<sup>54</sup> Schleier III, J.J., R.K.D. Peterson, P.A. Macedo, and D.A. Brown. 2008. Environmental concentrations, fate, and risk assessment of pyrethrins and piperonyl butoxide after aerial ultralow-volume applications for adult mosquito management. *Environmental Toxicology and Chemistry* 27: 1063-1068. At: <http://landresources.montana.edu/WNV/Schleier%20III%20et%20al.%202008%20pyrethrins%20and%20PBO%20study.pdf>

<sup>55</sup> Mueller-Beilschmidt, Doria. 1990. "Toxicology and Environmental Fate of Synthetic Pyrethroids." *Journal of Pesticide Reform*. 10 (3):32-37. At: [http://www.co.lassen.ca.us/govt/dept/county\\_clerk/Agenda/MG11693/AS11744/AS11747/AI11979/DO12022/DO\\_12022.pdf](http://www.co.lassen.ca.us/govt/dept/county_clerk/Agenda/MG11693/AS11744/AS11747/AI11979/DO12022/DO_12022.pdf)

which feed heavily on aquatic invertebrates, and small insectivorous birds are the most susceptible.

**Synthetic pyrethroids should be used only when needed to contain an existing health threat and in coordination with ODFW; earlier generation products, such as resmethrin (as supplies last) and sumithrin, are preferred due to their lower persistence in the environment. Use of deltamethrin is discouraged, as it is one of the most persistent pyrethroids in use.** ODFW would like to see long-term field studies on the impacts to non-target organisms from product use related to mosquito abatement.

#### **d. Organophosphates**

The National Marine Fisheries Service issued a Biological Opinion (BiOp)<sup>56</sup> in 2008 that concluded that continued registration of malathion (as well as two other pesticides not utilized for vector control in Oregon) by EPA is likely to jeopardize the continued existence of 27 endangered and threatened Pacific salmonids and is likely to destroy or adversely modify designated critical habitat for 25 threatened and endangered salmonids. As of the date of this document, litigation is ongoing, with the US Court of Appeals most recently determining that the buffer restrictions in the BiOp were “arbitrary and capricious” in February 2013. The full BiOp is available at [http://www.nmfs.noaa.gov/pr/pdfs/pesticide\\_biop.pdf](http://www.nmfs.noaa.gov/pr/pdfs/pesticide_biop.pdf).

**Organophosphates should be used for adult mosquito control only when needed to contain an existing health threat and in coordination with ODFW.** They are broad-spectrum in nature, posing potential negative impacts to many non-target species of fish and wildlife. **Naled is the preferred organophosphate for use on sensitive areas, when needed, due to its non-persistent nature. Malathion is not recommended for use on sensitive areas until further information is available.** ODFW would like to see long-term field studies on the impacts to non-target organisms from product use related to mosquito abatement.

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<sup>56</sup> NMFS. National Marine Fisheries Service Endangered Species Act Section 7 Consultation Biological Opinion “Environmental Protection Agency Registration of Pesticides Containing Chlorpyrifos, Diazinon, and Malathion” At: [http://www.nmfs.noaa.gov/pr/pdfs/pesticide\\_biop.pdf](http://www.nmfs.noaa.gov/pr/pdfs/pesticide_biop.pdf)

## VI. PUP Review and Approval

This document is intended to replace individual comments from ODFW staff pertaining to pesticide use for the purpose of mosquito control. However, local biologists will still annually provide input on new sensitive areas or species. Ideally, new information will be discussed with VCDs and Counties as it becomes available throughout the season, but may only be incorporated into the annual approval letter. ODFW will strive to give VCDs and Counties as much notice as possible concerning new sensitive areas or other changes. The annual approval from ODFW will outline any new information, along with a reference to this document and the recommendations herein.

ODFW will provide this Guidance Document to all active VCDs and Counties as our agency's recommendations for vector control treatment on sensitive areas identified through aforementioned procedures. **ODFW's annual PUP approval will be for the entire range of the VCD or County program, but will default to other State and Federal regulations for areas not identified as sensitive under the guidelines established in this document.**

Vector Control Districts and Counties will add the following language into the PUP template under Sensitive Areas as their recognition of ODFW's recommendations contained in this document:

**"The Oregon Department of Fish and Wildlife (ODFW) has statutory authority under ORS 452.140 and ORS 452.245 to annually approve Pesticide Use Plans. ODFW recommends the treatment protocols outlined in the "Oregon Department of Fish and Wildlife's Vector Control Guidance for Sensitive Areas" (attached) as a means to protect fish, wildlife, and their habitats while allowing for efficient and effective control of vector species to protect human health. The "Oregon Department of Fish and Wildlife's Vector Control Guidance for Sensitive Areas" document provides ODFW's recommendations only. Should the (insert VCD name here) choose to implement an IPM plan that varies from ODFW's recommendations, our authority comes from another source, such as label restrictions (EPA and FIFRA), NOAA and USFWS rules, ODA's pesticide rules, DEQ's Pesticide General Permit, and OHA's annual PUP approval. Variation from ODFW's recommendations does not constitute a violation of the PUP approval as long as all other State and Federal regulations are followed. The (insert VCD name here) understands, however, that ODFW reserves the ability to more strictly implement their statutory authority at any time new research reveals threats to fish, wildlife, or their habitats or new products become available for use. In addition, ODFW requires prior communication with local staff concerning surveillance, issues or treatment on ODFW-owned or managed Wildlife Areas."**

## **VII. Annual Reports**

On an annual basis, ODFW requests a report outlining treatments on identified sensitive areas that deviated from the guidance provided in this document, along with an explanation of the justification for each event. This information should be provided as soon as possible following the end of the season so that plans can be discussed and, if appropriate, adjusted in a manner acceptable to ODFW and the VCD or County for the following season.

**Appendix A**  
**OREGON REVISED STATUTES**

**496.012 Wildlife policy.** It is the policy of the State of Oregon that wildlife shall be managed to prevent serious depletion of any indigenous species and to provide the optimum recreational and aesthetic benefits for present and future generations of the citizens of this state. In furtherance of this policy, the State Fish and Wildlife Commission shall represent the public interest of the State of Oregon and implement the following coequal goals of wildlife management:

- (1) To maintain all species of wildlife at optimum levels.
- (2) To develop and manage the lands and waters of this state in a manner that will enhance the production and public enjoyment of wildlife.
- (3) To permit an orderly and equitable utilization of available wildlife.
- (4) To develop and maintain public access to the lands and waters of the state and the wildlife resources thereon.
- (5) To regulate wildlife populations and the public enjoyment of wildlife in a manner that is compatible with primary uses of the lands and waters of the state.
- (6) To provide optimum recreational benefits.
- (7) To make decisions that affect wildlife resources of the state for the benefit of the wildlife resources and to make decisions that allow for the best social, economic and recreational utilization of wildlife resources by all user groups. [1973 c.723 §6; 1993 c.659 §2; 2001 c.762 §6]

**506.109 Food fish management policy.** It is the policy of the State of Oregon that food fish shall be managed to provide the optimum economic, commercial, recreational and aesthetic benefits for present and future generations of the citizens of this state. In furtherance of this policy, the goals of food fish management are:

- (1) To maintain all species of food fish at optimum levels in all suitable waters of the state and prevent the extinction of any indigenous species.
- (2) To develop and manage the lands and waters of this state in a manner that will optimize the production, utilization and public enjoyment of food fish.
- (3) To permit an optimum and equitable utilization of available food fish.
- (4) To develop and maintain access to the lands and waters of the state and the food fish resources thereon.
- (5) To regulate food fish populations and the utilization and public enjoyment of food fish in a manner that is compatible with other uses of the lands and waters of the state and provides optimum commercial and public recreational benefits.
- (6) To preserve the economic contribution of the sports and commercial fishing industries in a manner consistent with sound food fish management practices.
- (7) To develop and implement a program for optimizing the return of Oregon food fish for Oregon's recreational and commercial fisheries. [1975 c.253 §15; 1985 c.529 §2]

**96.172 Commission management authority for threatened or endangered species; rules.** In carrying out the provisions of the wildlife laws with regard to the management of wildlife that is a threatened species or an endangered species, the State Fish and Wildlife Commission:

(3) Shall work cooperatively with state agencies that have land management authority or regulatory authority to determine their roles within their statutory obligations in the conservation of endangered species, as described in ORS 496.182 (8).

**496.192 Effect of law on commercial forestland or other private land; effect on other laws. ... (2)**

Notwithstanding subsection (1) of this section, other statutes may authorize administrative rules or programs to protect wildlife species, including threatened species or endangered species, and nothing in ORS 496.004, 496.171 to 496.182 or 498.026 shall diminish the force or effect of such rules or programs. [1987 c.686 §6a]

**635-100-0040 Sensitive Species List**

(1) For the purpose of maintaining a watch list of species potentially eligible for listing as threatened or endangered species, the category of sensitive species is established in the Nongame Wildlife Management Plan. The sensitive species list shall be updated by the department biannually, distributed to state and federal resource agencies, and made available to any member of the public upon request.

**635-415-0010 Fish and Wildlife Habitat Mitigation Policy**

It is the fish and wildlife habitat mitigation policy of the Oregon Department of Fish and Wildlife to require or recommend, depending upon the habitat protection and mitigation opportunities provided by specific statutes, mitigation for losses of fish and wildlife habitat resulting from development actions. Priority for mitigation actions shall be given to habitat for native fish and wildlife species. Mitigation actions for nonnative fish and wildlife species may not adversely affect habitat for native fish and wildlife.

**635-007-0502 Purpose of the Native Fish Conservation Policy**

The purpose of this policy is to ensure the conservation and recovery of native fish in Oregon. The policy focuses on naturally produced native fish. This focus is because naturally produced native fish are the primary basis for Endangered Species Act (ESA) delisting decisions and the foundation for long-term sustainability of native species and hatchery programs. Conservation of hatchery produced native fish is also important to maintain opportunities for fisheries and aid conservation of naturally produced fish. The Hatchery Management Policy describes conservation of hatchery produced native fish.

The intent of the Native Fish Conservation Policy is to provide a basis for managing hatcheries, fisheries, habitat, predators, competitors, and pathogens in balance with sustainable production of naturally produced native fish. The policy has three areas of emphasis. The first is defensive to ensure the avoidance of serious depletion of native fish. The second is more proactive to restore and maintain native fish at levels providing ecological and societal benefits. The third ensures that, consistent with native fish conservation, opportunities for fisheries and other societal resource uses are not unnecessarily constrained. This approach will allow Oregon to play a vital role in the recovery of ESA listed species and the prevention of future listings.

**635-100-0010 Wildlife Diversity Program Goal**

It is the goal of the *Wildlife Diversity Program* to maintain Oregon's wildlife diversity by protecting and enhancing populations and habitats of native wildlife at self-sustaining levels throughout natural geographic ranges.

**635-410-0000 Authority of the Department of Fish and Wildlife**

ORS 468B.060 provides the Oregon Department of Fish and Wildlife with authority to seek damages in a court of competent jurisdiction for the value of fish and wildlife injured or killed as the result of pollution or violation of the condition of any permit, and for all costs of restoring fish and wildlife production in affected areas.

**Statewide Planning Goal 5**

**OAR 660-016-0005 Identify Conflicting Uses ... (2) Preserve the Resource Site:** If there are no conflicting uses (“...uses allowed in broad zoning districts established by the jurisdiction (e.g., forest and agricultural zones)”). for an identified resource site, the jurisdiction must adopt policies and ordinance provisions, as appropriate, which ensure preservation of the resource site.

**660-016-0010 Develop Program to Achieve the Goal (1) Protect the Resource Site:** Based on the analysis of the ESEE consequences, a jurisdiction may determine that the resource site is of such importance, relative to the conflicting uses, and the ESEE consequences of allowing conflicting uses are so great that the resource site should be protected and all conflicting uses prohibited on the site and possibly within the impact area identified in OAR 660-016-0000(5)(c). Reasons which support this decision must be presented in the comprehensive plan, and plan and zone designations must be consistent with this decision.

**Appendix B**  
**MEMORANDUM OF UNDERSTANDING**

# Memorandum of Understanding

Between

Oregon Department of Fish and Wildlife,  
Oregon Vector Control Association

And

Vector Control Districts and County Vector Control Programs

Purpose: This Memorandum of Understanding is intended to clarify the roles and expectations of Oregon Department of Fish and Wildlife (ODFW), and Oregon Vector Control Association (OVCA) member vector control districts and county vector control programs (herein cumulatively called Districts) related to development by Districts and submission to ODFW of vector control pesticide use plans and review of those plans by ODFW to fulfill requirements under ORS 452.140 and ORS 452.245.<sup>57</sup>

## Preamble

ODFW is the state agency charged with management of fish and wildlife resources and protecting fish and wildlife habitats to maintain, restore and enhance fish and wildlife pursuant to the Wildlife Policy (ORS 496.012) and the Food Fish Policy (ORS 506.109).

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<sup>57</sup> **452.140 Destroying vectors by spreading chemicals; consent of State Fish and Wildlife Commission needed.**

The board of trustees of a district:

(1) Shall not apply insecticides or oil or other chemicals to waters in the district which are frequented by waterfowl or which contain any game fish without first obtaining the approval of the State Fish and Wildlife Commission.

(2) Shall not spread poisons for rats or public health vectors without first obtaining approval of the State Fish and Wildlife Commission. [Amended by 1959 c.600 §8; 1981 c.640 §2]

**452.245 Uses of insecticides, oil, chemicals and poisons limited.** In exercising its powers under ORS 452.210 to 452.250, a county court:

(1) Shall not order the application of insecticides, oil or other chemicals to waters in the county which are frequented by waterfowl or which contain any game fish without first obtaining the approval of the State Fish and Wildlife Commission.

(2) Shall not order the spreading of poisons for public health vectors without first obtaining the approval of the State Fish and Wildlife Commission. [1981 c.640 §5]

The OVCA is a state of Oregon registered domestic non-profit entity (registry #25026-97) and is the professional association for vector control entities in the state of Oregon. Many, but currently not all, vector control districts and county vector control agencies are members of OVCA. OVCA provides information and guidance to its member on emerging diseases, best management practices, pesticides, among other resources.

#### ODFW Goals:

- 1) Protect fish and wildlife and sensitive habitats, in accordance with the Wildlife Policy (ORS 496.012) and the Food Fish Policy (ORS 506.109).
- 2) Clarify elements expected by ODFW in vector control pesticide use plans.
- 3) Understand better how vector control functions and how the Districts protect fish and wildlife resources during vector control activities and provide OVCA and the Districts a better understanding of how to protect fish and wildlife resources during vector control operations.

#### OVCA Goals:

- 1) Creation of Pesticide Use Plan submission criteria that will provide ODFW with all relevant information needed to review and approve annual Pesticide Use Plans.
- 2) OVCA will strive to provide to ODFW with technical assistance related to the control of public health vectors on lands within the State of Oregon.

#### ODFW Objectives:

- 1) Provide protections for and minimize effects on fish, wildlife and their habitats during vector control operations.
- 2) Outline the process for ODFW's review of vector control pesticide use plans.
- 3) Provide a mechanism for ODFW to communicate with OVCA and vector control districts on protections needed for sensitive species or areas during vector control actions.

- 4) Provide a process for districts to identify where sensitive fish and wildlife species or areas (habitats) occur and preferred options for their protection.
- 5) Establish timelines for submittal of plans and approval by ODFW.
- 6) Define approval frequency of and reevaluation points for vector control pesticide use plan review.

OVCA Objectives:

- 1) Promote vector control activities within the State of Oregon based on an Integrated Pest Management strategy to ensure that operations and control practices that are employed are environmentally compatible to the extent practical, and are not significantly detrimental to ODFW's mission, purpose, or goals.
- 2) Demonstrate a continued professional commitment to reduce pesticide usage as outlined in the NWMVCA/OVCA PESP Strategy Document, created as a partner with the American Mosquito Control Association in the US Environmental Protection Agency's Pesticide Environmental Stewardship Program.

Background

Vector control for disease prevention and containment is a vital function for human health. ODFW's goal in review and approval of vector control pesticide use plans is to minimize effects on fish, wildlife and their habitats. In approvals, ODFW reiterates requirements already listed on labels, material safety data sheets (MSDS) or in U.S. EPA advisories that protect fish and aquatic life, wildlife and their habitats from harm by pesticides. In addition, under ORS 452.140 and ORS 452.245, ODFW may require protections for its statutory mandates pursuant to the Wildlife Policy (ORS 496.012) and the Food Fish Policy (ORS 506.109).

Districts control mosquitoes in natural habitats and many types of waterways, as well as human habitation areas. Mosquito control is the District activity that may have the greatest potential to affect fish, wildlife or their habitats. Based on U.S. EPA-required studies for pesticide registration, even low concentrations of some mosquito-control pesticides may have the potential to affect fish, wildlife or their habitats. As a result, ODFW encourages least harmful alternatives for vector control.

The parties understand that certain types of vector control at any mosquito life stage can affect fish, wildlife or their habitats. ODFW and the Districts acknowledge that vector control is primarily aimed at reducing mosquito vectors to reduce the risk of disease transmission rather than eliminating mosquitoes. Secondly, vector control also provides human quality of life benefits by reducing mosquito pests.

To further this understanding and cooperation, ODFW, the OVCA and the Districts agree to the following:

ODFW will:

- 1) Work with Districts at the ODFW field staff level to identify sensitive habitat areas and species, including sensitive timing needs (e.g. nesting time periods). In order to do this, ODFW will develop an internal process and general criteria for identifying sensitive habitat areas.
- 2) Develop ODFW Wildlife Area vector control management plans on Wildlife Areas within vector control District boundaries. ODFW Wildlife Area Managers will work with their local Districts to develop mosquito monitoring, sampling and treatment options. Wildlife Area Managers will meet annually with the local District to review last year's strategies and revise the plan if needed. Sensitive areas will be identified and mapped, including sensitive time periods. Wildlife Area Managers will address vector control using ODFW's guiding statutes, rules and policies related to their specific areas.
- 3) Send an acknowledgment of receipt of the vector control pesticide use plan (Plan(s)) and provide an expected date for a response back to the District on the Plan.
- 4) Send submitted Plans to the appropriate fish and wildlife field staff for review. The ODFW coordinator will review comments from field staff, discuss and resolve any potential issues between ODFW and Districts and prepare a response letter.
- 5) Target a 45-day turn-around from date the Plan is received for providing a response letter to the District.
- 6) If ODFW determines additional information is needed before the Plan can be approved, ODFW may send a preliminary one month approval so that the District can move ahead with their vector control responsibilities while any issues are being resolved. ODFW will also provide the District with a response in writing describing, in detail, information that needs to be addressed in the Plan.

- 7) If for some reason a District needs approval of their Plan in an expedited manner and the Plan has not changed significantly from previously approved Plans, ODFW may provide the District with a preliminary one month approval to be followed later by a response letter on the Plan.
- 8) Consider Plan approval on a less frequent basis than annually for Plans which do not change from year to year (no new sensitive areas, species, no change in pesticides used or in application locations, no labeling changes and the like). The District must send a letter to the ODFW coordinator stating that the Plan remains the same as the previous year. ODFW will need to review a Plan every five (5) years regardless of whether it has changed or not.
- 9) Provide information to Districts as soon as possible on new or emerging issues so that Districts can accommodate the information in their Plans. Information would include newly identified sensitive fish or wildlife species (such as, new endangered species listings, new information on locations of sensitive fish or wildlife habitat, federal critical habitat designations, etc), new understandings of how certain pesticides affect non-target species and methods to reduce effects on non-target species.
- 10) Determine under which circumstances or situations monitoring for effects on non-target species may be required.
- 11) Clearly define circumstances that may result in protections for fish, wildlife or their habitats in addition to restrictions listed on pesticide labels.
- 12) Attend the annual OVCA meeting and, on request, provide a presentation on ODFW activities related to OVCA member interests and ODFW's statutory responsibilities.

The OVCA will:

- 1) Incorporate this agreement into its By-Laws by reference and obligate, to the extent of its ability, its members to abide by the terms of this agreement, until such time as it is amended or terminated.

The Districts will<sup>58</sup>:

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<sup>58</sup> Most of these elements, once written into the Plan, should not change greatly year to year unless new information becomes available or new pesticides are used.

- 1) Contact the local ODFW field office and, if within the District boundaries, the ODFW Wildlife Area manager early in Plan development to identify sensitive habitat areas and species.
- 2) Submit Plans to ODFW's coordinator before the beginning of the vector control season, preferably during January. (Plans may be submitted either as a hardcopy or electronically.)
- 3) Follow the Plan format outlined by Oregon Department of Human Services (ODHS). This Plan format may need to be changed as a result of this agreement.
- 4) Discuss in the Plan how the District will use the integrated pest management approach (IPM)<sup>59</sup> to minimize impacts to fish and wildlife.
- 5) Provide information indicating under what circumstances (or "triggers") a District would shift from one control method to another.
- 6) Provide a list of pesticides that Districts might use for vector control and under what circumstances a particular pesticide might be used.
- 7) List label restrictions, by product, related to application to, over, around or near water, and other protections listed for fish, wildlife or their habitats, using latest pesticide label or material safety data sheet (MSDS) information and any other applicable information.

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<sup>59</sup> IPM for Oregon agencies is defined in ORS 634.650 "Definitions for ORS 634.650 to 634.665. As used in ORS 634.650 to 634.665:

"(1) 'Integrated pest management' means a coordinated decision-making and action process that uses the most appropriate pest control methods and strategy in an environmentally and economically sound manner to meet agency pest management objectives. The elements of integrated pest management include:

"(a) Preventing pest problems;

"(b) Monitoring for the presence of pests and pest damage;

"(c) Establishing the density of the pest population, which may be set at zero, that can be tolerated or correlated with a damage level sufficient to warrant treatment of the problem based on health, public safety, economic or aesthetic thresholds;

"(d) Treating pest problems to reduce populations below those levels established by damage thresholds using strategies that may include biological, cultural, mechanical and chemical control methods and that shall consider human health, ecological impact, feasibility and cost effectiveness; and

"(e) Evaluating the effects and efficacy of pest treatments.

"(2) "Pest" means any vertebrate or invertebrate animal, pathogen, parasitic plant, weed or similar or allied organism which can cause disease or damage to crops, trees, shrubs, grasses or other plants, humans, animals or property. [1991 c.943 §1]

**Note:** 634.650 to 634.665 were enacted into law by the Legislative Assembly but were not added to or made a part of ORS chapter 634 or any series therein by legislative action. See Preface to Oregon Revised Statutes for further explanation."

- 8) Provide ODFW field offices with copies of labels and MSDS for the pesticides identified in their Plans. Copies can be provided electronically, including by website location and only need to be provided the first time a pesticide or other vector control product is introduced into the Plan.
- 9) List past year usage by active ingredient (A.I.) per acre and maximum frequency of application. Include a five-year running chart of all pesticides used in the last five years. ODFW will consider the possibility of using the Pesticide Use Report System (PURS) developed by Oregon Department of Agriculture (ODA) so as not to duplicate work.
- 10) Indicate an understanding of how to prevent contamination of non-target species and habitats.
- 11) For mosquito control, include information about how *Gambusia affinis* (western mosquito fish) will be used and about obtaining a fish transportation permit (per OAR 635-007-0620).
- 12) Specify how the District will monitor the effects of vector management on non-target species. Most Districts have limited budgets for this activity and indicate they will conduct monitoring in the course of other duties. Districts are encouraged to maintain contact with local ODFW field offices so they can be made aware of any unintended impacts on non-target species.
- 13) Describe in plans implementation of best practicable monitoring and sampling techniques to determine effects of vector control on target and non-target species, including how pesticide resistance will be determined, measures to prevent resistance and courses of actions if resistance is detected. Minimal monitoring and reporting to local ODFW field offices of non-target impacts must be implemented. This includes noting dead fish, wildlife or non-target insect die-offs at application locations.

ODFW and Districts must:

- 1) Communicate openly about emerging issues related to vector control and fish, wildlife and their habitats.
- 2) Use a step-wise hierarchical approach to solving problems:
  - a. Work together at the local level first (e.g. between individual Districts and ODFW field staff, including involving the ODFW Watershed Manager) to resolve problems that arise locally (between a District and ODFW field staff).

- b. If issues cannot be resolved locally or are broader in nature, an OVCA representative, a District (if involved), the ODFW pesticide use plan coordinator, and ODFW field staff (if involved) will attempt to resolve the issue.
- c. Unresolved issues will be elevated first to the Fish Division administrator or management designee; And, finally:
- d. To ODFW's Deputy Director of Natural Resources for resolution.

Being in the best interests of the state to prevent and contain human health vectors while protecting fish and wildlife resources for the citizens of Oregon, the OVCA, representing its member Districts, and the ODFW agree to this Memorandum of Understanding. Either party may withdraw from this agreement upon a two-week notice sent by certified letter to the other party. This agreement does not obligate any funds by either party.

Signed:

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President, Oregon Vector Control Association

Date

Virgil Moore, Director, Oregon Department of Fish and Wildlife Date

Vector Control Districts and County Vector Control Programs:

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Baker Valley VCD

Date

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City of Beaverton

Date

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Bly VCD

Date

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Bonanza-Langell Valley VCD Date

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Chiloquin VCD

Date

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Clackamas County VCD

Date

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Columbia Drainage VCD

Date

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Crook Co. VCD

Date

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Four Rivers VCD                      Date

Jackson Co. VCD                      Date

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Klamath VCD                      Date

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Multnomah Co. VCNC                      Date

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Marion Co. Health Dept                      Date

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North Morrow VCD                      Date

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Poe Valley VCD                      Date

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Sun River VCD                      Date

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Union Co. VCD                      Date

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Wasco Co. Weed Control                      Date

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Washington Co. Health                      Date

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West Umatilla VCD                      Date

## **Appendix C**

# **ENVIRONMENTAL FATE AND ECOTOXICITY DATA FOR PRODUCTS PROPOSED FOR USE IN OREGON**

Appendix Table C1. Environmental Fate and Ecotoxicity data for larvicide products proposed for use in Oregon during 2013.

Category	Active Ingredient	Mode of Action	Environmental Fate				Toxicity		Potential Impacts to invertebrate	Comments
			Soil	Water	Air	Plants	Fish and Frogs	Birds		
Biological	Bacillus thuringiensis israelensis (Bti)	Ingestion; starvation	Half-life of 4 mos; moderately persistent	Not likely to proliferate		Degrades rapidly; half-life of 1-4 d	Practically non-toxic to fish	Practically non-toxic	Minimal toxicity to bees and other non-target beneficial insects	May result in temporary reductions in susceptible insect populations, but will not greatly affect insectivorous birds and mammals
Biological	Bacillus sphaericus (Bs)	Ingestion								
Biological	Spinosad	Excitation of nervous system	Strongly binds to soil				Moderately toxic to fish	Slightly toxic	Slightly to moderately toxic to aquatic invertebrates	EPA classifies it as "reduced risk" pesticide; does not leach, bioaccumulate, volatilize, or persist in the Environment; highly toxic to oysters and other marine mollusks
Insect Growth Regulator	Methoprene	Interference with metamorphosis	Half-life is 10 d	Half-life <1 d in sunlight, but >4 weeks in dark		Half-life 1-2 d	Slightly toxic	Relatively non-toxic	May be toxic to some beneficial aquatic invertebrates when used at excessive rates, but no clear adverse effects in most organisms	Crustaceans show the greatest sensitivity
Monomolecular Film	Poly (oxy-1,2-ethanediyl), a-(C16-20 branched and linear alkyl)-w-hydroxy	suffocation								
Surface Oil	Aliphatic Petroleum Hydrocarbons Petroleum Distillate	suffocation		Low solubility				May reduce hatching success		Effective with pupae; can be used

Category	Active Ingredient	Mode of Action	Environmental Fate				Toxicity		Potential Impacts to invertebrate	Comments
			Soil	Water	Air	Plants	Fish and Frogs	Birds		
	Petroleum Hydrocarbon									effectively in most field conditions, even polluted water
Exempt Products	Mineral Oil USP Peppermint Oil Rosemary Oil Vanillin Wintergreen Oil									
Organophosphate	Temephos		Probably has a high affinity for soil; estimated half-life of 30 d; low to moderate persistence in soil	Very low solubility; low persistence		Breakdown in plants is very slow	Very highly to moderately toxic; practically nontoxic to bull frog	Highly to moderately toxic	Freshwater and some marine aquatic invertebrates are highly susceptible; very highly toxic to species such as pink shrimp and Eastern oyster	Potential to accumulate in aquatic organisms, but nearly 75% is eliminated after exposure ends; LD50 for rainbow trout ranges from 0.16 mg/L to 3.49 mg/L;

Appendix Table C2. Environmental Fate and Ecotoxicity data for adulticide products proposed for use in Oregon during 2013.

Category	Active Ingredient	Mode of Action	Environmental Fate				Toxicity		Potential Impacts to invertebrate	Comments
			Soil	Water	Air	Plants	Fish and Frogs	Birds		
Natural Pyrethrin	Pyrethrin		Binds tightly to soil; half-life of 12 d	Rapidly degrades in sunlight in water	Rapidly degrades in sunlight in air		Highly toxic to fish and tadpoles	Low	Toxic to beneficial insects and aquatic organisms	One of the least poisonous insecticides to mammals
Synthetic Pyrethroid	Bifenthrin	Contact or ingestion	Binds to soil	Low solubility; photo-stable with aqueous photolysis half-life ranging from 276-416 d	Low potential to volatilize; low vapor pressure	Not absorbed by foliage; non-toxic	Very highly toxic to fish; slow swimming, head-shaking, opercle flaring, and gulping for air	Low	Highly toxic to aquatic invertebrates; exposure risk for birds and mammals that feed on aquatic organisms and detritus-feeding species	Mammals are less susceptible than insects; <b>can concentrate in fish tissue</b> ; can contaminate surface water through runoff; detected in urban streams
Synthetic Pyrethroid	Deltamethrin	Contact or ingestion	Binds to soil	Average half-life is 2.5 d	Low potential to volatilize	Uptake not likely, but accumulates in aquatic plants	Moderately to highly toxic	Practically non-toxic	No effect on midge larvae when found in natural sediments	Mammals are less susceptible than insects; remains in aquatic sediment for a long time
Synthetic Pyrethroid	Permethrin	Contact or ingestion; mild repellent	Binds tightly to soil; broken down primarily by microorganisms	Some degraded by sunlight, but most binds tightly to sediment; average half-life in water is 19-27 hours	Low vapor pressure; not expected to volatilize; can drift	Half-life on foliage is 1-3 weeks	Highly toxic to fish	Low	Highly toxic to aquatic organisms and invertebrates, including honey bees and other beneficial insects; may inhibit growth of exposed invertebrates	Mammals are less susceptible than insects; can remain in sediment for more than 1 year; found in creek sediment
Synthetic Pyrethroid	Resmethrin	Contact	Binds to soil	Rapidly degraded in aqueous solutions through photodegradation	Not expected to significantly volatilize from water or soil; low vapor pressure	No phytotoxic concern; degrades quickly	Very highly toxic	Moderately toxic; practically non-toxic in subacute dietary study	Very highly toxic to freshwater and estuarine invertebrates	Mammals are less susceptible than insects; restricted Use Pesticide;
Synthetic Pyrethroid	Sumithrin	Contact or	Binds tightly to soil;	Low solubility; readily	Readily degraded;	Half-life < 1 d;	Very highly toxic to	Practically	Very highly toxic to	High potential to

Category	Active Ingredient	Mode of Action	Environmental Fate				Toxicity		Potential Impacts to invertebrate	Comments
			Soil	Water	Air	Plants	Fish and Frogs	Birds		
	(d-phenothrin)	ingestion; nerve stimulant	half-life 1-2 d	degraded through aqueous photolysis; half-life of 6.5 d in clear, shallow water; high affinity to bind to suspended solids and bottom sediment	half-life of 38.4 min – 1.2 hr	not expected to be toxic	freshwater and estuarine/marine fish	non-toxic	freshwater and estuarine/marine invertebrates	reach surface water through erosive runoff events
Synthetic Pyrethroid	Lambda-cyhalothrin	Contact or ingestion; repellent	Binds to soil; half-life of 30 d	Photodegrades in water when exposed to sunlight with half-life of 30 d; low solubility		Half-life on plant surface is 5 d	Highly toxic to fish	Low	Highly toxic to aquatic invertebrates	Mammals are less susceptible than insects; <b>potential to bioconcentrate in fish</b>
Synthetic Pyrethroid	Tau-fluvalinate		Half-life of 6-8 d; strong tendency to bind to soil; no photodegradation	Nearly insoluble; half-life up to 1 d; photodegradation			Very highly toxic	Slightly toxic	Not toxic to honeybees	<b>low to moderate potential to accumulate in aquatic organisms</b>
Non-ester Pyrethroid	Etofenprox	Contact or ingestion; nerve stimulant	Half-life of 4.4 d	Half-life of 1.7 d			Very highly toxic	Practically non-toxic	Very highly toxic to aquatic invertebrates	EPA classifies it as “reduced risk” pesticide; no synergist (no PBO)
Organophosphate	Malathion	Contact, ingestion, or inhalation; overstimulation of nervous system	Half-life of 1-17 d; high microbial degradation; very mobile	Half-life estimated at 1.65 – 17.4 d; low binding to sediments; dissolves in rainwater	Low concentrations in air	Half-life of <1 – 9 d; hydrolysis	Moderately toxic to highly toxic to fish; potential to increase time to metamorphosis in tadpoles and decrease mass	Slightly to moderately toxic; reduced food availability plausible reason for declines in bird densities	Very highly toxic to aquatic invertebrates; highly toxic to bees and toxic to other beneficial insects	Uptake and metabolism similar for insects and mammals, but higher vertebrates detoxify and excrete it more readily than insects; the metabolite, <b>malaoxon is considerably more toxic</b> ; carried in runoff from application site; detected in surface water; altered aquatic community

Category	Active Ingredient	Mode of Action	Environmental Fate				Toxicity		Potential Impacts to invertebrate	Comments
			Soil	Water	Air	Plants	Fish and Frogs	Birds		
										structure and altered predator-prey relationships
Organophosphate	Naled	Contact and ingestion	Not strongly bound to soils; half-life of <1 d; microorganisms break it down	Not highly soluble; half-life of 2 d	Moderately volatile	Plants degraded to dichlorvos, which may evaporate or be further metabolized	Highly to moderately toxic	Highly to moderately toxic	Very highly toxic to aquatic invertebrates	<b>Practically nonpersistent in the environment;</b> degrades to dichlorvos

## **Appendix D**

### **SPECIES TIMING TABLES FOR SELECT WILDLIFE AREAS**

## Bridge Creek Wildlife Area

**Occurrence:** **C** = Common, **U** = Uncommon, **O** = Occasional, **R** = Rare, **X** = Status Unknown (Few Observations and/or habitat present within species distribution)

<b>AVIAN</b>					
Order-Common Name	Scientific Name	Winter	Spring	Summer	Fall
<b>Anseriformes</b>					
Blue Winged Teal	<i>Anus discors</i>		U	U	
Canada Goose	<i>Branta canadensis</i>	O	C	C	
Cinnamon Teal	<i>Anas cyanoptera</i>		U	U	
Common Merganser	<i>Mergus merganser</i>		C	C	C
Green-winged Teal	<i>Anus crecca</i>		U	U	
Mallard	<i>Anas platyrhynchos</i>	U	C	C	
Northern Pintail	<i>Anas acuta</i>		U	U	
Northern Shoveler	<i>Anas clypeata</i>		C	C	
Redhead	<i>Aythya americana</i>		O	O	
Widgeon	<i>Anas americana</i>		O	O	
<b>Apodiformes</b>					
Black-chinned Hummingbird	<i>Archilochus alexandri</i>		U	U	
Rufous Hummingbird	<i>Selasphorus rufus</i>		C	C	
<b>Caprimulgiformes</b>					
Common Nighthawk	<i>Chordeiles minor</i>	C	C	C	C
<b>Charadriiformes</b>					
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>			U	U
California Gull	<i>Larus californicus</i>		U	U	U
Common Snipe	<i>Gallinago gallinago</i>		U	U	
Killdeer	<i>Charadrius vociferus</i>		U	U	
Upland Sandpiper (Plover)	<i>Bartramia longicauda</i>		R	R	
<b>Ciconiiformes</b>					
Great Blue Heron	<i>Ardea herodias</i>		C	C	
Turkey Vulture	<i>Cathartes aura</i>		O	O	O
<b>Columbiformes</b>					
Mourning Dove	<i>Zenaida macroura</i>		C	C	C
<b>Coraciiformes</b>					
Belted Kingfisher	<i>Ceryle alcyon</i>	C	C	C	C
<b>Falconiformes</b>					
American Kestrel	<i>Falco sparverius</i>	C	C	C	C
Bald Eagle	<i>Haliaeetus leucocephalus</i>	C	C	C	C
Coopers Hawk	<i>Accipiter cooperii</i>	C	C	C	C
Ferruginous Hawk	<i>Buteo regalis</i>		R	R	
Golden Eagle	<i>Aquila chrysaetos</i>	C	C	C	C
Northern Goshawk	<i>Accipiter gentilis</i>		R	R	
Northern Harrier (Marsh)	<i>Circus cyaneus</i>	X	X	X	X

Hawk)					
Prairie Falcon	<i>Falco mexicanus</i>		R	R	
Red-tailed Hawk	<i>Buteo jamaicensis</i>	C	C	C	C
Rough-legged Hawk	<i>Buteo lagopus</i>	C			
Sharp-shinned Hawk	<i>Accipiter striatus</i>	C	C	C	C
Swainson's Hawk	<i>Buteo swainsoni</i>	X	X	X	X
<b>Galliformes</b>					
Blue Grouse	<i>Dendragapus obscurus</i>	C	C	C	C
Chukar	<i>Alectoris chukar</i>	O	O	O	O
Gray Partridge (Hungarian)	<i>Perdix perdix</i>	U	U	U	U
California Quail	<i>Callipepla Californica</i>	U	U	U	U
Mountain Quail	<i>Oreortyx pictus</i>	U	U	U	U
Rio Grande Turkey	<i>Meleagris galopavo intermedia</i>	U	U	U	U
Ruffed Grouse	<i>Bonasa umbellus</i>	C	C	C	C
<b>Gruiformes</b>					
American Coot	<i>Fulica americana</i>		O	O	
Sandhill Crane	<i>Grus canadensis</i>				C
<b>Passeriformes</b>					
Willow Flycatcher (Traill's)	<i>Empidonax traillii</i>	X	X	X	X
American Crow	<i>Corvus brachyrhynchos</i>	C	C	C	C
American Dipper (Water Ouzel)	<i>Cinclus mexicanus</i>		O	O	
American Goldfinch	<i>Carduelis tristis</i>		C	C	
American Robin	<i>Turdus migratorius</i>		C	C	
Barn Swallow	<i>Hirundo rustica</i>	X	X	X	X
Black-billed Magpie	<i>Pica pica</i>	C	C	C	C
Black-capped Chickadee	<i>Poecile atricapilla</i>	X	X	X	X
Brewers blackbird	<i>Euphagus cyanocephalus</i>	X	X	X	X
Brown-Headed Cowbird	<i>Molothrus ater</i>	X	X	X	X
Bullock's Oriole	<i>Icterus bullockii</i>		C	C	
Canyon Wren	<i>Catherpes mexicanus</i>		O	O	
Cassin's Finch	<i>Carpodacus cassinii</i>	X	X	X	X
Cassin's Vireo (Solitary)	<i>Vireo cassinii</i>	X	X	X	X
Cedar Waxwing	<i>Bombycilla cedrorum</i>	X	X	X	X
Chipping Sparrow	<i>Spizella passerina</i>	X	X	X	X
Clark's Nutcracker	<i>Nucifraga columbiana</i>	X	X	X	X
Common Raven	<i>Corvus corax</i>	C	C	C	C
Dark-eyed Junco (Oregon)	<i>Junco hyemalis</i>	C			
Eastern Kingbird	<i>Tyrannus tryannus</i>	X	X	X	X
European Starling	<i>Sturnus vulgaris</i>	C	C	C	C
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	X	X	X	X
Golden-Crowned Kinglet	<i>Regulus satrapa</i>		O		O
Gray Jay	<i>Perisoreus canadensis</i>		U	U	
Green-tailed Towhee	<i>Pipilo chlorurus</i>	X	X	X	X

House Wren	<i>Troglodytes aedon</i>	X	X	X	X
Lazuli Bunting	<i>Passerina amoena</i>	X	X	X	X
MacGillivray's Warbler	<i>Oporonis tolmiei</i>		O	O	O
Mountain Bluebird	<i>Sialia currucoides</i>	C	C	C	C
Mountain Chickadee	<i>Poecile gambeli</i>	X	X	X	X
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	X	X	X	X
Northern Shrike	<i>Lanius exubitor</i>	X	X	X	X
Olive-sided Flycatcher	<i>Contopus cooperi</i>	X	X	X	X
Pine Grosbeak	<i>Pinicola enucleator</i>	X	X	X	X
Pine Siskin	<i>Carduelis pinus</i>		C	C	
Pygmy Nuthatch	<i>Sitta pygmaea</i>		C	C	C
Red-Breasted Nuthatch	<i>Sitta canadensis</i>	X	X	X	X
Red-winged Blackbird	<i>Agelaius phoeniceus</i>		C	C	
Rock Wren	<i>Salpinctes obsoletus</i>		O	O	
Ruby-crowned Kinglet	<i>Regulus calendula</i>	X	X	X	X
Song Sparrow	<i>Melospiza melodia</i>	X	X	X	X
Steller's Jay	<i>Cyanocitta stelleri</i>	O	O	O	O
Swainson Thrush	<i>Catharus ustulatus</i>	X	X	X	X
Townsend's Solitaire	<i>Myadestes townsendi</i>	X	X	X	X
Townsend's Warbler	<i>Dendroica townsendi</i>		O	O	
Tree Swallow	<i>Tachycineta bicolor</i>	X	X	X	X
Varied Thrush	<i>Ixoreus naevius</i>	X	X	X	X
Vesper Sparrow	<i>Poocetes gramineus</i>	X	X	X	X
Violet-green Swallow	<i>Tachycineta thalassina</i>	X	X	X	X
Warbling Vireo	<i>Vireo gilvus</i>	X	X	X	X
Western Bluebird	<i>Sialia mexicana</i>		C	C	C
Western Kingbird	<i>Tyrannus verticalis</i>		C	C	
Western Meadowlark	<i>Sturnella neglecta</i>		C	C	
Western Tanager	<i>Piranga ludoviciana</i>		C	C	
Western Wood-Pewee	<i>Contopus sordidulus</i>	X	X	X	X
White-breasted Nuthatch	<i>Sitta carolinensis</i>	X	X	X	X
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	C	C		C
Yellow Warbler	<i>Dendroica petechia</i>		C	C	
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	X	X	X	X
Yellow-rumped (Audubon's) Warbler	<i>Dendroica coronata</i>		C	C	
<b>Piciformes</b>					
Downy Woodpecker	<i>Picoides pubescens</i>	C	C	C	C
Hairy Woodpecker	<i>Picoides villosus</i>	C	C	C	C
Lewis Woodpecker	<i>Melanerpes lewis</i>		U	U	
Northern Flicker	<i>Colaptes auratus</i>	C	C	C	C
Pileated Woodpecker	<i>Dryocopus pileatus</i>		U	U	
White-headed Woodpecker	<i>Picoides albolarvatus</i>	X	X	X	X
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>		O	O	
<b>Strigiformes</b>					
Great Gray Owl	<i>Strix nebulosa</i>	O	O	O	O

Great Horned Owl	<i>Bubo virginianus</i>	C	C	C	C
Long-eared Owl	<i>Asio otus</i>	O	O	O	O
Northern Pygmy Owl	<i>Glaucidium gnoma</i>	C	O	O	O
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	O	O	O	O
Short-eared Owl	<i>Asio flammeus</i>	O	O	O	O
<b>MAMMAL</b>					
<b>Artiodactyla</b>					
Mule Deer	<i>Odocoileus hemionus</i>	C	C	C	C
Pronghorn	<i>Antilocapra americana</i>		O	O	
Rocky Mountain Elk	<i>Cervus elaphus nelsoni</i>	C	C	C	C
<b>Carnivora</b>					
Badger	<i>Taxidea taxus</i>	O	O	O	O
Black Bear	<i>Ursus americanus</i>		O	O	O
Bobcat	<i>Lynx rufus</i>	U	U	U	U
Cougar	<i>Felis concolor</i>	U	U	U	U
Coyote	<i>Canis latrans</i>	C	C	C	C
Mink	<i>Mustella vision</i>	O	C	C	C
Raccoon	<i>Procyon lotor</i>	C	C	C	C
River Otter	<i>Lutra canadensis</i>	O	O	O	O
Striped Skunk	<i>Mephitis mephitis</i>		O	O	O
Weasel	<i>Mustella spp</i>	O	O	O	O
<b>Chiroptera</b>					
Big Brown Bat	<i>Eptesicus fuscus</i>	X	X	X	X
Hoary Bat	<i>Lasiurus cinereus</i>	X	X	X	X
Long-eared myotis	<i>Myotis evotis</i>	X	X	X	X
Pallid Bat	<i>Antrozous pallidus</i>	X	X	X	X
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	X	X	X	X
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	X	X	X	X
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>	X	X	X	X
<b>Lagomorpha</b>					
Black-tail Jackrabbit	<i>Lepus californicus</i>	R	R	R	R
Cottontail Rabbit	<i>Sylvilagus nuttallii</i>	C	C	C	C
Snowshoe Hare	<i>Lepus americanus</i>	O	O	O	O
Whitetail Jackrabbit	<i>Lepus townsendii</i>	R	R	R	R
<b>Rodentia</b>					
Beaver	<i>Castor canadensis</i>	O	O	O	O
Belding's Ground Squirrel	<i>Spermophilus beldingi</i>	X	X	X	X
Bush-tailed Woodrat	<i>Neotoma cinerea</i>	C	C	C	C
Columbian Ground Squirrel	<i>Spermophilus columbianus</i>	X	X	X	X
Deer Mouse	<i>Peromyscus maniculatus</i>	C	C	C	C
Golden-mantled ground Squirrel	<i>Spermophilus lateralis</i>	C	C	C	C
House Mouse	<i>Mus musculus</i>	X	X	X	X
Least Chipmunk	<i>Neotamias minimus</i>	O	O	O	O
Long-tailed Vole	<i>Microtus longicaudus</i>	C	C	C	C

Montane Vole	<i>Microtus montanus</i>	X	X	X	X
Muskrat	<i>Ondatra zibethicus</i>	O	O	O	O
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	X	X	X	X
Northern Pocket Gopher	<i>Thomomys talpoides</i>	X	X	X	X
Porcupine	<i>Erethizon dorsatum</i>	C	C	C	C
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	C	C	C	C
Southern Red-backed Vole	<i>Myodes gapperi</i>	X	X	X	X
Water Vole	<i>Microtus richardsoni</i>	X	X	X	X
Western Jumping Mouse	<i>Zapus princeps</i>	X	X	X	X
Yellow-bellied Marmot	<i>Marmota flaviventris</i>	R	R	R	R
Yellow-pine Chipmunk	<i>Neotamias amoenus</i>	C	C	C	C
<b>AMPHIBIAN/ REPTILE</b>					
<b>Anura</b>					
Columbia Spotted Frog	<i>Rana luteiventris</i>	X	X	X	X
Inland Tailed Frog	<i>Ascaphus montanus</i>	X	X	X	X
Pacific Chorus Frog (Treefrog)	<i>Hyla regilla</i>	X	X	X	X
Western Toad	<i>Bufo boreas</i>	X	X	X	X
<b>Squamata</b>					
Bull Snake	<i>Pituophis catenifer sayi</i>		C	C	C
Racer Snake	<i>Coluber constrictor</i>		C	C	C
Rubber Boa	<i>Charina bottae</i>		C	C	C
Western Rattlesnake	<i>Crotalus oreganus</i>		C	C	C
Western Fence Lizard	<i>Sceloporus occidentalis</i>		C	C	C
Western Skink	<i>Eumeces skiltonianus</i>		C	C	C
<b>FISH</b>					
<b>Cypriniformes</b>					
Bridgelip Sucker	<i>Catostomus columbianus</i>				Abundant
Chiselmouth	<i>Acrocheilus alutaceus</i>				Abundant
Coarsescale Sucker	<i>Catostomas macrocheilus</i>				Abundant
Longnose Dace	<i>Rhinichthys cataractae</i>				Abundant
Northern Pike Minnow	<i>Ptychocheilus oregonensis</i>				Abundant
Redsided Shiner	<i>Clinostomus elongatus</i>				Abundant
Speckled Dace	<i>Rhinichthys osculus</i>				Abundant
<b>Perciformes</b>					
Smallmouth Bass	<i>Micropterus dolomieu</i>				Occasional
Brook Lamprey	<i>Ichthyomyzon fossor</i>				Common
Pacific Lamprey	<i>Entosphenus tridentatus</i>				Common
<b>Salmoniformes</b>					
Bull trout	<i>Salvelinus confluentus</i>				Uncommon
Mountain Whitefish	<i>Prosopium williamsoni</i>				Common
Redband/inland Rainbow	<i>Onchoryncus mykiss spp.</i>				Abundant

Spring Chinook Salmon	<i>Onchoryncus tshawytscha.</i>	Seasonally common
Steelhead	<i>Onchoryncus mykiss</i>	Abundant
<b>Scorpaeniformes</b>		
Sculpin	<i>Cottus sp.</i>	Abundant

## Ken Denman Wildlife Area

Occurrence: Abundant = A, Common = C, Uncommon = U, Rare = R

Species	Occurrence	Species	Occurrence
<b>Birds</b>		Short-billed Dowitcher ( <i>Limnodromus griseus</i> )	R
Common Loon ( <i>Gavia immer</i> )	R	California Gull ( <i>Larus californicus</i> )	C
Horned Grebe ( <i>Podiceps auritus</i> )	R	Herring Gull ( <i>Larus argentatus</i> )	R
Eared Grebe ( <i>Podiceps nigricollis</i> )	R	Band-tailed Pigeon ( <i>Columba fasciata</i> )	U
Western Grebe ( <i>Aechmophorus occidentalis</i> )	U	Rock Dove ( <i>Columba livia</i> )	A
Pied-billed Grebe ( <i>Podilymbus podiceps</i> )	A	Mourning Dove ( <i>Zenaida macroura</i> )	A
Double-crested Cormorant ( <i>Phalacrocorax auritus</i> )	C	Barn Owl ( <i>Tyto alba</i> )	C
Great Blue Heron ( <i>Ardea herodias</i> )	A	Western Screech Owl ( <i>Otus kennicottii</i> )	C
Green-backed Heron ( <i>Butorides striatus</i> )	U	Great Horned Owl ( <i>Bubo virginianus</i> )	C
Great Egret ( <i>Casmerodius albus</i> )	U	Pygmy Owl ( <i>Glaucidium gnoma</i> )	C
Black-crowned Night Heron ( <i>Nycticorax nycticorax</i> )	C	Burrowing Owl ( <i>Athene cunicularia</i> )	R
American Bittern ( <i>Botaurus lentiginosus</i> )	U	Short-eared Owl ( <i>Asio flammeus</i> )	R
Tundra Swan ( <i>Cygnus columbianus</i> )	U	Turkey Vulture ( <i>Cathartes aura</i> )	C
Canada Goose ( <i>Branta canadensis</i> )	A	Sharp-shinned Hawk ( <i>Accipiter striatus</i> )	C
Mallard ( <i>Anas platyrhynchos</i> )	A	Coopers Hawk ( <i>Accipiter cooperii</i> )	C
Gadwall ( <i>Anas strepera</i> )	C	Red-tailed Hawk ( <i>Buteo jamaicensis</i> )	A
Northern Pintail ( <i>Anas acuta</i> )	C	Rough-legged Hawk ( <i>Buteo lagopus</i> )	U
Green-winged Teal ( <i>Anas crecca</i> )	C	Golden Eagle ( <i>Aquila chrysaetos</i> )	U
Blue-winged Teal ( <i>Anas discors</i> )	U	Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	U
Cinnamon Teal ( <i>Anas cyanoptera</i> )	U	Northern Harrier ( <i>Circus cyaneus</i> )	C
American Wigeon ( <i>Anas americana</i> )	A	Osprey ( <i>Pandion haliaetus</i> )	C
Northern Shoveler ( <i>Anas clypeata</i> )	C	Prairie Falcon ( <i>Falco mexicanus</i> )	U
Wood Duck ( <i>Aix sponsa</i> )	A	Peregrine Falcon ( <i>Falco peregrinus</i> )	U
Redhead ( <i>Aythya americana</i> )	U	Merlin ( <i>Falco columbarius</i> )	C
Ring-necked Duck ( <i>Aythya collaris</i> )	C	American Kestrel ( <i>Falco sparverius</i> )	A
Canvasback ( <i>Aythya valiseneria</i> )	U	California Quail ( <i>Callipepla californica</i> )	C
Greater Scaup ( <i>Aythya marila</i> )	U	Western Kingbird ( <i>Tyrannus verticalis</i> )	C
Lesser Scaup ( <i>Aythya affinis</i> )	C	Ash-throated Flycatcher ( <i>Myiarchus cinerascens</i> )	U
Common Goldeneye ( <i>Bucephala clangula</i> )	C	Common Night Hawk ( <i>Chordeiles minor</i> )	U
Bufflehead ( <i>Bucephala albeola</i> )	C	Vaux's Swift ( <i>Chaetura vauxi</i> )	U
Ruddy Duck ( <i>Oxyura jamaicensis</i> )	C	Rufous Hummingbird ( <i>Selasphorus rufus</i> )	A
Ring-necked Pheasant ( <i>Phasianus colchicus</i> )	C	Calliope Hummingbird ( <i>Stellula calliope</i> )	U
Wild Turkey ( <i>Meleagris gallopavo</i> )	R	Virginia Rail ( <i>Rallus limicola</i> )	C
American Kestrel ( <i>Falco sparverius</i> )	A	Sora ( <i>Porzana carolina</i> )	U
Hooded Merganser ( <i>Lophodytes cucullatus</i> )	C	Semipalmated Plover ( <i>Charadrius semipalmatus</i> )	R
Common Merganser ( <i>Mergus merganser</i> )	A	Killdeer ( <i>Charadrius vociferus</i> )	A
American Coot ( <i>Fulica americana</i> )	A	Common Snipe ( <i>Gallinago gallinago</i> )	C
Forster's Tern ( <i>Sterna forsteri</i> )	R	Spotted Sandpiper ( <i>Actitis macularia</i> )	R

Caspian Tern ( <i>Sterna caspia</i> )	U	Greater Yellowlegs ( <i>Tringa melanoleuca</i> )	U
Black Tern ( <i>Chlidonias niger</i> )	R	Lesser Yellowlegs ( <i>Tringa flavipes</i> )	U
Western Gull ( <i>Larus occidentalis</i> )	C	Long-billed Dowitcher ( <i>Limnodromus scolopaceus</i> )	U
Species	Occurrence	Species	Occurrence
Western Sandpiper ( <i>Calidris mauri</i> )	C	House Wren ( <i>Troglodytes aedon</i> )	C
Wilson's Phalarope ( <i>Phalaropus tricolor</i> )	R	Winter Wren ( <i>Troglodytes troglodytes</i> )	C
Red-necked Phalarope ( <i>Phalaropus lobatus</i> )	R	Bewick's Wren ( <i>Thryomanes bewickii</i> )	C
Belted Kingfisher ( <i>Ceryle alcyon</i> )	A	Marsh Wren ( <i>Cistothorus palustris</i> )	A
Northern Flicker ( <i>Colaptes auratus</i> )	A	American Robin ( <i>Turdus migratorius</i> )	A
Pileated Woodpecker ( <i>Dryocopus pileatus</i> )	C	Varied Thrush ( <i>Ixoreus naevius</i> )	C
Acorn Woodpecker ( <i>Melanerpes formicivorus</i> )	A	Hermit Thrush ( <i>Catharus guttatus</i> )	A
Lewis Woodpecker ( <i>Melanerpes lewis</i> )	A	Swainson's Thrush ( <i>Catharus ustulatus</i> )	C
Yellow-bellied Sapsucker ( <i>Sphyrapicus varius</i> )	C	Western Bluebird ( <i>Sialia mexicana</i> )	A
Hairy Woodpecker ( <i>Picoides villosus</i> )	C	Mountain Bluebird ( <i>Sialia currusoides</i> )	U
Downy Woodpecker ( <i>Picoides pubescens</i> )	C	Townsend's Solitaire ( <i>Myadestes townsendi</i> )	C
Western Kingbird ( <i>Tyrannus verticalis</i> )	A	Western Tanager ( <i>Piranga ludoviciana</i> )	C
Ash-throated Flycatcher ( <i>Myiarchus cinerascens</i> )	A	Black-headed Grosbeak ( <i>Pheucticus melanocephalus</i> )	C
Say's Phoebe ( <i>Sayornis saya</i> )	U	Lazuli Bunting ( <i>Passerina amoena</i> )	C
Willow Flycatcher ( <i>Empidonax traillii</i> )	U	Evening Grosbeak ( <i>Coccothraustes vespertinus</i> )	U
Western Wood-Pewee ( <i>Contopus sordidulus</i> )	C	Purple Finch ( <i>Carpodacus purpureus</i> )	C
Olive-sided Flycatcher ( <i>Contopus borealis</i> )	C	Cassin's Finch ( <i>Carpodacus cassinii</i> )	C
Violet-green Swallow ( <i>Tachycineta thalassina</i> )	A	House Finch ( <i>Carpodacus mexicanus</i> )	A
Tree Swallow ( <i>Tachycineta bicolor</i> )	A	Pine Siskin ( <i>Carduelis pinus</i> )	C
Rough-winged Swallow ( <i>Stelgidopteryx serripennis</i> )	C	American Goldfinch ( <i>Carduelis tristis</i> )	A
Barn Swallow ( <i>Hirundo rustica</i> )	A	Lesser Goldfinch ( <i>Carduelis psaltria</i> )	A
Cliff Swallow ( <i>Hirundo pyrrhonota</i> )	A	Rufous-sided Towhee ( <i>Pipilo erythrophthalmus</i> )	C
Purple Martin ( <i>Progne subis</i> )	R	Brown Towhee ( <i>Pipilo fuscus</i> )	C
Steller's Jay ( <i>Cyanocitta stelleri</i> )	A	Savannah Sparrow ( <i>Passerculus sandwichensis</i> )	A
Scrub Jay ( <i>Aphelocoma coerulescens</i> )	A	Vesper Sparrow ( <i>Poocetes gramineus</i> )	C
Common Raven ( <i>Corvus corax</i> )	A	Lark Sparrow ( <i>Chondestes grammacus</i> )	C
American Crow ( <i>Corvus Brachyrhynchos</i> )	A	Dark-eyed Junco ( <i>Junco hemalis</i> )	A
Black-capped Chickadee ( <i>Parus atricapillus</i> )	A	Chipping Sparrow ( <i>Spizella passerina</i> )	A
Mountain Chickadee ( <i>Parus gambeli</i> )	C	White-crowned Sparrow ( <i>Zonotrichia leucophrys</i> )	U
Chestnut-backed Chickadee ( <i>Parus rufescens</i> )	C	Golden-crowned Sparrow ( <i>Zonotrichia atricapilla</i> )	A

Common Bushtit ( <i>Psaltriparus minimus</i> )	C	White-throated Sparrow ( <i>Zonotrichia albicollis</i> )	U
White-breasted Nuthatch ( <i>Sitta carolinensis</i> )	A	Fox Sparrow ( <i>Passerella iliaca</i> )	A
Red-breasted Nuthatch ( <i>Sitta canadensis</i> )	A	Lincoln's Sparrow ( <i>Melospiza lincolni</i> )	C
Brown Creeper ( <i>Certhia americana</i> )	C	Song Sparrow ( <i>Melospiza melodia</i> )	A
		<b>Amphibians and Reptiles</b>	
House Sparrow ( <i>Passer domesticus</i> )	A	Western Pond Turtle ( <i>Clemmys marmorata</i> )	C
Orange-crowned Warbler ( <i>Vermivora celata</i> )	C	Western Fence Lizard ( <i>Sceloporus occidentalis</i> )	A
Nashville Warbler ( <i>Vermivora ruficapilla</i> )	C	Western Skink ( <i>Eumeces skiltonianus</i> )	A
Yellow Warbler ( <i>Dendroica petechia</i> )	C	Southern Alligator Lizard ( <i>Elgaria multicarinata</i> )	A
Yellow-rumped Warbler ( <i>Dendroica coronata</i> )	C	Rubber Boa ( <i>Charina bottae</i> )	A
Black-throated Gray Warbler ( <i>Dendroica nigrescens</i> )	C	Ringneck Snake ( <i>Diadophis punctatus</i> )	R
Hermit Warbler ( <i>Dendroica townsendi</i> )	C	Sharp-tailed Snake ( <i>Contia Tenuis</i> )	R
MacGillivray's Warbler ( <i>Oporornis tolmiei</i> )	C	Racer ( <i>Coluber constrictor</i> )	A
Common Yellowthroat ( <i>Geothlypis trichas</i> )	C	Gopher Snake ( <i>Pituophis melanoleucus</i> )	A
Yellow-breasted Chat ( <i>Icteria virens</i> )	C	Common King Snake ( <i>Lampropeltis getula</i> )	R
Wilson Warbler ( <i>Wilsonia pusilla</i> )	C	California Mountain King Snake ( <i>Lampropeltis zonata</i> )	R
Western Meadowlark ( <i>Sturnella neglecta</i> )	A	Common Garter Snake ( <i>Thamnophis sirtalis</i> )	A
Yellow-headed Blackbird ( <i>Xanthocephalus xanthocephalus</i> )	U	Western Terrestrial Garter Snake ( <i>Thamnophis elegans</i> )	A
Red-winged Blackbird ( <i>Agelaius phoeniceus</i> )	A	Northwestern Garter Snake ( <i>Thamnophis ordinoides</i> )	A
Tri-colored Blackbird ( <i>Agelaius tricolor</i> )	C	Western Rattle Snake ( <i>Crotalus viridis</i> )	C
Northern Oriole ( <i>Icterus galbula</i> )	R	Long-toed Salamander ( <i>Ambystoma macrodactylum</i> )	R
Brewer's Blackbird ( <i>Euphagus cyanocephalus</i> )	A	Pacific Giant Salamander ( <i>Dicamptodon tenebrosus</i> )	C
Brown-headed Cowbird ( <i>Molothrus ater</i> )	A	Rough-skinned Newt ( <i>Taricha granulosa</i> )	R
Golden-crowned Kinglet ( <i>Regulus satrapa</i> )	C	Western Toad ( <i>Bufo boreas</i> )	R
Ruby-crowned Kinglet ( <i>Regulus calendula</i> )	C	Pacific Treefrog ( <i>Pseudacris regilla</i> )	A
Water Pipit ( <i>Anthus rubescens</i> )	U	Bull Frog ( <i>Rana catesbeiana</i> )	A
Cedar Waxwing ( <i>Bombycilla cedrorum</i> )	A	<b>Mammals</b>	
Northern Shrike ( <i>Lanius excubitor</i> )	U	Northern River Otter ( <i>Lontra canadensis</i> )	A
Loggerhead Shrike ( <i>Lanius ludovicianus</i> )	R	Gray Fox ( <i>Urocyon cinereoargenteus</i> )	A
European Starling ( <i>Sturnus vulgaris</i> )	A	Coyote ( <i>Canis latrans</i> )	A
Hutton's Vireo ( <i>Vireo huttoni</i> )	C	Bobcat ( <i>Lynx rufus</i> )	C
Solitary Vireo ( <i>Vireo solitarius</i> )	C	Badger ( <i>Taxidea taxus</i> )	R
Warbling Vireo ( <i>Vireo gilvus</i> )	C	House Mouse ( <i>Mus musculus</i> )	A
		Creeping Vole ( <i>Microtus oregoni</i> )	A

Muskrat ( <i>Ondatra zibethicus</i> )	A	Heerman Kangaroo Rat ( <i>Dipodomys heermanni</i> )	C
Pinon Deermouse ( <i>Peromyscus truei</i> )	A	Dusky-footed Woodrat ( <i>Neotoma fuscipes</i> )	A
North American Deer Mouse ( <i>Peromyscus maniculatus</i> )	A	Northern Pocket Gopher ( <i>Thomomys talpoides</i> )	C
Western Harvest Mouse ( <i>Reithrodontomys megalotis</i> )	A	California Ground Squirrel ( <i>Spermophilus beecheyi</i> )	A
Mexican Free-tailed Bat ( <i>Tadarida brasiliensis</i> )	A	Western Gray Squirrel ( <i>Sciurus griseus</i> )	A
Raccoon ( <i>Procyon lotor</i> )	A	Northern Flying Squirrel ( <i>Glaucomys sabrinus</i> )	C
Striped Skunk ( <i>Mephitis mephitis</i> )	A	Porcupine ( <i>Erithizon dorsatum</i> )	A
Long-tailed Weasel ( <i>Mustela frenata</i> )	C	Black-tailed Jackrabbit ( <i>Lepus californicus</i> )	A
Mink ( <i>Mustela vison</i> )	C	Brush rabbit ( <i>Sylvilagus bachmani</i> )	A
Western Spotted Skunk ( <i>Spilogale gracilis</i> )	C	Beaver ( <i>Castor canadensis</i> )	A
Broad-footed Mole ( <i>Scapanus latimanus</i> )	C	Black-tailed Deer ( <i>Odocoileus hemionus columbianus</i> )	A
American Shrew-mole ( <i>Neurotrichus gibbsii</i> )	A	Long-eared Myotis ( <i>Myotis evotis</i> )	C
Vagrant Shrew ( <i>Sorex vagrans</i> )	A	Big Brown Bat ( <i>Eptesicus fuscus</i> )	C
Trowbridge's Shrew ( <i>Sorex trowbridgii</i> )	C	Hoary Bat ( <i>Lasiurus cinereus</i> )	R
Yuma Myotis ( <i>Myotis yumanensis</i> )	C	Silver-haired Bat ( <i>Lasionycteris noctivagans</i> )	R
California Myotis ( <i>Myotis californicus</i> )	A	Pallid Bat ( <i>Antrozous pallidus</i> )	U
Fringed Myotis ( <i>Myotis thysanodes</i> )	C		
Long-legged Myotis ( <i>Myotis volans</i> )	C		

## Columbia Basin Wildlife Areas (Irrigon, Coyote Springs, Power City)

Plant	Order-Common Name	Species	Family	Location			
	<b>Apiales</b>						
	Poison Hemlock	Conium maculatum	Apiaceae	PC	IR	CS	WC
	Water hemlock	Cicuta douglasii	Apiaceae				WC
	<b>Asparagales</b>						
	Asparagus	Asparagus officinalis	Asparagaceae	PC	IR		WC
	<b>Asterales</b>						
	Arrowleaf Balsomroot	Balsamorhiza sagittata	Asteraceae			CS	WC
	Basin Big Sage	Artemisia tridentata	Asteraceae	PC	IR	CS	WC
	Black Oil Sunflower	Helianthus annuus	Asteraceae		IR		WC
	Canada Goldenrod	Solidago canadensis	Asteraceae			CS	
	Canada Thistle	Cirsium arvense	Asteraceae		IR		WC
	Chicory	Cichorium intybus	Asteraceae		IR	CS	WC
	Columbia Coreopsis	Coreopsis tinctoria var. atkinsoniana	Asteraceae			CS	
	Common Cocklebur	Xanthium strumarium	Asteraceae		IR	CS	WC
	Common Spring Gold	Crocidium multicaule	Asteraceae		IR		
	Dandelion	Taraxacum officinale	Asteraceae	PC	IR	CS	WC
	Diffuse Knapweed	Centaurea diffusa	Asteraceae		IR		WC
	Mules Ears	Wyenthia amplexicaulis	Asteraceae		IR	CS	WC
	Rabbitbrush	Ericameria nauseosa	Asteraceae	PC	IR	CS	WC
	Russian Knapweed	Acroptilon repens	Asteraceae	PC	IR	CS	WC
	Tapertip Hawksbeard	Crepis acuminata	Asteraceae		IR	CS	
	Yarrow	Achillea millefolium	Asteraceae	PC	IR	CS	WC
	Yellow Starthistle	Centaurea solstitialis L.	Asteraceae			CS	WC
	<b>Capparales</b>						
	Field Mustard	Brassica rapa	Brassicaceae		IR		WC
	Perennial Pepperweed	Lepidium latifolium	Brassicaceae		IR		
	Short fruited tansy mustard	Descurainia pinnata	Brassicaceae				WC
	Tumble Mustard	Sisymbrium altissimum	Brassicaceae		IR		WC
	Watercress	Nasturtium officinale	Brassicaceae	PC	IR	CS	WC
	<b>Caryophyllales</b>						
	Prickly Pear Cactus	Opuntia polyacantha	Cactaceae		IR	CS	WC
	Fourwing Saltbrush	Atriplex canescens	Chenopodiaceae		IR		WC
	Kochia	Kochia scoparia	Chenopodiaceae		IR		WC
	Russian Thistle	Salsola iberica	Chenopodiaceae		IR	CS	WC
	Winterfat	Krascheninnikovia lanata	Chenopodiaceae	PC	IR	CS	WC
	<b>Cyperales</b>						
	Hardstem Bulrush	Schoenoplectus acutus	Cyperaceae	PC	IR	CS	WC

Basin Wildrye	<i>Leymus cinereus</i>	Poaceae		IR		WC
Bluebunch Wheatgrass	<i>Pseudoroegneria spicata</i>	Poaceae	PC	IR	CS	WC
Cereal Rye	<i>Secale cereale</i> L.	Poaceae	PC	IR		
Cheatgrass	<i>Bromus tectorum</i>	Poaceae	PC	IR	CS	WC
Common Reed	<i>Phalaris australis</i>	Poaceae				WC
Crabgrass	<i>Digitaria haller</i>	Poaceae	PC	IR	CS	WC
Idaho Fescue	<i>Festuca idahoensis</i>	Poaceae		IR	CS	WC
Indian Ricegrass	<i>Achnatherum hymenoides</i>	Poaceae	PC	IR	CS	
Inland Saltgrass	<i>Distichlis spicata</i>	Poaceae	PC	IR		WC
Intermediate Wheatgrass	<i>Thinopyrum intermedium</i>	Poaceae		IR		
Needle & Thread	<i>Hesperostipa comata</i>	Poaceae	PC	IR	CS	
Reed Canarygrass	<i>Phalaris arundinacea</i>	Poaceae	PC	IR	CS	WC
Sandberg Bluegrass	<i>Poa secunda</i>	Poaceae		IR	CS	WC
Witchgrass	<i>Panicum capillare</i>	Poaceae		IR		
<b>Dipsacales</b>						
Teasel	<i>Dipsacus fullonum</i>	Dipsaceae		IR	CS	WC
<b>Fabales</b>						
False Indigo	<i>Amorpha fruticosa</i>	Fabaceae		IR		WC
Locust	<i>Robinia pseudoacacia</i>	Fabaceae		IR		
Lupine	<i>Lupinus</i> spp	Fabaceae		IR	CS	WC
Woolly-pod milkvetch	<i>Astragalus purshii</i>	Fabaceae				WC
<b>Gentianales</b>						
Showy Milkweed	<i>Asclepias speciosa</i>	Asclepiadaceae			CS	
<b>Lamiales</b>						
Fiddleneck(Buglass) Tarweed	<i>Amsinckia intermedia</i>	Boraginaceae		IR		WC
<b>Malvales</b>						
Common Mallow	<i>Malva neglecta</i>	Malvaceae	PC	IR	CS	WC
<b>Myrtales</b>						
Purple Loosestrife	<i>Lythrum salicaria</i>	Lythraceae		IR		
Pale-stemmed Evening Primrose	<i>Oenothera pallida</i>	Onagraceae		IR	CS	WC
<b>Najadales</b>						
Waternymph	<i>Nejas</i> spp	Najadaceae	PC	IR	CS	WC
Sago	<i>Stuckenia pectinata</i>	Potamogetonaceae	PC	IR	CS	WC
<b>Pinales</b>						
Juniper	<i>Juniperus occidentalis</i>	Cupressaceae				WC
<b>Poales</b>						
Corn	<i>Zea</i> spp	Graminea		IR	CS	WC
Millet	<i>Panicum miliaceum</i>	Poaceae		IR	CS	WC
Wheat	<i>Triticum</i> spp	Poaceae		IR	CS	WC
<b>Polygonales</b>						
Western Dock	<i>Rumex aquaticus</i>	Polygonaceae		IR	CS	
<b>Rhamnales</b>						

Russian Olive	Elaeagnus angustifolia L.	Elaeagnaceae	PC	IR	CS	WC
<b>Rosales</b>						
Bitterbrush	Purshia tridentata	Rosaceae	PC	IR	CS	WC
Chokecherry	Prunus virginiana	Rosaceae		IR		
Himalayan Blackberry	Rubus armeniacus	Rosaceae	PC	IR	CS	
Nootka Rose	Rosa nutkana	Rosaceae		IR	CS	
Western Sand	Prunus pumila	Rosaceae		IR		
Wood's Rose	Rosa woodsii	Rosaceae		IR		WC
<b>Rununculales</b>						
Larkspur	Delphinium spp	Ranunculaceae		IR		
<b>Salicales</b>						
White Willow	Salix alba	Saliaceae		IR		WC
Black Cottonwood	Populus balsamifera L. spp trichocarpa	Salicaceae	PC	IR	CS	WC
Coyote Willow	Salix exigua Nutt.	Salicaceae	PC	IR	CS	WC
Peachleaf Willow	Salix amygdaloides	Salicaceae		IR		WC
<b>Sapindales</b>						
Puncture Vine	Tribulus terrestris	Zygophyllaceae	PC	IR	CS	WC
<b>Scrophulariales</b>						
Common Mullein	Verbascum thapsus	Scrophulariaceae		IR	CS	
<b>Solanales</b>						
Field Bindweed	Convolvulus arvensis	Convolvulaceae	PC	IR	CS	WC
Longleaf Phlox	Phlox longifolia	Polemoniaceae		IR		WC
Nightshade	Solanum dulcamara	Solanaceae		IR		
<b>Typhales</b>						
Cattail	Typha latifolia L.	Typhaceae	PC	IR	CS	WC
<b>Urticales</b>						
Stinging Nettle	Urtica dioica	Urticaceae		IR		WC

	Order-Common Name	Species	Family	Location		
<b>Bird</b>	<b>Anseriformes</b>					
	American Widgeon	<i>Anas americana</i>	Anatidae		IR	WC
	Blue-winged Teal	<i>Anus discors</i>	Anatidae	PC	IR	CS
	Bufflehead	<i>Bucephala albeola</i>	Anatidae	PC	IR	WC
	Cinnamon Teal	<i>Anas cyanoptera</i>	Anatidae	PC	IR	CS
	Common Goldeneye	<i>Bucephala clangula</i>	Anatidae		IR	
	Common Merganser	<i>Mergus merganser</i>	Anatidae		IR	WC
	Gadwall	<i>Anas strepera</i>	Anatidae	PC	IR	
	Green-winged Teal	<i>Anus crecca</i>	Anatidae	PC	IR	CS
	Lesser Canada Goose	<i>Branta canadensis parvipes</i>	Anatidae	PC	IR	CS
	Lesser Scaup	<i>Aythya affinis</i>	Anatidae	PC	IR	WC
	Mallard	<i>Anas platyrhynchos</i>	Anatidae	PC	IR	CS
	Northern Pintail	<i>Anas acuta</i>	Anatidae	PC	IR	CS
	Northern Shoveler	<i>Anas clypeata</i>	Anatidae	PC	IR	CS
	Redhead	<i>Aythya americana</i>	Anatidae	PC	IR	WC
	Ring-neck Duck	<i>Aythya collaris</i>	Anatidae	PC	IR	WC

Ruddy Duck	<i>Oxyura jamaicensis</i>	Anatidae	PC	IR		WC
Snow Geese	<i>Chen caerulescens</i>	Anatidae		IR		
Taverner's Canada Goose	<i>Branta canadensis taverneri</i>	Anatidae		IR		WC
Tundra (Whistling) Swan	<i>Cygnus columbianus</i>	Anatidae	PC	IR		WC
Western Canada Goose	<i>Branta canadensis moffitti</i>	Anatidae	PC	IR	CS	WC
Wood Duck	<i>Aix sponsa</i>	Anatidae	PC	IR		WC
<b>Caprimulgiformes</b>						
Common Nighthawk	<i>Chordeiles minor</i>	Caprimulgidae	PC			WC
<b>Charadriiformes</b>						
Killdeer	<i>Charadrius vociferus</i>	Charadriidae	PC	IR	CS	WC
Caspian Tern	<i>Sterna hirundo</i>	Laridae		IR		WC
Forster's Tern	<i>Sterna forsteri</i>	Laridae		IR		WC
California Gull	<i>Larus californicus</i>	Laridae	PC	IR	CS	WC
Ring-billed Gull	<i>Larus delawarensis</i>	Laridae	PC	IR	CS	WC
American Avocet	<i>Recurvirostra americana</i>	Recurvirostridae	PC	IR		WC
Black-necked Stilt	<i>Himantopus mexicanus</i>	Recurvirostridae	PC	IR		WC
Common Snipe	<i>Gallinago gallinago</i>	Scolopacidae		IR		
Greater Yellowlegs	<i>Tringa melanoleuca</i>	Scolopacidae		IR		
Long-billed Curlew	<i>Numenius americanus</i>	Scolopacidae	PC	IR	CS	WC
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	Scolopacidae		IR		WC

Order – Common Name	Species	Family				
Short-billed Dowitcher	<i>Limnodromus griseus</i>	Scolopacidae		IR		
Spotted Sandpiper	<i>Actitis macularia</i>	Scolopacidae		IR	CS	WC
Western Sandpiper	<i>Calidris mauri</i>	Scolopacidae	PC			
Wilson's Phalarope	<i>Phalaropus tricolor</i>	Scolopacidae	PC	IR		
Wilson's Snipe	<i>Gallinago gallinago</i>	Scolopacidae	PC	IR		WC
<b>Ciconiiformes</b>						
American Bittern	<i>Botaurus lentiginosus</i>	Ardeidae	PC	IR		
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	Ardeidae	PC	IR	CS	WC
Great Blue Heron	<i>Ardea herodias</i>	Ardeidae	PC	IR	CS	WC
Great Egret	<i>Ardea alba</i>	Ardeidae		IR		WC
Turkey Vulture	<i>Cathartes aura</i>	Cathartidae				WC
<b>Columbiformes</b>						
Mourning Dove	<i>Zenaida macroura</i>	Columbidae	PC	IR	CS	WC
Rock Dove (Domestic Pigeon)	<i>Columba livia</i>	Columbidae	PC	IR		WC
Belted Kingfisher	<i>Ceryle alcyon</i>	Alcedinidae	PC	IR		
<b>Falconiformes</b>						
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Accipitridae		IR		

Coopers Hawk	<i>Accipiter cooperii</i>	Accipitridae		IR		
Golden Eagle	<i>Aquila chrysaetos</i>	Accipitridae		IR		WC
Northern Harrier	<i>Circus cyaneus</i>	Accipitridae	PC	IR	CS	WC
Osprey	<i>Pandion haliaetus</i>	Accipitridae		IR		WC
Red-tailed Hawk	<i>Buteo jamaicensis</i>	Accipitridae	PC	IR	CS	WC
Rough-legged Hawk	<i>Buteo lagopus</i>	Accipitridae		IR		
Sharp-shinned Hawk	<i>Accipiter striatus</i>	Accipitridae	PC	IR	CS	
Swainson's Hawk	<i>Buteo swainsoni</i>	Accipitridae		IR		
American Kestrel	<i>Falco sparverius</i>	Falconidae	PC	IR		
Prairie Falcon	<i>Falco mexicanus</i>	Falconidae		IR		
<b>Galliformes</b>						
California Quail	<i>Callipepla californica</i>	Odontophoridae	PC	IR	CS	WC
Chukar	<i>Alectoris chukar</i>	Phasianidae				WC
Gray Partridge (Hungarian)	<i>Perdix perdix</i>	Phasianidae		IR		WC
Ring-neck Pheasant	<i>Phasianus colchicus</i>	Phasianidae	PC	IR	CS	WC
<b>Gruiformes</b>						
Sandhill Crane	<i>Grus canadensis</i>	Gruidae		IR		
American Coot	<i>Fulica americana</i>	Rallidae	PC	IR		WC
Sora	<i>Porzana carolina</i>	Rallidae	PC			
<b>Passeriformes</b>						
Horned Lark	<i>Eremophila alpestris</i>	Alaudidae	PC	IR	CS	WC
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	Cardinalidae		IR		
Lazuli Bunting	<i>Passerina amoena</i>	Cardinalidae			CS	
American Crow	<i>Corvus brachyrhynchos</i>	Corvidae	PC	IR	CS	WC
Black-billed Magpie	<i>Pica pica</i>	Corvidae	PC	IR	CS	WC
Common Raven	<i>Corvus corax</i>	Corvidae	PC	IR		WC
Chipping Sparrow	<i>Spizella passerina</i>	Emberizidae	PC	IR	CS	
Dark-eyed Junco	<i>Junco hyemalis</i>	Emberizidae	PC	IR	CS	WC
Gold-crowned Sparrow	<i>Zonotrichia atricapilla</i>	Emberizidae				WC
Lark Sparrow	<i>Chondestes grammacus</i>	Emberizidae			CS	
Savannah Sparrow	<i>Passerculus sandwichensis</i>	Emberizidae	PC	IR	CS	WC
Song Sparrow	<i>Melospiza melodia</i>	Emberizidae	PC	IR	CS	WC
Spotted Tohee	<i>Pipilo maculatus</i>	Emberizidae				WC
Tree Sparrow	<i>Spizella arborea</i>	Emberizidae			CS	WC
Vesper Sparrow	<i>Poocetes gramineus</i>	Emberizidae		IR		WC
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	Emberizidae	PC	IR	CS	WC
House Finch	<i>Carpodacus mexicanus</i>	Fringillidae	PC	IR		
Pine Grosbeak	<i>Pinicola enucleator</i>	Fringillidae		IR		
Bank Swallow	<i>Riparia riparia</i>	Hiruninidae		IR		
Barn Swallow	<i>Hirundo rustica</i>	Hiruninidae	PC	IR	CS	WC
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	Hiruninidae		IR		WC

Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Hiruninidae	PC	IR		
Tree Swallow	<i>Tachycineta bicolor</i>	Hiruninidae	PC	IR	CS	WC
Violet-green Swallow	<i>Tachycineta thalassina</i>	Hiruninidae	PC	IR	CS	WC
Brewers Blackbird	<i>Euphagus cyanocephalus</i>	Icteridae	PC	IR	CS	WC
Brown-headed Cowbird	<i>Molothrus ater</i>	Icteridae	PC			
Bullock's Oriole	<i>Icterus bullockii</i>	Icteridae		IR	CS	WC
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Icteridae	PC	IR	CS	WC
Western Meadowlark	<i>Sturnella neglecta</i>	Icteridae	PC	IR	CS	WC
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	Icteridae	PC	IR		
Loggerhead Shrike	<i>Lanius ludovicianus</i>	Laniidae		IR		WC
Black-capped Chickadee	<i>Poecile atricapilla</i>	Paridae		IR		
Common Yellowthroat	<i>Geothlypis trichas</i>	Parulidae		IR		
Nashville Warbler	<i>Vermivora ruficapilla</i>	Parulidae		IR		
Wilson's Warbler	<i>Wilsonia pusilla</i>	Parulidae		IR		WC
Yellow Warbler	<i>Dendroica petechia</i>	Parulidae	PC	IR		WC
Yellow-rumped Warbler	<i>Dendroica coronata</i>	Parulidae	PC			WC
House (English) Sparrow	<i>Paser domesticus</i>	Passeridae	PC	IR	CS	WC
White-breasted Nuthatch	<i>Sitta carolinensis</i>	Sittidae			CS	
European Starling	<i>Sturnus vulgaris</i>	Sturnidae	PC	IR	CS	WC
Western Tanager	<i>Piranga ludoviciana</i>	Thraupidae		IR		WC
Bewick's Wren	<i>Thryomanes bewickii</i>	Troglodytidae		IR		WC
Marsh wren	<i>Cistothorus palustris</i>	Troglodytidae	PC	IR		WC
American Robin	<i>Turdus migratorius</i>	Turdidae	PC	IR	CS	WC
Swainson Thrush	<i>Catharus ustulatus</i>	Turdidae	PC			
Western Bluebird	<i>Sialia mexicana</i>	Turdidae	PC			
Eastern Kingbird	<i>Tyrannus tyrannus</i>	Tyrannidae		IR	CS	WC
Say's Phoebe	<i>Sayornis saya</i>	Tyrannidae				WC
Western Kingbird	<i>Tyrannus verticalis</i>	Tyrannidae	PC	IR	CS	WC
Warbling Vireo	<i>Vireo gilvus</i>	Vireonidae		IR		WC
<b>Pelecaniformes</b>						
American White Pelican	<i>Pelecanus erythrorhynchos</i>	Pelecanidae		IR		WC
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	Phalacrocoracidae		IR		WC
<b>Piciformes</b>						
Downy Woodpecker	<i>Picoides pubescens</i>	Picidae	PC	IR		
Lewis' Woodpecker	<i>Melanerpes lewis</i>	Picidae		IR		WC
Northern Flicker	<i>Colaptes auratus</i>	Picidae	PC	IR	CS	WC
<b>Podicipediformes</b>						
Pied-billed Grebe	<i>Podilymbus podiceps</i>	Podicipedidae	PC	IR		
Western Grebe	<i>Aechmophorus occidentalis</i>	Podicipedidae	PC	IR		WC
<b>Strigiformes</b>						
Burrowing Owl	<i>Athene cunicularia</i>	Strigidae	PC	IR		
Great Horned Owl	<i>Bubo virginianus</i>	Strigidae		IR		WC

	Short-eared Owl	<i>Asio flammeus</i>	Strigidae	PC	IR		WC	
	Western Screech Owl	<i>Megascops kennicottii</i>	Strigidae				WC	
	Barn Owl	<i>Tyto alba</i>	Tytonidae	PC	IR			
<b>Mammal</b>	<b>Artiodactyla</b>							
	Mule Deer	<i>Odocoileus hemionus</i>	Cervidae	PC	IR	CS	WC	
	<b>Carnivora</b>							
	Coyote	<i>Canis latrans</i>	Canidae	PC	IR	CS	WC	
	Badger	<i>Taxidea taxus</i>	Mustelidae		IR		WC	
	Mink	<i>Mustella vision</i>	Mustelidae		IR		WC	
	Otter	<i>Lutra canadensis</i>	Mustelidae		IR		WC	
	Striped Skunk	<i>Mephitis mephitis</i>	Mustelidae	PC	IR		WC	
	Weasel	<i>Mustella spp</i>	Mustelidae	PC				
	Raccoon	<i>Procyon lotor</i>	Procyonidae	PC	IR	CS	WC	
	<b>Chiroptera</b>							
	Little Brown Myotis	<i>Myotis lucifugus</i>	Vespertilionidae		IR			
	<b>Lagomorpha</b>							
	Black-tailed Jackrabbit	<i>Lepus californicus</i>	Leporidae	PC	IR		WC	
	Mountain Cottontail	<i>Sylvilagus nuttallii</i>	Leporidae		IR		WC	
	<b>Rodentia</b>							
	Beaver	<i>Castor canadensis</i>	Castoridae	PC	IR		WC	
	Bushy-tailed Woodrat	<i>Neotoma cinerea</i>	Cricetidae		IR			
	Porcupine	<i>Erethizon dorsatum</i>	Erethizontidae		IR	CS	WC	
	Northern Pocket Gopher	<i>Thomomys talpoides</i>	Geomyidae	PC	IR	CS	WC	
	Great Basin Pocket Mouse	<i>Perognathus parvus</i>	Heteromyidae		IR		WC	
	Kangaroo Rat	<i>Dipodomys ordii</i>	Heteromyidae	PC				
	Ords Kangaroo Rat	<i>Dipodomys ordii</i>	Heteromyidae		IR		WC	
	Deer Mouse	<i>Peromyscus maniculatus</i>	Muridae	PC	IR	CS	WC	
	Long-tailed Vole	<i>Microtus longicaudus</i>	Muridae		IR		WC	
	Montane Vole	<i>Microtus montanus</i>	Muridae		IR		WC	
	Muskrat	<i>Ondatra zibethicus</i>	Muridae	PC	IR	CS	WC	
	Sagebrush Vole	<i>Lemmyscus curtatus</i>	Muridae		IR		WC	
	White-footed Mouse	<i>Peromyscus leucopus</i>	Muridae	PC				
	Yellow-bellied Marmot	<i>Marmota flaviventris</i>	Sciuridae	PC	IR			
	<b>Amph./ Reptile</b>	<b>Anura</b>						
		Western Toad	<i>Bufo boreas</i>	Bufoidea		IR		WC
Woodhouse Toad		<i>Bufo woodhouseii</i>	Bufoidea		IR			
Tree (Chorus) Frog		<i>Hyla regilla</i>	Hylidae		IR		WC	
Great Basin Spadefoot		<i>Spea intermontana</i>	Pelobatidae		IR			
Bullfrog		<i>Rana catesbeiana</i>	Ranidae	PC		IR	WC	
Leopard Frog		<i>Rana pipiens</i>	Ranidae		IR			
<b>Caudata</b>								
Long-toed Salamander		<i>Ambystoma macrodactylum</i>	Ambystomatidae	PC	IR	CS	WC	

**Fish**

<b>Squamata</b>						
Rubber Boa	<i>Carhina bottae</i>	Boidae	PC	IR		WC
Gopher Snake	<i>Pituophis catenifer sayi</i>	Colubridae	PC	IR		WC
Racer	<i>Coluber constrictor</i>	Colubridae	PC	IR		WC
Common Garter Snake	<i>Thamnophis sirtalis</i>	Colubridae	PC	IR		WC
Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>	Colubridae	PC	IR		WC
Fence Lizard	<i>Sceloporus occidentalis</i>	Phrynosomatidae				WC
Short-horned Lizard (Horned Toad)	<i>Phrynosoma douglasii</i>	Phrynosomatidae	PC			
Western Rattlesnake	<i>Crotalus oreganus</i>	Viperidae				WC
<b>Testudines</b>						
Painted Turtle	<i>Chrysemys picta bellii</i>	Emydidae	PC	IR		WC
<b>Cypriniformes</b>						
Carp	<i>Cyprinus carpio</i>	Cyprinidae	IR			
<b>Cyprinodontiformes</b>						
Gambusia	<i>Gambusia affinis</i>	Poeciliidae	PC	IR		
<b>Perciformes</b>						
Black Crappie	<i>Pomoxis nigromaculatus</i>	Centrarchidae	IR			
Largemouth Bass	<i>Micropterus salmoides</i>	Centrarchidae	PC	IR		
<b>Siluriformes</b>						
Brown Bullhead	<i>Ameiurus nebulosus</i>	Ictaluridae	PC			
<b>Scorpaeniformes</b>						
Margined Sculpin	<i>Cottus marginatus</i>	Cottidae	IR			WC
<b>Petromyzontiformes</b>						
Pacific Lamprey	<i>Lampetra tridentate</i>	Petromyzontidae	IR			WC
Western Brook Lamprey	<i>Lampetra richardsoni</i>	Petromyzontidae	IR			WC
<b>Salmoniformes</b>						
Chinook Salmon - Snake River and Upper Columbia River	<i>Oncorhynchus tshawytscha</i>	Salmonidae	IR			WC
Coho Salmon	<i>Oncorhynchus kisutch</i>	Salmonidae	IR			WC
Steelhead-Upper and Middle Columbia River and Snake R.	<i>Oncorhynchus mykiss spp.</i>	Salmonidae	IR			WC
Interior Redband Trout	<i>Oncorhynchus mykiss gibbsi</i>	Salmonidae	IR			WC
Sockeye Salmon-Snake River	<i>Oncorhynchus nerka</i>	Salmonidae	IR			WC
Steelhead-Upper and Middle Columbia River and Snake R.	<i>Oncorhynchus mykiss spp.</i>	Salmonidae	IR			WC

## Elkhorn Wildlife Area

Species	Occurrence		Species	Occurrence	
	Frequent	Occasional		Frequent	Occasional
<b>Mammals</b>					
Rocky Mountain elk ( <i>Cervus elaphus</i> )	X		Snowshoe hare ( <i>Lepus americanus</i> )	X	
Mule deer ( <i>Odocoileus hemionus</i> )	X		Bats (species unknown)	X	
White-tail deer ( <i>Odocoileus virginianus</i> )	X		<b>Birds</b>		
Pronghorn ( <i>Antilocapra americana</i> )		X	Blue grouse ( <i>Dendragapus obscurus</i> )	X	
Black bear ( <i>Ursus americanus</i> )		X	Ruffed grouse ( <i>Bonasa umbellus</i> )	X	
Cougar ( <i>Puma concolor</i> )		X	California quail ( <i>Callipepla californica</i> )	X	
Bobcat ( <i>Lynx rufus</i> )		X	Chukar partridge ( <i>Alectoris chukar</i> )		X
Raccoon ( <i>Procyon lotor</i> )	X		Ring-necked pheasant ( <i>Phasianus colchicus</i> )		X
Beaver ( <i>Castor canadensis</i> )		X	Mourning dove ( <i>Zenaida macroura</i> )	X	
Muskrat ( <i>Ondatra zibethicus</i> )		X	Wild turkey ( <i>Meleagris gallopavo</i> )		X
Mink ( <i>Mustela vison</i> )		X	Common merganser ( <i>Mergus merganser</i> )		X
Coyote ( <i>Canis latrans</i> )	X		Wood duck ( <i>Aix sponsa</i> )		X
Badger ( <i>Taxidea taxus</i> )		X	Canada goose ( <i>Branta canadensis</i> )	X	
Long-tailed weasel ( <i>Mustela frenata</i> )		X	Mallard ( <i>Anas platyrhynchos</i> )	X	
Porcupine ( <i>Erethizon dorsatum</i> )		X	Cinnamon teal ( <i>Anas cyanoptera</i> )		X
Striped skunk ( <i>Mephitis mephitis</i> )		X	Turkey vulture ( <i>Cathartes aura</i> )		X
Belding's ground squirrel ( <i>Spermophilus beldingi</i> )	X		Great blue heron ( <i>Ardea herodias</i> )	X	
Yellow pine chipmunk ( <i>Tamias amoenus</i> )	X		Common snipe ( <i>Gallinago gallinago</i> )	X	
Red squirrel ( <i>Tamiasciurus hudsonicus</i> )	X		Killdeer ( <i>Charadrius vociferus</i> )	X	
Northern flying squirrel ( <i>Glaucomys sabrinus</i> )		X	Brewer's blackbird ( <i>Euphagus cyanocephalus</i> )	X	
Golden-mantled ground squirrel ( <i>Spermophilus lateralis</i> )	X		Brown-headed cowbird ( <i>Molothrus ater</i> )	X	
Columbian ground squirrel ( <i>Spermophilus columbianus</i> )			Barn swallow ( <i>Hirundo rustica</i> )	X	
Yellow-bellied marmot ( <i>Marmota flaviventris</i> )	X		Violet-green swallow ( <i>Tachycineta thalassina</i> )	X	
Tree swallow ( <i>Tachycineta bicolor</i> )	X		Black-capped chickadee ( <i>Parus atricapillus</i> )	X	
Cliff swallow ( <i>Hirundo pyrrhonota</i> )	X		Mountain chickadee ( <i>Parus gambeli</i> )	X	
American dipper		X	White-breasted nuthatch	X	

Species	Occurrence		Species	Occurrence	
	Frequent	Occasional		Frequent	Occasional
<i>(Cinclus mexicanus)</i>			<i>(Sitta carolinensis)</i>		
Pine grosbeak ( <i>Pinicola enucleator</i> )		X	Red-breasted nuthatch ( <i>Sitta canadensis</i> )	X	
Evening grosbeak ( <i>Coccothraustes vespertinus</i> )		X	Pygmy nuthatch ( <i>Sitta pygmaea</i> )		X
Cedar waxwing ( <i>Bombycilla cedrorum</i> )		X	House wren ( <i>Troglodytes aedon</i> )	X	
Common nighthawk ( <i>Chordeiles minor</i> )		X	American Robin ( <i>Turdus migratorius</i> )	X	
Rufus hummingbird ( <i>Selasphorus rufus</i> )		X	Swainson's thrush ( <i>Catharus ustulatus</i> )	X	
Belted kingfisher ( <i>Ceryle alcyon</i> )		X	Townsend's solitaire ( <i>Myadestes townsendi</i> )		X
Northern flicker ( <i>Colaptes auratus</i> )	X		Golden-crowned kinglet ( <i>Regulus satrapa</i> )		X
Red-naped sapsucker ( <i>Sphyrapicus nuchalis</i> )	X		Ruby-crowned kinglet ( <i>Regulus calendula</i> )		X
Hairy woodpecker ( <i>Picoides villosus</i> )		X	Northern shrike ( <i>Lanius excubitor</i> )		X
Downy woodpecker ( <i>Picoides pubescens</i> )	X		European starling ( <i>Sturnus vulgaris</i> )	X	
White-headed woodpecker ( <i>Picoides albolarvatus</i> )		X	Solitary vireo ( <i>Vireo solitarius</i> )		X
Pileated woodpecker ( <i>Dryocopus pileatus</i> )	X		Warbling vireo ( <i>Vireo gilvus</i> )		X
Western kingbird ( <i>Tyrannus verticalis</i> )	X		Townsend's warbler ( <i>Dendroica townsendi</i> )	X	
Western wood-pewee ( <i>Contopus sordidulus</i> )		X	Yellow-rumped warbler ( <i>Dendroica coronata</i> )		X
Olive-sided flycatcher ( <i>Contopus borealis</i> )		X	Yellow warbler ( <i>Dendroica petechia</i> )	X	
Gray jay ( <i>Perisoreus canadensis</i> )	X		MacGillivray's warbler ( <i>Oporornis tolmiei</i> )		X
Steller's jay ( <i>Cyanocitta stelleri</i> )	X		Western meadowlark ( <i>Sturnella neglecta</i> )	X	
Black-billed magpie ( <i>Pica pica</i> )	X		Bullock's oriole ( <i>Icterus bullockii</i> )	X	
Common raven ( <i>Corvus corax</i> )	X		Western tanager ( <i>Piranga ludoviciana</i> )		X
American crow ( <i>Corvus brachyrhynchos</i> )	X		Cassin's finch ( <i>Carpodacus cassinii</i> )	X	
Clark's nutcracker ( <i>Nucifraga columbiana</i> )	X		Pine siskin ( <i>Carduelis pinus</i> )	X	

## Klamath Wildlife Area

Occurrence: Abundant = a, Common = c, Uncommon = u, Rare = r

Symbols Used

**Sp** Spring; March-June

**S** Summer; July-September                      fc      fairly common

**F** Fall; October-December

**W** Winter; January-February                      o      occasional

(I) Introduced species

\* Nests in area    vr      very rare

### Seasonal Abundance

Amphibians	Sp	S	F	W
Western toad ( <i>Bufo boreas</i> )	u	u	u	
Pacific treefrog ( <i>Pseudacris regilla</i> )	u	u	u	o
Bullfrog (I) ( <i>Rana catesbeiana</i> )	c	c	c	
<b>Reptiles</b>				
Sagebrush lizard ( <i>Sceloporus graciosus</i> )	c	c	c	
Western skink ( <i>Eumeces skiltonianus</i> )	c	c	c	
Rubber boa ( <i>Charina bottae</i> )	c	c	c	
Western racer ( <i>Coluber mormon</i> )	u	u	u	
Ringneck snake ( <i>Diadophis punctatus</i> )	u	u	u	
Common garter snake ( <i>Thamnophis sirtalis</i> )	c	c	c	
Common gopher snake ( <i>Pituophis catenifer</i> )				
Western terrestrial garter snake ( <i>Thamnophis elegans</i> )	c	c	c	
Western pond turtle ( <i>Clemmys marmorata</i> )	c	c	c	
Short-horned lizard ( <i>Phrynosoma douglassii</i> )	u	u	u	
Western fence lizard ( <i>Sceloporus occidentalis</i> )	u	u	u	
<b>Mammals</b>				
Black-tailed deer ( <i>Odocoileus hemionus columbianus</i> )		o		
Mule deer ( <i>Odocoileus hemionus hemionus</i> )	u	c	c	o
Pronghorn ( <i>Antilocapra americana</i> )	o	o		
Coyote ( <i>Canis latrans</i> )	c	c	c	c
Common gray fox ( <i>Urocyon cinereoargenteus</i> )	o	o		o

Red fox ( <i>Vulpes vulpes</i> )	u	u	u	u
Striped skunk ( <i>Mephitis mephitis</i> )	c	c	c	c
Western spotted skunk ( <i>Spilogale gracilis</i> )	o	o	o	o
Northern Raccoon ( <i>Procyon lotor</i> )	c	c	c	c
Bobcat ( <i>Lynx rufus</i> )	c	c	c	c
Beaver ( <i>Castor canadensis</i> )	o	o	o	o
Northern river otter ( <i>Lontra canadensis</i> )	o	o	o	o
Muskrat ( <i>Ondatra zibethicus</i> )	c	c	c	c
American mink ( <i>Mustela vison</i> )	c	c	c	c
Long-tailed weasel ( <i>Mustela frenata</i> )	c	c	c	c
Black-tailed Jackrabbit ( <i>Lepus californicus</i> )	c	c	c	c
Mountain cottontail ( <i>Sylvilagus nuttallii</i> )	c	c	c	c
American Badger ( <i>Taxidea taxus</i> )	r	r	r	
Yellow-bellied marmot ( <i>Marmota flaviventris</i> )	c	u	c	u
California kangaroo rat ( <i>Dipodomys californicus</i> )	u	u	u	u
Deer mouse ( <i>Peromyscus maniculatus</i> )	c	c	c	c
House mouse (l) ( <i>Mus musculus</i> )	c	c	c	c
Great Basin pocket mouse ( <i>Perognathus parvus</i> )	u	u	u	
Belding's ground squirrel ( <i>Spermophilus beldingi</i> )	c	u	c	u
Golden-mantled ground squirrel ( <i>Spermophilus lateralis</i> )	c	u	c	u
Western gray squirrel ( <i>Sciurus griseus</i> )	fc	c	c	u
Douglas's squirrel ( <i>Tamiasciurus douglasii</i> )	fc	c	c	u
Western harvest mouse ( <i>Reithrodontomys megalotis</i> )	c	c	c	u
Montane vole ( <i>Microtus montanus</i> )	c	c	c	c
California ground squirrel ( <i>Spermophilus beecheyi</i> )	c	c	c	
California myotis ( <i>Myotis californicus</i> )	c	c	c	
Big brown bat ( <i>Eptesicus fuscus</i> )	c	c		
Pallid bat ( <i>Antrozous pallidus</i> )	c	c	c	u
Little brown myotis ( <i>Myotis lucifugus</i> )	c	c		
Silver-haired bat ( <i>Lasionycteris noctivagans</i> )	c	c		
Water shrew ( <i>Sorex palustris</i> )	fc	fc	fc	u
Vagrant shrew ( <i>Sorex vagrans</i> )	c	c	c	
Bushy-tailed woodrat ( <i>Neotoma cinerea</i> )	c	c	fc	u
North American porcupine ( <i>Erithizon dorsatum</i> )	c	c	c	c
Northern pocket gopher ( <i>Thomomys talpoides</i> )	c	c	c	u

Broad-footed mole ( <i>Scapanus latimanus</i> )	fc	fc	fc	u
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Birds	Seasonal Abundance			
	Sp	S	F	W
<b>Loons, Grebes</b>				
Common loon ( <i>Gavia immer</i> )	r		r	
Pied-billed grebe * ( <i>Podilymbus podiceps</i> )	c	fc	c	fc
Horned grebe ( <i>Podiceps auritus</i> )			o	
Eared grebe ( <i>Podiceps nigricollis</i> )	fc	o	fc	r
Western grebe ( <i>Aechmophorus occidentalis</i> )	fc	u	fc	r
Clark's grebe ( <i>Aechmophorus clarkii</i> )	u	u	u	r
<b>Pelicans, Cormorants</b>				
American white pelican ( <i>Pelecanus erythrorhynchos</i> )	c	fc	c	
Double-crested cormorant ( <i>Phalacrocorax auritus</i> )	c	c	c	
<b>Herons, Bitterns, Ibis</b>				
American bittern * ( <i>Botarus lentiginosus</i> )	u	u	u	
Least bittern ( <i>Ixobrychus exilis</i> )		r	r	
Great blue heron ( <i>Ardea herodias</i> )	c	c	c	fc
Green-backed heron ( <i>Butorides virescens</i> )	vr	vr	vr	
Great egret ( <i>Ardea alba</i> )	c	c	c	
Cattle egret ( <i>Bubulcus ibis</i> )		vr		
Snowy egret ( <i>Egretta thula</i> )		fc		
White-faced ibis ( <i>Plegadis chihi</i> )	fc	fc	vr	
Black-crowned night heron ( <i>Nycticorax nycticorax</i> )	fc	c	fc	o
<b>Waterfowl</b>				
Tundra Swan ( <i>Cygnus columbianus</i> )	fc	o	c	c
Greater white-fronted goose ( <i>Anser albifrons</i> )	c	r	u	fc
Lesser snow goose ( <i>Chen caerulescens</i> )	c	r	u	o
Ross' goose ( <i>Chen rossii</i> )	c		u	o
Lesser Canada goose ( <i>Branta hutchinsii parvipes</i> )	u			u
Canada goose * ( <i>Branta canadensis</i> )	c	c	fc	c
Cackling Canada goose ( <i>Branta hutchinsii minima</i> )	c			fc
Wood duck* ( <i>Aix sponsa</i> )	o	o	o	

Green-winged teal ( <i>Anas crecca</i> )	fc	r	fc
Northern pintail * ( <i>Anas acuta</i> )	c	c	fc u
Mallard * ( <i>Anas platyrhynchos</i> )	c	c	c u
Blue-winged teal ( <i>Anas discors</i> )	o	o	
Cinnamon teal * ( <i>Anas cyanoptera</i> )	c	c	c
Northern shoveler * ( <i>Anas clypeata</i> )	c	u	c o
Gadwall * ( <i>Anas strepera</i> )	c	c	c o
American wigeon ( <i>Anas americana</i> )	c	u	c r
Canvasback * ( <i>Aythya valisineria</i> )	c	u	c o
Redhead * ( <i>Aythya americana</i> )	c	c	c r
Ring-necked duck ( <i>Aythya collaris</i> )	u	u	u o
Greater scaup ( <i>Aythya marila</i> )	r		r
Lesser scaup * ( <i>Aythya affinis</i> )	c	o	c fc
Common goldeneye ( <i>Bucephala clangula</i> )	u		u u
Barrow's goldeneye ( <i>Bucephala islandica</i> )			o o
Bufflehead ( <i>Bucephala albeola</i> )	c	o	c o
Hooded merganser ( <i>Lophodytes cucullatus</i> )	o		o
Common merganser ( <i>Mergus merganser</i> )	c	o	c u
Ruddy duck * ( <i>Oxyura jamaicensis</i> )	c	c	c u

### **Birds of Prey**

Turkey vulture ( <i>Cathartes aura</i> )	fc	u	fc
Bald eagle* ( <i>Haliaeetus leucocephalus</i> )	u	o	u c
Golden eagle ( <i>Aquila chrysaetos</i> )	u		u u
Northern Harrier * ( <i>Circus cyaneus</i> )	c	c	u c
Sharp-shinned hawk ( <i>Accipiter striatus</i> )	u		u
Northern goshawk ( <i>Accipiter gentilis</i> )			o
Cooper's hawk ( <i>Accipiter cooperii</i> )	u		u
Red-shouldered hawk ( <i>Buteo lineatus</i> )			vr vr
Swainson's hawk ( <i>Buteo swainsoni</i> )	r		r
Red-tailed hawk * ( <i>Buteo jamaicensis</i> )	c	c	c c
Ferruginous hawk ( <i>Buteo regalis</i> )			o o
Rough-legged hawk ( <i>Buteo lagopus</i> )	u		fc fc
Osprey ( <i>Pandion haliaetus</i> )	r		r
American kestrel * ( <i>Falco sparverius</i> )	c	c	c c
Prairie falcon ( <i>Falco mexicanus</i> )	u	o	u u

Merlin ( <i>Falco columbarius</i> )	r	r	r
<b>Grouse, Quail, Pheasants</b>			
Chukar (l) ( <i>Alectoris chukar</i> )	r	r	r
Ring-necked pheasant * (l) ( <i>Phasianus colchicus</i> )	c	c	c
California quail * (l) ( <i>Callipepla californica</i> )	c	c	c
<b>Cranes, Rails, Coot</b>			
Virginia rail * ( <i>Rallus limicola</i> )	fc	fc	vr
Sora * ( <i>Porzana carolina</i> )	fc	fc	vr
American coot * ( <i>Fulica americana</i> )	c	c	c
Greater sandhill crane * ( <i>Grus canadensis</i> )	c	c	fc
<b>Shorebirds</b>			
Snowy plover ( <i>Charadrius alexandrinus</i> )			vr
Semipalmated plover ( <i>Charadrius semipalmatus</i> )	fc		u
Killdeer * ( <i>Charadrius vociferous</i> )	c	c	c
Black-necked stilt * ( <i>Himantopus mexicanus</i> )	c	c	fc
American avocet * ( <i>Recurvirostra americana</i> )	c	c	c
Greater yellowlegs ( <i>Tringa melanoleuca</i> )	c		c
Lesser yellowlegs ( <i>Tringa flavipes</i> )	fc		fc
Solitary sandpiper ( <i>Tringa solitaria</i> )	o		o
Willet * ( <i>Catoptrophorus semipalmatus</i> )	fc	c	fc
Spotted sandpiper * ( <i>Actitis macularia</i> )	fc	u	fc
Whimbrel ( <i>Numenius phaeopus</i> )	r		r
Long-billed curlew ( <i>Numenius americanus</i> )	u		u
Marbled godwit ( <i>Limosa fedoa</i> )	o		o
Western sandpiper ( <i>Calidris mauri</i> )	c	c	u
Least sandpiper ( <i>Calidris minutilla</i> )	c	c	u
Baird's sandpiper ( <i>Calidris bairdii</i> )	vr		u
Pectoral sandpiper ( <i>Calidris melanotos</i> )			u
Dunlin ( <i>Calidris alpina</i> )	fc		u
Short-billed dowitcher ( <i>Limnodromus griseus</i> )	r		r
Long-billed dowitcher ( <i>Limnodromus scolopaceus</i> )	fc	c	fc
Common snipe * ( <i>Gallinago gallinago</i> )	c	u	c
Wilson's phalarope * ( <i>Phalaropus tricolor</i> )	c	fc	c
Red-necked phalarope ( <i>Phalaropus lobatus</i> )	o		o

<b>Gulls, Terns</b>				
Bonaparte's gull ( <i>Larus philadelphia</i> )	fc	u		
Ring-billed gull ( <i>Larus delawarensis</i> )	c	c	c	fc
California gull ( <i>Larus californicus</i> )	c	c	c	fc
Herring gull ( <i>Larus argentatus</i> )	u	u	u	
Caspian tern ( <i>Sterna caspia</i> )	fc	u	fc	
Forster's tern * ( <i>Sterna forsteri</i> )	c	fc	c	
Black tern ( <i>Chidonias niger</i> )	u	o	u	
<b>Pigeons, Doves</b>				
Rock dove* (I) ( <i>Columba livia</i> )	c	c	c	c
Mourning dove ( <i>Zenaida macroura</i> )	fc	u	fc	r
<b>Owls</b>				
Barn owl * ( <i>Tyto alba</i> )	fc	fc	fc	fc
Great horned owl * ( <i>Bubo virginianus</i> )	fc	fc	fc	fc
Long-eared owl ( <i>Asio otus</i> )	vr	vr	vr	
Short-eared owl ( <i>Asio flammeus</i> )	r	r	r	r
Western screech owl ( <i>Otus kennicottii</i> )	u	u	u	
Burrowing owl ( <i>Athene cunicularia</i> )	Historically common; No recent sightings			
<b>Goatsuckers, Swifts, Hummingbirds</b>				
Common nighthawk * ( <i>Chordeiles minor</i> )			fc	
Vaux's swift ( <i>Chaetura vauxi</i> )		r		
Common poor-will ( <i>Phalaenoptilus nuttallii</i> )			vr	
Anna's Hummingbird ( <i>Calypte anna</i> )		r	r	
Rufous hummingbird ( <i>Selasphorus rufus</i> )		o	o	
<b>Kingfisher</b>				
Belted kingfisher ( <i>Ceryle alcyon</i> )	u	u	u	u
<b>Woodpeckers</b>				
Lewis' woodpecker ( <i>Melanerpes lewis</i> )				r
Red-breasted sapsucker ( <i>Sphyrapicus ruber</i> )				r
Downy woodpecker ( <i>Picoides pubescens</i> )			o	o
Hairy woodpecker ( <i>Picoides villosus</i> )				r
Northern flicker * ( <i>Colaptes auratus</i> )	c	c	c	c

**Flycatchers**

Western wood-pewee ( <i>Contopus sordidulus</i> )	u u
Willow flycatcher ( <i>Empidonax traillii</i> )	u fc
Hammond's flycatcher ( <i>Empidonax hammondii</i> )	o
Dusky flycatcher ( <i>Empidonax oberholseri</i> )	o
Gray flycatcher ( <i>Empidonax wrightii</i> )	u
Cordilleran flycatcher ( <i>Empidonax occidentalis</i> )	r
Say's phoebe ( <i>Sayornis saya</i> )	u
Western kingbird * ( <i>Tyrannus verticalis</i> )	c c

**Lark**

Horned lark * ( <i>Eremophila alpestris</i> )	fc fc fc u
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**Swallows**

Purple martin ( <i>Progne subis</i> )	r
Tree swallow * ( <i>Tachycineta bicolor</i> )	c c
Violet-green swallow ( <i>Tachycineta thalassina</i> )	u
Northern rough-winged swallow ( <i>Stelgidopteryx serripennis</i> )	u u
Bank swallow ( <i>Riparia riparia</i> )	u u
Cliff swallow * ( <i>Petrochelidon pyrrhonota</i> )	c c
Barn swallow * ( <i>Hirundo rustica</i> )	c c

**Jays, Magpies, Crows**

Western Scrub jay ( <i>Aphelocoma californica</i> )	o o o o
Steller's jay ( <i>Cyanocitta stelleri</i> )	r r r r
Black-billed magpie* ( <i>Pica hudsonia</i> )	o o o o
Common raven ( <i>Corvus corax</i> )	u u fc
American crow ( <i>Corvus brachyrhynchos</i> )	

**Chickadees, Bushtits, Nuthatches, Creepers**

Mountain chickadee ( <i>Poecile gambeli</i> )	o o
Bushtit ( <i>Psaltriparus minimus</i> )	o
Red-breasted nuthatch ( <i>Sitta canadensis</i> )	o
Brown creeper ( <i>Certhia americana</i> )	r

**Wrens**

Bewick's wren ( <i>Thryomanes bewickii</i> )	u u u u
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House wren * ( <i>Troglodytes aedon</i> )	u	o
Marsh wren * ( <i>Cistothorus palustris</i> )	c	c c u

### Kinglets, Bluebirds, Thrushes

Ruby-crowned kinglet ( <i>Regulus calendula</i> )	fc	fc
Mountain bluebird ( <i>Sialia currucoides</i> )	u	u u
Western bluebird ( <i>Sialia mexicana</i> )	r	r
Townsend's solitaire ( <i>Myadestes townsendi</i> )	o	o o o
Varied thrush ( <i>Ixoreus naevius</i> )	o	o
Hermit thrush ( <i>Catharus guttatus</i> )		o
American robin * ( <i>Turdus migratorius</i> )	u	u u u

### Pipits, Waxwings

Water pipit ( <i>Anthus rubescens</i> )	fc	fc r
Bohemian waxwing ( <i>Bombycilla garrulus</i> )		vr
Cedar waxwing ( <i>Bombycilla cedrorum</i> )	o	o o

### Shrikes

Northern shrike ( <i>Lanius excubitor</i> )	r	o u
Loggerhead shrike ( <i>Lanius ludovicianus</i> )	r	r

### Starling

European starling * (I) ( <i>Sturnus vulgaris</i> )	c	c c c
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### Vireos, Warblers

Solitary vireo ( <i>Vireo solitarius</i> )	u	u
Warbling vireo ( <i>Vireo gilvus</i> )	fc	fc
Orange-crowned warbler ( <i>Vermivora celata</i> )	c	c
Nashville warbler ( <i>Vermivora ruficapilla</i> )	o	u
Yellow warbler ( <i>Dendroica petechia</i> )	c	c
Yellow-rumped warbler ( <i>Dendroica coronata</i> )	c	c
MacGillivray's warbler ( <i>Oporonis tolmiei</i> )	u	fc
Common yellowthroat ( <i>Geothlypis trichas</i> )	u	o u
Black-throated gray warbler ( <i>Dendroica nigrescens</i> )	r	r
Wilson's warbler ( <i>Wilsonia pusilla</i> )	fc	fc
Townsend's warbler ( <i>Dendroica townsendi</i> )	r	

### Tanagers, Grosbeaks, Towhees

Western tanager ( <i>Piranga ludoviciana</i> )	u	u
Black-headed grosbeak ( <i>Pheucticus melanocephalus</i> )	u	u
Evening grosbeak ( <i>Coccothraustes vespertinus</i> )	fc	fc
Rufous-sided towhee ( <i>Pipilo erythrophthalmus</i> )	fc	fc
Lazuli bunting ( <i>Passerina amoena</i> )	u	

### Sparrows

American tree sparrow ( <i>Spizella arborea</i> )		o	o
Chipping sparrow ( <i>Spizella passerine</i> )	u	u	
Brewer's sparrow ( <i>Spizella breweri</i> )		o	o
Vesper sparrow * ( <i>Pooecetes gramineus</i> )	o	u	o
Lark sparrow ( <i>Chondestes grammacus</i> )	r	r	r
House sparrow* (I) ( <i>Passer domesticus</i> )	c	c	c c
Savannah sparrow * ( <i>Passerculus sandwichensis</i> )	c	c	c r
Fox sparrow * ( <i>Passerella iliaca</i> )	u	o	u o
Song sparrow * ( <i>Melospiza melodia</i> )	c	c	c c
Lincoln's sparrow ( <i>Melospiza lincolni</i> )	fc	fc	
Golden-crowned sparrow ( <i>Zonotrichia atricapilla</i> )	fc	fc	o
White-crowned sparrow ( <i>Zonotrichia leucophrys</i> )	c	c	u
Harris' sparrow ( <i>Zonotrichia querula</i> )			vr
Dark-eyed junco ( <i>Junco hyemalis</i> )	fc	fc	o
Lapland longspur ( <i>Calcarius lapponicus</i> )		r	r

### Blackbirds

Red-winged blackbird * ( <i>Agelaius phoeniceus</i> )	c	c	c fc
Tricolored blackbird ( <i>Agelaius tricolor</i> )	fc	u	u o
Western meadowlark * ( <i>Sturnella neglecta</i> )	c	c	c u
Yellow-headed blackbird * ( <i>Xanthocephalus xanthocephalus</i> )	c	c	c r
Brewer's blackbird * ( <i>Euphagus cyanocephalus</i> )	c	c	c fc
Brown-headed cowbird * ( <i>Molothrus ater</i> )	fc	fc	fc r
Northern oriole * ( <i>Icterus galbula</i> )	u	u	

### Finches

Purple finch ( <i>Carpodacus purpureus</i> )		o	
Cassin's finch ( <i>Carpodacus cassinii</i> )		o	
House finch * ( <i>Carpodacus mexicanus</i> )	c	c	c c
Pine siskin ( <i>Carduelis pinus</i> )	o	o	

Lesser goldfinch ( <i>Carduelis psaltria</i> )	o	o
American goldfinch ( <i>Carduelis tristis</i> )	u	u

## Ladd Marsh Wildlife Area

Occurrence: Abundant = A, Common = C, Uncommon = U, Rare = R

<b>Bird Species Common Name</b>	<b>Scientific Name</b>	<b>Spring</b>	<b>Summer</b>	<b>Fall</b>	<b>Winter</b>
Greater White-fronted Goose	<i>Anser albifrons</i>	C		O	
Snow Goose	<i>Chen caerulescens</i>	O		U	
Ross's Goose	<i>Chen rossii</i>	R			
Cackling Goose	<i>Branta hutchinsii</i>	R			R
Canada Goose	<i>Branta canadensis</i>	C	C	C	C
Trumpeter Swan	<i>Cygnus buccinator</i>	R		R	R
Tundra Swan	<i>Cygnus columbianus</i>	C		C	U
Wood Duck	<i>Aix sponsa</i>	U	U	O	R
Gadwall	<i>Anas strepera</i>	C	C	C	O
Eurasian Wigeon	<i>Anas penelope</i>	R			
American Wigeon	<i>Anas americana</i>	C	U	C	O
Mallard	<i>Anas platyrhynchos</i>	C	C	C	C
Blue-winged Teal	<i>Anas discors</i>	C	C	C	
Cinnamon Teal	<i>Anas cyanoptera</i>	C	C	C	
Northern Shoveler	<i>Anas clypeata</i>	C	C	C	R
Northern Pintail	<i>Anas acuta</i>	C	U	C	R
Green-winged Teal	<i>Anas crecca</i>	C	C	C	
Canvasback	<i>Aythya valisineria</i>	U	U	U	R
Redhead	<i>Aythya americana</i>	C	C	C	O
Ring-necked Duck	<i>Aythya collaris</i>	C	O	U	R
Lesser Scaup	<i>Aythya affinis</i>	U	O	U	R
Surf Scoter	<i>Melanitta perspicillata</i>	X			R
White-winged Scoter	<i>Melanitta fusca</i>				R
Long-tailed Duck	<i>Clangula hyemalis</i>				X
Bufflehead	<i>Bucephala albeola</i>	C		C	U
Common Goldeneye	<i>Bucephala clangula</i>	C	R	C	C
Barrow's Goldeneye	<i>Bucephala islandica</i>	O		O	O
Hooded Merganser	<i>Lophodytes cucullatus</i>	O	O	O	O
Common Merganser	<i>Merus merganser</i>	U	U	U	U
Ruddy Duck	<i>Oxyura jamaicensis</i>	C	C	U	O
Gray Partridge	<i>Perdix perdix</i>	U	U	U	U
Ring-necked Pheasant	<i>Phasianus colchicus</i>	C	C	C	C
Ruffed Grouse	<i>Bonasa umbellus</i>	U	U	U	U
Dusky Grouse	<i>Dendragopus obscurus</i>	U	U	U	U
Wild Turkey	<i>Meleagris gallopavo</i>	O	O	O	O
California Quail	<i>Callipepla californica</i>	C	C	C	C
Common Loon	<i>Gavia immer</i>	R		R	
Pied-billed Grebe	<i>Podilymbus podiceps</i>	U	U	U	R
Horned Grebe	<i>Podiceps auritus</i>	O	R	O	R
Red-necked Grebe	<i>Podiceps grisegena</i>	R		R	
Eared Grebe	<i>Podiceps nigricollis</i>	U	U	O	
Western Grebe	<i>Aechmophorus occidentalis</i>	R		R	
Clark's Grebe	<i>Aechmophorus clarkii</i>	R		R	

<b>Bird Species Common Name</b>	<b>Scientific Name</b>	<b>Spring</b>	<b>Summer</b>	<b>Fall</b>	<b>Winter</b>
American White Pelican	<i>Pelecanus erythrorhynchos</i>	O	O		
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	O	U	O	
American Bittern	<i>Botaurus lentiginosus</i>	U	U	U	
Great Blue Heron	<i>Ardea herodias</i>	C	C	C	C
Great Egret	<i>Ardea alba</i>	R	R	R	
Snowy Egret	<i>Egretta thula</i>	R		R	
Cattle Egret	<i>Bubulcus ibis</i>	X			
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	U	U	U	
White-faced Ibis	<i>Plegadis chihi</i>	R	R	R	
Turkey Vulture	<i>Cathartes aura</i>	O	O	O	
Osprey	<i>Pandion haliaetus</i>	U	U	U	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	C	R	O	C
Northern Harrier	<i>Circus cyaneus</i>	C	C	C	C
Sharp-shinned Hawk	<i>Accipiter striatus</i>	U	O	U	U
Cooper's Hawk	<i>Accipiter cooperii</i>	U	O	U	U
Northern Goshawk	<i>Accipiter gentilis</i>	O	O	O	O
Swainson's Hawk	<i>Buteo swainsoni</i>	C	C	C	
Red-tailed Hawk	<i>Buteo jamaicensis</i>	C	C	C	C
Ferruginous Hawk	<i>Buteo regalis</i>	R		R	
Rough-legged Hawk	<i>Buteo lagopus</i>	C			C
Golden Eagle	<i>Aquila chrysaetos</i>	U	O	U	U
American Kestrel	<i>Falco sparverius</i>	C	C	C	U
Merlin	<i>Falco columbarius</i>	O	O	O	U
Peregrine Falcon	<i>Falco peregrinus</i>	R	R		
Prairie Falcon	<i>Falco mexicanus</i>	O	O	O	U
Virginia Rail	<i>Rallus limicola</i>	U	U	U	R
Sora	<i>Porzana carolina</i>	U	U	U	
American Coot	<i>Fulica americana</i>	C	C	C	O
Sandhill Crane	<i>Grus canadensis</i>	C	C	O	
Black-bellied Plover	<i>Pluvialis squatarola</i>	R			
Pacific Golden-plover	<i>Pluvialis fulva</i>	R			
Semipalmated Plover	<i>Charadrius semipalmatus</i>	U		O	
Killdeer	<i>Charadrius vociferus</i>	C	C	C	U
Black-necked Stilt	<i>Himantopus mexicanus</i>	C	C	U	
American Avocet	<i>Recurvirostra americana</i>	C	C	U	
Greater Yellowlegs	<i>Tringa melanoleuca</i>	U	U	U	
Lesser Yellowlegs	<i>Tringa flavipes</i>	U	U	U	
Solitary Sandpiper	<i>Tringa solitaria</i>	O		O	
Willet	<i>Catoptrophorus semipalmatus</i>	R		R	
Spotted Sandpiper	<i>Actitis macularia</i>	C	C	C	
Long-billed Curlew	<i>Numenius americanus</i>	C	O	O	
Marbled Godwit	<i>Limosa fedoa</i>	R		R	
Ruddy Turnstone	<i>Arenaria interpres</i>	R		R	
Sanderling	<i>Calidris alba</i>	R		R	
Semipalmated Sandpiper	<i>Calidris pusilla</i>			R	
Western Sandpiper	<i>Calidris mauri</i>	C		C	
<b>Bird Species</b>	<b>Scientific Name</b>	<b>Spring</b>	<b>Summer</b>	<b>Fall</b>	<b>Winter</b>

<b>Common Name</b>					
Least Sandpiper	<i>Calidris minutilla</i>	C		C	
Baird's Sandpiper	<i>Calidris bairdii</i>	O		U	
Pectoral Sandpiper	<i>Calidris melanotos</i>	O		U	
Dunlin	<i>Calidris alpina</i>	R		R	
Stilt Sandpiper	<i>Calidris himantopus</i>			R	
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	O		O	
Wilson's Snipe	<i>Gallinago delicata</i>	C	C	C	O
Wilson's Phalarope	<i>Phalaropus tricolor</i>	U	U	U	
Red-necked Phalarope	<i>Phalaropus lobatus</i>	R	R	R	
Franklin's Gull	<i>Larus pipixcan</i>	R			
Bonaparte's Gull	<i>Larus philadelphia</i>	R		R	
Ring-billed Gull	<i>Larus delawarensis</i>	C	C	U	U
California Gull	<i>Larus californicus</i>	C	C	O	R
Herring Gull	<i>Larus argentatus</i>	O		O	
Sabine's Gull	<i>Xema sabini</i>	R		R	
Caspian Tern	<i>Sterna caspia</i>	O	R		
Forster's Tern	<i>Sterna forsteri</i>	R		R	
Black Tern	<i>Chlidonias niger</i>	O	O	O	
Rock Pigeon	<i>Columba livia</i>	C	C	C	C
Eurasian Collared-dove	<i>Streptopelia decaocto</i>	X			
Mourning Dove	<i>Zenaida macroura</i>	C	C	C	O
Barn Owl	<i>Tyto alba</i>	C	C	C	C
Western Screech Owl	<i>Otus kennicottii</i>	U	U	U	
Great Horned Owl	<i>Bubo virginianus</i>	C	C	C	C
Snowy Owl	<i>Nyctea scandiaca</i>				X
Northern Pygmy Owl	<i>Glaucidium gnoma</i>	O	O	O	O
Burrowing Owl	<i>Athene cunicularia</i>	O	O	U	
Great Gray Owl	<i>Strix nebulosa</i>	U	U	U	U
Long-eared Owl	<i>Asio otus</i>	O	O	O	O
Short-eared Owl	<i>Asio flammeus</i>	U	U	U	U
Northern saw-whet Owl	<i>Aegolius acadicus</i>	O	O	O	O
Common Nighthawk	<i>Chordeiles minor</i>	C	C	C	
Vaux's Swift	<i>Chaetura vauxi</i>	C	C	U	
Black-chinned Hummingbird	<i>Archilochus alexandri</i>	U	U	U	
Anna's Hummingbird	<i>Calypte anna</i>	R	R	R	
Calliope Hummingbird	<i>Stellula calliope</i>	U	U	U	R
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>	X			
Rufous Hummingbird	<i>Selasphorus rufus</i>	O	O	O	
Belted Kingfisher	<i>Ceryle alcyon</i>	C	C	C	U
Lewis' Woodpecker	<i>Melanerpes lewis</i>	O	O	O	
Downy Woodpecker	<i>Picoides pubescens</i>	C	C	C	
Hairy Woodpecker	<i>Picoides villosus</i>	C	C	C	C
White-headed Woodpecker	<i>Picoides albolarvatus</i>	O	O	O	O
Three-toed Woodpecker	<i>Picoides tridactylus</i>	O	O	O	O
Black-backed Woodpecker	<i>Picoides arcticus</i>	O	O	O	O
Northern Flicker	<i>Colaptes auratus</i>	C	C	C	C
Pileated Woodpecker	<i>Dryocopus pileatus</i>	C	C	C	C
<b>Bird Species</b>					
<b>Common Name</b>	<b>Scientific Name</b>	<b>Spring</b>	<b>Summer</b>	<b>Fall</b>	<b>Winter</b>

Olive-sided Flycatcher	<i>Contopus cooperi</i>	U	U	U	
Western Wood-pewee	<i>Contopus sordidulus</i>	C	C	C	
Willow Flycatcher	<i>Empidonax trailii</i>	C	C	C	
Hammond's Flycatcher	<i>Empidonax hammondii</i>	U	U	U	
Dusky Flycatcher	<i>Empidonax oberholseri</i>	U	U	U	
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	U	U	U	
Say's Phoebe	<i>Sayornis saya</i>	U	U	U	
Western Kingbird	<i>Tyrannus verticalis</i>	C	C	C	
Eastern Kingbird	<i>Tyrannus tyrannus</i>	C	C	C	
Loggerhead shrike	<i>Lanius ludovicianus</i>	O	O	O	O
Northern Shrike	<i>Lanius excubitor</i>	U		O	U
Cassin's Vireo	<i>Vireo cassinii</i>	O	O		
Warbling Vireo	<i>Vireo gilvus</i>	C	C	C	
Gray Jay	<i>Perisoreus canadensis</i>	U	C	C	U
Steller's Jay	<i>Cyanocitta stelleri</i>	C	C	C	C
Blue Jay	<i>Cyanocitta cristata</i>				R
Western Scrub-jay	<i>Aphelocoma californica</i>			R	
Clark's Nutcracker	<i>Nucifraga columbiana</i>	O	O	O	O
Black-billed Magpie	<i>Pica hudsonia</i>	C	C	C	C
American Crow	<i>Corvus brachyrhynchos</i>	C	C	U	O
Common Raven	<i>Corvus corax</i>	C	C	C	C
Horned Lark	<i>Eremophila alpestris</i>	C	C	C	C
Tree Swallow	<i>Tachycineta bicolor</i>	C	C	C	
Violet-green swallow	<i>Tachycineta thalassina</i>	C	C	C	
Northern rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	C	C	C	
Bank Swallow	<i>Riparia riparia</i>	C	C	C	
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	C	C	C	
Barn Swallow	<i>Hirundo rustica</i>	C	C	C	
Black-capped Chickadee	<i>Poecile atricapilla</i>	C	C	C	C
Mountain Chickadee	<i>Poecile gambeli</i>	C	C	C	C
Bushtit	<i>Psaltriparus minimus</i>	R	R	R	R
Red-breasted Nuthatch	<i>Sitta canadensis</i>	U	U	U	U
White-breasted Nuthatch	<i>Sitta carolinensis</i>	U	U	U	U
Pygmy Nuthatch	<i>Sitta pygmaea</i>	O	O	O	O
Brown Creeper	<i>Certhia americana</i>	U	O	U	O
Rock Wren	<i>Salpinctes obsoletus</i>	U	U		
Bewick's Wren	<i>Thryomanes bewickii</i>	U	U	O	
House Wren	<i>Troglodytes aedon</i>	C	C	C	
Winter Wren	<i>Troglodytes troglodytes</i>	O	O	O	O
Marsh Wren	<i>Cistothorus palustris</i>	C	C	C	O
Golden-crowned Kinglet	<i>Regulus satrapa</i>	U	U	U	U
Ruby-crowned Kinglet	<i>Regulus calendula</i>	C	C	C	U
Western Bluebird	<i>Sialia mexicana</i>	C	C	U	R
Mountain Bluebird	<i>Sialia currucoides</i>	C	C	U	R
Townsend's Solitaire	<i>Myadestes townsendi</i>	C	U	U	C
Hermit Thrush	<i>Catharus guttatus</i>	C	U	C	R
<b>Bird Species</b>					
<b>Common Name</b>	<b>Scientific Name</b>	<b>Spring</b>	<b>Summer</b>	<b>Fall</b>	<b>Winter</b>
American Robin	<i>Turdus migratorius</i>	C	C	C	U

Varied Thrush	<i>Ixoreus naevius</i>	U	U	U	U
Gray catbird	<i>Dumetella carolinensis</i>	R	R	R	
Eurasian Starling	<i>Sturnis vulgaris</i>	C	C	C	C
American Pipit	<i>Anthus rubescens</i>	R		R	
Bohemian Waxwing	<i>Bombycilla garrulus</i>	O		O	C
Cedar Waxwing	<i>Bombycilla cedrorum</i>	C	C	C	C
Orange-crowned Warbler	<i>Vermivora celata</i>	U	U	U	
Nashville Warbler	<i>Vermivora ruficapilla</i>	O	O	O	
Yellow Warbler	<i>Dendroica petechia</i>	C	C	C	
Yellow-rumped Warbler	<i>Dendroica coronata</i>	C	C	C	R
Townsend's Warbler	<i>Dendroica townsendi</i>	C	C	C	
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	U	U	U	
Common Yellowthroat	<i>Geothlypis trichas</i>	C	C	C	
Wilson's Warbler	<i>Wilsonia pusilla</i>	U	U	U	
Yellow-breasted Chat	<i>Icteria virens</i>	O	O	O	
Western Tanager	<i>Piranga ludoviciana</i>	C	C	C	
Spotted Towhee	<i>Pipilo maculatus</i>	C	C	C	R
American Tree Sparrow	<i>Spizella arborea</i>				O
Chipping Sparrow	<i>Spizella passerina</i>	C	C	C	U
Brewer's Sparrow	<i>Spizella breweri</i>	U			
Vesper Sparrow	<i>Poocetes gramineus</i>	U	U	U	
Lark Sparrow	<i>Chondestes grammacus</i>	U	O	U	
Sage Sparrow	<i>Amphispiza belli</i>	X			
Savannah Sparrow	<i>Passerculus sandwichensis</i>	C	C	C	
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	R	R		
Song Sparrow	<i>Melospiza melodia</i>	C	C	C	C
Lincoln's Sparrow	<i>Melospiza lincolni</i>	O	U	O	R
Swamp Sparrow	<i>Melospiza georgiana</i>	R			R
Harris's Sparrow	<i>Zonotrichia querula</i>				R
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	C		C	U
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>				X
Dark-eyed Junco	<i>Junco hyemalis</i>	C	C	C	C
Snow Bunting	<i>Plectrophenax nivalis</i>				O
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	U	U	U	
Lazuli Bunting	<i>Passerina amoena</i>	C	C	C	
Bobolink	<i>Dolichonix oryzivorus</i>	O	C	U	
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	C	C	C	U
Western Meadowlark	<i>Sturnella neglecta</i>	C	C	C	U
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	C	C	C	
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	C	C	C	U
Brown-headed Cowbird	<i>Molothrus ater</i>	C	C	C	O
Bullock's Oriole	<i>Icterus galbula</i>	C	C	C	
Gray-crowned Rosy-finch	<i>Leucosticte tephrocotis</i>	U	U	U	O
Pine Grosbeak	<i>Pinicola enucleator</i>	R			R
<b>Bird Species</b>					
<b>Common Name</b>	<b>Scientific Name</b>	<b>Spring</b>	<b>Summer</b>	<b>Fall</b>	<b>Winter</b>
Purple Finch	<i>Carpodacus purpureus</i>	R		R	R
Cassin's Finch	<i>Carpodacus cassinii</i>	C	C	U	C

House Finch	<i>Carpodacus mexicanus</i>	C	C	C	C
Red Crossbill	<i>Loxia curvirostra</i>	U	U	U	U
Common Redpoll	<i>Carduelis flammea</i>				X
Pine Siskin	<i>Carduelis pinus</i>	C	C	C	C
Lesser Goldfinch	<i>Carduelis psaltria</i>				R
American Goldfinch	<i>Carduelis tristis</i>	C	C	C	C
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	U	U	C	U
House Sparrow	<i>Passer domesticus</i>	C	C	C	C

**Occurrence (in appropriate habitat): C = Common; U = Uncommon; O = Occasional; R = Rare; X = Status Unclear (only 1 or 2 records for the area).**

<b>Mammal Species Common Name</b>	<b>Scientific Name</b>	<b>Occurrence</b>
<b>Insectivora</b>		
Vagrant shrew	<i>Sorex vagrans</i>	X
Preble's Shrew	<i>Sorex preblei</i>	X
Coast Mole	<i>Scapanus orarius</i>	X
<b>Chiroptera</b>		
Fringed Myotis	<i>Myotis thysanodes</i>	X
Yuma Myotis	<i>Myotis yumanensis</i>	U
Little Brown Bat	<i>Myotis lucifugus</i>	U
Long-legged Bat	<i>Myotis volans</i>	X
Big Brown Bat	<i>Eptesicus fuscus</i>	U
<b>Lagomorpha</b>		
Mountain Cottontail	<i>Sylvilagus nuttallii</i>	U
<b>Rodentia</b>		
Yellow-pine Chipmunk	<i>Neotamias amoenus</i>	C
Yellow-bellied Marmot	<i>Marmota flaviventris</i>	U
Belding's Ground Squirrel	<i>Spermophilus beldingi</i>	U
Columbian ground squirrel	<i>Spermophilus columbianus</i>	C
Eastern Fox Squirrel	<i>Sciurus niger</i>	O
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	U
Northern Pocket Gopher	<i>Thomomys talpoides</i>	C
American Beaver	<i>Castor canadensis</i>	O
Deer mouse	<i>Peromyscus maniculatus</i>	C
Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	C
Norway Rat	<i>Rattus norvegicus</i>	O
House Mouse	<i>Mus musculus</i>	U
Long-tailed Vole	<i>Microtus longicaudus</i>	C
Montane Vole	<i>Microtus montanus</i>	C
Western Jumping Mouse	<i>Zapus princeps</i>	C
Muskrat	<i>Ondatra zibethicus</i>	C
Porcupine	<i>Erithizon dorsatum</i>	U

<b>Carnivora</b>		
Coyote	<i>Canis latrans</i>	C
American Black Bear	<i>Ursus americanus</i>	O
Raccoon	<i>Procyon lotor</i>	U
Long-tailed weasel	<i>Mustela frenata</i>	U
Mink	<i>Mustela vison</i>	U
Badger	<i>Taxidea taxus</i>	O
River Otter	<i>Lontra canadensis</i>	U
Striped skunk	<i>Mephitis mephitis</i>	C
Cougar	<i>Puma concolor</i>	O
Bobcat	<i>Lynx rufus</i>	O
<b>Artiodactyla</b>		
Rocky Mountain elk	<i>Cervus canadensis</i>	C
Mule deer	<i>Odocoileus hemionus</i>	C
White-tailed deer	<i>Odocoileus virginianus</i>	U
Pronghorn	<i>Antilocapra americana</i>	U

<b>Amphibian Species</b>		
<b>Common Name</b>	<b>Scientific Name</b>	
Long-toed salamander	<i>Ambystoma macrodactylum</i>	C
Bullfrog	<i>Rana catesbeiana</i>	C
Columbia Spotted Frog	<i>Rana luteiventris</i>	R
Pacific Chorus Frog	<i>Pseudacris regilla</i>	C
Great Basin Spadefoot	<i>Spea intermontana</i>	U
<b>Reptile Species</b>		
<b>Common Name</b>	<b>Scientific Name</b>	
Western Painted Turtle	<i>Chrysemys picta belli</i>	U
Common Garter Snake	<i>Thamnophis sirtalis</i>	C
Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>	C
Gopher Snake	<i>Pituophis catenifer</i>	O
Western Rattlesnake	<i>Crotalus oreganus</i>	R
Racer	<i>Coluber constrictor</i>	O
Rubber boa	<i>Charina bottae</i>	O
Western Fence Lizard	<i>Sceloporus occidentalis</i>	O
Western skink	<i>Eumeces skiltonianus</i>	O

### Invertebrates present on Ladd Marsh Wildlife Area

<b>Invertebrate Species</b>	
<b>Common Name</b>	<b>Scientific Name</b>
<b>Odonata</b>	
<b>Coenagrionidae</b>	
Emma's dancer	<i>Argia emma</i>
Pacific forktail	<i>Ischnura cervula</i>

<b>Aeschnidae</b>	
Paddle-tailed Darner	<i>Aeshna palmata</i>
Lord of June	<i>Anax junius</i>
<b>Libellulidae</b>	
Western Pondhawk	<i>Erythemis collocata</i>
Eight-spotted Skimmer	<i>Libellula forensis</i>
Twelve-spotted Skimmer	<i>Libellula pulchella</i>
Four-spotted Skimmer	<i>Libellula quadrimaculata</i>
Common Whitetail	<i>Platythemis lydia</i>
Variiegated Meadowhawk	<i>Sympetrum corruptum</i>
Saffron-winged Meadowhawk	<i>Sympetrum costiferum</i>
Western Meadowhawk	<i>Sympetrum occidentale</i>
Striped Meadowhawk	<i>Sympetrum pallipes</i>
Black Saddlebags	<i>Tramea lacerata</i>
<b>Hemiptera</b>	
<b>Rhopalidae</b>	
Western box elder bug	<i>Boisea rubrolineatus</i>
<b>Coleoptera</b>	
<b>Curculionidae</b>	
Canada thistle stem weevil	<i>Ceutorhynchus litura</i>
Seed head weevil	<i>Larinus plinus</i>
Knapweed seed head weevil	<i>Larinus minutus</i>
Rose weevil	<i>Rhynchites bicolor</i>
<b>Diptera</b>	
<b>Tephritidae</b>	
Canada thistle stem gall fly	<i>Urophora cardui</i>
<b>Lepidoptera</b>	
<b>Hesperiidea</b>	
Woodland Skipper	<i>Ochlodes sylvanoides</i>
Persius duskywing	<i>Erynnis persius</i>
<b>Papilionidea</b>	
Pale Swallowtail	<i>Papilio eurymedon</i>
Western Tiger Swallowtail	<i>Papilio rutulus rutulus</i>
<b>Pierinae</b>	
Western White	<i>Pontia occidentalis</i>
Cabbage White	<i>Pieris rapae</i>
<b>Lycaeninae</b>	
Ruddy Copper	<i>Lycaena rubida</i>
Western Pygmy Blue	<i>Brephidium exilis</i>
<b>Melitaeini</b>	
Northern Checkerspot	<i>Chlosyne palla</i>
<b>Nymphalini</b>	
California Tortoiseshell	<i>Nymphalis californica</i>
Mourning Cloak	<i>Nymphalis antiopa</i>

Lorquin's Admiral	<i>Limenitis lorquini</i>
<b>Satyrinae</b>	
Common Wood Nymph	<i>Cercyonis pegala</i>
<b>Danainae</b>	
Monarch	<i>Danaus plexippus</i>
<b>Hymenoptera</b>	
<b>Apidae</b>	
Bumblebee	<i>Bombus spp</i>
<b>Cynipidae</b>	
Mossy rose gall	<i>Diplolepis rosae</i>

## Lower Deschutes Wildlife Area

The following table and letter keys identify the bird species presence/sightability by season and relative abundances: Occurrence for bird species according to (Miller, C. 1999): C = Common, U = Uncommon, R = Rare, X = Extremely Rare, \* = Regular breeder in the area, Bird season symbols: Spring(Sp) = March-May, Summer(Su) = June-August, Fall(F) = September-November, Winter(W) = December-February

Common Name	Scientific Name	Sp	Su	F	W
Pacific Loon	( <i>Gavia pacifica</i> )			X	X
Common Loon	( <i>Gavia immer</i> )	R		R	R
Pied-billed Grebe	( <i>Podilymbus podiceps</i> )	U	R	U	R
Horned Grebe	( <i>Podiceps auritus</i> )			U	U
Red-necked Grebe	( <i>Podiceps grisegena</i> )				X
Eared Grebe	( <i>Podiceps nigricollis</i> )			R	R
Western Grebe	( <i>Aechmophorus occidentalis</i> )	U		U	R
Double-crested Cormorant*	( <i>Phalacrocorax auritus</i> )	C	C	C	C
Great Blue Heron*	( <i>Ardea herodias</i> )	C	C	C	C
Great Egret	( <i>Ardea alba</i> )	X			
Black-crowned Night-Heron	( <i>Nycticorax nycticorax</i> )	X			
Greater White-fronted Goose	( <i>Anser albifrons</i> )	R		R	
Canada Goose*	( <i>Branta canadensis</i> )	C	C	C	C
Tundra Swan	( <i>Cygnus cygnus</i> )		R	R	
Trumpeter Swan	( <i>Cygnus buccinator</i> )		X		
Wood Duck	( <i>Aix sponsa</i> )			X	
Mallard*	( <i>Anas platyrhynchos</i> )	C	C	C	C
Northern Pintail	( <i>Anas acuta</i> )			R	R
Gadwall	( <i>Anas strepera</i> )			R	R
American Wigeon	( <i>Anas americana</i> )	U		C	C
Eurasian Wigeon	( <i>Anas penelope</i> )			X	
Northern Shoveler	( <i>Anas clypeata</i> )	R		R	R
Blue-winged Teal	( <i>Anas discors</i> )	R			
Cinnamon Teal	( <i>Anas cyanoptera</i> )	U			
Green-winged Teal	( <i>Anas crecca</i> )	U		U	U
Ring-necked Duck	( <i>Aythya collaris</i> )	U		U	C
Harlequin Duck	( <i>Histrionicus histrionicus</i> )				X
Redhead	( <i>Aythya americana</i> )	U		U	U
Canvasback	( <i>Aythya valisineria</i> )	R		R	R
Barrow's Goldeneye	( <i>Bucephala islandica</i> )			R	U
Common Goldeneye	( <i>Bucephala clangula</i> )	C		C	C
Bufflehead	( <i>Bucephala albeola</i> )	C		C	C
Greater Scaup	( <i>Aythya marila</i> )				U
Lesser Scaup	( <i>Aythya affinis</i> )	U		U	C
Common Merganser*	( <i>Mergus merganser</i> )	C	C	C	C
Hooded Merganser	( <i>Lophodytes cucullatus</i> )	R		R	U
Red-breasted Merganser	( <i>Mergus serrator</i> )	X			X
Ruddy Duck	( <i>Oxyura jamaicensis</i> )				R
Turkey Vulture	( <i>Cathartes aura</i> )	C	C		
Northern Harrier	( <i>Circus cyaneus</i> )	R			
Cooper's Hawk	( <i>Accipiter cooperii</i> )	R		R	R
Sharp-shinned Hawk	( <i>Accipiter striatus</i> )	R		R	R
Red-tailed Hawk*	( <i>Buteo jamaicensis</i> )	C	C	C	C

Common Name	Scientific Name	Sp	Su	F	W
Rough-legged Hawk	( <i>Buteo lagopus</i> )				U
Osprey	( <i>Pandion haliaetus</i> )	U	U	U	
Golden Eagle*	( <i>Aquila chrysaetos</i> )	U	U	U	U
Bald Eagle	( <i>Haliaeetus leucocephalus</i> )	R		R	U
American Kestrel*	( <i>Falco sparverius</i> )	C	C	C	U
Prairie Falcon*	( <i>Falco mexicanus</i> )	U	U	U	U
Peregrine Falcon	( <i>Falco peregrinus</i> )	R	R	R	R
Ring-necked Pheasant*	( <i>Phasianus colchicus</i> )	U	U	U	U
Hungarian (Gray) Partridge*	( <i>Perdix perdix</i> )	U	R	R	R
American Coot	( <i>Fulica americana</i> )	C		C	C
Chukar*	( <i>Alectoris chukar</i> )	C	C	C	U
California Quail*	( <i>Callipepla californica</i> )	C	C	C	C
Wild Turkey	( <i>Meleagris gallopavo</i> )	X			
Ring-billed Gull	( <i>Larus delawarensis</i> )	C	C	C	C
California Gull	( <i>Larus californicus</i> )	C	U	C	C
Herring Gull	( <i>Larus argentatus</i> )	R		R	
Thayer's Gull	( <i>Larus thayeri</i> )	R		R	
Glaucous-winged Gull	( <i>Larus glaucescens</i> )	U		U	U
Caspian Tern	( <i>Sterna caspia</i> )	U	U	U	
Killdeer*	( <i>Charadrius vociferus</i> )	C	C	C	U
Spotted Sandpiper*	( <i>Actitis macularia</i> )	R	R	R	
Black-necked Stilt	( <i>Himantopus mexicanus</i> )	U	U	U	
Rock Pigeon*	( <i>Columba livia</i> )	C	C	C	C
Mourning Dove*	( <i>Zenaida macroura</i> )	C	C	C	U
Western Screech-Owl	( <i>Megascops kennicottii</i> )	U	U	U	U
Great Horned Owl*	( <i>Bubo virginianus</i> )	U	U	U	U
Great Gray Owl	( <i>Strix nebulosa</i> )			X	
Common Nighthawk	( <i>Chordeiles minor</i> )		C		
White-throated Swift	( <i>Aeronautes saxatalis</i> )	R		R	
Vaux's Swift	( <i>Chaetura vauxi</i> )	R		R	
Belted Kingfisher	( <i>Ceryle alcyon</i> )	C	C	C	C
Rufous Hummingbird	( <i>Selasphorus rufus</i> )	R	U		
Northern Flicker	( <i>Colaptes auratus</i> )	C	C	C	C
Lewis's Woodpecker	( <i>Melanerpes lewis</i> )	R	U	U	R
Downy Woodpecker	( <i>Picoides pubescens</i> )	R	R	R	R
Western Wood-pewee	( <i>Contopus sordidulus</i> )		U		
Gray Flycatcher	( <i>Empidonax wrightii</i> )	U	U		
Say's Phoebe*	( <i>Sayornis saya</i> )	U	U		
Western Kingbird	( <i>Tyrannus verticalis</i> )	U	C		
Eastern Kingbird	( <i>Tyrannus tyrannus</i> )		R		
Northern Shrike	( <i>Lanius excubitor</i> )			R	R
Loggerhead Shrike*	( <i>Lanius ludovicianus</i> )	U	U		
Warbling Vireo	( <i>Vireo gilvus</i> )	U	U		
Black-billed Magpie*	( <i>Pica hudsonia</i> )	C	C	C	C
American Crow*	( <i>Corvus brachyrhynchos</i> )	C	C	C	C
Common Raven	( <i>Corvus corax</i> )	C	C	C	C
Horned Lark*	( <i>Eremophila alpestris</i> )	C	C	C	C
Tree Swallow*	( <i>Tachycineta bicolor</i> )	C	C	U	
Violet-green Swallow	( <i>Tachycineta thalassina</i> )	C	C	C	
Northern Rough-winged Swallow	( <i>Stelgidopteryx serripennis</i> )	C	C	U	

Common Name	Scientific Name	Sp	Su	F	W
Bank Swallow*	( <i>Riparia riparia</i> )	C	C	C	
Barn Swallow*	( <i>Hirundo rustica</i> )	C	C	C	
Cliff Swallow	( <i>Petrochelidon pyrrhonota</i> )	C	C	C	
Black-capped Chickadee*	( <i>Poecile atricapillus</i> )	C	C	C	C
Mountain Chickadee	( <i>Poecile gambeli</i> )	R		R	R
Bushtit*	( <i>Psaltriparus minimus</i> )	C	C	C	C
Bewick's Wren*	( <i>Thryomanes bewickii</i> )	C	C	C	C
House Wren*	( <i>Troglodytes aedon</i> )	C	C	U	
Winter Wren	( <i>Troglodytes troglodytes</i> )				R
Rock Wren*	( <i>Salpinctes obsoletus</i> )	U	U		
Canyon Wren*	( <i>Catherpes mexicanus</i> )	C	C	C	R
Marsh Wren	( <i>Cistothorus palustris</i> )	R		R	
American Dipper	( <i>Cinclus mexicanus</i> )	U	U	U	U
Golden-crowned Kinglet	( <i>Regulus satrapa</i> )			U	U
Ruby-crowned Kinglet	( <i>Regulus calendula</i> )	C		C	U
Mountain Bluebird	( <i>Sialia currucoides</i> )	U		U	
Western Bluebird	( <i>Sialia mexicana</i> )	U		U	
Townsend's Solitaire	( <i>Myadestes townsendi</i> )				R
American Robin*	( <i>Turdus migratorius</i> )	C	C	C	C
American Pipit	( <i>Anthus rubescens</i> )	R		R	
Hermit Thrush	( <i>Catharus guttatus</i> )	R		R	R
Cedar Waxwing	( <i>Bombycilla cedrorum</i> )	U	U	U	U
European Starling*	( <i>Sturnus vulgaris</i> )	C	C	C	C
Orange-crowned Warbler	( <i>Vermivora celata</i> )	U		U	
Yellow Warbler*	( <i>Dendroica petechia</i> )	C	C	U	
Black-throated Gray Warbler	( <i>Dendroica nigrescens</i> )	R			
Palm Warbler	( <i>Dendroica palmarum</i> )				X
Yellow-rumped Warbler	( <i>Dendroica coronata</i> )	C	U	C	U
Common Yellowthroat	( <i>Geothlypis trichas</i> )	R		R	
Wilson's Warbler	( <i>Wilsonia pusilla</i> )	U	U	U	
Western Tanager	( <i>Piranga ludoviciana</i> )	U	U		
Lazuli Bunting*	( <i>Passerina amoena</i> )	U	U	U	
Black-headed Grosbeak	( <i>Pheucticus melanocephalus</i> )	U	U		
Spotted Towhee*	( <i>Pipilo maculatus</i> )	C	C	C	U
House Sparrow*	( <i>Passer domesticus</i> )	C	C	C	C
Song Sparrow*	( <i>Melospiza melodia</i> )	C	C	C	C
Lincoln's Sparrow	( <i>Melospiza lincolni</i> )	R		R	
Dark-eyed Junco*	( <i>Junco hyemalis</i> )	C	C	U	U
White-crowned Sparrow	( <i>Zonotrichia leucophrys</i> )	C		C	C
Golden-crowned Sparrow	( <i>Zonotrichia atricapilla</i> )	U		U	U
Harris' Sparrow	( <i>Zonotrichia querula</i> )				X
Bullock's Oriole*	( <i>Icterus bullockii</i> )	C	C		
Western Meadowlark*	( <i>Sturnella neglecta</i> )	C	C	C	U
Red-Winged Blackbird*	( <i>Agelaius phoeniceus</i> )	C	C	C	U
Brewer's Blackbird*	( <i>Euphagus cyanocephalus</i> )	C	C	C	U
Brown-headed Cowbird*	( <i>Molothrus ater</i> )	C	C	C	
House Finch*	( <i>Carpodacus mexicanus</i> )	C	C	C	C
American Goldfinch*	( <i>Carduelis tristis</i> )	C	C	U	U
<b>Total Birds:</b>	<b>141</b>				

Common Name	Scientific Name
<b>Fish</b>	
Redband Trout	( <i>Oncorhynchus mykiss rideus</i> )
Steelhead	( <i>Oncorhynchus mykiss</i> )
Chinook Salmon	( <i>Oncorhynchus tshawytscha</i> )
Coho Salmon	( <i>Oncorhynchus kisutch</i> )
Sockeye Salmon	( <i>Oncorhynchus nerka</i> )
Bull Trout	( <i>Salvelinus confluentus</i> )
Mountain Whitefish	( <i>Prosopium williamsoni</i> )
Northern Pikeminnow	( <i>Ptychocheilus oregonensis</i> )
Chiselmouth	( <i>Acrocheilus alutaceus</i> )
Largescale Sucker	( <i>Catostomus macrocheilus</i> )
Peamouth	( <i>Mylocheilus caurinus</i> )
Redside Shiner	( <i>Richardsonius balteatus</i> )
Dace	( <i>Rhinichthys spp.</i> )
Sculpin	( <i>Cottus spp.</i> )
Pacific Lamprey	( <i>Lampetra tridentata</i> )
<b>Total Fish: 15</b>	

<b>Mammals</b>	
Little Brown Myotis	( <i>Myotis lucifugus</i> )
Townsend's Big-eared Bat	( <i>Plecotus townsendii</i> )
Pallid Bat	( <i>Antrozous pallidus</i> )
White-tailed Jackrabbit	( <i>Lepus townsendii</i> )
Mountain Cottontail	<i>Sylvilagus nuttallii</i>
California Ground Squirrel	( <i>Spermophilus beecheyi</i> )
Northern Pocket Gopher	( <i>Thomomys talpoides</i> )
Vagrant Shrew	( <i>Sorex vagrans</i> )
American Beaver	( <i>Castor canadensis</i> )
Great Basin Pocket Mouse	( <i>Perognathus parvus</i> )
Deer Mouse	( <i>Peromyscus maniculatus</i> )
House Mouse	<i>Mus musculus</i>
Bushy-tailed Woodrat	( <i>Neotoma cinerea</i> )
Montane Vole	( <i>Microtus montanus</i> )
Long-tailed Vole	( <i>Microtus longicaudus</i> )
Sagebrush Vole	( <i>Lagurus curtatus</i> )
Muskrat	( <i>Ondatra zibethicus</i> )
North American Porcupine	( <i>Erethizon dorsatum</i> )
Coyote	( <i>Canis latrans</i> )
Black Bear	( <i>Ursus americanus</i> )
Raccoon	( <i>Procyon lotor</i> )
River Otter	( <i>Lontra canadensis</i> )
Long-tailed Weasel	( <i>Mustela frenata</i> )
Mink	( <i>Mustela vison</i> )
American Badger	( <i>Taxidea taxus</i> )
Striped Skunk	( <i>Mephitis mephitis</i> )
Cougar	( <i>Puma concolor</i> )
Bobcat	( <i>Lynx rufus</i> )
Rocky Mountain Elk	( <i>Cervus elaphus nelsoni</i> )
Mule Deer	( <i>Odocoileus hemionus hemionus</i> )
California Bighorn Sheep	( <i>Ovis canadensis californiana</i> )
<b>Total Mammals: 31</b>	

Common Name	Scientific Name
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**Amphibians and Reptiles**

Long-toed Salamander	<i>(Ambystoma macrodactylum)</i>
Rough-skinned Newt	<i>(Taricha granulose)</i>
Western Toad	<i>(Bufo boreas)</i>
Pacific Treefrog	<i>(Pseudacris regilla)</i>
Bull Frog	<i>(Rana catesbeiana)</i>
Sagebrush Lizard	<i>(Sceloporus graciosus)</i>
Southern Alligator Lizard	<i>(Elgaria multicolor)</i>
Western Fence Lizard	<i>(Sceloporus occidentalis)</i>
Rubber Boa	<i>(Charina bottae)</i>
Racer	<i>(Coluber constrictor)</i>
Gopher Snake	<i>(Pituophis catenifer )</i>
Western Terrestrial Garter Snake	<i>(Thamnophis elegans)</i>
Common Garter Snake	<i>(Thamnophis sirtalis)</i>
Western Rattlesnake	<i>(Crotalus viridis)</i>

**Total Amphibians & Reptiles: 14**

## Riverside Wildlife Area

Common Name	Scientific Name	F	W	Sp	S
<b>Occurrence: A =Abundant, C = Common, U = Uncommon, R = Rare</b>					
<b>Waterfowl</b>					
American Widgeon	( <i>Anas penelope</i> )	U		C	C
Barrow's Goldeneye	( <i>Bucephala islandica</i> )			R	U
Blue-winged Teal	( <i>Anas discors</i> )	R			
Bufflehead	( <i>Bucephala albeola</i> )	C		C	C
Canada Goose	( <i>Branta canadensis</i> )*	C	C	C	C
Canvasback	( <i>Aythya valisineria</i> )	R		R	R
Cinnamon Teal	( <i>Anas cyanoptera</i> )	U			
Common Goldeneye	( <i>Bucephala clangula</i> )	C		C	C
Common Merganser	( <i>Mergus merganser</i> )*	C	C	C	C
Gadwall	( <i>Anas strepera</i> )			R	R
Great White-fronted goose	( <i>Anser albifrons</i> )	R		R	
Greater Scaup	( <i>Aythya marila</i> )				U
Green-winged Teal	( <i>Anas crecca</i> )	U		U	U
Hooded Merganser	( <i>Lophodytes cucullatus</i> )	R		R	U
Lesser Scaup	( <i>Aythya affinis</i> )	U		U	C
Mallard	( <i>Anas platyrhynchos</i> )*	C	C	C	C
Northern Pintail	( <i>Anus acuta</i> )			R	R
Northern Shoveler	( <i>Anas clypeata</i> )	R		R	R
Red-breasted Merganser	( <i>Mergus serrator</i> )	C		C	C
Redhead	( <i>Aythya americana</i> )	U		U	U
Ring-necked Duck	( <i>Aythya collaris</i> )	U		U	C
Ruddy Duck	( <i>Oxyura jamaicensis</i> )				R
Wood Duck	( <i>Aix sponsa</i> )			R	
<b>Waterbirds</b>					
American Coot	( <i>Fulica americana</i> )	C		C	C
American Pelican	( <i>Pelecanus erythrorhynchos</i> )	R		C	A
California Gull	( <i>Larus californicus</i> )	C	U	C	C
Caspian Tern	( <i>Sterna caspia</i> )	R	U		C
Common loon	( <i>Gavia immer</i> )	R		R	R
Common Snipe	( <i>Gallinago gallinago</i> )	U		R	C
Double-crested Cormorant	( <i>Phalacrocorax auritus</i> )	C	C	C	C
Eared Grebe	( <i>Podiceps nigricollis</i> )			R	R
Foster's Tern	( <i>Sterna fosteri</i> )			C	
Great Blue Heron	( <i>Ardea herodias</i> )	C	C	C	C
Horned Grebe	( <i>Podiceps auritus</i> )			U	U
Pacific loon	( <i>Gavia pacifica</i> )			R	U
Pie-billed Grebe	( <i>Podilymbus podiceps</i> )	U	R	U	R
Red-necked Grebe	( <i>Podiceps grisegena</i> )	R			U
Ring-billed Gull	( <i>Larus delawarensis</i> )	C	C	C	C
<b>Common Name</b>	<b>Scientific Name</b>	<b>F</b>	<b>W</b>	<b>Sp</b>	<b>S</b>
Western Grebe	( <i>Aechmophorus occidentalis</i> )	U		U	R

### Shore-Marsh-Wading

Black-crowned Night-heron	( <i>Nycticorax nycticorax</i> )	R			
Black-necked Stilt	( <i>Himantopus mexicanus</i> )			R	R
Great Egret	( <i>Adea alba</i> )	C			C
Greater Sandhill Crane	( <i>Grus canadensis</i> )			R	R
Killdeer	( <i>Charadrius vociferus</i> )*	C	C	C	U
Sandhill Crane	( <i>Grus canadensis</i> )	U		R	R
Sora	( <i>Porzana carolina</i> )			R	
Virginia Rail	( <i>Rallus limicola</i> )			R	
Willet	( <i>Tringa semipalmata</i> )			C	R

### Upland Game Birds

California Quail	( <i>Callipepla californica</i> )*	C	C	C	C
Chukar	( <i>Alectoris chukar</i> )*	C	C	C	C
Gray Partridge	( <i>Perdix perdix</i> )*	U	R	R	R
Ring-necked Pheasant	( <i>Phasianus colchicus</i> )*	U	U	U	U
Sage Grouse	( <i>Centrocercus urophasianu</i> )	U	U	R	R

### Migratory Game Birds

Mourning Dove	( <i>Zenaida macroura</i> )*	C	C	C	U
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### Passerines

American Crow	( <i>Corvus brachyrhynchos</i> )*	C	C	C	C
American Dipper	( <i>Cinclus mexicanus</i> )	U	U	U	U
American Goldfinch	( <i>Carduelis tristis</i> )*	C	C	U	U
American Robin	( <i>Turdus migratorius</i> )*	C	C	C	C
American Tree Sparrow	( <i>Spizella arborea</i> )	C	R	R	C
Ash-throated Flycatcher	( <i>Myarchus cinerascens</i> )	C	R	R	C
Barn Swallow	( <i>Hirundo rustica</i> )*	C	C	C	
Belted Kingfisher	( <i>Ceryle alcyon</i> )	C	C	C	C
Black-billed Magpie	( <i>Pica hudsonia</i> )*	C	C	C	C
Black-capped Chickadee	( <i>Poecile atricapilla</i> )*	C	C	C	C
Black-headed Grosbeak	( <i>Pheucticus melanocephalus</i> )	U	U		
Black-throated Sparrow	( <i>Amphispiza bilineata</i> )		U	R	C
Brewer's Blackbird	( <i>Euphagus cyanocephalus</i> )*	C	C	C	U
Brewer's Sparrow	( <i>Spizella breweri</i> )			C	R
Brown-headed Cowbird	( <i>Molothrus ater</i> )*	C	C	C	
Bullock's Oriole	( <i>Icterus bullockii</i> )*	C	C		
Bushtit	( <i>Psaltirparus minimus</i> ) *	C	C	C	C
Canyon Wren	( <i>Catherpes mexicanus</i> )*	C	C	C	R
Cedar Waxwing	( <i>Bombycilla cedrorum</i> )	U	U	U	U
Cliff Swallow	( <i>Petrochelidon pyrrhonota</i> )	C	C	C	
Common Nighthawk	( <i>Chordeiles minor</i> )		C	C	C
Common Raven	( <i>Corvus corax</i> )	C	C	C	C
<b>Common Name</b>	<b>Scientific Name</b>	<b>F</b>	<b>W</b>	<b>Sp</b>	<b>S</b>
Common Yellowthroat	( <i>Geothlypis trichas</i> )	R		R	
Dark-eyed Junco	( <i>Junco hyemalis</i> )*	C	C	U	U
Downy Woodpecker	( <i>Picoides pubescens</i> )	R	R	R	R

Eastern Kingbird	( <i>Tyrannus tyrannus</i> )				
European Starling	( <i>Sturnus vulgaris</i> )*	C	C	C	C
Evening Grosbeak	( <i>Coccothraustes vespertinus</i> )			R	R
Golden-Crowned Kinglet	( <i>Regulus satrapa</i> )			U	U
Golden-crowned Sparrow	( <i>Zonotrichia atricapilla</i> )	U		U	U
Gray Flycatcher	( <i>Empidonax wrightii</i> )	U	U		
Hairy Woodpecker	( <i>Picoides villosus</i> )			R	R
Harris' Sparrow	( <i>Zonotrichia querula</i> )				R
Horned Lark	( <i>Eremophila alpestris</i> )*	C	C	C	C
House Finch	( <i>Carpodacus mexicanus</i> )*	C	C	C	C
House Sparrow	( <i>Passer domesticus</i> )*	C	C	C	C
House Wren	( <i>Troglodytes aedon</i> )*	C	C	U	
Lark Sparrow	( <i>Chondestes grammacus</i> )			R	
Lewis's Woodpecker	( <i>Melanerpes lewis</i> )	R	U	U	R
Loggerhead Shrike	( <i>Lanius ludovicianus</i> )*	U	U		
Marsh wren	( <i>Cistothorus palustris</i> )			C	R
Mountain Bluebird	( <i>Sialia currucoides</i> )	U		U	
Northern Flicker	( <i>Colaptes auratus</i> )	C	C	C	C
Northern Shrike	( <i>Lanius excubitor</i> )			R	R
Orange-crowned Warbler	( <i>Vermivora celata</i> )	U		U	
Pine Siskin	( <i>Carduelis pinus</i> )			R	
Red-Winged Blackbird	( <i>Agelaius phoeniceus</i> ) *	C	C	C	U
Rock Wren	( <i>Salpinctes obsoletus</i> )*	U	U		
Ruby-Crowned Kinglet	( <i>Regulus calendula</i> )	C		C	U
Rufous Hummingbird	( <i>Selaphorus rufus</i> )	R	U		
Sage Thrasher	( <i>Oreoscoptes montanus</i> )			C	C
Song Sparrow	( <i>Melospiza melodia</i> )*	C	C	C	C
Spotted Towhee	( <i>Pipilo maculatus</i> ) *	C	C	C	U
Townsend's Solitaire	( <i>Myadestes townsendi</i> )				R
Tree Swallow	( <i>Iridoprocne bicolor</i> )*	C	C	U	
Varied Thrush	( <i>Zoothera naevia</i> )			U	C
Vesper Sparrow	( <i>Pooecetes gramineus</i> )		R	U	
Violet-Green Swallow	( <i>Tachycineta thalassina</i> )	C	C	C	
Warbling Vireo	( <i>Vireo gilvus</i> )	U	U		
Western Bluebird	( <i>Sialia mexicana</i> )	U		U	R
Western Kingbird	( <i>Tyrannus verticalis</i> )*	U	C		
Western Meadowlark	( <i>Sturnella neglecta</i> )*	C	C	C	U
Western Tanager	( <i>Piranga ludoviciana</i> )	U	U		
White-crowned Sparrow	( <i>Zonotrichia leucophrys</i> )	C		C	C
White-throated Swift	( <i>Aeronautes saxatalis</i> )	R		R	
Willow Flycatcher	( <i>Empidonax traillii</i> )	R	C		
Wilson's Warbler	( <i>Wilsonia pusilla</i> )	U	U	U	
Winter wren	( <i>Troglodytes troglodytes</i> )		C	C	R
Yellow Warbler	( <i>Dendroica petechia</i> ) *	C	C	U	
Yellow-rumped Warbler	( <i>Dendroica coronata</i> )	C	U	C	U

Common Name	Scientific Name	F	W	Sp	S
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### Raptors

American Kestrel	( <i>Falco sparverius</i> )*	C	C	C	U
Bald Eagle	( <i>Haliaeetus leucocephalus</i> )	R		R	U
Ferruginous Hawk	( <i>Buteo regalis</i> )	U	U	C	C

Golden Eagle	( <i>Aquila chrysaetos</i> )*	U	U	U	U
Great Gray Owl	( <i>Strix nebulosa</i> )	R	R	C	C
Great Horned Owl	( <i>Bubo virginianus</i> )*	U	U	U	U
Long Eared Owl	( <i>Asio Otus</i> )	U	U	R	U
Northern Harrier	( <i>Circus cyaneus</i> )	U	R	C	C
Northern Rough-winged	( <i>Stelgidopteryx serripennis</i> )	C	C	U	
Osprey	( <i>Pandion haliaetus</i> )	U	U	U	
Prairie Falcon	( <i>Falco mexicanus</i> )*	U	U	U	U
Red-tailed Hawk	( <i>Buteo jamaicensis</i> )*	C	C	C	C
Rough-legged Hawk	( <i>Buteo lagopus</i> )				U
Turkey Vulture	( <i>Cathartes aura</i> )	R	R	U	C
Western Screech-Owl	( <i>Megascops kennicottii</i> )	U	U	U	U

<b>Mammal</b>	<b>Artiodactyla</b>		
	Mule Deer	<i>Odocoileus hemionus</i>	Cervidae
	<b>Carnivora</b>		
	Coyote	<i>Canis latrans</i>	Canidae
	Badger	<i>Taxidea taxus</i>	Mustelidae
	Mink	<i>Mustella vison</i>	Mustelidae
	Otter	<i>Lutra canadensis</i>	Mustelidae
	Striped Skunk	<i>Mephitis mephitis</i>	Mustelidae
	Weasel	<i>Mustella spp</i>	Mustelidae
	Raccoon	<i>Procyon lotor</i>	Procyonidae
	<b>Chiroptera</b>		
	Little Brown Myotis	<i>Myotis lucifugus</i>	Vespertilionidae
	<b>Lagomorpha</b>		
	Black-tailed Jackrabbit	<i>Lepus californicus</i>	Leporidae
	Mountain Cottontail	<i>Sylvilagus nuttallii</i>	Leporidae
	<b>Rodentia</b>		
	Beaver	<i>Castor canadensis</i>	Castoridae
	Bushy-tailed Woodrat	<i>Neotoma cinerea</i>	Cricetidae
	Porcupine	<i>Erethizon dorsatum</i>	Erethizontidae
	Northern Pocket Gopher	<i>Thomomys talpoides</i>	Geomyidae
	Great Basin Pocket Mouse	<i>Perognathus parvus</i>	Heteromyidae
	Kangaroo Rat	<i>Dipodomys ordii</i>	Heteromyidae
	Ords Kangaroo Rat	<i>Dipodomys ordii</i>	Heteromyidae
	Deer Mouse	<i>Peromyscus maniculatus</i>	Muridae
	Long-tailed Vole	<i>Microtus longicaudus</i>	Muridae
	Montane Vole	<i>Microtus montanus</i>	Muridae
	Muskrat	<i>Ondatra zibethicus</i>	Muridae
	Sagebrush Vole	<i>Lemmyscus curtatus</i>	Muridae
	White-footed Mouse	<i>Peromyscus leucopus</i>	Muridae
	Yellow-bellied Marmot	<i>Marmota flaviventris</i>	Sciuridae
<b>Amph./ Reptile</b>	<b>Anura</b>		
	Western Toad	<i>Bufo boreas</i>	Bufoidea
	Woodhouse Toad	<i>Bufo woodhouseii</i>	Bufoidea

Tree (Chorus) Frog	<i>Hyla regilla</i>	Hylidae
Great Basin Spadefoot	<i>Spea intermontana</i>	Pelobatidae
Bullfrog	<i>Rana catesbeiana</i>	Ranidae
Leopard Frog	<i>Rana pipiens</i>	Ranidae
<b>Caudata</b>		
Long-toed Salamander	<i>Ambystoma macrodactylum</i>	Ambystomatidae
<b>Squamata</b>		
Rubber Boa	<i>Carhina bottae</i>	Boidae
Gopher Snake	<i>Pituophis catenifer sayi</i>	Colubridae
Racer	<i>Coluber constrictor</i>	Colubridae
Common Garter Snake	<i>Thamnophis sirtalis</i>	Colubridae
Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>	Colubridae
Fence Lizard	<i>Sceloporus occidentalis</i>	Phrynosomatidae
Short-horned Lizard (Horned Toad)	<i>Phrynosoma douglasii</i>	Phrynosomatidae
Western Rattlesnake	<i>Crotalus oreganus</i>	Viperidae
<b>Testudines</b>		
Painted Turtle	<i>Chrysemys picta bellii</i>	Emydidae
<b>Gamefish</b>		
<b>Trouts: Family Salmonidae</b>		
Redband trout	<i>(Oncorhynchus mykiss irideus.)</i>	
Rainbow trout	<i>(Oncorhynchus mykiss)</i>	
Mountain whitefish	<i>(Prosopium williamsoni)</i>	
<b>Sunfishes: Family Centrarchidae</b>		
Smallmouth bass	<i>(Micropterus dolomieu)</i>	
Black crappie	<i>(Pomoxis nigromaculatus)</i>	
White crappie	<i>(Poromoxis annularis)</i>	
Bluegill	<i>(Lepomis macrochirus)</i>	
Pumpkinseed	<i>(Lepomis gibbosus)</i>	
<b>Perches: Family Percidae</b>		
Yellow perch	<i>(Perca flavescens)</i>	
<b>Bullhead catfishes: Family Ictaluridae</b>		
Channel catfish	<i>(Ictalurus punctatus)</i>	
Brown bullhead	<i>(Ameiurus nebulosus)</i>	

Fish

<b>Crayfishes: Family Asticidae</b>		
Crayfish	<i>(Pacifasticus gambeli, Pacifasticus leniusculus)</i>	
<b>NONGAME FISH</b>		
<b>Suckers: Family Catostomidae</b>		
Bridgelip sucker	<i>(Catostomus columbianus)</i>	
Largescale sucker	<i>(Catostomus macrocheilus)</i>	
<b>Minnows: Family Cyprinidae</b>		
Common carp	<i>(Cyprinus carpio)</i>	
Chiselmouth	<i>(Acrocheilus alutaceus)</i>	
Redside shiner	<i>(Richardsonius balteatus)</i>	
Longnose dace	<i>(Rhinichthys cataractae)</i>	
Speckled dace	<i>(Rhinichthys osculus)</i>	
Northern pikeminnow	<i>(Ptychocheilus oregonensis)</i>	
<b>Sculpins: Family Cottidae</b>		
Mottled sculpin	<i>(Cottus bairdii)</i>	

## Sauvie Island Wildlife Area

### Birds

#### Symbols

S -	March – May	C - Common
S -	June – August	R – Rare
F -	September – November	U – Uncommon
W -	December - February	A - Accidental
# -	Threatened or Endangered Species	O - Occasional
*	Breeds locally	

	SEASON			
	S	S	F	W
<b>Loons and Grebes</b>				
Red-throated Loon	R		R	O
Pacific Loon	R		R	O
Common Loon	R		R	O
Pied-billed Grebe*	C	C	C	C
Horned Grebe	O		O	R
Red-necked Grebe				A
Eared Grebe	O		O	O
Western Grebe	O	O	O	O
Clark's Grebe	O	O	O	O
<b>Pelicans and Cormorants</b>				
American White Pelican	R	R	R	R
Brown Pelican	A	A	A	
Double-crested Cormorant	C	O	C	C
<b>Bitterns, Herons and Ibis</b>				
American Bittern	C	U	U	O
Black-crowned Night Heron	R	R	R	R
Green Heron*	U	U	U	R
Cattle Egret			R	R
Snowy Egret			R	
Great Egret	U	U	U	U
Great Blue Heron*	C	C	C	C
White-faced Ibis				A
<b>Waterfowl</b>				
Tundra Swan	U	R	U	C
Trumpeter Swan	R	R	R	R
Greater White-fronted Goose	U	R	U	O
Snow Goose	O		O	U
Ross's Goose				R

Emperor Goose			R	R
Canada Goose	C	U	C	C
Cackling Goose	C		C	C
Brant	O	O	O	
Wood Duck*	C	C	U	U
Mallard*	C	C	C	C
American Black Duck				A
Gadwall*	U	O	U	U
Green-winged Teal	C	U	C	C
American Wigeon	C	U	C	C
Eurasian Wigeon	O		O	O
Northern Pintail*	C	U	C	C
Baikal Teal				A
Northern Shoveler*	C	O	C	C
Blue-winged Teal*	R	R	R	R
Cinnamon Teal*	U	C	U	O
Canvasback	O		O	O
Redhead				O
Ring-necked Duck	C		U	C
Greater Scaup	O		O	O
Lesser Scaup	C	R	U	C
Black Scoter				A
White-winged Scoter			A	A
Surf Scoter				A
Harlequin Duck	R	R		
Long-tailed Duck				A
Barrow's Goldeneye				R
Common Goldeneye				U
Common Merganser	U		O	U
Red-breasted Merganser	R	R		R
Hooded Merganser*	U	O	O	O
Ruddy Duck	U	O	U	U
Bufflehead	U		U	U
<b>Raptors</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Turkey Vulture*	U	U	O	R
Osprey*	U	U	U	R
White-tailed Kite	R		R	
Northern Harrier*	C	U	C	C
Golden Eagle	R	R		R
Bald Eagle*	U	O	C	U
Sharp-shinned Hawk	U	U	U	U
Cooper's Hawk*	O	O	O	O
Northern Goshawk	R			R
Red-shouldered Hawk				A
Red-tailed Hawk*	C	C	C	C
Swainson's Hawk	A		A	
Rough-legged Hawk	O		O	U
Ferruginous Hawk	A			A
American Kestrel*	C	C	C	C
Merlin	O	O	O	O

Prairie Falcon	R	R	R	R
Peregrine Falcon		O	O	O
Gyr Falcon				A
<b>Gallinaceous Birds</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Ring-necked Pheasant*	U	O	U	U
Ruffed Grouse	O	O	O	O
Bobwhite	O	O	O	O
California Quail*	R	R	R	R
Chukar	O	O	O	O
<b>Rails, Coots and Cranes</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Virginia Rail*	U	U	O	O
Sora*	U	U	R	R
Common Moorhen	A			
American Coot*	C	C	C	C
Sandhill Crane	C	R	C	O
<b>Shorebirds</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Black-bellied Plover			R	R
Pacific Golden Plover			A	
Semipalmated Plover		O	O	O
Killdeer*	C	C	C	C
American Avocet		A	A	
Black-necked Stilt	A			
Greater Yellowlegs	O	O	U	O
Lesser Yellowlegs	U	O	U	
Solitary Sandpiper	R	R	R	
Spotted Sandpiper	O	O	O	
Whimbrel		O		
Long-billed Curlew		A		
Marbled Godwit		A	A	
Sanderling		A	A	
Dunlin	C		C	
Semipalmated Sandpiper			A	
Western Sandpiper	U	U	U	
Least Sandpiper	U	U	U	O
Baird's Sandpiper	R		R	
Pectoral Sandpiper			O	
Willet	O		O	
Sharp-tailed Sandpiper				A
Dunlin	U		U	U
Stilt Sandpiper				A
Buff-breasted Sandpiper				A
Ruff				A
Short-billed Dowitcher				U
Long-billed Dowitcher	U	U	U	O
Wilson's Snipe*	U	O	U	C
Wilson's Phalarope	O	R	O	
Red-necked Phalarope	A	A	A	
Red Phalarope	R		R	

<b>Gulls and Terns</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Parasitic Jaeger			A	
Franklin's Gull	A	A	A	A
Bonaparte's Gull	O	R	O	R
Ring-billed Gull	C	U	U	C
Mew Gull	U	O	O	C
California Gull	C	O	U	C
Herring Gull	U		O	U
Glaucous Gull	R			O
Thayer's Gull	O		O	U
Western Gull	O	O	U	U
Glaucous-winged Gull	C	O	U	C
Slaty-backed Gull				A
Sabine's Gull			A	A
Black-legged Kittiwake			A	
Caspian Gull	O	O	O	
Forster's Tern			A	
Common Tern	A		A	
Arctic Tern	A		A	
Black Tern	A			
<b>Doves and Cuckoos</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Band-tailed Pigeon	O	O	O	O
Eurasian-collared Dove	O	O	O	O
Rock Dove*	C	C	C	C
Mourning Dove*	U	C	U	O
Yellow-billed Cuckoo			A	
<b>Owls</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Barn Owl*	O	O	O	O
Short-eared Owl	O		O	O
Long-eared Owl	R	R	R	R
Great Horned Owl*	U	U	U	U
Snowy Owl			R	R
Western Screech-Owl*	U	U	U	O
Northern Pygmy-Owl	O	O	O	O
Northern Saw-whet Owl	A	A	A	A
Northern Hawk-Owl				A
Burrowing Owl	A	A	A	
Barred Owl			A	
<b>Nighthawks and Swifts</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Common Nighthawk			O	O
Vaux's Swift*	U	U	O	
<b>Hummingbirds</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Anna's Hummingbird	R	R	R	R
Rufous Hummingbird	C	C	U	
<b>Kingfishers</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>

Belted Kingfisher*	U	C	U	U
<b>Woodpeckers</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Acorn Woodpecker	A	A	A	A
Lewis's Woodpecker	O		R	R
Northern Flicker*	C	C	C	C
Red-breasted Sapsucker*	O	O	O	O
Downy Woodpecker*	C	C	C	C
Hairy Woodpecker	O	O	O	O
Pileated Woodpecker	O	O	O	O
<b>Flycatchers</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Olive-sided Flycatcher		O	O	
Western Wood-Pee-wee*	R	C	O	
Willow Flycatcher*	U	U		
Least Flycatcher	R	R		
Hammond's Flycatcher	O	O	R	
Dusty Flycatcher	A			
Pacific-slope Flycatcher*	U	C	R	
Say's Phoebe	R			
Ash-throated Flycatcher				A
Western Kingbird	R	R		
Tropical Kingbird		A		
Eastern Kingbird	R			
<b>Shrikes</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Loggerhead Shrike	R			
Northern Shrike	O		O	O
<b>Vireos</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Hutton's Vireo	R	R	R	R
Cassin's Vireo	U	O		
Red-eyed Vireo	R	R		
Warbling Vireo*	O	U	O	
<b>Jays and Crows</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Blue Jay			A	
Steller's Jay	C	U	U	C
Gray Jay	R			R
Western Scrub Jay*	C	C	C	C
Black-billed Magpie	A		A	
American Crow*	C	C	C	C
Common Raven	A	A	A	A
<b>Larks and Swallows</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Horned Lark	U		U	U
Tree Swallow*	C	C	R	R
Violet-green Swallow*	U	C	O	R
Purple Martin*	O	U	O	
Bank Swallow	R	R		
Cliff Swallow*	U	U	R	

No. Rough-winged Swallow*	O	U	O	
Barn Swallow*	U	C	C	R
<b>Chickadees and Bushtits</b>				
	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Black-capped Chickadee*	C	C	C	C
Mountain Chickadee				A
Chestnut-backed Chickadee*	R	R	R	R
Bushtit*	C	C	C	C
<b>Nuthatches and Creepers</b>				
	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Brown Creeper*	O	O	O	O
White-breasted Nuthatch*	C	C	C	C
Red-breasted Nuthatch*	O	O	O	O
<b>Wrens</b>				
	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
House Wren*	U	C	O	R
Winter Wren	R	R	R	R
Bewick's Wren*	C	C	C	C
Marsh Wren*	C	C	U	U
<b>Kinglets</b>				
	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Golden-crowned Kinglet	U	O	U	O
Ruby-crowned Kinglet	U	O	U	O
<b>Thrushes</b>				
	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Western Bluebird	R		R	R
Swainson's Thrush*	U	U		
Hermit Thrush	R		O	R
Varied Thrush	U		U	C
American Robin*	C	C	C	C
Townsend's Solitaire	A		A	A
<b>Mockingbirds and Starlings</b>				
	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
North Mockingbird	A			
Cedar Waxwing	U	U	U	U
European Starling*	C	C	C	C
American Pipit	U	U	U	U
<b>Warblers</b>				
	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Orange-crowned Warbler*	C	U	O	O
Nashville Warbler	O	O		
Northern Parula			A	
Yellow-rumped Warbler*	C	O	U	U
Black-throated Gray Warbler*	U	R	U	
Townsend's Warbler	O		O	O
Blackpoll Warbler			A	
Palm Warbler	A			
Yellow Warbler*	U	U	O	
MacGillivray's Warbler	U	U	R	
Wilson's Warbler	U	O	O	
Common Yellowthroat*	C	C	O	O

Yellow-breasted Chat	R	R		
<b>Tanagers</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Western Tanager	U	U	O	
<b>Sparrows</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Spotted Towhee*	C	C	C	C
American Tree Sparrow	A			
Chipping Sparrow	O	O	O	R
Clay-colored Sparrow				A
Brewer's Sparrow				A
Lark Sparrow	A		A	
Fox Sparrow	O		O	U
Savannah Sparrow*	C	C	U	U
Lincoln's sparrow	O	O	O	O
Song Sparrow*	C	C	C	C
Vesper Sparrow	R	R	R	
Swamp Sparrow			R	R
White-throated Sparrow				R
Harris's Sparrow				R
White-crowned Sparrow	U	U	U	U
Golden-crowned Sparrow	C		C	C
Dark-eyed Junco	C	R	C	C
Lapland Longspur				A
Snow Bunting				A
Black-headed Grosbeak*		U		
Lazuli Bunting		U		
<b>Blackbirds</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Western Meadowlark*	U	O	U	O
Yellow-headed Blackbird*	O	O		
Red-winged Blackbird*	C	C	O	C
Tricolored Blackbird		A		
Rusty Blackbird	A			A
Brewer's Blackbird*	C	C	C	C
Brown-headed Cowbird*	C	C	U	O
Bullock's Oriole*	U	U	O	
<b>Finches and Grosbeaks</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
Purple Finch*	U	U	U	U
House Finch*	C	C	U	C
Red Crossbill	O	R	R	R
Pine Siskin*	O	O	O	O
American Goldfinch*	C	C	U	U
Lesser Goldfinch	A	A	A	A
Common Redpoll	A			A
Evening Grosbeak	O			
<b>Weaver Finches</b>	<b>S</b>	<b>S</b>	<b>F</b>	<b>W</b>
House Sparrow*	U	U	U	U

**Mammals**  
**( \* denotes non-native species. )**

Virginia Opossum*	<i>Didelphis virginiana</i>	Douglas' Squirrel	<i>Tamiasciurus douglasii</i>
Vagrant Shrew	<i>Sorex vagrans</i>	Camas Pocket Gopher	<i>Thomomys bulbivorus</i>
Pacific Shrew	<i>Sorex pacificus</i>	American Beaver	<i>Castor canadensis</i>
Black-Tailed Deer	<i>Odocoileus hemionus</i>	Deer Mouse	<i>Peromyscus maniculatus</i>
Trowbridge's Shrew	<i>Sorex trowbridgii</i>	Dusky-Footed Woodrat	<i>Neotoma fuscipes</i>
Shrew Mole	<i>Neurotrichus gibbsii</i>	Bushy-Tailed Woodrat	<i>Neotoma cinerea</i>
Townsend's Mole	<i>Scapanus townsendii</i>	Gray-Tailed Vole	<i>Microtus canicaudus</i>
Little Brown Myotis	<i>Myotis lucifugus</i>	Townsend's Vole	<i>Microtus townsendii</i>
Yuma Myotis	<i>Myotis yumanensis</i>	Creeping Vole	<i>Microtus oregoni</i>
Long Eared Myotis	<i>Myotis evotis</i>	Muskrat	<i>Ondatra zibethicus</i>
Fringed Myotis	<i>Myotis thysanodes</i>		
Long Legged Myotis	<i>Myotis volans</i>	Porcupine	<i>Erethizon dorsatum</i>
California Myotis	<i>Myotis californicus</i>	Nutria	<i>Myocastor coypus</i>
Silver Haired Bat	<i>Lasionycteris noctivagans</i>	Coyote	<i>Canis latrans</i>
Big Brown Bat	<i>Eptesicus fuscus</i>	Red Fox	<i>Vulpes vulpes</i>
Hoary Bat	<i>Lasiurus cinereus</i>	Gray Fox	<i>Urocyon cinereoargenteus</i>
Townsend's Big-Eared Bat	<i>Plecotus townsendii</i>	Raccoon	<i>Procyon lotor</i>
Pallid Bat	<i>Antrozous pallidus</i>	Long-Tailed Weasel	<i>Mustela frenata</i>
Brush Rabbit	<i>Sylvilagus bachmani</i>	Mink	<i>Mustela vison</i>
Black-Tailed Jack Rabbit	<i>Lepus californicus</i>	Short-tailed Weasel	<i>Mustella erminea</i>
Townsend's Chipmunk	<i>Tamias townsendii</i>	Western Spotted Skunk	<i>Spilogale gracilis</i>
California Ground Squirrel	<i>Spermophilus beecheyi</i>	Striped Skunk	<i>Memphitis memphitis</i>
Eastern Fox Squirrel*	<i>Sciurus niger</i>	River Otter	<i>Lutra canadensis</i>
Eastern Gray Squirrel	<i>Sciurus carolinensis</i>		
Western Gray Squirrel	<i>Sciurus griseus</i>	Elk	<i>Cervus elaphus</i>
Pacific Jumping Mouse	<i>Zapus trinotatus</i>	Pacific Water Shrew	<i>Sorex bendirii</i>

**Amphibians and Reptiles**

Northwestern Salamander	<i>Ambystoma</i>	Northwestern Pond	<i>Clemmys</i>
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	<i>macrodactylum</i>	Turtle	<i>marmorata</i>
Long-toed Salamander	<i>Ambystoma macrodactylum</i>	Northern Alligator Lizard	<i>Elgaria coerulea</i>
Ensatina	<i>Ensatina eschscholtzi</i>	Southern Alligator Lizard	<i>Elgaria multicarinata</i>
Dunn's Salamander	<i>Plethodon dunni</i>	Western Fence Lizard	<i>Sceloporus occidentalis</i>
Western Red-backed Salamander	<i>Plethodon vehiculum</i>	Western Skink	<i>Eumeces skiltonianus</i>
Roughskin Newt	<i>Taricha granulosa</i>	Rubber Boa	<i>Charina bottae</i>
Western Toad	<i>Bufo boreas</i>	Racer	<i>Coluber constrictor</i>
Pacific Treefrog	<i>Hyla regilla</i>	Sharptail Snake	<i>Contia tenuis</i>
Red-Legged Frog	<i>Rana aurora</i>	Ringneck Snake	<i>Diadophis punctatus</i>
Foothill Yellow-Legged Frog	<i>Rana boylei</i>	Gopher Snake	<i>Pituophis melanoleucus</i>
Bullfrog*	<i>Rana catesbeiana</i>	W. Terrestrial Garter Snake	<i>Thamnophis elegans</i>
Spotted Frog	<i>Rana pretiosa</i>	Northwestern Garter Snake	<i>Thamnophis ordinoides</i>
Painted Turtle	<i>Chrysemys picta</i>	Common Garter Snake	<i>Thamnophis sirtalis</i>

### Fish

Coho Salmon	<i>Oncorhynchus kisutch</i>	Dace	<i>Rhinichthys</i> spp.
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	Bridgelip Sucker	<i>Catostomus columbianus</i>
Sockeye Salmon	<i>Onchorhynchus nerka</i>	Longnose Sucker	<i>Catostomus catostomus</i>
Chum Salmon	<i>Onchorhynchus keta</i>	Largescale Sucker	<i>Catostomus macrosheilus</i>
Steelhead	<i>Onchorhynchus gairdneri</i>	Asian Weatherfish	
Black Crappie	<i>Pomoxis nigro-annularis</i>	American Shad	<i>Alosa sapidissima</i>
White Crappie	<i>Pomoxis annularis</i>	Mosquitofish	<i>Gambusia affinis</i>
Bluegill	<i>Lepomis macrochirus</i>	Redside Shiner	<i>Richardsonius balteatus</i>
Largemouth Bass	<i>Micropterus salmoides</i>	Sculpin	<i>Cottus</i> spp.
Warmmouth Bass	<i>Lepomis gulosus</i>	Northern Pikeminnow	<i>Ptychocheilus oregonensis</i>
Pumpkinseed	<i>Lepomis gibbosus</i>	Common Carp	<i>Cyprinus carpio</i>
Brown Bullhead	<i>Ictalurus nebulosus</i>	Yellow Bullhead	<i>Ictalurus natalis</i>



## White River Wildlife Area

The following table and letter keys identify the species presence/sightability by season and relative abundances:

**W-winter, S-summer, S-spring, F-fall** A-abundant, C-common, U-uncommon, R-rare

Common Name	Scientific Name	W	S	S	F
<b>Birds</b>					
Common Loon	<i>Gavia immer</i>	R	R	R	R
Horned Grebe	<i>Podiceps auritus</i>	R	R	R	R
Eared Grebe	<i>Podiceps nigricollis</i>	R	R	R	R
American Bittern	<i>Botaurus lentiginosus</i>	R	R	R	R
Great Blue Heron	<i>Ardea herodias</i>	U	U	U	U
Tundra Swan	<i>Cygnus columbianus</i>	U	U	U	U
Greater White-fronted Goose	<i>Anser albifrons</i>	R	R	R	R
Snow Goose	<i>Chen caerulescens</i>	U	U	U	U
Ross' Goose	<i>Chen rossii</i>	R	R	R	R
Canada Goose	<i>Branta canadensis</i>	C	A	C	C
Wood Duck	<i>Aix sponsa</i>	U	C	C	U
Green-winged Teal	<i>Anas crecca</i>	U	U	U	U
Mallard	<i>Anas platyrhynchos</i>	C	A	C	C
Northern Pintail	<i>Anas acuta</i>	U	U	U	U
Blue-winged Teal	<i>Anas discors</i>	U	U	U	U
Cinnamon Teal	<i>Anas cyanoptera</i>	C	C	C	C
Northern Shoveler	<i>Anas clypeata</i>	U	U	U	U
Gadwall	<i>Anas strepera</i>	U	U	U	U
American Wigeon	<i>Anas americana</i>	U	U	U	U
Canvasback	<i>Aythya valisineria</i>	U	U	U	U
Redhead	<i>Aythya americana</i>	U	U	U	U
Ring-necked Duck	<i>Aythya collaris</i>	U	U	U	U
Greater Scaup	<i>Aythya marila</i>	U	U	U	U
Common Goldeneye	<i>Bucephala clangula</i>	C	C	C	C
Bufflehead	<i>Bucephala albeola</i>	C	C	C	C
Hooded Merganser	<i>Lophodytes cucullatus</i>	U	U	U	U
Common Merganser	<i>Mergus merganser</i>	R	R	R	R
Ruddy Duck	<i>Oxyura jamaicensis</i>	C	C	C	C
Osprey	<i>Pandion haliaetus</i>	R	R	R	R
Turkey Vulture	<i>Cathartes aura</i>	C	C	C	C
Bald Eagle	<i>Haliaeetus leucocephalus</i>	R	R	R	R
Northern Harrier	<i>Circus cyaneus</i>	C	C	C	C
Sharp-shinned Hawk	<i>Accipiter striatus</i>	C	C	C	C
Cooper's Hawk	<i>Accipiter cooperii</i>	C	C	C	C
Northern Goshawk	<i>Accipiter gentilis</i>	R	R	R	R
Swainson's Hawk	<i>Buteo swainsoni</i>	R	R	R	R
Red-tailed Hawk	<i>Buteo jamaicensis</i>	C	C	C	C
Ferruginous Hawk	<i>Buteo regalis</i>	U	U	U	U
Rough-legged Hawk	<i>Buteo lagopus</i>	C	C	C	C
Golden Eagle	<i>Aquila chrysaetos</i>	U	C	U	U
American Kestrel	<i>Falco sparverius</i>	C	C	C	C

Common Name	Scientific Name	W	S	S	F
Peregrine Falcon	<i>Falco peregrinus</i>				
Gray Partridge	<i>Perdix perdix</i>	U	U	U	U
Chukar	<i>Alectoris chukar</i>	U	U	U	U
French Red-legged Partridge	<i>Alectoris rufa</i>	R	R	R	R
Ring-necked pheasant	<i>Phasianus colchicus</i>	U	U	U	U
Ruffed Grouse	<i>Bonasa umbellus</i>	U	U	U	U
Blue Grouse	<i>Dendragapus obscurus</i>	U	U	U	U
Wild Turkey	<i>Meleagris gallopavo</i>	A	A	A	A
Mountain Quail	<i>Oreortyx pictus</i>	U	U	U	U
California Quail	<i>Callipepla californica</i>	U	C	C	U
Sora	<i>Porzana carolina</i>	U	U	U	U
American Coot	<i>Fulica americana</i>	C	C	C	C
Sandhill Crane	<i>Grus canadensis</i>	R	R	R	R
Killdeer	<i>Charadrius vociferus</i>	U	U	C	C
Spotted Sandpiper	<i>Actitis macularia</i>	R	R	R	R
Common Snipe	<i>Gallinago gallinago</i>	C	C	C	C
Wilson's Phalarope	<i>Phalaropus tricolor</i>	U	U	U	U
Ring-billed Gull	<i>Larus delawarensis</i>	U	U	U	U
California Gull	<i>Larus californicus</i>	U	U	U	U
Band-tailed Pigeon	<i>Columba fasciata</i>	U	U	U	U
Mourning Dove	<i>Zenaida macroura</i>	C	C	A	A
Barn Owl	<i>Tyto alba</i>	U	U	U	U
Flammulated Owl	<i>Otus flammeolus</i>	R	R	R	R
Western Screech-owl	<i>Otus kennicottii</i>	U	U	U	U
Great Horned Owl	<i>Bubo virginianus</i>	C	C	C	C
Snowy Owl	<i>Nyctea scandiaca</i>	R	R	R	R
Northern Pygmy-owl	<i>Glaucidium gnoma</i>	R	R	R	R
Burrowing Owl	<i>Athene cunicularia</i>	?			
Spotted Owl	<i>Strix occidentalis</i>	?			
Great Gray Owl	<i>Strix nebulosa</i>	R	R	R	R
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	U	U	U	U
Common Nighthawk	<i>Chordeiles minor</i>	U	U	C	C
Poorwill	<i>Phalaenoptilus nuttallii</i>	U	U	C	C
Vaux's Swift	<i>Chaetura vauxi</i>	R	R	R	R
Black-chinned Hummingbird	<i>Achilochus alexandri</i>	U	C	C	C
Calliope Hummingbird	<i>Stellula calliope</i>	U	C	C	C
Rufous Hummingbird	<i>Selasphorus rufus</i>	U	C	C	C
Belted Kingfisher	<i>Ceryle alcyon</i>	C	C	C	C
Lewis' Woodpecker	<i>Melanerpes lewis</i>	C	C	C	C
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>	R	R	R	R
Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>	?			
Downy Woodpecker	<i>Picoides pubescens</i>	U	U	U	U
Hairy Woodpecker	<i>Picoides villosus</i>	C	C	C	C
White-headed Woodpecker	<i>Picoides albolarvatus</i>			?	
Three-toed Woodpecker	<i>Picoides tridactylus</i>	?			
Black-backed Woodpecker	<i>Picoides arcticus</i>	?			
Northern Flicker	<i>Colaptes auratus</i>	C	C	C	C
Pileated Woodpecker	<i>Dryocopus pileatus</i>	?			
Western Wood-pewee	<i>Contopus sordidulus</i>	U	C	C	C
Willow Flycatcher	<i>Empidonax traillii</i>	C	C	C	C
Hammond's Flycatcher	<i>Empidonax hammondii</i>	U	C	C	C

Common Name	Scientific Name	W	S	S	F
Dusky Flycatcher	<i>Empidonax oberholseri</i>	U	C	C	C
Pacific Slope Flycatcher	<i>Empidonax difficilis</i>	U	C	C	C
Say's Phoebe	<i>Sayornis saya</i>	U	C	C	U
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	U	U	U	U
Western Kingbird	<i>Tyrannus verticalis</i>	U	C	C	C
Eastern Kingbird	<i>Tyrannus tyrannus</i>	U	U	U	U
Horned Lark	<i>Eremophila alpestris</i>	C	C	C	C
Tree Swallow	<i>Tachycineta bicolor</i>	U	C	C	C
Violet-green Swallow	<i>Tachycineta thalassina</i>	U	C	C	C
Barn Swallow	<i>Hirundo rustica</i>	U	C	C	C
Gray Jay	<i>Perisoreus canadensis</i>	U	U	U	U
Steller's Jay	<i>Cyanocitta stelleri</i>	C	C	C	C
Blue Jay	<i>Cyanocitta cristata</i>	R	R	R	R
Clark's Nutcracker	<i>Nucifraga columbiana</i>	U	U	U	U
Black-billed Magpie	<i>Pica pica</i>	C	C	C	C
American Crow	<i>Corvus brachyrhynchos</i>	C	C	C	C
Common Raven	<i>Corvus corax</i>	C	C	C	C
Black-capped Chickadee	<i>Poecile atricapillus</i>	C	C	C	C
Mountain Chickadee	<i>Poecile gambeli</i>	C	C	C	C
Plain Titmouse	<i>Parus atricapillus</i>	C	C	C	C
Bushtit	<i>Psaltriparus minimus</i>	U	U	U	U
Red-breasted Nuthatch	<i>Sitta canadensis</i>	U	U	U	U
White-breasted Nuthatch	<i>Sitta carolinensis</i>	C	C	C	C
Pygmy Nuthatch	<i>Sitta pygmaea</i>	?			
Brown Creeper	<i>Certhia americana</i>	U	U	U	U
Canyon Wren	<i>Catherpes mexicanus</i>	U	C	U	U
Bewick's Wren	<i>Thryomanes bewickii</i>	U	U	U	U
House Wren	<i>Troglodytes aedon</i>	U	U	U	U
Winter Wren	<i>Troglodytes troglodytes</i>	U	U	U	U
American Dipper	<i>Cinclus mexicanus</i>	U	U	U	U
Golden-crowned Kinglet	<i>Regulus satrapa</i>	U	U	U	U
Ruby-crowned Kinglet	<i>Regulus calendula</i>	U	U	U	U
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	?			
Western Bluebird	<i>Sialia mexicana</i>	R	R	R	R
Mountain Bluebird	<i>Sialia currucoides</i>	U	C	C	C
Townsend's Solitaire	<i>Myadestes townsendi</i>	U	C	C	C
American Robin	<i>Turdus migratorius</i>	U	C	A	A
Varied Thrush	<i>Ixoreus naevius</i>	U	U	U	U
Gray Catbird	<i>Dumetella carolinensis</i>	R	R	R	R
Sage Thrasher	<i>Oreoscoptes montanus</i>	?			
Cedar Waxwing	<i>Bombycilla cedrorum</i>	U	U	U	U
European Starling	<i>Sturnus vulgaris</i>	U	A	A	U
Loggerhead Shrike	<i>Lanius ludovicianus</i>	U	U	U	U
Solitary Vireo	<i>Vireo solitarius</i>	U	U	U	U
Warbling Vireo	<i>Vireo gilvus</i>	U	C	C	C
Orange-crowned Warbler	<i>Vermivora celata</i>	U	U	U	U
Yellow Warbler	<i>Dendroica petechia</i>	U	C	C	C
Yellow-rumped Warbler	<i>Dendroica coronata</i>	U	C	C	C
Townsend's Warbler	<i>Dendroica townsendi</i>	U	U	U	U
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	U	U	U	U
Hermit Warbler	<i>Dendroica occidentalis</i>	U	U	U	U

Common Name	Scientific Name	W	S	S	F
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	U	U	U	U
Common Yellowthroat	<i>Geothlypis trichas</i>	U	U	U	U
Wilson's Warbler	<i>Wilsonia pusilla</i>	U	U	U	U
Yellow-breasted Chat	<i>Icteria virens</i>	U	U	U	U
Western Tanager	<i>Piranga ludoviciana</i>	U	U	U	U
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	U	U	U	U
Lazuli Bunting	<i>Passerina amoena</i>	U	U	U	U
Spotted Towhee	<i>Pipilo maculatus</i>	C	C	C	C
Chipping Sparrow	<i>Spizella passerina</i>	C	C	C	C
Vesper Sparrow	<i>Poocetes gramineus</i>	U	U	U	U
Savannah Sparrow	<i>Passerculus sandwichensis</i>	C	C	C	C
Fox Sparrow	<i>Passerelia iliaca</i>	U	U	U	U
Song Sparrow	<i>Melospiza melodia</i>	C	C	C	C
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	U	U	U	U
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	U	C	C	U
Western Meadowlark	<i>Sturnella neglecta</i>	U	U	U	U
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	U	C	C	C
Brown-headed Cowbird	<i>Molothrus ater</i>	U	U	U	U
Northern Oriole	<i>Icterus galbula</i>	U	U	U	U
Purple Finch	<i>Carpodacus purpureus</i>	C	C	C	C
House Finch	<i>Carpodacus mexicanus</i>	C	C	C	C
Red Crossbill	<i>Loxia curvirostra</i>	U	U	U	U
Pine Siskin	<i>Carduelis pinus</i>	C	C	C	C
American Goldfinch	<i>Carduelis tristis</i>	U	U	U	U
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	C	C	C	C
House Sparrow	<i>Passer domesticus</i>	C	C	C	C
<b>Total Birds: 169</b>					
<b>Fish</b>					
Smallmouth bass	<i>Micropterus dolomieu</i>	C	C	C	C
Largemouth bass	<i>Micropterus salmoides</i>	C	C	C	C
Eastern brook trout	<i>Salvelinus fontinalis</i>	C	C	C	C
Inland redband trout	<i>Oncorhynchus mykiss</i>	C	C	C	C
Mountain whitefish	<i>Prosopium williamsoni</i>	U	U	U	U
Torrent sculpin	<i>Cottus rhotheus</i>	C	C	C	C
Speckled dace	<i>Rhinichthys osculus</i>	U	U	U	U
Longnose dace	<i>Rhinichthys cataractae</i>	U	U	U	U
Redside shiner	<i>Richardsonius balteatus</i>	U	U	U	U
Bridgelip sucker	<i>Catostomus columbianus</i>	U	U	U	U
<b>Total Fish: 10</b>					
<b>Mammals</b>					
Little Brown Bat	<i>Myotis lucifugus</i>	C	C	C	C
Townsend's Big-eared Bat	<i>Plecotus townsendii</i>	U	U	U	U
Pallid Bat	<i>Antrozous pallidus</i>	U	U	U	U
Mountain Cottontail	<i>Sylvilagus nuttallii</i>	C	C	C	C
Snowshoe Hare	<i>Lepus americanus</i>	C	U	U	U
White-tailed Jackrabbit	<i>Lepus townsendii</i>	U	U	U	U
Least Chipmunk	<i>Eutamias minimus</i>	C	C	C	C
Yellow-pine Chipmunk	<i>Tamias amoenus</i>	C	C	C	C
Yellow-bellied Marmot	<i>Marmota flaviventris</i>	U	U	U	U
California Ground Squirrel	<i>Spermophilus beecheyi</i>	A	A	A	A

Common Name	Scientific Name	W	S	S	F
Townsend's Ground Squirrel	<i>Spermophilus townsendi</i>	U	U	U	U
Golden-mantled Ground Squirrel	<i>Spermophilus lateralis</i>	U	C	C	U
Western Grey Squirrel	<i>Sciurus griseus</i>	C	C	C	C
Chickaree	<i>Tamiasciurus douglasii</i>	C	C	C	C
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	U	U	U	U
Northern Pocket Gopher	<i>Thomomys talpoides</i>	A	A	A	A
Coast Mole	<i>Scapanus orarius</i>	U	U	U	U
Vagrant Shrew	<i>Sorex vagrans</i>	U	U	U	U
Virginia Opossum	<i>Didelphis virginiana</i>	U	U	U	U
American Beaver	<i>Castor canadensis</i>	C	C	C	C
Great Basin Pocket Mouse	<i>Perognathus parvus</i>	U	U	U	U
Deer Mouse	<i>Peromyscus maniculatus</i>	C	C	C	C
Jumping Mouse	<i>Zapus princeps</i>	U	U	U	U
Ord's Kangaroo Rat	<i>Dipodomys ordii</i>	U	U	U	U
Bushy-tailed Woodrat	<i>Neotoma cinerea</i>	U	C	U	U
Dusky-footed Woodrat	<i>Neotoma fuscipes</i>	U	U	U	U
Western Heather Vole	<i>Phenacomys intermedius</i>	?			
Mountain Vole	<i>Microtus montana</i>	?			
Long-tailed Vole	<i>Microtus longicaudus</i>	?			
Sagebrush Vole	<i>Lagurus curtatus</i>	?			
Oregon Vole	<i>Microtus oregoni</i>	?			
Muskrat	<i>Ondatra zibethicus</i>	C	C	C	C
House Mouse	<i>Mus musculus</i>	C	C	C	C
Norway Rat	<i>Rattus norvegicus</i>	U	U	U	U
Common Porcupine	<i>Erethizon dorsatum</i>	C	C	C	C
Coyote	<i>Canis latrans</i>	C	C	C	C
Marten	<i>Martes americana</i>	?			
Black Bear	<i>Ursus americanus</i>	U	C	C	C
Raccoon	<i>Procyon lotor</i>	C	C	C	C
River Otter	<i>Lontra canadensis</i>	U	U	U	U
Long-tailed Weasel	<i>Mustela frenata</i>	U	U	U	U
Mink	<i>Mustela vison</i>	C	C	C	C
American Badger	<i>Taxidea taxus</i>	C	C	C	C
Striped Skunk	<i>Mephitis mephitis</i>	C	C	C	C
Spotted Skunk	<i>Spilogale putorius</i>	U	U	U	U
Cougar	<i>Puma concolor</i>	C	C	C	C
Bobcat	<i>Lynx rufus</i>	C	C	C	C
Rocky Mountain Elk	<i>Cervus elaphus nelsoni</i>	A	A	A	A
Black-tailed Deer	<i>Odocoileus hemionus columbianus</i>	A	A	A	A
Mule deer	<i>Odocoileus hemionus hemionus</i>	R	R	R	R
White-tailed Deer	<i>Odocoileus virginianus</i>	U	U	U	U
<b>Total Mammals: 51</b>					
<b>Amphibians and Reptiles</b>					
Pacific Giant Salamander	<i>Dicamptodon tenebrosus</i>				
Northwestern Salamander	<i>Ambystoma gracile</i>				
Long-toed Salamander	<i>Ambystoma macrodactylum</i>				
Rough-skinned Newt	<i>Taricha granulosa</i>				
Ensatina	<i>Ensatina eschscholtzii</i>				
Western Toad	<i>Bufo boreas</i>				
Pacific (Chorus) Treefrog	<i>Pseudacris regilla</i>				

Common Name	Scientific Name	W	S	S	F
Great Basin Spadefoot	<i>Scaphiopus intermontanus</i>				
Northern Leopard Frog	<i>Rana pipiens</i>				
Red-legged Frog	<i>Rana aurora</i>				
Spotted Frog	<i>Rana pretiosa</i>				
Cascades Frog	<i>Rana cascadae</i>				
Tailed Frog	<i>Ascaphus truei</i>				
Long-nosed Leopard Lizard	<i>Gambelia wislizenii</i>				
Side-blotched Lizard	<i>Uta stansburiana</i>				
Sagebrush Lizard	<i>Sceloporus graciosus</i>				
Northern Alligator Lizard	<i>Elgaria coerulea</i>				
Southern Alligator Lizard	<i>Elgaria multicarinata</i>				
Short-horned Lizard	<i>Phrynosoma douglassi</i>				
Western Fence Lizard	<i>Sceloporus occidentalis</i>				
Western Skink	<i>Eumeces skiltonianus</i>				
Rubber Boa	<i>Charina bottae</i>				
Racer	<i>Coluber constrictor</i>				
Sharp-tailed Snake	<i>Contia tenuis</i>				
Ringneck Snake	<i>Diadophis punctatus</i>				
Night Snake	<i>Hypsiglena torquata</i>				
Striped Whipsnake	<i>Masticophis taeniatus</i>				
Gopher Snake	<i>Pituophis catenifer</i>				
Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>				
Common Garter Snake	<i>Thamnophis sirtalis</i>				
Northwestern Garter Snake	<i>Thamnophis ordinoides</i>				
Western Rattlesnake	<i>Crotalus viridis</i>				
<b>Total:</b>	<b>32</b>				

**Appendix E**  
**WETLANDS OF CONSERVATION CONCERN**

## Wetlands of Conservation Concern

([http://www.oregon.gov/DSL/PERMITS/docs/wetland\\_cons\\_concern.pdf](http://www.oregon.gov/DSL/PERMITS/docs/wetland_cons_concern.pdf))

Wetlands of Conservation Concern are bogs, fens, playas, salt flats, alkaline lakes, hot springs, native wet prairies, vernal pools, inter-dunal wetlands, mature forested wetlands, ultramafic soil wetlands, wooded tidal wetlands, and un-diked tidal freshwater wetlands, as determined by the Department.

**Bog or Fen:** contains a sponge-like organic soil layer and often has extensive cover of sedges and/or broad-leaved evergreen shrubs (e.g., *Ledum*). Often lacks tributaries, being fed mainly by groundwater and/or direct precipitation.

**Playa, Salt Flat, or Alkaline Lake:** a non-tidal ponded water body usually having saline (salinity >1 ppt or conductivity >1000  $\mu$ S) or alkaline (conductivity >2000  $\mu$ S and pH >9) conditions and large seasonal water level fluctuations (if inputs-outputs unregulated). If a playa or salt flat, vegetation cover is sparse and plants typical of saline or alkaline conditions (e.g., *Distichlis*, *Atriplex*) are common. For additional information on plant species typically occurring in tidal or saline conditions see the *Salt Tolerant and Low Tidal Marsh Plants* information sheet at the Department of State Lands webpage:

[http://www.oregonstatelands.us/DSL/WETLAND/docs/orwap-supinfo-p\\_salt-p\\_lowtidal.pdf](http://www.oregonstatelands.us/DSL/WETLAND/docs/orwap-supinfo-p_salt-p_lowtidal.pdf)

**Hot spring** (anywhere in Oregon): a wetland where discharging groundwater in summer is >10 degrees (F) warmer than the expected water temperature.

**Native wet prairie** (west of the Cascade crest): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, and dominated primarily by native graminoids often including the following plant species: *Deschampsia caespitosa*, *Danthonia californica*, *Camassia quamash*, *Triteleia hyacinthina*, *Carex densa*, *C. aperta*, and/or *C. unilateralis*

*Above: Vernal pool over hardpan, part of a complex of dozens of vernal pool wetlands. White City, Oregon.*

*Right: Vernal pool in the dry season, White City, Oregon.*

*Right: Vernal pool over basalt bedrock terrace above the Columbia River, The Dalles*

**Vernal pool** (Willamette Valley): a seasonally inundated wetland, underlain by hardpan or claypan, with hummocky micro-relief, usually without a naturally-occurring inlet or outlet, and with native plant species distinctly different from those in slightly higher areas, and often including the following plant species: *Downingia elegans*, *Isoetes nuttallii*, *Triteleia hyacinthina*, *Eleocharis spp.*, *Eryngium petiolatum*, *Plagiobothrys figuratus*, *Plagiobothrys scouleri*, *Grindelia nana*, *Veronica*

*peregrina*, *Lasthenia glaberrima*, *Cicendia quadrangularis*, *Kickxia elatine*, *Gnaphalium palustre*, and/or *Callitriche* spp.

**Vernal pool** (Medford area): a seasonally inundated acidic wetland, underlain by hardpan, with hummocky micro-relief, usually without a naturally-occurring inlet or outlet, and having concentric rings of similar native vegetation, often including the following plant species: *Downingia vina*, *Isoetes nuttalli*, *Pilularia americana*, *Triteleia hyacinthina*, *Eleocharis* spp., *Eryngium petiolatum*, *Plagiobothrys brachteatus*, *Plagiobothrys scouleri*, *Grindelia nana*, *Veronica peregrina*, *Alopecurus saccatus*, *Lasthenia californica*, *Deschampsia danthonioides*, and/or *Callitriche* spp.

**Vernal pool** (Modoc basalt & Columbia Plateau): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, located on shallow basalt bedrock and often having the following plant species: *Blennosperma nanum*, *Camassia quamash*, *Epilobium densiflorum*, *Callitriche marginata*, *Cicendia quadrangularis*, *Eryngium vaseyi*, *Psilocarphus brevissimus*, and/or *Sedella pumila*.

*Above top: Interdunal wetland. South Jetty, Florence, Oregon.*

*Above: Interdunal wetland, Coos Bay, Oregon.*

*Left: Interdunal wetland. Newport-South Beach, Oregon.*

**Interdunal wetland** (Coastal ecoregion): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, located between sand dunes where wind has scoured the sand down to the water table (deflation plain), and often with significant cover of the following native plant species: *Carex obnupta*, *Argentina egedii*, *Juncus lesueurii*, *J. nevadensis*, *J. falcatus*, *Sisyrinchium californicum* and/or *Salix hookeriana*

**Mature forested wetland** (anywhere): a wetland in which mean diameter of trees (d.b.h., FACW and FAC species only) exceeds 18 inches, and/or the average age of trees exceeds 80 years, or there are >5 trees/acre with diameter >32 inches. To qualify, the diameter of >18 inches must be the mean measured from at least 10 trees.

**Ultramafic soil wetland** (mainly southwestern Oregon): a low-elevation wetland, usually with a sponge-like organic soil layer, occurring in an area with exposed serpentine or peridotite rock, and/or in soils with very low Ca:Mg ratios.

**Wooded tidal** wetlands with >30% cover of trees and shrubs. A wetland inundated at least once annually by tides and often dominated by woody plant species. The plant species may include Sitka spruce, crabapple, and/or others.

**Undiked tidal freshwater wetland:** an emergent or wooded wetland inundated at least once annually by tides and with surface salinity <0.5 ppt during most of spring and summer, and which has never been diked.

**Report includes mapped rare wetland type within 1 mile**

## **Wetland Explorer Mapping Tool**

Information on your location of interest can be obtained from the interactive Wetland Explorer. This information can be used to advise (but not necessarily determine) if your wetland site may be a Wetland of Conservation Concern.

To access Wetland Explorer go to Oregon Rapid Wetland Assessment Protocol (ORWAP) part of the Wetland Explorer at: <http://oregonexplorer.info/wetlands/orwap>

To locate your site you can enter the latitude and longitude into the “Lat/Long Finder” at the left of the map, use the “Find on Map” box above the map, or zoom to the area of interest by double clicking, rolling your mouse button, or selecting the zoom magnify glass.

To obtain mapped information on your location of interest press the “Generate Report” button on the “Lat/Long Finder” or right click on map at the area of interest. This generates a report for that location and included in that information is whether or not there is a mapped rare wetland type within 1 mile.

The information in this document was summarized from the following sources:

Adamus, P., J. Morlan, and K. Verble. 2010. Manual for the Oregon Rapid Wetland

Assessment Protocol (ORWAP). Version 2.0.2. Oregon Dept. of State Lands, Salem, OR.

Rempel, M., P. Adamus, and J. Kagan. 2009. Oregon Wetlands Explorer: an internet tool for ORWAP wetland assessment support and data archiving. Oregon State University Library and Institute for Natural Resources, Oregon State University, Corvallis, OR. Internet:

<http://oregonexplorer.info/wetlands/orwap/>