the OREGON CONSERVATION STRATEGY

Chapter 6: Strategy Species

2016
Oregon Department
of Fish and Wildlife

OregonConservationStrategy.org

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Strategy Species

The Conservation Strategy identifies 294 Strategy Species, which are Oregon's "Species of Greatest Conservation Need". Strategy Species are defined as having small or declining populations, are at-risk, and/or are of management concern. Oregon's Strategy Species include 17 amphibians, 58 birds, 29 mammals, 5 reptiles, 60 fish, 62 invertebrates, and 63 plants and algae. Information on the Special Needs, Limiting Factors, Data Gaps, Conservation Actions, and available resources are listed for each of Oregon's Strategy Species.

Strategy Species are designated by ecoregion, based on conservation need and opportunities, rather than at a statewide level. The ecoregions designated for each species represent the highest priorities for implementing conservation actions for individual species. Some species occur in ecoregions other than where they are designated as a Strategy Species; conservation actions implemented in these ecoregion(s) will also contribute to the overall conservation success for the species.

Although efforts were made to standardize the conservation criteria used to determine Strategy Species, some variation exists between taxa. For more information, see Methods for Determining Strategy Species. For some species, not enough information was known to determine whether a species meets the conservation criteria to qualify as a Strategy Species. The Conservation Strategy identifies these species as Data Gap Species.

The Strategy Species and Data Gap Species lists are available for download in Excel table format: Download the Oregon Conservation Strategy. You can also find it by clicking on the information symbol at the top right-hand corner of the screen.

ODFW Top 5 Wildlife Priority Strategy Species List: In order to improve the efficiency and effectiveness of agency efforts to conserve Strategy Species, the Oregon Department of Fish and Wildlife developed a *Top 5 Wildlife Priority Strategy Species List* for each ecoregion (excluding the Nearshore ecoregion). The intent of this list is to help direct and inform agency species conservation efforts, and is part of ODFW's OCS Implementation Plan.

Although the focus of this section is on the requirements of Strategy Species and the actions needed to conserve them, it also takes a broader view of fish and wildlife conservation and includes information on naturally-occurring Fish and Wildlife Diseases and Animal Concentrations.

Methods for Determining Strategy Species

The U.S. Fish and Wildlife Service (USFWS) requires all State Wildlife Action Plans to designate "Species of Greatest Conservation Need" as well as to provide specific information about problems that may affect those species, information needed to improve conservation, and recommended conservation actions.

The Oregon Conservation Strategy uses the term "Strategy Species" to represent "Species of Greatest Conservation Need", with the Strategy Species list developed to meet these requirements for Oregon. The Strategy identifies wildlife (amphibians, birds, mammals, and reptiles), fish, invertebrates, and plants and algae as Strategy Species, including species occurring within the nearshore.

Background

The original list of Strategy Species was developed by regional biologists and species experts in 2006. This was done by first creating a list of all declining species in Oregon, and then using spatial models of Oregon's vegetation types to produce species-habitat associations that estimated the extent of habitat loss experienced by each species. The 2006 Strategy also identified "Data Gap Species", defined as species that may be of conservation concern, but insufficient information was available to fully assess whether they met the Strategy Species criteria.

For the 2016 revision, all 2006 Strategy Species and Data Gap Species were reviewed and updated. The Oregon Department of Fish and Wildlife (ODFW) divisions and partner organizations took the lead on reviewing and updating the various taxonomic groups. The ODFW Wildlife Division updated the Wildlife (amphibians, birds, mammals, and reptiles) Strategy Species. The ODFW Fish Division updated the Fish Strategy Species. Experts from the Oregon Department of Agriculture (ODA), Oregon Biodiversity Information Center (ORBIC), the Xerces Society for Invertebrate Conservation, and independent species experts were consulted to update the Invertebrate Strategy Species. The ODA reviewed the Plant and Algae Strategy Species, with additional information provided by the Institute for Applied Ecology. Nearshore Strategy Species were updated by the ODFW Marine Program.

Although efforts were made to standardize criteria, available information and the conservation criteria for Strategy Species do vary between taxa.

Wildlife Strategy Species List

The ODFW's Wildlife Conservation Program staff led a comprehensive review process for the Wildlife Strategy Species list, including amphibians, birds, mammals, and reptiles. The conservation criteria used were based on the original 2006 criteria. New scientific literature and available data were reviewed to determine whether to keep, remove, or add species to the Strategy Species list dependent on whether they met the conservation criteria. All 2006 Strategy Species were reviewed. The list of 2006 Data Gap Species, and species that experienced elevated conservation status (e.g., federal Endangered Species Act status,

NatureServe Global or State Rank) during the 10 years were reviewed to determine whether they met the conservation criteria to be added as a 2016 Strategy Species or Data Gap Species.

Information from literature searches, agency and partner databases, and expert review was used to update the content associated with each Strategy Species, including: special needs, limiting factors, data gaps, recommended conservation actions, and key references. The ODFW consulted with species experts throughout Oregon to review and update the Wildlife Strategy Species list and information associated with each species.

Wildlife Strategy Species Conservation Criteria:

If three or more of the criteria below apply to a species within an ecoregion, the species may be considered a Wildlife Strategy Species:

1. Life history traits render the species vulnerable to potential threats, such as: low reproductive rates, low dispersal ability, dependence on uncommon or at-risk habitats and/or structures, or the species gathers in concentrations for some part of its life cycle, including nesting, roosting, or feeding sites.
2. Population size is small or greatly reduced from its historical population size, suggesting the species could become extirpated in much or all of the ecoregion.
3. The population is at-risk because it is: (a) declining in the ecoregion, and the ecoregion is especially important for conservation, or (b) declining statewide.
4. The species is at-risk because it has a restricted distribution. This includes species that:
   - are considered an ecoregion endemic or near-endemic (e.g., a notable proportion of the species' range occurs in this ecoregion), or
   - have had a significant retraction from historical geographic range, or
   - represent a disjunct (isolated) population that is important to conservation of the species throughout its range.
5. Populations of this species are known (or strongly suspected) to be impacted by a Key Conservation Issue or major threat, including:
   - Climate Change (University of Washington Climate Change Vulnerability Assessment)
   - Land Use Changes (including renewable energy)
   - Water Quality and Quantity
   - Barriers to Animal Movement
   - Disruption of Disturbance Regimes (i.e., fire, flooding) or ecological processes (stream hydrology or nutrient flows)
   - Invasive Species
   - Other known threats to populations including: disease, predation, pollutants, hybridization, or parasitism

Fish Strategy Species List

The ODFW Fish Conservation and Recovery Program staff led the review for the Fish Strategy Species list.

The comprehensive review was based on a number of criteria, which closely match the Wildlife Strategy Species Conservation Criteria. If a fish species or Species Management Unit (SMU) is listed under the Endangered Species Act as threatened or endangered, either at the state or federal level, it was automatically designated as a Strategy Species. Additionally, the ODFW updated the ODFW Sensitive Species List to inform the Conservation Strategy Species update, and any fish species that was designated as an ODFW Sensitive Species was also designated as a Strategy Species.

A variety of resources were used to update the Sensitive Species List. Status assessments in recently approved conservation and recovery plans were used. For species and SMUs with no recent written assessment or plan, ODFW staff used information from recent research or monitoring efforts (e.g., fish distribution and abundance surveys), prior listing on the Sensitive Species List, the 2005 Oregon Native Fish Status Report, or professional knowledge and judgment to determine the status. When applicable, ODFW staff consulted with partner scientists and agencies to help inform decisions.

To account for the lack of data and multiple sources of uncertainty (e.g., taxonomic, range, abundance) surrounding many of the non-game species, the conservation risk was assessed based on a rarity model that assesses species vulnerability to drought, wildfire, climate change, or nonnative fishes. The model data were sourced from the Oregon State University Fish Collection and expert opinion, including ODFW District Fish Biologists and researchers. Two metrics were developed to assess distribution or range. For the first metric, fish distribution was defined as narrow (limited) when a species was found in four or fewer districts and broad (widespread) when a species was found in 5-16 districts. For the second metric, fish distribution was defined as narrow if only "limited distribution" or "rare" status responses were received for a species and broad if a species was "widespread" or "common" in any district. An abundance metric was developed, where a "low" abundance score was assigned if the minimum district score for a species was 4-6 (limited, not locally abundant; rare; or unknown) and a "high" abundance score was assigned if the minimum district score for a species was 1-3 (widespread; common; or limited, but locally abundant).

A metric for habitat specificity was also developed, where fish were assigned to the "narrow" category if a species inhabited fewer than three of the five habitat types (i.e., large river, small river, creek, spring, lacustrine) and did not occupy both lowland and upland habitats, and to the "broad" category if the species inhabited three or more habitat types or occupied both lowland and upland habitats. The data for habitat types and elevation (upland, lowland, or both) were obtained from the online FishTraits.

The range/distribution, abundance, habitat specificity, and endemism (y/n) data for each species were then compiled and each fish was assigned to one of eight rarity categories (see figure below), according to Yu and Dobson (2000), based on distribution/range (high or low, assigned once for each of the two metrics), population abundance (high or low), and habitat specificity (broad or narrow).

		Distribution (range)			
		Large		Small	
	Population abundance	high	low	high	low
Habitat Specificity	broad	A (4)	C (3)	E (3)	G (2)
	narrow	B (3)	D (2)	F (2)	H (1)

Categories	Description
A	Generalist
B	Locally abundant over a large range and in specific habitat
C	Low abundance over a broad range in several habitats
D	Low abundance overa a large range and in specific habitat
E	Locally abundant in several habitats but narrow geographic range
F	Locally abundant in specific habitat but narrow geographic range
G	Low abundance, narrow geographic range, in several habitats
H	Low abundance, narrow geographic range, in specific habitat

Rarity categories, descriptions, and scores (in parentheses) from: Yu, J. and F.S. Dobson. 2000. Seven forms of rarity in mammals. Journal of Biogeography 27:131-139.

Invertebrate Strategy Species List

The ODFW consulted with experts from the ODA, ORBIC, the Xerces Society for Invertebrate Conservation, and independent species experts to update the Invertebrate Strategy Species list and the information associated with each species. To the extent possible, the Wildlife Strategy Species Conservation Criteria were used to review invertebrate species. Over the past 10 years, more information has been gathered to indicate a lack of knowledge for many species, resulting in several species moved to Data Gap Species status.

Plant Strategy Species List

The ODFW consulted with the ODA's Plant Conservation Program and with the Institute for Applied Ecology to consider new information and references for plant species. Numerous data gaps exist for plant species of conservation concern, and few surveys are conducted regularly. The list of Strategy Plants remains the same as the 2006 list; however, new information was incorporated regarding taxonomy, special needs, limiting factors, data gaps, recommended conservation actions, and key references.

Nearshore Strategy Species List

The ODFW Marine Program led the update process for Nearshore Strategy Species. Nearshore Strategy Species are species occurring within the Nearshore that were determined to be in greatest need of management attention. Identification as a Nearshore Strategy Species does not necessarily mean the species is in trouble. Rather, those identified as Nearshore Strategy Species have some significant nearshore management and/or conservation issue connected to that species that is of interest to resource managers.

Development of the 2016 Nearshore Strategy Species list began with a review of the original list of Nearshore Strategy Species developed a decade ago, including species that utilize the nearshore but that had only been included in the Oregon Conservation Strategy. The species that were still recognized as species of concern, at-risk, important, or a priority by federal or state agencies, stakeholders, experts, non-government organizations, scientific researchers, tribes, or other conservation processes were included on the revised list. In addition, a comprehensive list of species that occur in the nearshore was evaluated for potential new additions to the Nearshore Strategy Species list. To maintain a nearshore ecosystem focus, attention was focused on both harvested and non-harvested species that predominantly occur, or are common, within Oregon's nearshore environment.

To assist with the identification of Nearshore Strategy Species, the following information was compiled from published literature, available online data, scientific databases, and personal communication from experts for each species on the list:

- taxonomic information
- distribution, including species geographic range and depth
- harvest/collection information, including sector(s) (commercial, sport, aquarium trade, and/or scientific/medical research) and whether targeted or incidental catch
- life history information, including mode of reproduction, fecundity, timing of reproduction, timing of egg/larval/juvenile stages, longevity, age at maturity, and migratory behavior or seasonal distribution
- habitat use for each life history stage
- trophic interactions, including prey, predators, and competition
- population status information, including whether a population assessment has been conducted and if the species is listed as overharvested, listed as threatened or endangered, has experienced a population decline, is rare, has small range, or is endemic, has specialized habitat requirements, or has low productivity

This information was used to help examine the conservation needs of each species with regards to four separate criteria, each weighted equally. Each species was evaluated for each of these four criteria to identify those species in greatest need of management attention:

1. Species status – examples of species status include overharvested, rare, declining population throughout its range or in Oregon.

2. Ecological importance – examples of ecological importance include habitat forming, habitat engineer, keystone species, or prey species.
3. Vulnerability to human or natural factors – examples of vulnerability include susceptible to oil spills or water pollution, life history traits render it particularly vulnerable (low productivity, specialized habitat requirements, climate change or ocean acidification effects, etc.), or there are significant data gaps or research needs on vulnerability for that species.
4. Economic/social/cultural importance – examples of importance to humans include commercially important, recreationally important, culturally important to Oregon tribes, and flagship or sentinel species.

Those species whose conservation needs were determined to best be met through existing management affecting habitats or communities of organisms were separated from the list. Through extensive examination, deliberation, and consultation with subject matter experts, 73 species were identified as Nearshore Strategy Species. These species, or distinct populations, were determined to have conservation needs in greatest need of management attention and to have the greatest potential for benefit from management actions.

The supplemental information on the special needs, limiting factors, data gaps, and conservation actions for each Nearshore Strategy Species is provided for use by managers, research and monitoring projects or programs, those producing education and outreach materials, planners, and the general public. Readers should note that management jurisdiction varies for each species. For instance, some Nearshore Strategy Species are managed by the ODFW, National Oceanic and Atmospheric Administration, and USFWS, and many species are under shared management authority by multiple resource agencies and institutions.

Species Data Gaps

In the Oregon Conservation Strategy, information needs are identified at various scales:

- Specific 'Data Gaps' are indicated for each [Strategy Species](#).
- 'Data Gap Species' are documented. These are species where not enough information is known to determine whether they meet the conservation criteria to qualify as Strategy Species.
- General research and monitoring needs are outlined for Strategy Species.

Data Gap Species

The Conservation Strategy identifies 112 Data Gap Species, including 6 amphibians, 9 birds, 12 mammals, 45 fish, and 40 invertebrates. For these species, some basic information, such as distribution and range, habitat associations, and general abundance, is not known, and it is not possible to determine whether they are truly at risk, or should be designated as a Strategy Species. The Oregon Conservation Strategy Data Gap Species list documents species that require more information to determine whether they should be elevated to Strategy Species status.

The Strategy Species and Data Gap Species lists are available for download in Excel table format: [Download the Oregon Conservation Strategy](#).

Invertebrate Species Taxonomic Information

For invertebrates, few specific surveys are typically done each year, and basic information is often lacking. Before making a conservation designation for Strategy Species or Data Gap Species status, more taxonomic information is needed to determine whether a group of invertebrates actually represents a population of one species or is a distinct species. If it is determined to be a distinct species, then more data on range and habitat associations may still be needed to determine conservation status.

During the technical review for the 2016 Strategy update, these invertebrates were determined to lack sufficient taxonomic information before they can be fully designated as a Data Gap Species or a Strategy Species: bald hesperian, basalt juga, Blue Mountains duskysnail, Blue Mountains juga, brown juga, Cascades axetail slug, Columbia duskysnail, Columbia springsnail, Crooked River juga, Deschutes mountainsnail, Deschutes sideband, diminuitive pebblesnail, disc Oregonian, Fall Creek pebblesnail, Hells Canyon mountainsnail, hotspring physa, humped coin, Keene Creek pebblesnail, Klamath taildropper, Lake Albert springsnail, Lake of the Woods pebblesnail, Malheur pebblesnail, Malheur springsnail, Modoc peaclam, Modoc Rim sideband, nerite pebblesnail, northwest hesperian, Oak Springs hesperian, Opal Springs juga, Owyhee hot springsnail, pinhead pebblesnail, purple juga, thinlip tightcoil, three-band juga, toothed pebblesnail, and Tuscan pebblesnail. The same applied to the following species complexes: duskysnails (*Colligyrus*), jugas (*Juga*), mountainsnails (*Oreohelix*), pebblesnails (*Fluminicola*), and springsnails (*Pyrgulopsis*).

Additional resources for invertebrates: [Oregon Biodiversity Information Center](#), [Oregon Department of Agriculture](#), [The Xerces Society for Invertebrate Conservation](#)

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General Research and Monitoring needs for Strategy Species

Species Management and Monitoring

- Determine baseline conservation status, estimated population size, and trends for Strategy Species.
- Develop and implement survey and monitoring methodology for species lacking protocols.
- Determine population goals for Strategy Species while accounting for current habitat conditions and potential for habitat restoration in Oregon.
- Develop measurable indicators of high quality habitat. For example, develop a framework for using species and habitat indicators to assess habitat status and trends.
- Determine relationships between population dynamics and habitat dynamics.
- Evaluate effectiveness of providing passage around barriers for fish and wildlife (including amphibians, reptiles, and mammals) to enhance migration or habitat connectivity.
- Improve data collection efforts and methods for all Plant Strategy Species (all plants of conservation concern).

Species Observation Data Management

An initial step to filling Strategy Species Data Gaps is taking advantage of available species observation datasets.

Species observation information collected throughout ODFW should be compiled and managed within centralized databases, and the process to incorporate data should be streamlined and automated as much as possible. This would not only allow surveys and research results to be better incorporated into statewide analyses and programs, but also provide a structure for recording incidental observations of Strategy Species by ODFW field staff.

Incorporating species observation datasets developed and maintained by partner agencies and organizations into ODFW databases and programs is a critical component of understanding species distributions, populations, and ranges. Species observations are a common dataset, frequently collected by government agencies, private contractors, conservation organizations, and public citizens. A concerted effort is involved to communicate with these organizations to understand what is available, and then how best to incorporate the information. The ODFW works closely with the [Institute for Natural Resources, ORBIC](#) to access and incorporate their biodiversity database of species occurrences throughout Oregon. This database includes contributions from various state and federal agencies as well as specific monitoring projects, such as the North American Breeding Bird Survey. This database provides an ideal way to

incorporate information from multiple agencies, but finding and inputting additional datasets require further effort. Carefully planned citizen science projects can provide more information on species observations with members that are trained in technique and identification protocols, while also providing a way for the public and landowners to contribute species information for use within the Conservation Strategy and other ODFW projects. For additional information, see the Monitoring page.

Animal Concentrations

Photo Credit: Charlie Bruce. Caspian Tern Colony.

Overview

Many animals gather together in large groups for migration, breeding, or sheltering, and these concentrations can be vulnerable to disturbance. Identifying the most important sites is the first step in conserving animal concentrations. Approaches include The Audubon Society's Important Bird Areas program, which recognizes the importance of migration stopovers and other areas where birds concentrate. Conservation Opportunity Areas include many, but not all, of the state's animal concentrations. For animal concentrations, appropriate conservation actions depend on the species and site, but will focus on maintaining or restoring important habitat features.

Klamath Lake hosts the largest concentration of wintering Bald Eagles in the continental United States, with up to a thousand individuals. At Dean Creek Wildlife Viewing Area, numerous elk congregate in marshy fields during the winter. At many of Oregon's mountain lakes and ponds, western toad tadpoles swarm in large masses in the summer, and begin to change into frogs and climb out onto land in large groups in the

early fall. In Portland, crowds gather nightly every autumn to watch 35,000 migrating Vaux's Swifts swirl and funnel into an old chimney at Chapman School, the largest known Vaux's Swift roost in the world.

Estuaries and bays along the Oregon coast and the lakes of southeastern Oregon provide vital stop-over refuges for shorebirds migrating to and from southern wintering areas and nesting locations in Canada and Alaska. Lake Abert may support the largest number of Wilson's Phalaropes in North America; up to 70,000 birds congregate here in late July.

People have long appreciated the spectacle of thousands or millions of animals gathered in one area. Oregonians enjoy wildlife viewing at several popular festivals that celebrate seasonal animal gatherings, including wintering Bald Eagles and migrating songbirds, shorebirds, and waterfowl.

Fish and wildlife often gather in concentrations for critical activities, such as feeding, breeding, or migrating. Some species breed in colonies, perhaps due to limited, specialized breeding sites or as a strategy to deter predators. Animals congregate when their food is concentrated, and migrating animals flock to a feeding site to refuel and rest.

Animals also might gather when an important resource is naturally limited in the landscape, such as fresh water in the desert or mineral springs in mineral-poor areas. Frogs and toads that breed in seasonal ponds tend to gather together for a short burst of spring breeding because they have a limited window of opportunity for egg-laying. When Pacific tree frogs gather to breed, a springtime chorus erupts as males sing to attract mates.

When animals gather in these large groups, they can become particularly vulnerable to habitat alteration and human disturbance. Because of the large number of individuals involved, any factors that impact highly critical sites can affect a large proportion of a species or an entire suite of species. The table below summarizes important habitat types and features for some of Oregon's animal concentrations.

Animal Concentrations, Habitat Types, and Features

Animal Concentration	Important Habitat Types	Important Habitat Features
Bald Eagles: wintering	Large lakes and rivers	Large trees or snags within a forest stand are used for communal roosts.
Bat roost sites (particularly hibernacula, maternal roosts, or diurnal roosts)	Depending on bat species, includes caves, mines, cliffs, bridges, and buildings	Roost sites must have suitable temperature and humidity. Lack of human disturbance critical for Townsend's big-eared bat and pallid bat.
Deer and elk key winter range areas	These vary by ecoregion but usually include warmer sites, such as lower valleys and southern slopes.	Wintering areas include diverse forested landscapes with openings and a variety of age classes, perennial grasslands, and sagebrush steppe habitats. Woody vegetation for foraging (e.g., bitterbrush, aspen, alder, willow, oak), and cover for

Animal Concentration	Important Habitat Types	Important Habitat Features
		insulation and hiding are needed. Shrub are important where snow is deep during winter.
Deer and elk herds: migration routes and transition range	These vary by ecoregion and combine features of summer and winter ranges. Travel corridors unobstructed by roads and urban areas are important.	Herds need forage and cover to provide safe passage between winter and summer ranges.
Freshwater mussel beds	Aquatic habitats	Freshwater mussels require clean water with low contamination and sedimentation and natural water flow regimes. They are important to tribal culture, filter water, a good indicators of high water quality, a are a key food source for fish, mink, otter and raccoons.
Nesting colonies (rookeries): Great Blue Herons	Riparian habitats	Herons require large trees near foraging areas (open grassy and wetland habitat and low levels of human disturbance during the nesting season. Great Blue Heron nesting colonies are declining and at risk some areas, particularly in the Willamette Valley.
Lamprey (juveniles concentrate in high densities)	Freshwater habitats	Lamprey may prefer low-gradient flood habitats and lower mainstem river channels.
Pond-breeding amphibians (toads, frogs, salamanders)	Ponds and other shallow wetlands. In many areas, these ponds are created by winter and spring rains, then dry up each summer. These temporary ponds provide essential breeding habitat.	In order to support breeding amphibians ponds and shallow wetlands must remain wet long enough for tadpoles to metamorphose, be relatively free of predators or disturbance, and provide sufficient food.
Raptors: migrating and wintering	Fields and pastures, grasslands and prairies, sagebrush steppe, and wet meadows; ridges during migration	Habitats where prey are often concentr include open grassy areas for rodents, riparian and deciduous shrub communit for songbirds, lakes for waterfowl, and managed agricultural fields. Raptors us thermals over ridges for soaring.
Salmonid (salmon, steelhead, trout) juvenile rearing areas	Estuaries, lakes, rivers, and streams	These areas must have suitable habitat complexity, low temperatures, and low sediment loads.
Salmonid spawning and holding areas	Streams, lakes, and rivers	These areas must have suitable habitat complexity and low temperatures.
Greater Sage-Grouse leks	Big sagebrush	Cover of 15-50% is needed for nesting. Open areas are used by males for courtship. Areas rich in forbs, such as playas, meadows, and higher-elevation

Animal Concentration	Important Habitat Types	Important Habitat Features
		sagebrush-steppe habitats, are importa for brood-rearing.
Seabird nesting colonies	Coastal bluffs, offshore islands and rocks, and sandy islands	Depending on the species, colonies ma include deep soil for burrowing (Tufted Puffin and storm-petrels), rocky ledges (Common Murres), or unvegetated san areas (Caspian Terns). Isolation from mammalian predators and human disturbance is critical.
Seal and sea lion haul-outs and pupping areas	Flat offshore rocks and isolated beaches	Isolation from human disturbance is important.
Shorebirds: migrating and wintering	Wet prairies, flooded fields, mudflats, alkali lakes, shorelines of wetlands and reservoirs, estuaries, and sandy ocean shore	Shorebirds need open, moist muddy or sandy areas with high invertebrate prey density.
Songbirds: migrating	Deciduous and mixed deciduous-conifer forests, high-elevation deciduous or mixed shrub communities, especially near water, and riparian habitat	Migrating songbirds need deciduous tr and shrubs with high invertebrate prey density and cover for insulation and hiding. Forested buttes are important i urban and agricultural landscapes.
Tadpole aggregations (for example, western toad, Oregon spotted frog)	Shallow areas in mountain lakes and ponds, slow stretches of rivers or side channels	Maintaining shallow mountain lake habitats, including native aquatic and lakeside vegetation, is important.
Waterbird nesting colonies	Lakes and marshes with both deep and shallow water	Colony characteristics vary by species include isolated and sparsely vegetate islands (American White Pelican), trees (Snowy Egret), and emergent vegetatio (Eared Grebes). Isolation from mamma predators and human disturbance is important.
Waterfowl and other waterbirds: migrating and wintering	Wetlands, lakes, reservoirs, and estuarine bays	Waterfowl need diverse water features high food availability (aquatic plant, invertebrate, or fish) and open water fo security.
Vaux's Swift roosts	Late successional conifers, urban and suburban	Large hollow trees and snags are impo for nesting and roosting. Chimneys (wh 'imitate' hollow trees) may also be used

Fish and Wildlife Diseases

Overview

Fish and wildlife are susceptible to naturally-occurring and introduced diseases caused by a variety of pathogens, including viruses, bacteria, fungi, prions, and protozoans. Animals exposed to pathogens may exhibit illness or death or show no signs of disease if the pathogen is cleared by the animal's immune system, or they may serve as carriers or reservoirs of the pathogen. In susceptible individuals and species, disease spreads quickly when large numbers of animals are concentrated naturally during migration, when they are artificially fed, or when they congregate during breeding or due to limited habitat. Emerging and novel diseases can have devastating effects on wildlife, human health, and local economies. Climate change may increase susceptibility of fish and wildlife to disease by altering ecosystem dynamics, increasing opportunities to spread disease, and raising animals' stress response, potentially making them more susceptible to disease and illness if they become exposed. Although not a disease, ocean hypoxia and acidification may have similar effects on populations of some marine species (see the Oregon Nearshore Strategy).

People can help to prevent unnatural disease outbreaks by remembering not to feed wildlife, vaccinating pets, and providing and managing natural habitat. Licensed Oregon wildlife rehabilitators care for sick or injured wild animals with the goal of returning them to their natural habitat, and provide valuable educational information and outreach to the public. In addition, accredited Association of Zoos and Aquariums facilities in Oregon (e.g., Oregon Zoo, Wildlife Safari, Oregon Coast Aquarium) provide valuable public education, outreach, and conservation projects related to the health of Oregon's fish and wildlife and their native habitats.

Endemic disease is a natural part of every ecosystem. However, introduced and emerging diseases not only threaten the balance of ecosystem health but can be very difficult and costly to eradicate once established. The best action to avoid unwanted disease outbreaks is prevention. The ODFW's biologists, veterinarians, and wildlife administrators make every effort to protect the state's fish and wildlife through surveillance, monitoring, training, response plans, policy, and regulation. Listed below are the diseases that present the greatest management concern or that present significant or recurring health risk to Oregon's fish and wildlife. This list includes diseases that occur naturally or are endemic in Oregon, as well as diseases that are introduced or emerging. The list is not inclusive of all diseases identified in Oregon fish and wildlife.

Wildlife Diseases of Management COncern

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Fish DISEASES OF MANAGEMENT CONCERN

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Emerging DISEASES OF MANAGEMENT CONCERN

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