

8. OTHER SPECIES

This chapter describes the non-focal species addressed by this Plan. While fundamentally a Recovery Plan for listed salmon and steelhead, this Plan also affects other species by virtue of the broad-based ecosystem focus of salmon and steelhead recovery as well as the need to address Federal Columbia River hydro system impacts on a variety of fish and wildlife species. Additional descriptions of other fish and wildlife species affected by subbasin elements of this Plan may be found in Appendix B.

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8.1. Overview

While primarily focused on listed salmon, steelhead, and trout, this Plan also recognizes the benefits of a comprehensive ecosystem-based approach to salmonid recovery on other fish and wildlife species throughout the region. This Plan addresses the needs of the Northwest Power and Conservation Council with respect to other fish and wildlife species affected by construction and operation of the federal Columbia River hydropower system. To recognize the ecosystem scope of these efforts, the Plan also included a representative subset of other significant fish and wildlife species that affect salmon, are affected by salmon recovery, or are useful for characterizing watershed status, functions, or management actions.

The *NPCC Technical Guide of Subbasin Planners (NPCC 2001)* identified criteria for species selection based on designation as federal endangered or threatened species; ecological significance; cultural significance; and local significance. A species list was developed by the LCFRB and the WDFW based on a review of potential candidates of interest in recovery area. As part of the joint effort between LCFRB and LCREP to develop the subbasin plan for the Columbia Estuary and Lower Columbia subbasin, a Planning Group¹ was formed to further develop and refine the species list. Additional refinements were included as part of the collaborative plan development process. The list of species was divided into broad categories that help convey the purpose and significance that individual species play in the planning process (Table 8-1).

Sensitive Species– These include other species of special conservation concern. Included are other state or federally-listed threatened or endangered species that may be affected by salmon recovery actions or hydro system construction and operations. Also included are species that are subject to other special conservation protections.

Species of Ecological Interest– This category of species is important from a management perspective or is related to the general health of the subbasins in terms of quality of the environment or habitat diversity. Individual species may be of interest because of their value as an indicator of ecosystem health or of a specific habitat type. The category also includes significant predators of salmon.

Species of Recreational Interest– This category of non-native species is primarily of recreational interest. These species might also interact with other species of interest.

Categories highlight the primary interest in any species but are not mutually exclusive. For instance many focal, sensitive, and recreational species are also ecologically significant.

The other fish and wildlife species addressed in this Plan are affected by many of the same limiting factors and threats that affect focal species. Regardless of their current abundance trend, implementation of an ecosystem-based approach to recovery of ESA-listed species indicates that an evaluation of effects of each recovery action on other species is warranted. Given the diversity of species comprising these other fish and wildlife species, population trends in response to current habitat conditions throughout the lower Columbia River ecosystem are quite variable. Some species are thriving in the altered lower Columbia River ecosystem, others have experienced precipitous declines, and others appear unaffected by habitat changes that have occurred from historical to present times. In addition, status of other species is unknown because data to assess population response to present habitat conditions are limited.

¹ NMFS, U.S. Fish & Wildlife Service, WA Dept of Fish & Wildlife, OR Dept of Fish & Wildlife, LCREP, LCFRB, City of Portland, Clatsop County Economic Development, CREST, USACE.

Table 8-1. Other species included in this Plan, listing status, and planning significance.

Species	Listed ¹	Sensitive	Ecological	Recreational
<i>Fish</i>				
American Shad ²			X	X
Channel Catfish ²			X	X
Cutthroat Trout		X	X	X
Eulachon	FT	X	X	X
Green Sturgeon	FT	X	X	
Northern Pikeminnow			X	X
Pacific Lamprey		X	X	
Smallmouth Bass ²			X	X
Walleye ²			X	X
White Sturgeon			X	X
<i>Reptiles and Amphibians</i>				
Larch Mt. Salamander	FS, WS	X	X	
Oregon Spotted Frog	WE	X	X	
Western Pond Turtle	WE	X		
<i>Mammals</i>				
Columbia Whitetail Deer	FE	X	X	
Fisher	FS, WE	X	X	
River Otter			X	
Harbor Seal		X	X	
Stellar Sea Lion	FT	X	X	
Western Gray Squirrel	FS, WT	X	X	
<i>Birds</i>				
Bald Eagle		X	X	
Band-tailed Pigeon			X	X
Caspian Tern		X	X	
Dusky Canada Goose		X		X
Osprey		X	X	
Red-eyed Vireo			X	
Sandhill Crane	WE	X		
Yellow Warbler			X	

¹ Listing status: FT = Federal threatened, FE = Federal endangered, FC = Federal candidate, FS = Federal species of concern, WE = Washington endangered, WT = Washington threatened, WS = Washington sensitive.

² Non-native species.

Ten non-focal fish species are considered in this Plan. Two are currently listed as threatened under ESA: green sturgeon and eulachon. In contrast, cutthroat trout, white sturgeon, northern pikeminnow, and American shad are relatively abundant throughout the lower Columbia. Pacific lamprey and eulachon have experienced declining trends or variable abundance in recent years; both are an integral part of the lower Columbia River ecosystem and are considered an important food source for sturgeon and pinnipeds. The remaining fish species (smallmouth bass, walleye, and channel catfish) appear to have stable but low population abundance relative to other areas of the Columbia River basin. Smallmouth bass, walleye, and channel catfish are all introduced species in the Columbia River basin and there is currently no basis for attempting to increase their productivity or abundance in the lower Columbia River ecosystem, particularly because of potential negative consequences on salmonid recovery.

Seventeen wildlife species are also included. Five of these (Larch Mountain Salamander, Columbia Whitetail Deer, Fisher, Stellar Sea Lion, and the Western Gray Squirrel) are listed under ESA. In addition, the Oregon Spotted Frog, Western Pond Turtle, and Sandhill Crane are listed as threatened under Washington State law. Columbia River seal and sea lion populations appear to be stable or increasing. Caspian Terns, native to the region but historically were not present in the lower Columbia River ecosystem, are now consistently found in the area because of human-induced habitat change. The Sandhill Crane and Dusky Canada Goose are other avian species that were not historically present in the lower Columbia River ecosystem. Agricultural lands in the lower Columbia floodplain have attracted cranes and geese to the region. Two avian species (Bald Eagle and Osprey) have relatively stable population trends but appear to be experiencing low reproductive success as a result of contaminant exposure. Two vastly different species (Columbian white-tailed deer and western pond turtle) have extremely low abundance levels in the lower Columbia River ecosystem. Data are sparse for a number of species, specifically Yellow Warbler and Red-eyed Vireo. Evidence suggests that abundance of both of these species is generally low in the lower Columbia River ecosystem; only possible evidence of breeding exists for the area.

Biological objectives and strategies are identified in this Plan for each species. Objectives and strategies take different forms due to inherent differences in species significance, ecological interactions, information available, and management structures in place. Detailed descriptions of the biology and life history of each species are found in Technical Appendix B. The following subsections briefly summarize the life history and status of each species.

8.2. American Shad

Millions of American shad (*Alosa sapidissima*) have colonized the Columbia River after their introduction from the East Coast into California's Sacramento River during the 1870s. Numbers increased steadily until the 1990s but now appear to have leveled off with some fluctuation based on annual conditions. Shad have become an important component of the lower mainstem and estuary ecosystem. Shad have become an important link in the Columbia River food web and are an important food source for sturgeon. Shad also provide a significant sport fishery fishing opportunity.

Limiting Factors

Productivity and abundance of shad are very high in the Columbia River. Shad have benefited from increased access to favorable reservoir spawning and rearing habitats due to mainstem dam passage improvements targeted toward salmon. Significant threats to American shad have not been identified in the lower Columbia River estuary and mainstem. Interactions between shad and salmonids are poorly understood. However, divergent trends in shad and salmon numbers are thought to occur primarily because the same habitat changes that favor shad are detrimental for salmon.

Objectives

The objective for shad is to decrease abundance but maintain a viable population (with ranges from 0.7 to 1.0 million, well below the recent record run sizes) while avoiding adverse impacts on other species, particularly the recovery of salmonids.

Measures

American shad are considered a potential threat to salmonids based on possible competition and food web effects, thus, shad are addressed in the regional ecological interactions strategies and measures developed for salmonids. Related measures, identified in Chapter 5, include:

- I.M6. Manage established populations of introduced game fish to limit or reduce significant predation or competition risks to salmon, and to optimize fishery benefits within these constraints.
- I.M7. Reduce the abundance of shad entering the estuary.
- I.M8. Evaluate positive and negative impacts of American shad on salmon, sturgeon, and other species as well as the feasibility and advisability of shad management measures.

Implementation will involve proactive fishery management to reduce the population to the suggested viable level; thus, harvest is encouraged but is also challenged by the incidental catch of salmonids and other species. Additional research is needed to better understand the interrelationships between shad and salmonids.



8.3. Channel Catfish

Channel catfish (*Ictalurus punctatus*) are another species that have been widely introduced outside their native range and can be found almost everywhere in the United States including the Pacific Northwest. Although channel catfish have inhabited Washington waters for more than a century, their abundance and distribution remain very limited. Small numbers of channel catfish can be found in some areas of the lower Columbia. Channel catfish provide fishery benefits in some altered lower Columbia habitats. Channel catfish are salmonid predators in certain situations and might also have an impact on juvenile sturgeon.

Limiting Factors

Channel catfish have benefited from hydrosystem development; they are found in reservoir habitats throughout the basin. Dams may provide increased suitable spawning habitat as well as more favorable water temperatures. Small numbers of channel catfish can be found in some areas of the lower Columbia. There are no known threats to channel catfish in the lower Columbia River.

Objectives

The objective for this species is to adaptively manage the population to limit adverse impacts on salmonids and other native fishes.

Measures

Because channel catfish are considered a predation threat to emigrating juvenile salmonids, they are addressed in the regional ecological interactions strategies and measures developed for salmonids. Related measures, identified in Chapter 5, include:

- I.M6. Manage established populations of introduced game fish to limit or reduce significant predation or competition risks to salmon, and to optimize fishery benefits within these constraints.
- I.M12. Manage pikeminnow, smallmouth bass, walleye, and channel catfish to prevent increases in abundance.

Implementation will involve development of an improved understanding of channel catfish habitat use, abundance, and distribution in the lower mainstem and estuary to evaluate and manage negative interactions with native species



8.4. Cutthroat Trout

Cutthroat trout (*Oncorhynchus clarki clarki*) are widely distributed in Washington lower Columbia River tributary systems. Cutthroat trout can rear to maturity in salt or fresh water, migrate large distances, remain in their natal area throughout their life, or exhibit any combination of these behaviors. Anadromous, fluvial, and resident life history forms of coastal cutthroat are reported in all Lower Columbia River drainages, and anadromous individuals are either documented or thought to be present in all Washington tributaries of the Columbia downstream of Bonneville Dam. Cutthroat have been documented in over 1,300 locations within the lower Columbia region.

The total abundance of coastal cutthroat trout in the lower Columbia basin is difficult to estimate because of their wide range of life history types and poor data availability. However, numbers have declined in almost all lower river tributaries over the past 10–15 years. The USFWS declined to list the Southwestern Washington/Columbia River DPS of the Coastal Cutthroat Trout as threatened in 1999 because some populations are relatively healthy and because of the ability of freshwater forms to produce anadromous progeny. However, WDFW describes cutthroat as depressed in all rivers entering the Columbia from its mouth to the Kalama River, citing either long-term negative trends or short-term severe declines. In March 2009, USFWS announced they were planning to reexamine the 1999 proposal to list coastal cutthroat trout as threatened under ESA.

Limiting Factors

Resident or fluvial cutthroat are regulated by local habitat conditions; sea-run populations encounter additional mainstem Columbia River and estuary effects. Because of their similar habitat requirements, cutthroat trout in the lower Columbia region are limited by the same subbasin and estuary/mainstem habitat limiting factors and threats identified for other salmonids. Cutthroat trout are thought to be distributed throughout most areas where they were historically present.

Objectives

The objective for cutthroat trout is to reverse declining abundance trends and maintain life history diversity (resident, fluvial, and anadromous forms).

Measures

Because cutthroat trout in the lower Columbia region are limited by the same subbasin and estuary/mainstem habitat limiting factors as other salmonids, they will benefit from regional subbasin habitat and estuary/mainstem habitat strategies and measures developed for salmon and steelhead. Implementation involves protection of existing functional habitats, restoration of other subbasin habitats toward historic conditions, and increased research efforts to determine the abundance, distribution, migration patterns, and population viability.



8.5. Eulachon

Eulachon or smelt (*Thaleichthys pacificus*) are a small, anadromous forage fish that enter the lower Columbia River and tributaries to spawn during winter and early spring. Eulachon inhabit the northeastern Pacific Ocean from Monterey Bay, California, to the Bering Sea and the Pribilof Islands. Large schools of smelt spawn in the Columbia and Cowlitz mainstems during most years. Pulses of spawners are also seen sporadically in other tributaries including the Grays, Lewis, and Sandy. Smelt support a popular sport and commercial dip net fishery in the tributaries, as well as a commercial gill-net fishery in the Columbia. Smelt are eaten in large numbers by other fishes (including sturgeon), birds, and marine mammals. Abundance is highly variable from year-to-year. However, nearly all spawning runs from California to southeastern Alaska have declined in the past 20 years. From 1938 to 1992, the median commercial catch of eulachon in the Columbia River was approximately 2 million pounds but from 1993 to 2006, the median catch had declined by nearly 98% to approximately 43,000 pounds. In March 2010, NMFS listed eulachon as threatened under the ESA (75 FR 13012).



Limiting Factors

Because of their anadromous life history, eulachon are limited by many of the same factors and threats identified above for salmonids, particularly long term changes in climate, subbasin habitat, mainstem and estuary habitat, and ecological interactions limiting factors. Although historic runs were reported as far upstream as Hood River, Oregon, Bonneville Dam currently limits distribution to the lower river. Dredging operations in the lower Columbia River have made local substrate unstable for the incubation of eulachon eggs. Eulachon were also subject to significant historical harvest. Eulachon are an important food item for many estuary and lower mainstem species including sturgeon, birds, and pinnipeds.

Objectives

In the interim, until specific recovery plans are developed for eulachon, the objective is to maintain or increase annual population abundance to ensure long term viability and support ecosystem value.

Measures

Eulachon will benefit from habitat measures described elsewhere in this Plan for the lower mainstem Columbia River and spawning tributaries including the Cowlitz River. Species measures also include:

- OS.M1. Identify and monitor status, limiting factors, and threats of Columbia River eulachon.
- OS.M2. Protect preferred spawning and rearing habitat of eulachon in the estuary and tributaries of the lower Columbia River.
- OS.M3. Avoid and/or mitigate incidental mortality of eulachon embryos and juveniles during dredging operations.
- OS.M4. Continue to monitor and regulate Columbia River fisheries for eulachon to inventory population status, limit impacts, and protect spawning escapement.

8.6. Green Sturgeon

Green sturgeon (*Acipenser medirostris*) occur in the lower Columbia River but rarely range far upstream from the estuary. Green sturgeon are among the most ocean-going of the sturgeons, leaving freshwater around 1-4 years of age and generally only return to spawn. Green sturgeon do not spawn in the Columbia River but originate from spawning populations in the Sacramento, Klamath, and Rogue rivers. The Southern DPS, consisting of the Sacramento River spawning population was listed as threatened under the ESA in 2006. The Northern DPS, consisting of Klamath and Rogue spawning populations was listed as a species of concern.

Green sturgeon, originating in other systems, are transitory seasonal residents of the Columbia River estuary. Large numbers of sub-adult and adult green sturgeon gather in the Columbia River estuary during summer and early fall, and individuals are occasionally observed as far upriver as Bonneville Dam. The lower Columbia River estuary was included in Critical Habitat designated for green sturgeon in 2009. Data on abundance and productivity of green sturgeon is very limited. Listing of the southern DPS was based on an apparent declining trend in recruitment and the existence of a single population in the DPS.

Limiting Factors

Little is known about green sturgeon and considerable research effort is needed to establish green sturgeon habitat usage and preferences in the lower Columbia River ecosystem. Because of their presence in the mainstem and estuary, green sturgeon may be limited by many of the same factors identified for salmonids in the estuary/mainstem habitat and the ecological interactions sections; green sturgeon are believed to be limited by the same factors identified for adult white sturgeon.

Objectives

Objectives for green sturgeon in the lower Columbia River are to avoid fish mortality and habitat destruction that might jeopardize the long term viability of this species.

Measures

Green sturgeon make extensive use of the lower Columbia River estuary habitats and will likely benefit from regional estuary and mainstem habitat and ecological interactions strategies and measures developed for other species. Species measures also include:

- OS.M5. Identify factors related to green sturgeon use of the Columbia River estuary and lower mainstem (timing, habitat use, diet analysis, etc.) and associated threats.
- OS.M6. Manage Columbia River salmon and white sturgeon fisheries to avoid direct and indirect impacts to green sturgeon.
- OS.M7. Protect critical habitats for green sturgeon in the lower Columbia River.



8.7. Northern Pikeminnow

The northern pikeminnow (*Ptychocheilus oregonensis*) are large (10-20 inches), long-lived (10-15 years), predaceous minnows that are native to freshwater lakes and rivers from Oregon to northern British Columbia. This opportunistic species has flourished with habitat changes in the mainstem Columbia River and its tributaries. Salmonids are a seasonal food of large pikeminnow and millions of juvenile salmonids are estimated to fall prey each year. Predation can be especially intense in dam forebays and tailraces where normal smolt migration behavior is disrupted by dam passage. A pikeminnow management program has been implemented in the Columbia and Snake rivers since the early 1990s in an attempt to reduce predation mortality by reducing numbers of the large, old pikeminnow that account for most of the salmonid losses.

Limiting Factors

Pikeminnow abundance has increased as a result of habitat alteration in the lower mainstem and large tributary reservoirs. In unaltered systems, pikeminnow and salmonid interactions are limited by habitat preferences and behavior patterns. In altered systems including the Columbia River mainstem and large tributary reservoirs, pikeminnow can become significant predators of juvenile salmonids. As such, pikeminnow are thoroughly addressed in the ecological interactions sections of this Plan.

Objectives

The objective for northern pikeminnow is to decrease predation on juvenile salmonids by reducing the number of larger, predaceous pikeminnow in the population, while also maintaining pikeminnow population viability.

Measures

Because northern pikeminnow are considered a predation threat to emigrating juvenile salmonids, they are addressed in the regional ecological interactions strategies and measures developed for salmonids. Related measures, identified in Chapter 5, include:

- I.M11. Continue to manage the northern pikeminnow fishery to help offset increased predation on salmon that has resulted from habitat alteration.
- I.M12. Manage pikeminnow, smallmouth bass, walleye, and channel catfish to prevent increases in abundance.



8.8. Pacific Lamprey

Pacific lamprey (*Entosphenus tridentatus*) are a native anadromous inhabitant of Pacific Northwest Rivers including the Columbia. Lamprey spawn in small tributaries, historically as far as Idaho and British Columbia, and die after spawning. Young lamprey, called ammocoetes, are algae filter feeders that burrow in sandy stream margins and side channels for up to 6 years before migrating downstream. Adults are predators that feed only in the ocean and attach themselves to their prey with suction mouths. Lamprey are culturally and ecologically important in the lower Columbia River ecosystem; they have served as an important food source for native peoples and for many Columbia River mainstem and estuary inhabitants (sturgeon, pinnipeds). Populations in the Columbia basin have declined concurrent with hydroelectric development and other habitat changes.

Limiting Factors

Because of their anadromous life history, lamprey are limited by many of the same factors and threats identified for salmonids, particularly subbasin habitat, mainstem and estuary habitat, and ecological interactions limiting factors. Lamprey are negatively affected by increased flood frequency in the subbasins (premature dispersal of ammocoetes), decreased river flow in the mainstem resulting from hydropower water regulation (altered juvenile dispersal mechanisms), and mainstem dam passage (limited access to spawning areas and decreased juvenile survival). Other tributary habitat problems include low flow, degraded riparian conditions, and high water temperature (Close 2000). Although adult lamprey can negotiate waterfalls, evidence suggests that adult lamprey experience considerable difficulty migrating through mainstem dam fish passage structures, which has severely limited lamprey access to historical spawning tributaries. Additionally, juvenile lamprey have difficulty in downstream dam passage and do not appear to benefit from juvenile salmonid passage systems.

Objectives

The objective for lamprey is to reverse the decreasing abundance trend and manage for populations that can meet cultural and ecological needs.

Measures

Lamprey will benefit from habitat measures described elsewhere in this Plan for the lower mainstem Columbia River and spawning tributaries. Species measures also include:

- OS.M8. Evaluate and improve migration and passage conditions for juvenile and adult lamprey at mainstem and tributary dams, ensuring no negative effects on salmonid passage.
- OS.M9. Reduce critical uncertainties regarding lamprey status, limiting factors, and threats through dedicated research and monitoring.



8.9. Smallmouth Bass

Smallmouth bass (*Micropterus dolomei*) are an introduced species that is widely distributed in the lower Columbia mainstem and common in specific habitats. Smallmouth bass provide some recreational fishery benefits but can also be significant salmonid predators in certain situations. Because of their popularity with anglers, smallmouth bass have been extensively transplanted throughout the continental United States including the Pacific Northwest. Numbers are generally small downstream from Bonneville Dam, but greater in upstream reservoirs that have created large amounts of favorable slow water habitat where rocky shorelines and substrate provide structure. Smallmouth bass are omnivorous and occasionally eat juvenile salmonids although they do not comprise a large proportion of the diet except in a few areas (e.g. fall Chinook rearing areas of the Hanford Reach).

Limiting Factors

Smallmouth bass have benefited from hydrosystem development, successfully colonizing reservoir habitats throughout the basin. Abundance in the free-flowing portion of the Columbia River below Bonneville Dam is generally recognized to be lower than elsewhere in the Columbia River basin. Smallmouth bass are considered predators of migrating juvenile salmonids and are addressed in the ecological interactions section of this Plan.

Objectives

The smallmouth bass objective is to adaptively manage the population to maintain or reduce current abundance levels while minimizing adverse impacts on salmonids and other native fishes. This objective involves managing the population to limit or decrease the current level of abundance, evaluate and limit interactions between smallmouth bass and native species, and develop an understanding of smallmouth bass habitat use, abundance, and distribution in the lower mainstem and estuary.

Measures

Because smallmouth bass are considered a predation threat to emigrating juvenile salmonids, they are addressed in the regional ecological interactions strategies and measures developed for salmonids. Related measures, identified in Chapter 5, include:

- I.M6. Manage established populations of introduced game fish to limit or reduce significant predation or competition risks to salmon, and to optimize fishery benefits within these constraints.
- I.M12. Manage pikeminnow, smallmouth bass, walleye, and channel catfish to prevent increases in abundance.



8.10. Walleye

Walleye (*Stizostedion vitreum*) were introduced from the Mississippi River basin into the Grand Coulee area. Over the last 40 years, they have gradually expanded downriver and now have significant populations throughout the lower Columbia. Distribution in the lower Columbia is patchy. Walleye are believed to be a voracious predator on salmon smolts. A sport fishery for walleye has been gradually growing in the lower Columbia River since the early 1980s, but walleye are not subject to the sport reward fishery program because salmon predation is by small walleye that are not particularly vulnerable to the effects of fishing.

Limiting Factors

Walleye have benefited from hydrosystem development and they have successfully colonized reservoir habitats throughout the basin. Abundance in the free-flowing portion of the Columbia River below Bonneville Dam is generally recognized to be lower than elsewhere in the Columbia River basin primarily because these fish are adapted to lakes and impoundments. Walleye numbers appear to be regulated by variable year class strength which is affected by fluctuating environmental conditions. Walleye are considered predators of migrating juvenile salmonids, as described in the ecological interactions section of this Plan.

Objectives

The objective for this species is to adaptively manage the population to maintain or reduce current abundance levels while minimizing adverse impacts on salmonids and other native fishes. This objective involves an improved understanding of walleye habitat use, abundance, and distribution in the lower mainstem and estuary to evaluate and manage negative interactions between walleye and native species.

Measures

Because walleye are considered a predation threat to emigrating juvenile salmonids, they are addressed in the regional ecological interactions strategies and measures developed for salmonids. Related measures, identified in Chapter 5, include:

- I.M6. Manage established populations of introduced game fish to limit or reduce significant predation or competition risks to salmon, and to optimize fishery benefits within these constraints.
- I.M12. Manage pikeminnow, smallmouth bass, walleye, and channel catfish to prevent increases in abundance.



8.11. White Sturgeon

White sturgeon (*Acipenser transmontanus*) live in large rivers along the Pacific coast of North America and move freely between freshwater and the ocean where they may remain for variable but prolonged periods. White sturgeon historically ranged all the way to the Canadian headwaters of the Columbia River and to Shoshone Falls in the upper Snake River. Columbia River white sturgeon were severely over-fished during the late 1800's. Recovery in the lower Columbia to current healthy population levels has required decades. Bonneville Reservoir continues to support a significant white sturgeon population although numbers and sizes are substantially less than in the lower river. Many other upriver populations have declined or disappeared. Only the Kootenai River subpopulation of white sturgeon has been listed as endangered under the ESA. White sturgeon provide important recreational, commercial, and tribal fisheries in the lower Columbia.



Limiting Factors

Because of their mainstem and estuary residency, white sturgeon are limited by many of the same habitat factors identified for salmonids. Although favorable habitat for sturgeon is abundant in the lower mainstem and estuary, mainstem dams block movement, fragment the habitat, and reduce anadromous prey in reservoirs upstream from Bonneville Dam. Sturgeon rarely use fish ladders which were engineered to pass the more surface-oriented salmon. Although Columbia River white sturgeon were severely over-fished during the late 1800s, populations and fisheries are currently monitored and regulated to maintain adult spawning abundance. Increased predation by sea lions on large adults has become a subject of significant concern in recent years.

Objectives

The white sturgeon objective is to continue management for a viable population that will maintain sufficient abundance to meet the continued cultural, economic, and ecological needs.

Measures

- OS.M10. Protect and restore all components of a healthy mainstem and estuary ecosystem that sustains sturgeon recruitment, survival, growth, and maturation.
- OS.M11. Protect preferred spawning habitat in extended tailrace zones downstream of Bonneville and The Dalles dams.
- OS.M12. Continue to monitor and manage Columbia River fisheries at sustainable levels, ensuring adequate spawner abundance through consistent recruitment to adulthood and protecting adult spawners from significant impacts.
- OS.M13. Avoid incidental mortality as a result of Bonneville Dam operations.
- OS.M14. Continue to mitigate hydropower impacts on fishery opportunity for white sturgeon upstream from Bonneville Dam.
- OS.M15. Evaluate and manage emerging threats to white sturgeon due to an increased incidence of predation by sea lions on the adult spawner population.

8.12. Larch Mountain Salamander

The Larch Mountain salamander (*Plethodon larselli*) occurs only in Washington and Oregon. Its known distribution includes west-side habitats of the southern Cascades region in Washington and the Columbia Gorge area of Oregon and Washington. Populations of Larch Mountain salamanders are small, isolated, and occur in a limited geographic area. Larch Mountain salamanders depend on cool, moist environments; they require a suitable combination of slope, rock size, shade, and organic debris. This salamander is sedentary and its very specific habitat requirements may hinder dispersal. Because the habitats preferred by these salamanders are naturally discontinuous, they are vulnerable to human disturbances such as logging and rock extraction. For these reasons, the Larch Mountain salamander is a Federally-listed species of concern as well as a sensitive species in the states of Washington and Oregon.

Limiting Factors

Because the habitats preferred by these salamanders are naturally discontinuous, they are vulnerable to disturbance from human activity. Disturbances such as logging, rock extraction, and inundation can alter their habitats, make them unsuitable and lead to greater vulnerability of this species. As the species is patchily distributed in the landscape, disturbances at the local level may negatively impact the population as a whole.

Objectives

The objective for this species is to increase quantity and quality of habitat and minimize disturbance of key habitats.

Measures

Specific measures are not identified for this species in this Plan. However, the species will benefit from subbasin habitat strategies and measures developed for salmonids.



8.13. Oregon Spotted Frog

The Oregon spotted frog (*Rana pretiosa*) is a Pacific Northwest endemic species recently differentiated from a close relative, the Columbia spotted frog (*Rana luteiventris*). In Washington, the Oregon spotted frog was historically found in the Puget Trough from the Canadian border to the Columbia River and east into the southern Washington Cascades. Oregon spotted frogs are closely associated with open water habitat and may be present in any number of forested or wetland habitats that are intertwined with open water. Only one of eleven historically known populations, and two recently discovered populations are known to remain in Washington. This species is listed as endangered in the State of Washington and is a federal candidate for protection under the ESA.

Limiting Factors

Limiting factors include loss of wetlands, decrease in water quality, displacement of native plant communities by introduced species, and competition and predation by bullfrogs and introduced fish species. Factors have included loss of wetland habitat and predation by introduced warmwater fish species (*Centrarchidae*, *Percidae*, and *Ictaluridae*) and the bullfrog (*Rana catesbeiana*).

Objectives

The recovery objective for this species is to increase quantity and quality of habitat and reduce effects of nonnative species.

Measures

Specific measures are not identified for this species in this Plan. However, because the Oregon spotted frog is limited by subbasin habitat limiting factors (loss of wetland habitat) and ecological interactions (predation by introduced species [i.e. warmwater fish and the bullfrog]), they will benefit from regional subbasin habitat and ecological interactions strategies and measures developed for salmonids.



8.14. Western Pond Turtle

The western pond turtle (*Clemmys marmorata*) is not listed under the federal ESA but is listed by Washington State as an endangered species. This species was essentially extirpated in the Puget lowlands by the 1980s and their present range in Washington is limited to two small populations in Skamania and Klickitat counties. In addition, two reintroduced populations are now currently found, one in south Puget Sound and one in the Columbia River Gorge.



Limiting Factors

Western pond turtles are limited by loss of riparian and wetland habitats, as well as predation by introduced bullfrogs and non-native fish. Wetland draining, filling, and development eliminated considerable habitat during the past century. Bullfrogs and warmwater fish are significant predators on hatchling and small juvenile western pond turtles. Raccoons are major predators on turtles and turtle eggs. Threats to the pond turtle populations are predation by introduced predators such as bullfrogs, illegal shooting, mortality from vehicle collisions and disease.

Objectives

The recovery objective for this species is to reverse the declining abundance trend in Washington and re-establish in the Puget Sound and Columbia Gorge regions at least 5 self-sustaining populations of >200 turtles composed of no more than 70% adults.

The WDFW wrote a recovery plan for the species in Washington in 1999 (Hays et al. 1999). The recovery plan objectives are to have a total of 7 populations with more than 200 turtles each in two recovery areas – 3 in Puget Sound and 4 in the Columbia River Gorge. Achieving this recovery objective requires an ongoing program of captive breeding, head-starting wild-hatched turtles, and reintroduction until population numbers are increased to ensure the species' survival in the state. Increasing both the number of populations and population sizes are needed to reduce the risk of potential loss of the species through catastrophic or other unforeseen circumstances.

Measures

Specific measures are not identified for this species in this Plan. However, because western pond turtles are limited by subbasin habitat limiting factors (loss of riparian and wetland habitats) and ecological interactions (predation by introduced fish), they will benefit from regional subbasin habitat and ecological interactions strategies and measures developed for salmonids.

8.15. Columbian Whitetail Deer

The Columbian white-tailed deer (*Odocoileus virginianus leucurus*), a subspecies of the white-tailed deer, is on the federal Endangered Species List, and is classified as endangered under Washington and Oregon state laws. This deer once ranged from Puget Sound to southern Oregon, where it lived in floodplain and riverside habitat. Columbian white-tailed deer are present in low-lying mainland areas and islands in the Columbia River upper estuary and along the river corridor in the vicinity of Cathlamet, WA, and Westport, OR. A recovery team, consisting of members from USFWS, ODFW, WDFW, and Oregon State University, has completed a Recovery Plan for Columbian white-tailed deer. The plan delineates the need to create three stable, secure, viable subpopulations.



Limiting Factors

Habitat conversion, losses, and isolation, coupled with low population productivity, are currently the most important threats to population viability. They are most closely associated with Westside oak/dry Douglas fir forest within 200 m of a stream or river; acreage of this habitat type has decreased substantially from historic to current conditions. The lower Columbia population, which has experienced a long-term decline, was significantly affected by flooding conditions in 1996.

Objectives

The recovery objective is to increase productivity and abundance of Columbia white-tailed deer, thereby creating a stable, viable population.

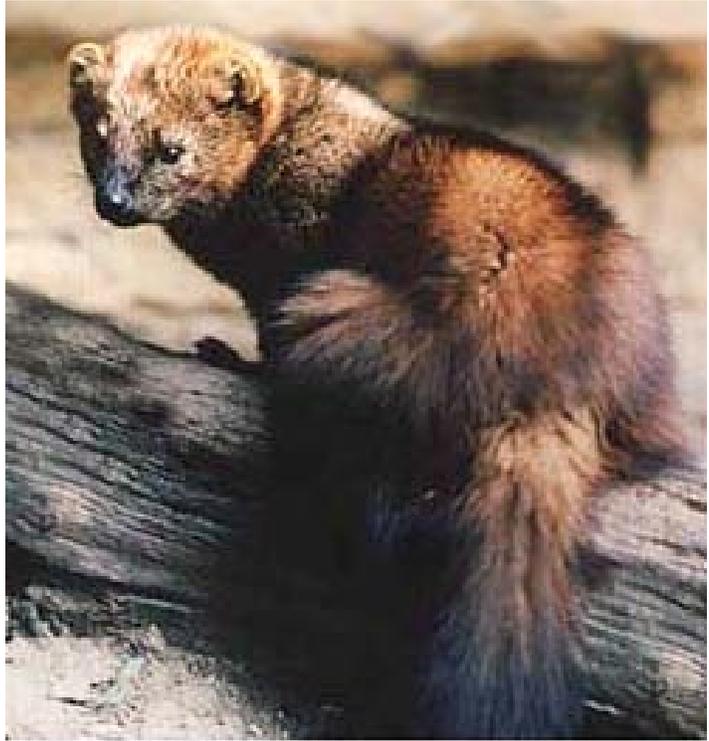
Measures

Because Columbia white-tailed deer may be limited by many of the same factors identified for salmonids in the estuary and mainstem habitat section (i.e. floodplain development and loss of riparian habitat), this species will benefit from regional estuary and mainstem habitat strategies and measures developed for salmonids. Species measures also include:

- OS.M16. Protect and enhance existing foraging habitat of Columbian whitetail deer to insure no further net degradation.
- OS.M17. Increase forested areas in lowlands and floodplain with hardwood and some coniferous riparian species to enhance habitat of Columbian whitetail deer.
- OS.M18. Decrease conversion of pastures and woodlots to intensive development to protect habitat of Columbian whitetail deer.
- OS.M19. Minimize interactions of Columbian whitetail deer with black-tailed deer.
- OS.M20. Reintroduce Columbian whitetail deer to suitable habitat.
- OS.M21. Reduce predation mortality on fawns of Columbian whitetail deer.
- OS.M22. Minimize flood mortality effects on Columbian whitetail deer.
- OS.M23. Minimize occurrence of parasites and disease in Columbian whitetail deer.
- OS.M24. Monitor and minimize mortality resulting from vehicle collisions of Columbian whitetail deer.

8.16. Fisher

The fisher (*Martes pennanti*) is a Washington state endangered species and a federal species of concern. Fishers historically occurred throughout much of the forested areas of Washington, though they were not particularly abundant. The fisher was over-trapped in the 19th and early 20th centuries. Trapping, predator and pest control programs, and loss and alteration of habitat combined to push the fisher to near extirpation. Although extensive surveys for fishers have been conducted throughout their historical range, no known population of fishers exists in Washington. The apparent absence of fishers in Washington represents a significant gap (i.e., lack of population continuity) in the species range from Canada to Oregon and California. However, infrequent sighting reports and incidental captures indicate that a small number may still be present.



Limiting Factors

Limiting factors include loss of large tracts of low and mid elevation old growth or late seral forest, habitat fragmentation, stand replacement fires, incidental mortality from vehicle collisions or trapping for other species, and small population risks. Despite protection from legal harvest for 64 years, the fisher has not recovered. The fisher population may have been kept from recovering by a combination of factors including: a reduction in quality and quantity of habitat due to development and logging; past predator and pest control programs; low inherent reproductive capacity of the species; and demographic and genetic effects of small population size. Riparian habitats, especially those with large diameter snags, live trees and downed logs, are considered high quality habitats for fishers, especially for resting and reproduction. They have large home ranges and generally avoid large clearings, suggesting that viable populations would require large areas of relatively contiguous habitat.

Objectives

The recovery objective for this species is to minimize risks to populations in the process of becoming established while increasing quantity and quality of habitat and minimizing incidental mortality.

Measures

Specific measures are not identified for this species in this Plan. However, because the fisher is limited by subbasin habitat and estuary and mainstem habitat limiting factors (loss and fragmentation of forested riparian habitat), they will benefit from regional subbasin habitat and estuary and mainstem habitat strategies and measures developed for salmonids.

8.17. River Otter

The river otter (*Lutra canadensis*) is a top predator of most aquatic food chains that has adapted to a wide variety of aquatic habitats, from marine environments to high mountain lakes of North America. The river otter is a year-round resident of the lower Columbia River mainstem and estuary, although field observations and trapper data indicate that population numbers are relatively low. Low abundance may be the normal equilibrium level for river otters in this region. Otters on the lower Columbia River concentrate their time in shallow, tidal influenced back waters, sloughs, and streams throughout the estuary. Otter home ranges (approximately 11 river miles) are largely defined by local topography and overlap extensively. Otter diets vary seasonally and generally consist of a wide variety of fish species and aquatic invertebrates such as crabs, crayfish, and mussels.



Limiting Factors

River otters are understudied and considerable research is needed to identify limiting factors or threats to the lower Columbia River mainstem and estuary population. However, because of their association with estuary riparian and floodplain habitat, river otters are assumed to be limited by many of the same factors identified for salmonids in the estuary and mainstem habitat section. In particular, floodplain development and loss of riparian habitat in the lower mainstem and estuary likely limit the capacity for river otter. Because river otters are capable of traveling over land, it is not understood how the loss of habitat connectivity of side channel and floodplain habitat has affected species' behaviors such as foraging, resting, mating, and rearing. River otters are concentrated in shallow water tidal sloughs and creeks associated with willow-dogwood and Sitka spruce habitats located primarily in the Cathlamet Bay area. Although dikes throughout the estuary have disconnected substantial amounts of side channel and floodplain habitats from the mainstem, the Cathlamet Bay area remains one of the most intact and productive tidal marsh and swamp habitat throughout the entire estuary. Contaminants in river otter tissue may have adverse physiological effects (Tetra Tech 1996).

Objectives

The objective for this species is to maintain current population abundance.

Measures

Because river otter are limited by estuary and mainstem habitat limiting factors (i.e., floodplain development and loss of riparian/wetland habitats), they will benefit from regional estuary and mainstem habitat strategies and measures developed for salmonids. Species measures also include:

OS.M25. Protect existing preferred habitat to insure no future net degradation of river otters.

8.18. Seals and Sea Lions

Harbor seals, Stellar sea lions, and California sea lions are seasonally present in the lower Columbia River. Steller sea lions are listed as threatened under the federal ESA. All seals and sea lions are also protected by the Marine Mammal Protection Act. Seals and sea lions are ecologically important in the Columbia River estuary and lower mainstem and are a predator of adult salmonids. Harbor seals are the only pinniped considered a year-round resident in the Columbia River mainstem and estuary. Abundance is highest in winter and lowest in summer as a



result of migratory behavior and the timing of the breeding season. Most seals and sea lions are concentrated in or near the estuary but individuals regularly range as far upstream as Bonneville Dam and Willamette Falls. Sea lions regularly travel long distances and marked individuals have been observed to travel between Washington, Oregon, and California. These animals were historically regarded as a nuisance by fishers and were regularly shot or harassed. Following the adoption of the Marine Mammal Protection Act, seals and sea lions recovered steadily from critically low population sizes. Seals and sea lions are predators of fish but diet studies indicate that non-salmonids comprise the majority of the diet. However, seals and sea lions do consume significant numbers of adult salmon and steelhead during some periods. Individual animals can become a fish passage problem where fish are artificially concentrated in the vicinity of locks, dams, and fish ladders.

Limiting Factors

There are no large-scale limiting factors or threats to harbor seals, Steller sea lions, and California sea lions in the lower Columbia River estuary and mainstem. However, they are considered a threat to migrating adult salmonids, as was described in the ecological interactions section of this Plan.

Objectives

The objective for seals and sea lions in the lower Columbia is to maintain current seasonal population abundance while limiting predation risks to adult salmonids.

Measures

Because seals and sea lions are considered a threat to emigrating adult salmonids, they are addressed in the regional ecological interactions strategies and measures developed for salmonids. Related measures, identified in Chapter 5, include:

- I.M14. Identify and implement actions to reduce salmonid predation by pinnipeds.

8.19. Western Gray Squirrel

The western gray squirrel (*Sciurus griseus*) is a Washington state threatened species and a Federal species of concern. Although the western gray squirrel was once abundant and widespread throughout oak-conifer forests, its range in Washington State has contracted to three disjunct populations. In a 2003 Status Review and 12-month finding for a petition to list the Washington population of the western gray squirrel (68 FR 34682), the USFWS concluded that listing was not warranted because the Washington population of western gray squirrels is not a distinct population segment and, therefore, not a listable entity. The WDFW has since completed a western gray squirrel recovery plan in 2007.



Limiting Factors

Limiting factors include loss of large tracts of old growth or late seral forest and increased disease or competition with introduced squirrel species. Population loss and fragmentation is largely due to disease (i.e., mange) associated with invasion of California ground squirrels and seasonal weather differences, which effect acorn production. Habitat loss and degradation is also a likely long-term factor. In the future, competition from the introduced eastern grey squirrel may also be an issue.

Objectives

The recovery objective is to Increase the quantity and quality of habitat and reduce effects of nonnative species.

Measures

Specific measures are not identified for this species in this Plan. However, because the western gray squirrel is limited by subbasin habitat and estuary and mainstem habitat limiting factors (loss of forested habitat), they will benefit from regional subbasin habitat strategies and measures developed for salmonids.

8.20. Bald Eagle

Bald Eagles (*Haliaeetus leucocephalus*) were listed as endangered under the Endangered Species Act in 1978. In 1994, the USFWS proposed to reclassify the Bald Eagle from endangered to threatened throughout its range; this reclassification was finalized in 1995. In 1999, the USFWS proposed to delist the Bald Eagle throughout its range, this delisting was finalized in 2007. Bald Eagles are still protected under the Bald and Golden Eagle Protection Act and are culturally important throughout the Pacific Northwest. Bald Eagles are distributed throughout North America, breeding in most of their range. Resident and migratory Bald Eagles are found along the lower Columbia River. Breeding birds are year-round residents and do not migrate during the winter. All Bald Eagle nest sites in this area have been monitored for productivity since the late 1970s, and in recent years there were 96 occupied breeding territories. The area supports an additional wintering population of over 100 eagles. The lower Columbia River Bald Eagle population is one of only two regional populations in Washington that has exhibited low reproductive success representative of a decreasing population (the other regional population was in Hood Canal). Adult abundance in the local population has remained relatively stable in recent years, but appears to be maintained by adult immigration from adjacent populations.



Limiting Factors

Because of their presence in the mainstem and estuary, Bald Eagles may be limited by many of the same factors identified for salmonids in the estuary and mainstem habitat section. In particular, floodplain development and presence of contaminants negatively affect Bald Eagles. Bald Eagles are strongly associated with large trees during nesting, perching, and roosting; thus, the loss of mature forest habitats in the Columbia River estuary and lower mainstem has likely decreased potential eagle territories. Bald Eagle populations in the estuary and lower mainstem have suffered from low reproductive success because of contaminants in the ecosystem that caused eggshell thinning. Uptake may be via prey consumption or direct contact.

Objective

The recovery objective is to increase the viability of the Bald Eagle breeding population in the lower Columbia River, particularly through increased reproductive success.

Measures

Because Bald Eagles may be limited by many of the same factors identified for salmonids in the estuary and mainstem habitat section (i.e. floodplain development and contaminants), this species is addressed under the regional estuary and mainstem habitat strategies and measures developed for salmonids. Species measures also include:

- OS.M26. Reduce contaminant exposure of Bald Eagles.
- OS.M27. Protect existing nesting and foraging habitat of Bald Eagles.
- OS.M28. Minimize human disturbance of Bald Eagles.
- OS.M29. Minimize persecution or other man-induced mortality of Bald Eagles.

8.21. Band-tailed Pigeon

Band-tailed Pigeons (*Columba fasciata*) are found in coniferous forest zones of mountainous areas of western North America including much of Western Washington. Band-tailed Pigeons are listed as a State and Federal Game species. Breeding bird survey data indicated the population of Band-tailed Pigeons in Washington declined significantly from 1968 to 1993. The hunting season in Washington underwent an emergency closure in 1991 due to a rapid decline in the population as determined from pigeon surveys. However, more recent data showed increases in population that allowed the reinstatement of a limited hunting season in 2002, after a 10-year restriction on hunting.



Limiting Factors

The Band-tailed Pigeon requires mineral springs as a source of calcium for egg-laying and the production of crop-milk for its young. The proximity of these mineral springs to suitable foraging habitats is an important limiting factor. A scarcity of mineral sites combined with the alteration of available nesting habitat jeopardizes Band-tailed Pigeon populations. Intensive hunting pressure in the past has also been held responsible for declines in the population.

Objectives

The objective for Band-tailed Pigeon is to increase quantity and quality of habitat.

Measures

Specific measures are not identified for this species in this Plan. Because the Band-tailed Pigeon is limited by subbasin habitat limiting factors (loss of coniferous forests with associated mineral springs), they will benefit from regional subbasin habitat strategies and measures developed for salmonids.

8.22. Caspian Tern

Caspian Terns (*Sterna caspia*) are a highly migratory species that are distributed throughout the world and are present in large numbers in the Columbia River estuary. The species is not listed but is of conservation concern because of the concentration of breeding terns at relatively few sites and ecological concern because of predation on listed salmon. Protection is provided by the Migratory Bird Treaty Act (1918) in the United States, the Migratory Bird Convention Act (1916) in Canada, and the Convention for the Protection of Migratory Birds and Game Mammals (1936) in Mexico. Currently two-thirds of the Pacific Coast and one-quarter of the North American population nests in the Columbia River estuary on islands created by deposition of material dredged from the navigational channel.



Limiting Factors

The USFWS, USACE, and NMFS completed a Final Environmental Impact Statement (EIS) for Caspian Tern management in the Columbia River estuary in 2005. The purpose of the EIS was to explore options to reduce the level of tern predation on Columbia River salmonids while insuring the protection and conservation of Caspian Terns in the Pacific Coast/Western region (California, Oregon, Washington, Idaho, and Nevada). Threats to and from Caspian Terns are part of the EIS. Federal and State agencies and non-governmental organizations have agreed to explore options for restoring, creating, and enhancing nesting habitat for Caspian Terns throughout portions of the Pacific Coast/Western region. The potential benefits of this proposed action would reduce the level of tern predation on migrating juvenile salmonids in the Columbia River, and lower the vulnerability of a significant portion of breeding Caspian Terns in the Pacific Coast/Western region to catastrophic events. A series of Caspian Tern management activities have been implemented to encourage significant numbers of nesting terns to nest on East Sand nearer the ocean where diet is more diverse than upstream at Rice Island where predation on salmonids is more significant.

Objectives

The Caspian tern objective is to maintain population viability region-wide and decrease the population's vulnerability to catastrophic events while also managing predation on salmon.

Measures

Because Caspian Terns are considered a predation threat to emigrating juvenile salmonids, they are addressed in the regional ecological interactions strategies and measures developed for salmonids. Related measures, identified in Chapter 5, include:

- I.M13. Continue to manage predation by avian predators, such as Caspian Terns, to avoid large increases in salmon predation while also protecting the viability of predator populations.
- I.M15. Implement projects to redistribute to multiple breeding sites, portions of the Caspian Tern colony currently nesting on lower Columbia River estuary islands.

8.23. Dusky Canada Goose

The Dusky Canada Goose (*Branta canadensis occidentalis*) is a distinctive race of medium size (about 6 lb) and dark brown plumage, that nests on the Copper River Delta, Alaska, migrates through southeastern coastal Alaska and coastal British Columbia, and winters primarily in southwestern Washington and western Oregon. Numbers began an abrupt decline after the 1964 Alaska earthquake raised the elevation of nesting area wetlands which precipitated a series of successional vegetation changes and



also increased predation. A network of federal and state waterfowl refuges were established in the mid-1960s to provide attraction and protection. The Dusky Canada Goose has been intensively managed since the 1950s with regulations that reduced harvest. Beginning in the early 1970s and increasing to the present, tens of thousands of other races of Canada geese began wintering in the same areas as the dusky which has significantly complicated protection of this species. In the late 1990s, a group of landowners, agency personnel, and others formed the Canada Goose Agricultural Depredation Working Group and developed a management plan to deal with increasing goose numbers and impacts on habitats. The Dusky Canada Goose is classed as a migratory bird by federal regulation and thus protected by the Migratory Bird Treaty Act. It is also considered a game bird by Washington rule. The Pacific Flyway and Washington Fish and Wildlife Commission regulate harvest.

Limiting Factors

Because of their presence in the mainstem and estuary, the Dusky Canada Goose may be limited by many of the same factors identified for salmonids in the estuary and mainstem habitat section. In particular, floodplain development and loss of riparian habitat in the lower mainstem and estuary limit the capacity for Dusky Canada Goose overwintering.

Objectives

The recovery objective for this species is to reverse the declining abundance trend and maintain a wintering population in the lower Columbia River, while limiting crop depredation.

Measures

Because Dusky Canada Goose may be limited by many of the same factors identified for salmonids in the estuary and mainstem habitat section (i.e. floodplain development and loss of riparian habitat), the species may be affected by regional estuary and mainstem habitat strategies and measures developed for salmonids. Species measures also include:

- OS.M30. Protect existing overwintering habitat of Dusky Canada Geese to insure no future net degradation.
- OS.M31. Encourage use of public lands of Dusky Canada Geese over private lands.
- OS.M32. Increase the availability of overwintering habitat for Dusky Canada Geese on public lands.
- OS.M33. Limit crop depredation by Dusky Canada Geese.

8.24. Osprey

The Osprey (*Pandion haliaetus*) is a large piscivorous bird of prey that nests and feeds along the lower Columbia River in spring and summer. Ospreys have nearly worldwide breeding distribution; birds that breed in the Pacific Northwest migrate to wintering grounds in southern Mexico and northern Central America. Ospreys nest in forested riparian areas along lakes, rivers, or coastlines; nests are situated atop trees, rock pinnacles, or artificial structures such as channel markers or power/light poles. Adult pairs are thought to mate for life and return to the same area annually for breeding. The Osprey population along the



lower Columbia River mainstem has increased slightly in recent years. Osprey productivity in the lower Columbia was estimated at 1.64 young/active nest in 1997 and 1998, which is higher than the generally recognized 0.80 young/active nest needed to maintain a stable population. Ospreys feed almost exclusively on fish and are not particular about the species of fish they consume. In the lower Columbia and Willamette rivers, largescale suckers are an important part of the Osprey's diet.

Limiting Factors

Although forest habitats used for nesting have likely decreased, Osprey have adapted to nesting on man-made structures. Osprey appear less selective of breeding sites than Bald Eagles, as they are often observed nesting on channel markers or power poles. Because of their presence in the mainstem and estuary, Osprey may be limited by many of the same factors identified for salmonids in the estuary and mainstem habitat section. In particular, floodplain development and presence of contaminants negatively affect Osprey. Contaminants are known to decrease eggshell thickness, which affects survival. Uptake may be via prey consumption or direct contact. Columbia River Osprey eggs contained the highest concentration of DDE reported in North America in the late 1980s and 1990s. Contaminant levels in Osprey tissue are high enough to result in decreased egg thickness, but the increasing population in recent years suggests that young production is not a limiting factor.

Objectives

The Osprey objective is to increase the viability of the Osprey breeding population in the lower Columbia River, particularly through increased reproductive success.

Measures

Because Osprey may be limited by many of the same factors identified for salmonids in the estuary and mainstem habitat section (i.e., floodplain development and contaminants), they may be affected by regional estuary and mainstem habitat strategies and measures developed for salmonids. Species measures also include:

- OS.M34. Protect existing nesting habitat of Osprey to insure no future net degradation.
- OS.M35. Reduce contaminant exposure of Osprey.

8.25. Red-eyed Vireo

The Red-eyed Vireo (*Vireo olivaceus*) is locally common in riparian growth and strongly associated with tall, somewhat extensive, closed canopy forests of cottonwood, maple, or alder in the Puget Lowlands and along the Columbia River in Clark and Skamania Counties. Within Washington, the Red-eyed Vireo is more widespread in northeastern and southeastern Washington, and not a conservation concern. Red-eyed Vireos in the lower Columbia River mainstem and estuary are ecologically significant. They are an excellent indicator of riparian habitat characterized by tall, closed canopy forests of deciduous trees with a deciduous understory, forest stand sizes larger than 50 acres, and riparian corridor widths greater than 50 m.



Limiting Factors

The Red-eyed Vireo is common and not a conservation concern. Red-eyed Vireos are negatively affected by floodplain development and loss of riparian and wetland habitat. Thus, loss of this specific habitat type limits Red-eyed Vireos in the lower Columbia River and estuary, although the extent of habitat loss is not clear. Habitat alterations along the lower Columbia River corridor have likely been more damaging to the possible presence of Red-eyed Vireos as opposed to Yellow Warblers because dense riparian forests along the lower Columbia River are likely less abundant than shrub-dominated wetland habitat. However, there are no data to compare historic and current breeding populations in the Columbia River estuary and lower mainstem.

Objectives

The objective for this species is to protect critical, preferred habitat including riparian gallery forest with tall, closed canopy forests of deciduous trees (cottonwood, maple, or alder and ash), with a deciduous understory, forest stand sizes larger than 50 acres, and riparian corridor widths greater than 50 m.

Measures

Because Red-eyed Vireos are limited by subbasin habitat and estuary and mainstem habitat limiting factors (i.e., loss of riparian and wetland habitats), they may be affected by regional subbasin habitat and estuary and mainstem habitat strategies and measures developed for salmonids. Species measures also include:

OS.M36. Protect existing preferred habitat of Red-eyed Vireo to insure no future net degradation.

8.26. Sandhill Crane

The Sandhill Crane (*Grus Canadensis*) was listed as an endangered species by the State of Washington in 1981. Sandhill Cranes have ecological, recreational (wildlife viewing) and management significance, along with potentially negative economic (crop depredation) impact. Because of their migratory life history, Sandhill Cranes are protected by the Migratory Bird Treaty Act. The lower Columbia River mainstem and estuary is not a historic breeding or overwintering area for Sandhill Cranes. Sandhill Cranes currently do not breed in the area, but agricultural



development throughout the lower Columbia River floodplain has attracted overwintering Sandhill Cranes. Up to 1,000 Sandhill Cranes are estimated to winter in the lower Columbia River floodplain and an additional 2,000 to 3,000 Sandhill Cranes are estimated to use the lower Columbia River floodplain as a migratory stopover. All cranes observed wintering at Ridgefield NWR and Sauvie Island Wildlife Area, Oregon, in late November 2001 and February 2002 were Canadian sandhills, and based on observations of marked birds, wintering cranes regularly move back and forth between these areas.

Limiting Factors

Because of their presence in the mainstem and estuary, Sandhill Cranes may be limited by many of the same factors identified for salmonids in the estuary and mainstem habitat section. In particular, floodplain development and loss of riparian habitat in the lower mainstem and estuary limit the capacity for Sandhill Crane overwintering and use during migration. Crane habitat on the lower Columbia bottomlands between Vancouver and Woodland is threatened with industrial development, conversion of agricultural lands to cottonwood plantations, tree nurseries, or other incompatible uses, and crane use is disturbed by hunters and other recreational users. Reclamation of agricultural land for habitat restoration projects may discourage overwintering by Sandhill Cranes, although future development of herbaceous wetlands may provide adequate winter habitat for Sandhill Cranes currently using the region. Wildlife refuges within the subbasins provide a vital baseline of winter habitat.

Objective

The objective for this species is to support and maintain wintering populations in the lower Columbia River, while limiting crop depredation. This objective involves protecting and expanding availability of winter habitat (particularly on public lands).

Measures

Because Sandhill Cranes may be limited by many of the same factors identified for salmonids in the estuary and mainstem habitat section (i.e. floodplain development and loss of riparian habitat), they may be affected by regional estuary and mainstem habitat strategies and measures developed for salmonids. Species measures also include:

- OS.M37. Protect existing overwintering habitat of Sandhill Crane to insure no future net degradation.
- OS.M38. Encourage use by Sandhill Cranes of public lands over private lands.
- OS.M39. Increase the availability of overwintering habitat for Sandhill Cranes on public lands.
- OS.M40. Limit crop depredation by Sandhill Cranes.

8.27. Yellow Warbler

Yellow Warblers (*Dendroica petechia*) are an excellent indicator of riparian zone structure and function. They are a riparian obligate species most strongly associated with wetland habitats that contain Douglas spirea and deciduous tree cover. Although within Washington, Yellow Warblers are apparently secure and are not of conservation concern, they are ecologically significant and are considered an indicator of dense riparian shrub habitat. Yellow Warblers are an indicator of riparian shrub habitat characterized by a dense deciduous shrub layer with edge and with small patch size.



Habitat suitability for warblers is correlated with the percent of deciduous shrub canopy comprised of hydrophytic shrubs; warbler abundance is positively associated with deciduous tree basal area and negatively associated with closed canopy and cottonwood proximity. Yellow Warblers in the lower Columbia River mainstem and estuary are widely distributed and common.

Limiting Factors

Yellow Warblers are negatively affected by floodplain development and loss of riparian and wetland habitat. Thus, loss of this specific habitat type limits Yellow Warblers in the lower Columbia River and estuary, although the extent of habitat loss is not clear.

Objectives

The objective for this species is to protect critical preferred habitat including riparian zones characterized by a dense deciduous shrub layer (1.5-4 m) with edge and small patch size (heterogeneity).

Measures

Because Yellow Warblers are limited by subbasin habitat and estuary and mainstem habitat limiting factors (i.e., loss of riparian and wetland habitats), they may be affected by regional subbasin habitat and estuary and mainstem habitat strategies and measures developed for salmonids. Species measures also include:

OS.M41. Protect existing preferred habitat of Yellow Warbler to insure no future net degradation.