CHAPTER 3

Species of Greatest Conservation Need

Table of Contents

3.0 Overview **2**
Revising the SGCN; criteria and process 2
Species dropped from the SGCN list since 2005 3

3.1 The SGCN Species **6**
3.1.1 MAMMALS 6
3.1.2 BIRDS 14
3.1.3 AMPHIBIANS AND REPTILES 22
3.1.4 FISH 29
3.1.5 INVERTEBRATES 37

3.2 Summary of Threats and Conservation Actions **46**
3.2.1 Methodology 46
3.2.2 Discussion 46

3.3 Reference Information **49**
Explanation of Terms Used in Conservation Status Tables 49

LIST OF FIGURES

Figure 3-1: Pollination Explanation 38
Figure 3-2: SGCN Threats, by taxa 47
Figure 3-3: SGCN Needed Actions by Taxa 47
Figure 3-4: SGCN Adequacy of Investment 48
Figure 3-5: SGCN Lead Entity for Actions 48

LIST OF TABLES

Table 3-1: Number of SGCN in 2015 and 2005 3
Table 3-2: SGCN from 2005 not included on 2015 list 4
Table 3-3: SGCN Mammals Summary of Conservation Status 9
Table 3-4: SGCN Birds Summary of Conservation Status 17
Table 3-5: SGCN Amphibians Summary of Conservation Status 25
Table 3-6: SGCN Reptiles Summary of Conservation Status 27
Table 3-7: SGCN Fish Summary of Conservation Status 32
Table 3-8: SGCN Invertebrates Summary of Conservation Status 40

CHAPTER 3
Species of Greatest Conservation Need

3.0 Overview

In this chapter we review the methodology used to develop the Species of Greatest Conservation Need (SGCN) and discuss changes in this list since 2005, including species no longer included. Section 3.1 includes an overview of all the current SGCN by taxonomic group: mammals, birds, reptiles and amphibians, fish, and invertebrates are all discussed separately. For each taxonomic group, there is a narrative summary of conservation trends and a table summarizing conservation status. Section 3.2 identifies the most prevalent stressors across taxa. Finally, Section 3.3 includes an explanation of terms used throughout the chapter.

Appendix A contains detailed information in the form of fact sheets for each species that describe distribution, habitat needs, stressors and priority actions needed. Additional information and discussion on the habitats important to SGCN and the actions needed to conserve them can be found in Chapter 4.

Revising the SGCN: Criteria and Process

WDFW staff focused significant effort on a re-evaluation of the 2005 SGCN list. Criteria used to develop the 2005 SGCN list were revised to simplify the methodology and provide clearer communication both internally and externally about the rationale for species inclusion on the SGCN list. NatureServe[1] rankings were emphasized in developing our revised list, as recommended in the Best Practices for State Wildlife Action Plans Guidance document. The most recent research was consulted to make evaluations for all proposed SGCN, and increased agency input resulted in inclusion of more fish and invertebrate species. As a result, the 2015 list is substantially different from the 2005 list.

Methodology

Selection of species for inclusion on the SGCN list began with a master list of 700 plus species with each species included in the first draft SGCN list for further consideration if it met at least one of the following criteria:

- Rank of “high” on threat/vulnerability by WDFW biologists in the 2005 SGCN process
- Listed as a state sensitive, threatened or endangered species or a federal threatened or endangered species
- Rank of S1 or S2 in NatureServe (see Section 3.3 - References section of this chapter for a description of these ranks)

If a species met at least one of these criteria it was included in a first draft SGCN list. An SGCN technical team then reviewed all the draft SGCN and applied a secondary set of criteria to either remove or add species. Secondary criteria included: 1) updated conservation status, 2) whether or not the population in Washington is considered peripheral to the species and, 3) if occurrence in the state was a result of a recent range expansion. The draft SGCN list was then reviewed by regional and field biologists across the state which resulted in additional modifications to the list. Experts and advisors outside the agency were also consulted for their input and guidance in developing the list (see Appendix D for a full description of outreach activities).

[1] (see Section 4.0 for an explanation of NatureServe rankings)

Multiple Species Lists

Prior to development of the 2005 Comprehensive Wildlife Conservation Strategy (CWCS), the agency had two lists of species at risk: 1) the Species of Concern list, maintained by the Wildlife Program, that included all State or Federal Endangered, Threatened, Sensitive or Candidate species; and 2) the Priority Habitats and Species List (PHS) list, maintained by the Habitat Program, to guide local governments and others in land use planning activities as part of the PHS Program. The requirement of the State Wildlife Action Planning Process to develop a SGCN introduces a third species "list". The 2015 SGCN list was developed for a different purpose and audience compared to the other two lists. The SWAP Update process provided a timely opportunity for the agency to work internally across programs to clarify the distinct purposes of these three lists, focusing in particular on the relationship between PHS and the SGCN.

In general, the PHS Program is the primary vehicle for WDFW to provide important fish, wildlife and habitat information to local governments, agencies, tribes, and private landowners for land use planning purposes. Local government officials and landowners seeking guidance for land use planning decisions should continue to consult the PHS program and the services it provides. The Species of Greatest Conservation Need, an integral part of the State's Wildlife Action Plan Update, is designed as a more comprehensive list and includes not only species already listed as threatened, endangered or sensitive, but also species that are in decline and in need of conservation attention to avoid becoming listed. The SGCN list serves in part as an "early warning system", drawing attention to species for which a primary conservation need might be additional monitoring and research. We expect that the data collected for SGCN and the habitats on which they depend may inform future updates of the PHS Program, as well as other conservation planning processes throughout the agency, including updates of the Species of Concern Lists.

Other Notable Changes in the SGCN list from 2005

The number of taxa on the 2015 SGCN list is substantially bigger than in 2005 – increasing from 183 in 2005 to 265 in 2015 (Table 3-1) due to changes in the inclusion criteria. Including NatureServe rankings as one of our criteria resulted in more species qualifying as SGCN. Other factors included the availability of updated information and research for many of the species, particularly several invertebrates that are now better understood in terms of distribution and threats.

Table 3-1: Number of SGCN in 2015 and 2005

	2015	2005
Mammals	44	31
Birds	52	58
Reptiles	12	8
Amphibians	14	11
Fish	51	33
Invertebrates	95	42
TOTAL	**268**	**186**

Species dropped from the SGCN list since 2005

Thirty-four species included on the 2005 SGCN list were removed from the 2015 SGCN list. The specific reasons each species was dropped are shown in Table 3-2. In a few cases, these reflect the improved conservation status of the species (for example, Steller Sea Lion and Pacific Harbor Porpoise) and are examples of conservation successes that should be celebrated. In other cases, the changes were due to a taxonomic reclassification (for example, Pallid Townsend's Big-eared Bat and Bog Idol Leaf Beetle), or determinations that the taxa is likely extirpated in Washington (Pacific Gopher Snake and Western Yellow Bellied Racer). Another group of species was removed from the list as a result of refining our SGCN Criteria – specifically clarifying that if a species' range in Washington is very limited and considered peripheral to its

overall range, it should not be considered an SGCN (unless it is listed under federal or state endangered species laws). Finally, in other cases, species were removed from the list due to a lack of knowledge regarding their distribution or status (for example, Common Murre and Cassin's Auklet). For these species, if new data surface that indicate a species should be on the SGCN list, the WDFW will take the necessary steps to add them during the next revision or address conservation needs as emerging issues if SWG funds are needed.

Table 3-2: SGCN from 2005 not included on 2015 list

2005 SGCN not included on 2015 list	
MAMMALS	
Elk (Nooksack herd)	This is one of ten managed herds in the state of Washington and is no longer of conservation concern.
Pallid Townsend's Big-eared Bat	Based on recent taxonomic changes, this subspecies of Townsend's Big-eared bat is no longer recognized as occurring in Washington.
Pronghorn	This species is native to the Columbia Basin in Washington, but was rare in the 1800s prior to agricultural conversion, possibly because of marginal habitat. No records exist from the 1900s. Habitat in Washington is now fragmented and may remain marginal. Historical status of pronghorn in Washington is very poorly known, but suggests that the state was at the periphery of its geographic range. Washington appears to have been marginal habitat for the species for at least the past 10,000 years, with modern agriculture degrading conditions even further.
Steller Sea Lion	This species was state delisted from threatened in May 2015 due to its strong population growth in Washington since the late 1980s, and along the North American west coast from about 1980 to the present. Washington has a small breeding population that has continued to grow since 1992.
Pacific Harbor Porpoise	The Pacific Harbor Porpoise has increased in abundance in the Washington portion of the Salish Sea during the past 15 to 20 years. It is now considered common in this area and may be at historical high population levels.
BIRDS	
Acorn Woodpecker	This species is peripheral and has expanded its range into the state in the last three decades.
Ancient Murrelet	The Ancient Murrelet's breeding range is peripheral in Washington. There is only one nest record from 1924.
Arctic Tern	The Arctic Tern is peripheral in Washington. It breeds in the Arctic, and the local breeding population--represented by one colony at a single location (human-built)--is 1,000 miles south of the breeding range.
Black Oystercatcher	Much of the population is secure, and generally does not appear to be greatly vulnerable to human disturbance. Sea level rise could affect the species in the future, but this is not currently an issue.
Black-backed Woodpecker	We are unaware of any data indicating that the species is experiencing a long-term population decline.
Cassin's Auklet	We are unaware of data indicating a population decline.
Common Murre	We are unaware of data indicating a population decline.
Great Blue Heron	Washington populations are common and appear to be stable according to BBS surveys. We are unaware of data indicating a population decline.
Greater Scaup	This species is a fairly common migrant and winter visitor in Washington, with a stable population.
Lesser Scaup	The overall population of this species in Washington has increased. BBS surveys show that populations are stable.
Northern Goshawk	Scientific literature indicates that there is no population concern about this species at a

2005 SGCN not included on 2015 list	
	range-wide scale. There are no specific data from Washington to support keeping the Northern Goshawk as a SGCN.
Northern Pintail	The Northern Pintail occurs at a limited number of sites in Washington, but it is abundant at those sites.
Pileated Woodpecker	General concerns relate only to industrial forest lands. The Pileated Woodpecker is numerically uncommon but regularly occurs in forests elsewhere in the state and even in some urban/suburban areas it appears to be faring well.
Prairie Falcon	Data from the BBS suggest stable or increasing populations in Washington, neighboring states, and the Great Basin as a whole. These trends are noted for the long-term analysis period of 1966 to 2013 as well as the more recent short-term period of 2003 to 2013.
Redhead	The overall population of Redheads in North America has increased. In Washington, BBS surveys for the last five years show that populations are stable.
Trumpeter Swan	Numbers and range for this species have been increasing for 30 years. Currently the population is at nearly 20,000 birds.
Tule Greater White-fronted Goose	This species spends only a few weeks in Washington each year during stopovers in September on its way to wintering areas in the southwestern U.S. Hunter harvest in Washington is limited and there is adequate habitat to accommodate them.
Vaux's Swift	We are aware of no monitoring data that rigorously demonstrate a population decline in this species on a regional scale in Washington.
Willet	This species is peripheral in Washington. The Washington population appears to consist of between 8 and 15 individuals that overwinter near Tokeland.
REPTILES	
Pacific Gopher Snake (Western WA)	This subspecies is extirpated in Washington. The only known evidence of occurrence is based on specimens from the 1800s.
Western Yellow-bellied Racer (Western WA only)	This subspecies is believed to be extirpated in western Washington. The last observations were reported in the 1970s.
FISH	
Black Rockfish (Puget Sound)	Black Rockfish are currently plentiful and may be on an abundance upswing. A harvest management plan is in place to help achieve conservation goals.
INVERTEBRATES	
Bog Idol Leaf Beetle	Taxonomic uncertainties make it difficult to justify keeping this species on the list, though it does appear on the list of species for the USFWS Cedar River HCP, updated in March 2015.
Boreal Whiteface	This species is peripheral in Washington. Knowledge of only a single site suggests that it is not present at very many additional sites. It has not been found in recent years, even at the historical site. Few surveys have been done.
Native Mussel	This mussel species is common and locally abundant in Washington's marine waters. It has a large Northeast Pacific Ocean range and has a NatureServe National Conservation Status Rank of "Secure". Aquaculture of non-native mussels (e.g., *M. galloprovincialis* and *M. edulis*) raises concerns about hybridization and competition risks, but few data are available about these potential threats in Washington.
Oregon Floater (bivalve)	Taxonomic questions exist regarding the Oregon Floater and Western Floater, and anatomical and genetic studies must be conducted to resolve them before either can be considered for addition to the SGCN list.
Shepard's Parnassian	This species is a rare and threatened habitat specialist. However, taxonomic questions exist, and surveys need to be conducted to resolve them.
Subarctic Darner	The Subarctic Darner occurs at four locations in Washington but is common in appropriate habitat throughout its range across North America. The species faces few immediate threats, though global warming could become a problem sometime in the future.
Western Floater (bivalve)	Taxonomic questions exist regarding the Western Floater and Oregon Floater, and anatomical and genetic studies must be conducted to resolve them before either can be considered for addition to the SGCN list.

Climate Change
Climate change poses potentially significant impacts for many of the SGCN on our list and we included it as a stressor where appropriate for both SGCN and their habitats. We assessed the relative vulnerability to climate change of all SGCN by evaluating the inherent sensitivity to climatic change, as well as the likelihood that such changes will occur. These two factors comprised a relative climate vulnerability rank for each species - low, moderate, high, or unknown. We also included the degree of confidence we had in assigning such ranks based on the extent and quality of available references. These rankings and the rationale and references for them are available in Appendix C.

For species that ranked low to moderate in vulnerability, we simply included the ranking in the SGCN fact sheets (see Appendix A). Species that ranked moderate-high or high, *and* for which we had a high degree of confidence in our assessment were placed on a Climate Watch list, indicating a high climate risk. Note that several species ranked as likely moderate-high or high in terms of overall vulnerability, but because our confidence was less than high based on initial literature availability, they were not included on the Climate Watch list. As additional reference information becomes available these rankings will be updated.

Future tasks for the Climate Watch species will include evaluating which of the existing stressors are likely exacerbated by climate change, and might consequently be considered as a higher priority to address. Please see Chapter 5 for a full discussion of Climate change in the context of the SWAP, including a summary of the projected impacts on fish, wildlife and their habitats, a detailed explanation of the methodology for ranking climate vulnerability, and a discussion of potential approaches for addressing climate risks and increasing the resilience of species and habitats.

3.1 The SGCN Species

The following sections of this chapter provide a high level summary of the SGCN species, by taxa, in the following order: mammals, birds, amphibians and reptiles, fish, and invertebrates. For each taxonomic group we provide a brief narrative summarizing the conservation trends of the species, a table listing the conservation status, and a table summarizing key threats and actions for each species. Please refer to Appendix A for a complete set of species fact sheets, with detail on distribution, status, habitats, threats and conservation actions needed.

3.1.1 MAMMALS

Mammals Overview
Forty-four species of mammals are included on the SGCN list for Washington. These represent a variety of taxa including rabbits (four species), shrews (three), bats (five), rodents (10), terrestrial carnivores (nine), marine mammals (10), and ungulates (three). These species use various habitats across the state, have small to large geographic distributions in Washington, and are of concern for different reasons, as summarized below. Most of the species are year-round residents, but at least 10 are either fully or partially migratory, including seven species of whale and two bat species (Hoary Bat, Silver-haired Bat).

Distribution
SGCN mammals have varying distributions across the state and occupy many habitats. Of the 44 species, 20 are found only or largely in western Washington (e.g., Mazama Pocket Gopher, Columbian White-tailed Deer), 16 in eastern Washington (e.g., Spotted Bat, Lynx), and eight in both western and eastern Washington (e.g., Western Gray Squirrel, Western Spotted Skunk). Marine mammals comprise half of the species, occurring only or largely on the state's west side. Three species are found statewide: Hoary Bat, Silver-haired Bat, and Townsend's Big-eared Bat. In contrast, all other species have much smaller ranges that cover less than a third of the state. Several taxa currently have extremely limited ranges that are less than five percent of the land area of Washington (e.g., Pygmy Rabbit, Brush Prairie Pocket Gopher, Gray-tailed Vole, Columbian White-tailed Deer, Woodland Caribou). Two species (Destruction Island Shrew, Shaw Island Townsend's Vole) are restricted entirely to islands, with the shrew having a total range of just 30 acres.

Three-quarters of the taxa are commonly associated with three general habitat types: 16 species in conifer and/or deciduous forest ecosystems (e.g., Keen's Myotis, Western Gray Squirrel, Fisher, Woodland Caribou); 10 species in marine ecosystems (all marine mammals); and eight species in shrub-steppe ecosystems (e.g., Washington Ground Squirrel, American Badger). Other habitat types include grasslands, alpine, wetlands, and riparian corridors.

Population Sizes and Trends
Most of Washington's SGCN mammals are uncommon or rare, or are represented by small populations. Populations of seven taxa are considered to be in critical condition (Grizzly Bear, Pacific Marten, Wolverine, Blue Whale, North Pacific Right Whale, Sei Whale, Woodland Caribou) and probably have state populations of fewer than 25 individuals at any one time. Twenty-two species have "low" populations compared to their historical abundance (e.g., White-tailed Jackrabbit, Northern Bog Lemming, Gray Wolf, Killer Whale, Bighorn Sheep). Four species (Hoary Bat, Silver-haired Bat, Shaw Island Townsend's Vole, Gray Whale) are characterized by having moderately-sized populations that face specific conservation challenges. Information is lacking on the relative population sizes of 11 species, which are categorized as having "unknown" population sizes (e.g., American Pika, Preble's Shrew, Western Gray Squirrel, Cascade Red Fox, Western Spotted Skunk). Population trends of SGCN mammals are either unknown (23 species), declining (eight), stable (eight), or increasing (five). With population trends unknown for nearly half of the species, improved information of this topic represents a clear need in future research and monitoring efforts.

Conservation Concern
Threats to SGCN mammals are varied and most taxa are of concern due to habitat-related factors, the lingering impacts of historical unsustainable harvest (e.g., most marine mammals, Pacific Marten, Fisher), small population size, or a combination of these factors. For a few species, the cause(s) of concern are poorly understood (e.g., Spotted Bat, Kincaid Meadow Vole, Western Spotted Skunk). Other factors include human disturbance, disease, prey declines, unnatural levels of predation, mortality at wind energy facilities, vessel interactions, entanglement in marine debris, highway mortality, direct human-caused mortality, oil spills, and the threat of future climate change. For nearly all species, there exists a need to gather more information to clarify threats.

Climate Change
Species evaluated with moderate-high or high vulnerability (but varying levels of confidence) included: American Pika, Cascade Red Fox, Keen's Myotis, Lynx, southern resident Killer Whale, Northern Bog Lemming, Olympic Marmot, Pacific Marten, Pygmy Rabbit, Townsend's Big-eared Bat, Wolverine, and Woodland Caribou. In general, species occupying higher elevation habitats such as alpine and subalpine forests, meadows, and parklands have higher vulnerability, in particular, to warming temperatures and reduced snowpack.

Conservation Success

Many of the 13 SGCN mammals with increasing or stable population trends represent conservation success stories, but they remain SGCN species because their recovery has not yet progressed far enough or delisting has not occurred so their legal status under Washington law remains unchanged. Conservation programs have allowed a number of mammal species in the state to recover (i.e., Gray Whale), to show recent improving trends in population size (e.g., Pygmy Rabbit, Gray Wolf, Fin Whale, Humpback Whale, Sea Otter), or to stabilize their population size (e.g., Townsend's Big-eared Bat, Blue Whale, Sperm Whale, Columbian White-tailed Deer).

Alphabetical List of SGCN Mammals

1. American Badger
2. American Pika
3. Bighorn Sheep
4. Black-tailed Jackrabbit
5. Blue Whale
6. Brush Prairie Pocket Gopher
7. Cascade Red Fox
8. Columbian White-tailed Deer
9. Destruction Island Shrew
10. Fin Whale
11. Fisher
12. Gray Whale
13. Gray Wolf
14. Gray-tailed Vole
15. Grizzly Bear
16. Hoary Bat
17. Humpback Whale
18. Keen's Myotis
19. Killer Whale
20. Kincaid's Meadow Vole
21. Lynx
22. Mazama Pocket Gopher
23. Merriam's Shrew
24. Minke Whale
25. North Pacific Right Whale
26. Northern Bog Lemming
27. Olympic Marmot
28. Pacific Marten
29. Preble's Shrew
30. Pygmy Rabbit
31. Sea Otter
32. Sei Whale
33. Shaw Island Townsend's Vole
34. Silver Haired Bat
35. Sperm Whale
36. Spotted Bat
37. Townsend's Big-eared Bat
38. Townsend's Ground Squirrel
39. Washington Ground Squirrel
40. Western Gray Squirrel
41. Western Spotted Skunk
42. White-tailed Jackrabbit
43. Wolverine
44. Woodland Caribou

Table 3-3: SGCN Mammals Summary of Conservation Status

Please see Appendix A for a complete discussion of key threats and conservation actions needed for these species

Please see Section 3.3 at the end of this chapter for an explanation of the terms used in the headings

MAMMAL SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
RABBITS						
American Pika	None	None	No	Unknown/ unknown	High	A montane talus habitat specialist that may face threats from climate change.
Black-tailed Jackrabbit	None	Candidate	Yes	Low/declining	Moderate	Once abundant and broadly distributed in eastern Washington, the species is now rare and sparsely distributed due to habitat loss from fragmentation and possibly disease.
Pygmy Rabbit	Endangered	Endangered	Yes	Low/increasing	Moderate-High	The Columbia Basin Pygmy Rabbit, a distinct population segment of this species, is a sagebrush obligate associated with shrub-steppe in eastern Washington. Large-scale loss and fragmentation of shrub-steppe habitat were likely the primary factors contributing to decline, but once the population dropped below a certain threshold, other factors such as environmental events (extreme weather and fire), predation, disease, and inbreeding likely became threats. A major recovery effort is currently underway for this species.
White-tailed Jackrabbit	None	Candidate	Yes	Low/declining	Moderate	Once abundant and broadly distributed across the bunchgrass communities of eastern Washington, the species is now rare and sparsely distributed due to the loss, degradation, and fragmentation of habitat and possibly disease and competition with Black-tailed Jackrabbits.
SHREWS						
Destruction Island Shrew	None	None	No	Unknown/ unknown	Low-Moderate	This subspecies is endemic to Destruction Island. Its status and biology have not been assessed, but it may be threatened by herbivory from introduced European Rabbits.
Merriam's Shrew	None	Candidate	Yes	Unknown/ unknown	Low-Moderate	This relatively little known species appears rare but widespread in much of the Columbia Basin and several adjoining localities of eastern Washington. Additional sampling is needed to clarify its status. It may be threatened by habitat loss and fragmentation, and by the invasion of cheatgrass.
Preble's Shrew	None	Candidate	Yes	Unknown/ unknown	Low-Moderate	Preble's Shrew is a poorly known species that appears to be extremely rare in Washington; additional sampling is needed to understand distribution, habitat needs, and factors that affect populations.
BATS						
Hoary Bat	None	None	No	Moderate/ unknown	Low-Moderate	This is a widely distributed migratory bat that is vulnerable to mortality from wind turbines during migration. It also faces threats from habitat alteration throughout its range.
Keen's Myotis	None	Candidate	Yes	Low/unknown	Moderate-High	In Washington, this bat is poorly known and probably rare. Loss of large decadent trees and snags is likely an important threat.

MAMMAL SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Silver-haired Bat	None	None	No	Moderate/ unknown	Low-Moderate	Although relatively common in much of Washington, silver-haired bats experience extensive mortality at wind turbines. Loss of large roost trees and snags locally and along migration routes is another important concern.
Spotted Bat	None	Monitor	No	Low/unknown	Low	Individual populations are apparently disjunct and may be vulnerable to human disturbance. Population trends, life history, and habitat requirements are unknown.
Townsend's Big-eared Bat	None	Candidate	Yes	Low/stable	Moderate-High	This species occurs in small to moderately-sized aggregations at sites throughout the state, where it may be vulnerable to human disturbance during the breeding and wintering periods.
RODENTS						
Brush Prairie Pocket Gopher	None	None	No	Unknown/ unknown	Low-Moderate	Current status and distribution of the Brush Prairie Pocket Gopher in Washington is unknown. It is known only from southwestern Clark County, a developing urban/suburban area.
Gray-tailed Vole	None	Candidate	Yes	Unknown/ unknown	N/A	Gray-tailed Voles are probably still common in pastures and grassy roadsides in Clark County, but current status and distribution is uncertain; southwestern Clark County is a developing urban/suburban area.
Kincaid Meadow Vole	None	Monitor	No	Low/unknown	Low-Moderate	The Kincaid Meadow Vole is a unique subspecies only found in eastern Washington. Its distribution is poorly defined and there is little current information on the status of populations.
Mazama Pocket Gopher	Threatened	Threatened	Yes	Low/declining	Low-Moderate	Some subspecies are threatened by habitat loss from human development. Species existence is compatible with some levels of development, but high density development likely leads to extirpation.
Northern Bog Lemming	Petitioned	Monitor	No	Low/unknown	Moderate-High	The Northern Bog Lemming is known from about 12 locations in Washington, where it reaches the southwestern limit of its range. Its glacial relict habitats are isolated and patchy in nature, making the risk of extinction very high.
Olympic Marmot	None	Candidate	Yes	Low/possibly stable	Moderate-High	An endemic to mountainous meadows of the Olympic Peninsula, Olympic Marmot populations have possibly stabilized since 2007 after declining from 2002 to 2006. Threats include increased coyote predation, and habitat fragmentation due to rising tree line (caused by declining snow pack and climate change), resulting in greater population isolation and increasing the risk of inbreeding and extinction.
Shaw Island Townsend's Vole	None	Monitor	No	Moderate/ unknown	N/A	This subspecies occurs on at least 16 islands in the San Juan Archipelago. Overall population status is unclear, but populations appear secure on several larger islands. Apparent threats include habitat loss and mortality from agricultural practices.
Townsend's Ground Squirrel	None	Candidate	Yes	Unknown/ unknown	Moderate	Population status of this Washington-endemic ground squirrel requires clarification. Significant declines have occurred in many areas, yet this species is common at a number of human-modified locations.

MAMMAL SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Washington Ground Squirrel	Candidate	Candidate	Yes	Low/declining	Moderate	This species is associated with shrub-steppe and steppe in eastern Washington and is threatened by a number of factors, especially habitat loss, degradation, and fragmentation.
Western Gray Squirrel	None	Threatened	Yes	Low/unknown	Low-Moderate	The three remaining populations of this species in Washington are isolated and face a number of threats, including habitat loss and degradation, wildfires, highway mortality, and disease.
TERRESTRIAL CARNIVORES						
American Badger	None	Monitor	No	Unknown/ unknown	Low-Moderate	The status of badgers in Washington is poorly understood because of a lack of survey effort and the small amount of occurrence data available to indicate its current distribution.
Pacific Marten	None	None	Yes	Critical or possibly extirpated/ unknown	Moderate-High	Based on the almost complete lack of recent verifiable detections, the population of coastal martens in Washington is very small. Trapping, loss, and fragmentation of late-successional forests at low elevations, and small population size are likely factors in the decline of the species in Washington.
Cascade Red Fox	None	Candidate	Yes	Unknown/ unknown	High	Little information is available on the distribution and status of this fox in Washington, although recent surveys suggest that populations are likely to be small and may be isolated. Climate change could reduce the availability of habitat for this species.
Fisher	Proposed Threatened	Endangered	Yes	Unknown/ unknown	Moderate-High	Historical over-trapping, incidental mortality, and habitat loss and fragmentation caused the extirpation of Fishers in Washington by the mid-1900s. A reintroduction project to recover the species on the Olympic Peninsula was completed in 2010. A Cascades Fisher reintroduction is scheduled to begin in 2015.
Gray Wolf	Endangered (Western two-thirds of WA only)	Endangered (State-wide)	Yes	Low/increasing	Low-Moderate	Gray wolves were once common throughout most of Washington, but human persecution led to their extirpation from the state by the 1930s. Wolves have started to recover in recent years, with pack numbers increasing from one in 2008 to 16 in 2014. Human-related mortality is the greatest threat to the population.
Grizzly Bear	Threatened	Endangered	Yes	Critical/ unknown	Moderate	This omnivore is extirpated from most of the state; however, two populations of uncertain viability have been identified and each plays an important role in the range-wide conservation and recovery of the species. Grizzly populations in Washington are very small and isolated due to habitat fragmentation caused by human settlement and highways, which makes the species more vulnerable to inbreeding, wildfire, illegal harvest, and other threats.
Lynx	Threatened	Threatened	Yes	Low/declining	High	Washington's Lynx population is small (likely less than 100 animals) and restricted to a small portion of its historical range. Small population size, habitat loss from large wildfires, and climate change are threats to Lynx in Washington.

MAMMAL SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Western Spotted Skunk	None	None	No	Unknown/ declining in Puget Trough	Low	There is inadequate information on the current status and distribution of this species in much of its range in western and southeastern Washington. The increased occurrence of opossums and loss and fragmentation of forest habitats due to urban and agricultural development may explain the apparent substantial decline of verified occurrences in the Puget Trough since the 1970s.
Wolverine	None	Candidate	Yes	Critical/stable	Moderate-High	Washington's Wolverine population is small, largely restricted to the North Cascades, and is an extension of a larger population in southern British Columbia. Climate change may be a significant threat to the species in Washington if denning and food cache sites are impacted.
MARINE MAMMALS						
Blue Whale	Endangered	Endangered	Yes	Critical/stable	Low-Moderate	The stock along the U.S. west coast, which includes Washington, is estimated at 1,647 whales and has a stable trend. Ship strikes and fisheries entanglements may negatively affect recovery.
Fin Whale	Endangered	Endangered	No	Low/increasing or stable	Low-Moderate	The stock along the U.S. west coast, which includes Washington, is estimated at about 3,000 whales and is either increasing or stable. Ship strikes and fisheries entanglements may hinder recovery.
Gray Whale	None	Sensitive	Yes	Medium/stable	Low-Moderate	The eastern North Pacific stock of this whale has recovered from over-harvest and has been stable for several decades. Status of a small group within this stock, the Pacific Coast Feeding Group, whose range includes Washington, requires further assessment.
Humpback Whale	Endangered	Endangered	Yes	Low/increasing	Low-Moderate	Abundance of this species along the U.S. west coast, including Washington, has steadily grown in recent decades. Entanglements in fishing gear and ship strikes are relatively minor sources of mortality and injury.
Killer Whale	Endangered (southern residents only)	Endangered	Yes	Low/declining (southern residents); Moderate/unknown (transients, offshores)	Southern residents: Moderate-High; Transient/offshore: Low-Moderate	Of the three main populations occurring in Washington, southern resident Killer Whales have shown an overall decline since 1995, whereas transient and offshore populations are currently not of conservation concern. The reduced availability of depleted Chinook salmon populations has limited the southern resident population's productivity. High levels of chemical contaminants, noise and disturbance from vessels and other human activities, as well as large oil spills all have the potential to negatively impact the health and status of all three populations.
Minke Whale	None		No	Low/unknown	Low-Moderate	The stock along the U.S. west coast, including Washington, is estimated at about 500 whales, with trend unknown. Ship strikes and fisheries entanglements may hinder population growth.
North Pacific Right Whale	Endangered	Endangered	No	Critical/ unknown	Moderate	The stock along western North America, including Washington, is critically endangered, with trend unknown. Threats to the stock are poorly known.
Sea Otter	None	Endangered	Yes	Low/increasing	Low-Moderate	Washington's population of Sea Otters has shown steady growth to almost 1,600 animals since its reintroduction in 1969 to 1970. Oil spills are the greatest potential threat to the population.

MAMMAL SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Sei Whale	Endangered	Endangered	No	Critical/ unknown	Low-Moderate	The stock along the U.S. west coast, which includes Washington, is quite small at about 125 whales, with trend unknown. Threats to the stock are poorly understood.
Sperm Whale	Endangered	Endangered	Yes	Low/stable	Low-Moderate	The stock along the U.S. west coast that includes Washington, numbers no more than several thousand whales, with trend probably stable. Fisheries entanglements are a relatively minor source of mortality and injury.
UNGULATES						
Bighorn Sheep	None	None	Yes	Low/Some herds declining, others stable or increasing	Moderate	Although a game species and sustainably hunted, Bighorn Sheep remain a conservation reliant species. Bighorns currently occupy approximately 15 to 20 percent of their historical habitat in Washington, and connectivity among individual herds is difficult to establish. Bighorns are susceptible to pneumonia caused by bacteria routinely carried by domestic sheep and goats.
Columbian White-tailed Deer	Endangered	Endangered	Yes	Low/stable	Moderate-High	This subspecies exists in small, isolated populations, rendering it vulnerable to such factors as disease and stochastic events. Continued habitat degradation will impede recovery by further fragmentation of existing habitat and loss of areas for future range expansion. In addition, this species has the potential to be greatly affected by climate change due to sea level rise that will reduce island and lowland coastal habitats.
Woodland Caribou	Endangered	Endangered	Yes	Critical/ declining	High	The South Selkirk Woodland Caribou population has been adversely affected by predation and habitat change. The core range for this population, which overlaps into Washington, is in British Columbia. The population is at a perilously low level with recent annual calf mortality recorded at 40 to 70 percent mainly due to predation, severe weather, and malnutrition.

3.1.2 BIRDS

Birds Overview

The Species of Greatest Conservation Need list for Washington includes 51 avian taxa. This diverse group of species includes waterfowl, upland game birds, marine birds and waterbirds, diurnal raptors (i.e., falcons, hawks and eagles), cranes, shorebirds, pigeons, cuckoos, owls, woodpeckers and perching birds. These species occupy a variety of habitats across the state, include year-round residents and migrants, have limited to widespread distributions in Washington, and are of concern for various reasons, as summarized below.

Because of the strong tendency for migration (or other seasonal movements) among birds, it is not surprising that about half of Washington's SGCN birds are migrants. Eight species reside in the state during winter after breeding elsewhere (i.e., six waterfowl species, two shorebird species), two species occur only as migrants (i.e., Short-tailed Albatross, Red Knot), one species (Brown Pelican) breeds to the south and migrates to the Washington coast for the post-breeding season, and a dozen species overwinter to the south and migrate north to breed in Washington (e.g. American White Pelican, Ferruginous Hawk, Flammulated Owl, Sage Thrasher). Some species have both resident and migrant individuals in the population (e.g. Burrowing Owl, Ferruginous Hawk, Snowy Plover).

Distribution

SGCN birds have varying distributions across the state and use a variety of cover types. Of the 51 taxa, 22 are found only or largely in western Washington (e.g. Surf Scoter, Marbled Murrelet), 21 are found in eastern Washington (e.g. Greater Sage Grouse, Pygmy Nuthatch) and eight are found in both western and eastern Washington (e.g. Peregrine Falcon, Bald Eagle, Golden Eagle). Some species have fairly large distributions; an example is the Northern Spotted Owl which is found on both slopes of the Cascade Range and the Olympic Peninsula, but which is now essentially extirpated from southwestern Washington and the Puget Trough. Other well-distributed species include Peregrine Falcon, Bald Eagle, and Western Screech-Owl. Conversely, a number of taxa have extremely limited ranges that are now less than five percent of the land area of Washington: Marbled Godwit, Red Knot, Rock Sandpiper, Sandhill Crane, Slender-billed White-breasted Nuthatch, Snowy Plover, Tufted Puffin, Upland Sandpiper, and Oregon Vesper Sparrow.

Nearly two-thirds of the taxa are commonly associated with three general cover types: 15 species in marine ecosystems, including marine waters (seabirds, waterbirds) and estuaries and beaches (shorebirds); nine species on conifer forest ecosystems (e.g. Spruce Grouse, Band-tailed Pigeon), and nine species in shrub-steppe ecosystems (e.g. Columbian Sharp-tailed Grouse, Burrowing Owl, Sage Thrasher). Other types include grasslands, freshwater, alpine, wetlands, and riparian.

Some avian taxa on the SGCN list are uncommon or rare subspecies or are represented by very small populations. Examples of uncommon or rare subspecies (overall, or the portion of the population that occurs in Washington) include Marbled Godwit, Oregon Vesper Sparrow, Sandhill Crane, Slender-billed White-breasted Nuthatch, and Streaked Horned Lark. Some of these and other taxa populations are very small and may number fewer than 100 individuals in Washington: Great Gray Owl, Oregon Vesper Sparrow, Rock Sandpiper, Sandhill Crane (breeding population), Short-tailed Albatross, Snowy Plover, Upland Sandpiper, and Yellow-billed Cuckoo. The latter two species have been virtually extirpated and neither has been documented breeding in the state for several decades or more and might be "functionally extinct."

Conservation Concern

Reasons for concern about the taxa are varied and most taxa are either of concern due to a factor related to habitat or for an unknown reason. Consequently, for a number of species there exists a need to gather basic information that may illuminate the cause for concern. Some reasons for concern include small population size that makes the taxon vulnerable to environmental impacts. Finally, other factors of

concern are varied and include human disturbance, effects of oil spills, water management, fire suppression effects and even volcanic activity. See Table 3-4 for more information on species status and conservation concerns.

Population Trends

Population trends of 41 of the 51 avian taxa are either declining (19) or unknown (22). Four species are thought to have stable populations and six are increasing. Some of the increasing populations are species that are recovering strongly and will likely be delisted in the future. Other increasing populations are very small and the perceived increase may in fact reflect influence of other subspecies present in the state (e.g. Marbled Godwit). Some landbirds impacted by conversion of shrub steppe exhibited declining trends from 1966 to 2013, although recent trends (2003 to 2013) for some were stable. For these species stability is obviously at a new, lower level of abundance given the reduced carrying capacity of the remaining habitat, and future management will be directed at increasing populations to make them more robust to environmental change.

Climate Change Considerations

Many species evaluated as having low or low-moderate overall vulnerability to climate change are generalist species or are highly adaptable (e.g., occur within a range of habitats, including human-altered landscapes); e.g., Bald Eagle, American White and Brown Pelicans, Dusky Canada Goose and Peregrine Falcon. Species evaluated with moderate-high or high vulnerability (but varying levels of confidence) included: Barrow's Goldeneye, Harlequin Duck, Greater Sage Grouse, Northern Spotted Owl, Sage Thrasher, Sagebrush Sparrow, Red Knot, Spruce Grouse, Surf Scoter, Western Snowy Plover, and White-tailed Ptarmigan. Birds utilizing higher elevation habitats (e.g., White-tailed Ptarmigan and Spruce Grouse) and sagebrush-obligate species appear more vulnerable. Coastal species such as Red Knot, Surf Scoter, and Western Snowy Plover exhibit higher vulnerability due to sea level rise impacts on nesting and/or foraging habitat, as well as climate-driven changes in timing mismatches.

Conservation Success

Lastly, it is appropriate to mention the species that are doing well. These taxa are still identified as SGCN because listing status was a criterion used to identify species for the list. Three species (Bald Eagle, Brown Pelican, and Peregrine Falcon) will have status reviews conducted and if they are formally delisted as expected, they will be removed from the SGCN list. Other species may be doing well but risks remain or not enough is known about them to justify their removal from the SGCN list at this time. For example, winter abundance of Marbled Godwit has increased in Washington but subspecies identity of Washington birds is uncertain (one subspecies totals only 2000 globally) and requires clarification.

Alphabetical List of SGCN Birds

1. American White Pelican
2. Bald Eagle
3. Band-tailed Pigeon
4. Barrow's Goldeneye
5. Black Scoter
6. Brown Pelican
7. Burrowing Owl
8. Cinnamon Teal
9. Clark's Grebe
10. Columbian Sharp-tailed Grouse
11. Common Loon
12. Dusky Canada Goose
13. Ferruginous Hawk
14. Flammulated Owl
15. Golden Eagle
16. Great Gray Owl
17. Greater Sage-grouse
18. Harlequin Duck
19. Lewis' Woodpecker
20. Loggerhead Shrike
21. Long-tailed Duck
22. Marbled Godwit
23. Marbled Murrelet
24. Mountain Quail
25. Northern Spotted Owl
26. Oregon Vesper Sparrow
27. Peregrine Falcon
28. Purple Martin
29. Pygmy Nuthatch
30. Red Knot
31. Red-necked Grebe
32. Rock Sandpiper
33. Sage Thrasher
34. Sagebrush Sparrow
35. Sandhill Crane (Greater)
36. Short-eared Owl
37. Short-tailed Albatross
38. Slender-billed White-breasted Nuthatch
39. Spruce Grouse
40. Streaked Horned Lark
41. Surf Scoter
42. Tufted Puffin
43. Upland Sandpiper
44. Western Bluebird (W. Wash)
45. Western Grebe
46. Western High Arctic Brant
47. Western Screech Owl
48. Western Snowy Plover
49. White-headed Woodpecker
50. White-tailed Ptarmigan
51. White-winged Scoter
52. Yellow-billed Cuckoo

Table 3-4: SGCN Birds Summary of Conservation Status

Please see Appendix A for a complete discussion of key threats and conservation actions needed for these species

Please see Section 3.3 at the end of this chapter for an explanation of the terms used in the headings

BIRD SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
WATERFOWL						
Barrow's Goldeneye	None	None	Yes	Low/ declining	High	This sea duck species breeds in Washington, has low population numbers and has been declining in Puget Sound. Sources of impacts have not been clearly identified.
Black Scoter	None	None	Yes	Moderate /declining	Moderate-High	This species has undergone significant population declines in Puget Sound. Sources of impacts have not been clearly identified.
Cinnamon Teal	None	None	No	Low/Stable	Moderate	Cinnamon Teal is a once fairly common breeding species in Washington that has declined significantly in the past 40 years.
Dusky Canada Goose	None	None	No	Low/Stable	Low-Moderate	Habitat changes on the dusky Canada goose breeding grounds on the Copper River Delta, Alaska have led to high predation pressure; combined with losses of wintering habitat in western Washington, these factors are responsible for a long-term population decline for this subspecies.
Harlequin Duck	Concern	None	Yes	Low/declining	Moderate-High	Declines in wintering numbers of Harlequin Ducks have occurred on Puget Sound. Sources of impacts have not been clearly identified.
Long-tailed Duck	None	None	No	Moderate/ declining	Moderate	This species has undergone significant population declines in Puget Sound. Sources of impacts have not been clearly identified.
Surf Scoter	None	None	Yes	Moderate/ declining	Moderate-High	This species has undergone significant population declines in Puget Sound. Sources of impacts have not been clearly identified.
White-winged Scoter	None	None	Yes	Low/declining	Moderate-High	This species has undergone significant population declines in Puget Sound. Sources of impacts have not been clearly identified.
Western High Arctic Brant	None	None	Yes	Low/stable	Moderate-High	Western High Arctic Brant include a small population which has experienced a long-term decline in numbers. Factors affecting population status and distribution are currently unknown.
UPLAND GAME BIRDS						
Greater Sage-grouse	Candidate	Threatened	Yes	Low/stable	High	Greater Sage-grouse require large landscapes of sagebrush steppe, much of which has been degraded, fragmented, or lost. The primary threat is the combined impact of habitat loss, fragmentation, and degradation.
Columbian Sharp-tailed Grouse	Concern	Threatened	Yes	Low/declining	Moderate-High	The statewide population of Columbian Sharp-tailed Grouse is distributed in seven subpopulations that are not sustainable. Maintaining the species in Washington will require restoring habitat and increasing populations.
Mountain Quail	None	None	Yes	Low/Unknown	Moderate	Populations have declined to very low levels within the native range in Washington. The decline is thought to be due to loss or degradation of dense shrub communities, and hydroelectric and other development in riparian zones.

BIRD SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Spruce Grouse	None	None	No	Declining	High	Although a gamebird, the indirect effects of climate change including disease of trees and wildfire, the direct effects of clear-cut timber harvest, and the uncertainty about taxonomy mean that their conservation status is uncertain.
White-tailed Ptarmigan	Petitioned	None	No	Low	High	The greatest threat to the long-term survival of ptarmigan populations appears to be climate change, which may lead to a gradual loss of alpine habitats as the treeline moves upward.
MARINE AND WATERBIRDS						
American White Pelican	None	Endangered	Yes	Low/increasing	Moderate	The abundance of American White Pelicans in Washington is relatively low and the population is somewhat vulnerable in that nesting is restricted to only one location in Washington.
Brown Pelican	Concern	Endangered	Yes	7-10,000/ increasing	Moderate-High	This species has recovered from its previous population decline and has been federally delisted. This species will undergo a state status review and its SGCN status will be reassessed pending the outcome of that review.
Clark's Grebe	None	Candidate	Yes	Low/declining	Moderate	The small breeding population of this species in Washington, which occurs at a small number of Columbia Basin lakes and reservoirs, is strongly impacted by various threats relating to water drawdowns and recreational boating activity.
Common Loon	None	Candidate	Yes	Low/stable	Moderate	This species has a small breeding population in Washington. Its overall range has contracted northward. Due to life history and a small population in Washington it is highly vulnerable to impacts if not monitored and managed where appropriate.
Marbled Murrelet	Threatened	Threatened	Yes	Low/declining	Moderate-High	Because of its breeding association with old forests, Marbled Murrelet populations have been severely affected by loss of mature and old forest habitat. Food resources in the marine environment may also influence population status.
Red-necked Grebe	None	Monitor	Yes	Unknown/ unknown	Moderate-High	Status of this species is unclear. Wintering populations in Washington exhibit ecological traits identified as risk factors for marine birds that occur in the Salish Sea that are declining.
Short-tailed Albatross	Endangered	Candidate	No	Rare/increasing	Low-Moderate	The Short-tailed Albatross is vulnerable to extreme reduction and breeding capacity due to about 90% of nesting pairs located in one colony (Torishima Island, Japan). Unintentional bycatch in offshore fisheries is a mortality threat.
Tufted Puffin	Concern	Endangered	Yes	Low/declining	Moderate-High	In Washington, this species has experienced an order-of-magnitude population decline in recent decades and has disappeared from more than half of its historical breeding sites. Sources of impacts have not been clearly confirmed.

BIRD SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Western Grebe	None	Candidate	Yes	Low/declining	Moderate	The breeding and wintering populations of this species in Washington, which occur in freshwater and marine habitats, respectively, are strongly impacted by different groups of threats, such as fluctuating water levels at breeding sites, disruption of nesting activities, and reductions of prey at overwintering areas in the Salish Sea.
FALCONS, HAWKS, EAGLES						
Bald eagle	Concern	Sensitive	Yes	Medium/ increasing	Moderate	This species has experienced recovery as a result of removal of DDT from most of its range. This species will undergo a status review and its SGCN status will be assessed pending the outcome of that review.
Ferruginous Hawk	Concern	Threatened	Yes	Low/declining	Low-Moderate	This species is impacted by the loss and fragmentation of shrub-steppe and grasslands from agriculture and residential development and associated declines in distribution and abundance of its primary prey, jackrabbits and ground squirrels. In addition, direct sources of mortality include shooting, electrocution, and collision with wind turbines.
Golden Eagle	None	Candidate	Yes	Low/unknown	Moderate-High	This species is of concern due to declines in the distribution and abundance of its primary prey species, jackrabbits and ground squirrels; across its range additional mortality factors include continued exposure to lead in the environment and collisions at wind energy facilities.
Peregrine Falcon	Concern	Sensitive	Yes	Low/increasing	Low	This species has experienced a remarkable recovery and the population continues to increase across Washington. This species will undergo a status review and its SGCN status will be assessed pending the outcome of that review.
CRANES						
Sandhill Crane (greater)	None	Endangered	Yes	Critical/increasing	Moderate-High	The Washington population of Greater Sandhill Cranes numbers about 80 adult and sub-adult birds, with about 30 breeding pairs. Sandhill Cranes are long-lived, but have a low reproductive rate, and nests are vulnerable to predators, disturbance, and fluctuating water levels.
SHOREBIRDS						
Marbled Godwit	None	None	Yes	Low/increasing	Moderate-High	Due to the extremely small size of the *beringiae* subspecies population and the localized area of foraging and roosting in coastal Washington, this species is vulnerable to oil spills or other actions that would degrade or impact its habitat.
Red Knot	None	None	Yes	Low/declining	Moderate	Limited information suggests the population has declined; its localized use of food resources in tidal areas along the flyway suggests it will be sensitive to climate change effects.
Rock Sandpiper	None	None	Yes	Low/unknown	Low-Moderate	Studies predicting vulnerabilities of Rock Sandpipers to climate change indicate no change in risk associated with wintering and migration habitats; all breeding habitat exists outside Washington State, and does have expected increased risk associated with climate change.

BIRD SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Upland Sandpiper	None	Endangered	Yes	Critical/unknown	Moderate-High	Habitat loss most likely contributed to population decline of this species in Washington. Incomplete information on distribution prevents meaningful protection should there be other extant small populations of breeding birds in the state. Lack of records suggests it no longer breeds in Washington.
Western Snowy Plover	Threatened	Endangered	Yes	Low/increasing	High	Washington's Snowy Plover population is very small and vulnerable to a variety of impacts such as predation, adverse weather, shoreline modification, dune stabilization, and recreational activities. Due to ongoing conservation efforts, regional and state populations are approaching targets established to indicate recovery.
PIGEONS						
Band-tailed Pigeon	None	None	Yes	Low/declining	Low-Moderate	The Band-tailed Pigeon population, which is reliant on upland forests and limited mineral sources in western Washington, has declined due to a combination of factors.
CUCKOOS						
Yellow-billed Cuckoo	Candidate	Candidate	Yes	Extirpated/ breeding Critical/migrant	Moderate-High	This species hasn't bred in Washington since about 1940 and has been a very rare migrant and summer resident since then. Recovery efforts are probably best directed at remnant nesting habitats still occupied in the southwest U.S.
OWLS						
Burrowing Owl	Concern	Candidate	Yes	Low/declining	Low-Moderate	This species is associated with shrub-steppe and grassland habitats and has experienced a contraction of its range and decline in numbers due to loss of habitat and persecution of mammalian species that provide earthen burrows that owls use.
Flammulated Owl	None	Candidate	Yes	Low/unknown	Moderate	Flammulated Owls are probably impacted by habitat loss (and degradation) and fire suppression in dry forest landscapes.
Great Gray Owl	None	Monitor	No	Low/unknown	Moderate-High	Little is known about this species, and although impacts and range contraction may have occurred over the last century, current threats and impacts are not understood.
Northern Spotted Owl	Threatened	Endangered	Yes	Low/declining	High	Impacts from habitat loss are now exacerbated by effects of competition with Barred Owls for prey and habitat. As the population declines and becomes even smaller, other threat factors may become more relevant.
Short-eared Owl	None	None	Yes	Low/unknown	Low-Moderate	This species is thought to be experiencing a range-wide, long-term decline in North America. The primary threat is the combined impact of habitat loss, fragmentation, and degradation.
Western Screech Owl	None	None	No	Unknown	Low-Moderate	This species appears to have been impacted by the presence of Barred Owls in western Washington. More information is needed to assess whether its population has declined or if suspected changes reflect only behavioral response to Barred Owls.

BIRD SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
WOODPECKERS						
Lewis' Woodpecker	None	Candidate	Yes	Low/declining	Low-Moderate	This species may be impacted by habitat loss and effects of fire suppression practices. Salvage harvest of trees in recently-burned forest may preclude or limit breeding in such areas for this fire-dependent species. Historically, breeding records included many areas in western Washington, but there have been no records for decades.
White-headed Woodpecker	None	Candidate	Yes	Low/declining	Low-Moderate	White-headed Woodpeckers are probably impacted by habitat loss (and degradation) and fire suppression in dry forest landscapes.
PERCHING BIRDS						
Loggerhead Shrike	Concern	Candidate	Yes	Low/stable	Low-Moderate	This species is strongly associated with shrub-steppe in Washington and has likely experienced a population decline in accordance with loss and conversion of shrub-steppe habitat.
Oregon Vesper Sparrow	Concern	Candidate	Yes	Low/declining	Moderate	Due to loss and degradation of habitat this subspecies is now in danger of extirpation in Washington.
Purple Martin	None	Candidate	Yes	Low/stable	Low-Moderate	The population of Purple Martins in Washington is small and largely dependent on humans to provide nest structures. Consequently, persistence of the population likely requires ongoing human intervention (e.g. erecting and maintaining nest structures).
Pygmy Nuthatch	None	Monitor	Yes	Low/unknown	Moderate-High	The Pygmy Nuthatch is dependent on old ponderosa pine forests to provide suitable nesting cavities in dead and decadent trees and a year round food source of pine seed. Historic logging and fire suppression have altered the structure and composition of ponderosa pine forests.
Sage Thrasher	None	Candidate	Yes	Low/declining	High	This sagebrush obligate is vulnerable to population declines and range contractions due to loss or degradation of shrub steppe habitat.
Sagebrush Sparrow	None	Candidate	Yes	Low/declining	High	The Sagebrush Sparrow is a species of concern because large expanses of big sagebrush, its preferred habitat, have been lost or degraded.
Slender-billed White-breasted Nuthatch	Concern	Candidate	Yes	Critical/declining	Low-Moderate	This species is of concern due to its dependence on large, mature oak trees to provide nest cavities and food (mast) and due to the fragmentation of oak tree stands from agriculture and residential development.
Streaked Horned Lark	Candidate	Endangered	Yes	Critical/unknown	Moderate-High	The Streaked Horned Lark is a subspecies only found in southwest Washington and western Oregon, with a population estimated at less than 2,000. Primary concerns are loss and degradation of habitat and human-related disturbance and mortality (e.g. mowing of grass) at breeding sites.
Western Bluebird – Western Washington	None	Monitor	No	Low/declining	Moderate-High	Declines in recent decades were caused primarily by habitat loss. Recent reintroductions onto San Juan Island may need additional translocations and removal of competitor's nests from nestboxes to be successful.

3.1.3 AMPHIBIANS AND REPTILES

Amphibians and Reptiles Overview

Approximately half the amphibian and reptile species native to Washington qualify as Species of Greatest Conservation Need. This includes eight salamanders, four frogs, two toads, four turtles, three lizards and five snakes. These species were generally included as SGCN for one or more of the following reasons; the species is listed in state or federal endangered species programs, only a small number of populations occur in the state, declines have been noted in certain ecoregions of the state, or the species is closely associated with a habitat type in Washington that is declining.

Distribution

SGCN amphibians and reptiles occur throughout the state with the exception of the North Cascades, Okanogan Highlands and the Northeast corner. Northern Leopard Frogs, Washington's most imperiled frog, occurred historically in some of these regions but it is now presumed extirpated except in the Columbia Basin near Moses Lake. Leopard Frogs, along with Oregon Spotted Frogs, Western Pond Turtles and Striped Whipsnakes are SGCN because so few populations occur that the persistence of the species in the state is at risk. Oregon Spotted Frogs occur in six watersheds in the Puget Sound Lowlands and southeastern Cascades, Western Pond turtles occur at two sites in Puget Sound and four in the Columbia River Gorge, and Striped Whipsnakes are confirmed extant from only one area of the Columbia Basin.

Nine of the SCGN amphibians and reptiles are included primarily because they are globally rare and/or have small ranges in Washington with specialized habitat requirements. The majority of these species are restricted to streams and seepages in moist coniferous forests and all but two occur in western Washington. Two of the species are Washington endemics: The Olympic Torrent Salamander is found only in the Olympia Peninsula and the Van Dyke's Salamander is found in the Olympic Peninsula, Willapa Hills and Southwest Cascades. Cope's Giant Salamander has a similar distribution to Van Dyke's Salamander and is nearly a Washington endemic with only a small portion of its range in Oregon. The Washington ranges of the Columbia Torrent Salamander and Dunn's Salamander are limited to the Willapa Hills and the Cascade Torrent Salamander and Larch Mountain Salamander occur only in the Southern Cascades and Columbia River Gorge. The Larch Mountain Salamander is closely associated with talus and other rocky habitats and the Rocky Mountain Tailed Frog occurs only in the Blue Mountains. The California Mountain Kingsnake occurs along a 20 mile stretch of the Columbia River Gorge and is isolated from the rest of the species' range by approximately 200 miles.

Six SGCN species are closely associated with shrub-steppe habitat in Washington's Columbia Basin. Today, less than 50 percent of Washington's shrub-steppe remains and much of it is degraded and fragmented. Of the habitat that remains, much of the vegetation has been altered by historic unsustainable grazing, invasion by exotic plants, and changes in fire frequency and intensity. In some areas of the basin, water withdrawal for agriculture is resulting in loss of surface water. Consequently, the amphibian and reptile species closely associated with shrub-steppe habitat may be at risk for declines. These species include Tiger Salamander, Woodhouse's Toad, Pygmy Horned Lizard, Sagebrush Lizard, Side-blotched Lizard, and Desert Nightsnake. With the exception of the nightsnake, these species can be common where they occur but all may experience local declines if the trend toward habitat loss and degradation continues. Tiger Salamanders, Pygmy Horned Lizards, and Desert Nightsnakes are found throughout the Columbia Basin. Woodhouse's Toads are found only along the Snake River and portions of the Columbia River. Side-blotched Lizards are limited primarily to the central Columbia Basin. Sagebrush Lizards are associated with inland sand dunes in Washington and more than 70 percent of this habitat has been lost since the 1970s. While the Western Toad and Columbia Spotted Frog have large ranges in Washington and remain common in many places, they are SCGN because of regional declines. The Western Toad was once common in the

lowland Puget Sound but now is relatively rare and has declined in the lower Columbia River Gorge. The concern for the Columbia Spotted Frog is in the Columbia Basin where the species appears to have been extirpated from the central basin and is declining from other areas within shrub-steppe habitat.

Current information available in the WDFW database regarding Ring-necked Snakes and Sharp-tailed Snakes suggest these species have limited distributions in Washington and are patchy on the landscape. However, finding Ring-necked Snakes and Sharp-tailed Snakes is challenging due to their small size and secretive habits including activity that takes place within and under surface litter, woody debris, and below ground. Consequently, it is possible that they are more common than current information indicates. More surveys targeted specifically for these species are needed to better understand their status.

Sea turtles are occasional visitors to Washington's outer coastal waters and all have Federal Endangered or Threatened status. Leatherback Sea Turtles are adapted to colder waters and may occur in Washington waters more than is currently recognized.

Population Sizes and Trends

For SCGN amphibians and reptiles, the population sizes are almost never known with the exception of the rarest species such as the Oregon Spotted Frog and Western Pond Turtle that are intensely monitored. Even for these species, estimating population size can be challenging. Many amphibian and reptiles species can be difficult to find even when common because they spend so much time inactive below the surface. For some species, such as the Torrent Salamanders, they can be common to abundant where they occur, but they have limited distributions and highly specific habitat requirements that make them vulnerable to habitat disturbance or alteration. Therefore, for most species the trend is unknown. Where trend is indicated, it is based on factors such as documented loss of habitat or populations. With population trends unknown for almost all the amphibian and reptile species, this information represents a clear need for future inventory, monitoring and research efforts. See Table 3-5 and 3-6 for more information about species status and conservation concerns.

Conservation Concern

The main threat to SGCN amphibians and reptiles is the loss, fragmentation, and degradation of habitat. An assessment by the International Union for Conservation of Nature (IUCN) found the number of amphibian species impacted by habitat loss and degradation to be almost four times greater than the next most common threat evaluated. Consequently, addressing habitat loss and degradation is paramount for conserving these species and highlighted in our conservation actions. The small size of these animals prevents them from dispersing long distances to find new suitable habitat. Many species have a strong association to certain habitat features such as breeding ponds and overwinter sites (*e.g.,* snake dens) that they return to annually. The fidelity to these sites and, perhaps, the scarcity of these unique habitat features, prevents them from leaving areas even if their habitat is degraded. When they do attempt to disperse, they encounter many barriers such as roads.

Some species, such as Western Pond Turtles, require occasional habitat disturbance to provide open sunny areas for basking and nesting. Many of the natural disturbance processes that set back plant succession, such as fires, have been altered in modern times and are either less frequent or more intense than in the past. Invasive plant species are another major issue because these plants can completely alter the vegetation structure and plant species composition; reed canarygrass and cheatgrass are particularly problematic. Many SCGN species are also threatened by non-native predatory animals such as American Bullfrogs and predatory fish. Most of Washington's native amphibians do not have strong defense mechanisms against these species or the diseases they carry. In the case of Washington's endangered Western Pond Turtles, hatchlings are small enough that bullfrogs eat them. Where there are high densities

of bullfrogs and small numbers of Western Pond Turtles, bullfrog predation can reduce natural recruitment of young Western Pond Turtles to almost zero.

Other Issues

The fact sheets presented in Appendix A highlight threats that are known -- of these, habitat loss and degradation are by far the greatest threat. Less is known about how a number of other threats may be impacting SGCN amphibians and reptiles. These threats and stressors include but are not limited to 1) pollution and chemical contaminates including herbicides, pesticides, fungicides, nitrogen fertilizers and heavy metals, 2) increasing ambient levels of UV-B radiation, and 3) impacts from climate change. The relevance and intensity of these stressors vary in space and time as do the tolerances of different species and populations.

Emerging diseases caused by viruses, fungi, bacteria and protozoans are a relatively new issue and one of growing concern for both amphibians and reptiles. Emerging diseases are those diseases that have increased in occurrence or range, have become more virulent, have shifted to new hosts or have recently evolved new strains. An example is chytridiomycosis caused by the chytrid fungus Batrachochytrium dendrobatidis (Bd). This emerging disease has had severe impacts on amphibian populations around the world including mass mortality events in the Americas, Australia and elsewhere. It is the first emerging disease known to cause decline or extinction in hundreds of species that otherwise were not threatened.

It is difficult to predict how a species or population will respond to an emerging disease. For chytridiomycosis, susceptibility varies by species with frogs affected to a greater extent than salamanders. Certain microhabitat thermal conditions appear to play a role. Frogs that live at higher elevations and are associated with permanent water, particularly streams, appear to be most susceptible. Some frog species are much less susceptible and may act as carriers including species that occur in Washington such as the native Northern Leopard Frog and Pacific Treefrog and the non-native but wide-spread American Bullfrog and the newly detected African Clawed Frog. Oregon Spotted Frogs also have been found to be resistant to mortality from chytrid. Resistance to chytrid may be conferred by genetically-based immune differences, anti-microbial skin flora or behavior that favors warmer and/or drier conditions that help clear the infection.

Alphabetical List of Reptiles

1. California Mountain Kingsnake
2. Desert Nightsnake
3. Green Sea Turtle
4. Leatherback Sea Turtle
5. Loggerhead Sea Turtle
6. Night Snake
7. Ringneck Snake
8. Sagebrush Lizard
9. Sharp-tailed Snake
10. Pygmy Horned Lizard
11. Side-blotched Lizard
12. Striped Whipsnake
13. Western Pond Turtle

Alphabetical List of Amphibians

1. Cascade Torrent Salamander
2. Columbia Spotted Frog
3. Columbia Torrent Salamander
4. Cope's Giant Salamander
5. Dunn's Salamander
6. Larch Mountain Salamander
7. Northern Leopard Frog
8. Olympic Torrent Salamander
9. Oregon Spotted Frog
10. Rocky Mountain Tailed Frog
11. Tiger Salamander
12. Van Dyke's Salamander
13. Western Toad
14. Woodhouse's Toad

Table 3-5: SGCN Amphibians Summary of Conservation Status

Please see Appendix A for a complete discussion of key threats and conservation actions needed for these species

Please see Section 3.3 at the end of this chapter for an explanation of the terms used in the headings

AMPHIBIAN SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
SALAMANDERS						
Tiger Salamander	None	Monitor	No	Medium/ unknown	Moderate-High	The Washington status is based on the small number of populations, a range that is restricted to a region that has been heavily altered, and a lack of information about this species. Of greatest concern is the drastic decline in stream flows and water body volume in much of Lincoln County and adjacent portions of Grant and Adams Counties caused by water withdrawal for agriculture. Larger remaining water bodies may not be suitable habitat because they may contain introduced predatory fish that eat larval salamanders.
Cope's Giant Salamander	None	Monitor	No	Unknown/ probably stable	High	The main concerns for this species have to do with protection of stream integrity. Activities that alter the integrity of small and medium-sized forested streams are of concern, especially those actions that increase water temperature and sedimentation. Sedimentation is particularly problematic in low-gradient streams, as increased silt deposition may fill crucial microhabitats such as the spaces between rocks and logs that are used as sheltering, hiding and nesting sites.
Cascade Torrent Salamander	None	Candidate	Yes	Medium/ unknown	High	This species is sensitive to temperature variation and increased sedimentation that may be caused by disturbances such as logging and road construction. Some populations are isolated by surrounding areas of unsuitable habitat and are vulnerable to extirpation through stochastic events exacerbated by habitat loss. Temperature sensitivity and limited dispersal ability makes this species potentially sensitive to climate change.
Columbia Torrent Salamander	None	Monitor	No	Medium/ unknown	High	The Washington status is based on the small global range, narrow environmental specificity and the potential concern that the species' headwater habitat may not be fully protected. In Washington, some occurrences are in protected areas (e.g., Natural Area Preserves) and some riparian habitat protections occur through forest practices rules and Habitat Conservation Plans. The temperature sensitivity limited dispersal ability makes this species potentially sensitive to climate change.

AMPHIBIAN SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Olympic Torrent Salamander	None	Monitor	No	Medium/ unknown	High	The status is based on the small global range (Washington endemic) and narrow environmental specificity. Most known occurrences (77 percent) are within Olympic National Park with an additional 15 percent of locations on the Olympic National Forest. National Forest occurrences are within Late-Successional Reserves and Adaptive Management Areas that provide some level of riparian habitat protection. Occurrence in landscapes with more intact, mature habitat with legacy structures (e.g., coarse woody debris) will likely buffer some impacts of climate change for this temperature-sensitive, species with limited dispersal ability.
Dunn's Salamander	None	Candidate	Yes	Low/stable	Moderate-High	The Washington status is based on the small state range, narrow environmental specificity and concern that riparian habitats the species relies upon may not be fully protected. The need for retention of large woody debris is also of concern.
Larch Mountain Salamander	None	Sensitive	Yes	Low/unknown	High	The status is based on the small global range, narrow environmental specificity and concern that there is not adequate protection for this species' specialized habitat of rocky accumulations and talus. Any ground-disturbing activity or land use that changes the moisture regimes and permeability of inhabited rocky substrates, such as over-story tree removal and gravel removal, may threaten populations. In addition, the sedentary habits and specific habitat requirements likely hinder dispersal and colonization to new areas as well as limiting gene flow between populations.
Van Dyke's Salamander	None	Candidate	Yes	Low/unknown	High	Van Dyke's Salamander is one of relatively few vertebrate species endemic to Washington. It is at risk due to its limited distribution and apparently small, isolated populations.
TOADS						
Western Toad	None	Candidate	Yes	In lowland Puget Sound: unknown	Moderate	In Washington, Western Toad declines have been documented in the Puget Trough and the lower Columbia River below Bonneville Dam. Of about 107 historical sites in those areas, only about 19 are thought to still remain. Elsewhere in the state, toads are locally common in many areas.
Woodhouse's Toad	None	Monitor	No	Unknown/ unknown	Moderate-High	The Washington State status is based on the small number of populations, a limited distribution restricted to shrub-steppe habitat in a region heavily altered for agriculture and urban development (e.g., Tri-Cities area), and a lack of information about the species.
FROGS						
Rocky Mountain Tailed Frog	None	Candidate	Yes	Low/ unknown	Moderate-High	This species is vulnerable to management practices that alter the riparian or aquatic zones of streams, especially those practices that change the moisture regime, increase sediment load, reduce woody debris input and change stream bank integrity. Protection of headwater streams is particularly important.

AMPHIBIAN SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Columbia Spotted Frog	None	Candidate	Yes	In Columbia Basin: Low/ unknown	Moderate-High	Populations of this species in the Columbia Basin are declining, likely due primarily to habitat loss and alteration, although other factors such as fish stocking may also cause declines. This species is aquatic, so drying of ponds and creeks related to agricultural water withdrawals is a threat in the region.
Oregon Spotted Frog	Threatened	Endangered	Yes	Low/declining	Moderate-High	The Washington State status is based on the rarity of the species. Human-caused stressors include wetland loss and alteration, loss of disturbance processes that set back succession, introduction of non-native/invasive flora and fauna and alteration of creek and river channels. Only six watersheds are currently known to be occupied in Washington. Within a watershed, most breeding populations are small and many are isolated from other breeding populations. They require breeding sites in shallow water with short vegetation and full sun exposure. This habitat type is rapidly lost to invasive grasses without management such as grazing, haying, mowing or restoration to native flora.
Northern Leopard Frog	None	Endangered	Yes	Low/ declining	Moderate-High	Only one known population remains in Washington; there is limited information about population status and trends; efforts are underway to determine the feasibility of translocations to portions of the former range.

Table 3-6: SGCN Reptiles Summary of Conservation Status

REPTILE SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
TURTLES						
Green Sea Turtle	Threatened	Threatened	No	Low/unknown	Moderate	A rare visitor off the outer Washington coast, this declining species is threatened by a number of factors occurring primarily outside of the state. However, issues related to consumption of plastic pollution could be addressed in Washington.
Leatherback Sea Turtle	Endangered	Endangered	No	Low/unknown	Moderate	This declining species, which may occur more regularly off the outer Washington coast than previously known, is threatened by numerous factors happening primarily outside of the state. However, issues related to oil spills and fishing gear entanglement as well as consumption of plastic pollution could be addressed in Washington.
Loggerhead Sea Turtle	Endangered	Threatened	No	Low/unknown	Moderate	A very rare visitor off the outer Washington coast, this declining species is threatened by factors occurring primarily outside of the state. However, issues related to consumption of plastic pollution could be addressed in Washington.
Western Pond Turtle	In review	Endangered	Yes	Low/increasing	Moderate	In the 1990s, only two populations remained in the Columbia River Gorge with estimates of less than 200 individuals. Because of recovery efforts, currently there are six populations with approximately 800 turtles. Many issues remain for the recovery of this species. Habitat must be managed to

REPTILE SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
						prevent invasive weeds from overgrowing the nesting areas. Predation by non-native American Bullfrogs on hatchlings, as well as mammalian predation on nests, prevents natural recruitment of hatchlings at many sites. Disease has emerged as a major concern in recent years due to the discovery that a substantial number of turtles have ulcerative shell disease. The cause of the disease is under investigation but is not yet known.
LIZARDS						
Pygmy Horned Lizard	None	Monitor	No	Medium/ unknown	Moderate-High	The conservation concern for this species is because its distribution is primarily restricted to the highly altered and fragmented shrub-steppe in Eastern Washington.
Sagebrush Lizard	None	Candidate	Yes	Low/declining	High	The Washington status is based on the species' obligate association with sand dunes in the Columbia Basin where greater than 70 percent of this habitat type has been lost since the 1970s.
Side-blotched Lizard	None	None	No	Medium/ unknown	Moderate-High	The Washington State status is based on the small number of populations and a distribution that is restricted to the heavily altered shrub-steppe of Eastern Washington.
SNAKES						
California Mountain Kingsnake	None	Candidate	Yes	Low/unknown	Low-Moderate	In Washington, occurs at the northern extreme of its range and the population is isolated from the rest of its range by approximately 200 miles. The species' range in Washington is small with few individuals documented. They occur in the Columbia River Gorge in an area of the state that is highly desirable and is likely to see increased development and vehicular traffic over the next decade.
Desert Nightsnake	None	Monitor	No	Medium/ unknown	Moderate-High	The Washington State status is based on a distribution that is primarily restricted to the shrub-steppe vegetation that has been heavily altered in Washington.
Ring-necked Snake	None	Monitor	No	Unknown/ unknown	Low-Moderate	The Washington State status is based on the small number of observations, patchy distribution and lack of information. Some of the distribution is in the Columbia Basin, a heavily altered region of the state.
Sharp-tailed Snake	None	Candidate	Yes	Low/unknown	Moderate	The Washington status and concern is based on the small number of populations, patchy distribution and lack of information.
Striped Whipsnake	None	Candidate	Yes	Low/declining	Moderate	The Washington status is based on the small number of populations. Currently only two populations are verified extant. Threats include conversion of habitat to agriculture, degradation of native shrub-steppe habitat from irrigation water and invasive weeds, basalt mining, single home construction and increasing vehicular traffic on roads and highways that bisect the occupied areas.

3.1.4 FISH

Fish Overview

There are 51 fish species or species units included on Washington's SGCN list. A species unit is an "evolutionarily significant unit" (ESU) or a "distinct population segment" (DPS) designated by NOAA-National Marine Fisheries Service and the U.S. Fish and Wildlife Service, respectively, as entities of a taxonomic species for ESA-listing purposes, or is a geographically designated population grouping (e.g., bull trout-coastal recovery unit). The 18 exclusively marine species represent about 7.5 percent of Puget Sound-area marine fishes or about 4.5 percent of marine fishes in all of Washington's marine waters. Of about 50 native freshwater and anadromous (freshwater and marine phases) fishes in Washington, the number of taxonomic species (22) on SGCN list represent 44 percent of these. Rockfish (genus *Sebastes*) and Pacific salmon and steelhead (genus *Oncorhynchus*) form about half of the SGCN list, but species diversity ranges from the Olympic Mudminnow (a Washington freshwater endemic) to the Bluntnose Sixgill Shark. Distribution of these fishes ranges from Pacific coastal waters to mountain streams of the interior Columbia Basin. Threats in common across a broad diversity of SGCN fishes include habitat loss and degradation from land and water uses, lack of abundance trend data, unintentional over-harvesting, and passage barriers due to dams, road crossings, diking, and other artificial structures. Many of these threats will be exacerbated by long-term climate change.

Distribution

Of the 18 SGCN species that live exclusively in marine environments, seven occur only within the confined marine waters of the Salish Sea (Puget Sound, Strait of Juan de Fuca, and Strait of Georgia). The other marine fishes and the anadromous fishes occur in these waters and in the Pacific Ocean. Most of the anadromous salmonids have a large Pacific Ocean range during marine phases of their life histories. In freshwater, anadromous fishes generally have well-defined spawning distributions, but rearing distributions may range more widely. Migration corridors between marine and freshwater habitats are essential elements of anadromous fishes' natural distributions, and include vital estuarine habitats. Due to their varied life histories, anadromous fishes are present year-round in freshwater habitats. Of the 13 exclusively freshwater SGCN species (including the non-anadromous salmonid species), eight occur only east of Cascades Mountains crest in Columbia Basin streams and lakes. Only two of the exclusively freshwater fishes (Olympic Mudminnow and Salish Sucker) do not occur in the Columbia Basin. Several freshwater species have relatively small or limited distributions in Washington.

Abundance Status - Size and Trends

Quantitative abundance and trend data for many SGCN fish species are lacking. Current population or unit size was unknown for 49 percent of the species, and abundance trend was unknown for 59 percent of the species. In many cases, information used to judge abundance status is qualitative, based on fishery-dependent data, or based on few, short-term surveys. Data insufficiency is considered a conservation threat for many SGCN fishes. Of the seven marine fish with abundance status ratings, five were rated at critical and two were rated at low abundances, and trends were rated as stable. All of the ESA-listed anadromous salmonids have long-term abundance data to assess status. For abundance ratings, 11 were low and three were medium; for trend ratings, two were declining, seven were stable, four were increasing and one was unknown. Only one of the freshwater species (Westslope Cutthroat Trout) was rated, and it had medium abundance and stable trend. Acquiring quantitative data for SGCN species is an action that will clearly benefit the design and evaluation of conservation actions.

Conservation Concerns

To effectively conserve SGCN fish we must attend to multiple sources of habitat degradation and loss. For many of the marine species, we need to curtail the loss of and restore degraded nearshore breeding and

rearing habitats, such as spawning beaches for herring, sand lance, surf smelt, eelgrass and algal habitats. In Puget Sound, residential and industrial shoreline uses and development that reduces and degrades marine habitats and water quality require management by multiple jurisdictions. In freshwater environments, we need to continue mitigation and elimination of impacts from dams, culverts, road crossings, and other instream modifications. Dams pose threats to all anadromous and some freshwater species by reducing, fragmenting, and modifying river habitats and by altering natural flow regimes and water quality. Dams may still impede juvenile and adult passage even where artificial passage has been constructed. Agricultural, urban, residential and commercial (e.g., forestry) land-uses have removed, modified, or degraded estuarine, floodplain, riverine, riparian, and wetland habitats essential to anadromous and freshwater fishes. Restoration of these habitats must continue in order to improve abundance, productivity and persistence of numerous SGCN. Threats from habitat loss and degradation are intensified for species with small or restricted ranges such as Olympic Mudminnow, Margined Sculpin, Salish Sucker, and Burbot. See Table 3-7 for more information on species status and conservation concerns.

For anadromous salmonid SGCN, hatchery production and hatchery-origin fish pose several kinds of threats to natural populations. Management of these risks is on-going and must continue in order to meet ESA-related recovery goals. For many SGCN fish species, mortality due to fishery-related impacts (unintentional or incidental catch, illegal harvest) is a threat that continues to need direct management and public education. The freshwater salmonid species continue to face threats from interbreeding with hatchery bred and released non-native salmonids. Invasive non-native freshwater fishes pose competition and predation threats to various SGCN species, especially those with limited native ranges (e.g., Pygmy Whitefish). Lack of data, such as on abundance, distribution, breeding habitats and/or viability status, is considered a threat for many SGCN species and will require significant investment to rectify.

Conservation Success

The status of Hood Canal Summer Chum Salmon ESU has improved considerably since ESA-listing in 1999. Threat reduction actions, such as eliminating excessive harvest, and supplementing natural production by short-term hatchery propagation, both of which began prior to ESA-listing, have led to large increases in abundance for the ESU's two independent populations. Re-introductions of chum to rivers that historically had sub-populations have occurred and continue to be monitored. Improvements to spawning and rearing habitats also have been made. Overall viability conditions are at a relatively high level.

Alphabetical list of Fish SGCN

1. Bluntnose Sixgill Shark
2. Bocaccio (Puget Sound/Georgia Basin DPS)
3. Broadnose Sevengill shark
4. Brown rockfish
5. Bull Trout - Coastal Recovery Unit
6. Bull Trout - Mid-Columbia Recovery Unit
7. Burbot
8. Canary Rockfish (Puget Sound/Georgia Basin
9. China Rockfish
10. Columbia River Chum Salmon ESU
11. Copper Rockfish
12. Eulachon (southern DPS)
13. Green Sturgeon (southern DPS)
14. Greenstriped Rockfish
15. Hood Canal Summer Chum Salmon ESU
16. Inland Redband Trout (landlocked populations)
17. Lake Chub
18. Leopard Dace
19. Lower Columbia Chinook Salmon ESU
20. Lower Columbia Coho ESU
21. Lower Columbia Steelhead DPS
22. Margined Sculpin
23. Middle Columbia Steelhead DPS
24. Mountain Sucker
25. Olympic Mudminnow
26. Ozette Sockeye ESU
27. Pacific Cod (Salish Sea population)
28. Pacific Hake (Georgia Basin DPS)
29. Pacific Herring (Georgia Basin DPS)
30. Pacific Lamprey
31. Pacific Sand Lance
32. Puget Sound Chinook Salmon ESU
33. Puget Sound Steelhead DPS
34. Pygmy Whitefish
35. Quillback Rockfish
36. Redstripe Rockfish
37. River Lamprey
38. Salish Sucker
39. Snake River Spring/Summer Chinook Salmon
40. Snake River Basin Steelhead DPS
41. Snake River Fall Chinook Salmon ESU
42. Surf Smelt
43. Tiger Rockfish
44. Tui Chub
45. Umatilla dace
46. Upper Columbia River Spring Chinook Salmon
47. Upper Columbia Steelhead DPS
48. Walleye Pollock (South Puget Sound)
49. Westslope Cutthroat Trout
50. White Sturgeon (Columbia River)
51. Yelloweye Rockfish (Puget Sound/Georgia

Table 3-7: SGCN Fish Summary of Conservation Status

Please see Appendix A for a complete discussion of key threats and conservation actions needed for these species

Please see Section 3.3 at the end of this chapter for an explanation of the terms used in the headings

FISH SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
MARINE FISH						
Bluntnose Sixgill Shark	None	None	No	Unknown/ unknown	Moderate	This is a large and long-lived species that uses Puget Sound as a nursery/pupping ground. Relatively little is known about their life history, population structure, or abundance trend.
Broadnose Sevengill Shark	None	None	No	Unknown/ unknown	Moderate	Abundance estimates are data deficient for the population known to occur in Washington waters. Willapa Bay may be critical habitat for breeding and seasonal feeding grounds.
Bocaccio – Puget Sound/Georgia Basin DPS	Endangered	Candidate	Yes	Critical/ unknown	Moderate-High	Bocaccio once supported a commercial set-net fishery in south Puget Sound but catches declined precipitously in the 1990s. Bocaccio are now rarely encountered, and abundance is considered at a critical level.
Brown Rockfish	None	Candidate	Yes	Unknown/ unknown	Moderate-High	A complete population assessment for this species is limited due to their wide distribution in Puget Sound and nearshore coastal habitats. They have been encountered rarely during WDFW Remotely Operated Vehicle (ROV)-based surveys (approximately 25 individuals between 2004 and 2014).
Canary Rockfish – Puget Sound /Georgia Basin DPS	Threatened	Candidate	Yes	Low/ unknown	Moderate-High	The species has been declared overfished along the entire West Coast of North America and this DPS's Threatened status is due to severely reduced populations in Puget Sound and Georgia Basin.
China Rockfish	None	Candidate	Yes	Unknown/ unknown	Moderate-High	China Rockfish population status is unknown, early life history is especially poorly understood, and relatively few are landed in the coastal recreational fishery.
Copper Rockfish	None	Candidate	Yes	Critical/stable	Moderate-High	A complete assessment for this species is limited due to their wide distribution in Puget Sound and nearshore coastal habitats. In a 2008 San Juan Islands survey, they were most abundant rockfish species encountered, other than Puget Sound rockfish. Overall, populations have declined recently.
Greenstriped Rockfish	None	Candidate	Yes	Unknown/unknown	Moderate-High	Abundance and distribution of this species are poorly known. A status assessment of Greenstriped Rockfish in Puget Sound concluded that federal ESA listing was not warranted.
Quillback Rockfish	None	Candidate	Yes	Critical/stable	Moderate-High	This species is currently considered depleted in both North and South Puget Sound, though increased fishery regulations and reductions in harvest have produced an increasing abundance trend in some areas.

FISH SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Redstripe Rockfish	None	Candidate	Yes	Unknown/ unknown	Moderate-High	Abundance and distribution of this species is poorly known. A 2010 status assessment of Redstripe Rockfish in Puget Sound concluded that federal ESA listing was not warranted.
Tiger Rockfish	None	Candidate	Yes	Unknown/ unknown	Moderate-High	Tiger Rockfish population size and structure in Washington waters are unknown, early life history is poorly understood, individuals of all life history stages are rare in WDFW ROV surveys, and none have been captured in WDFW trawl surveys.
Yelloweye Rockfish – Puget Sound/Georgia Basin DPS	Threatened	Candidate	Yes	Criticalunknown	Moderate-High	The species is declared overfished along the entire West Coast and has ESA Threatened status due to severely declining populations in Puget Sound and Georgia Basin.
Pacific Cod – Salish Sea Population	None	Candidate	Yes	Unknown/ unknown	Moderate-High	Abundance and distribution patterns of Pacific Cod in Washington waters are incompletely known. Historic over-harvest has led to dramatic declines in encounter rate and the curtailment of both commercial and recreational fisheries.
Pacific Hake – Georgia Basin DPS	None	Candidate	Yes	Unknown/ stable	Low-Moderate	Pacific Hake populations in Puget Sound have not been assessed in over a decade, but prior to this time a marked decline was observed, resulting in cessation of commercial fisheries.
Pacific Herring – Georgia Basin DPS	Not Warranted	Monitor	Yes	Critical/stable	Moderate	A 2006 status assessment determined that ESA listing was not warranted. However, the Cherry Point stock is at critically low abundance, the Squaxin Pass stock is stable, and abundance of all other stocks has fluctuated substantially since the 1970s but exhibits a slight downward trend.
Pacific Sand Lance	None	None	Yes	Unknown/ unknown	Moderate-High	Pacific Sand Lance abundance and distribution in Washington are almost completely unknown. The species is ubiquitous in beach seining surveys but difficult to capture with most traditional sampling methods.
Surf Smelt	None	None	Yes	Unknown/ unknown	Moderate-High	Surf smelt abundance and distribution in Washington are almost completely unknown. The species is ubiquitous in beach seining surveys but has not been sampled comprehensively due to lack of funding and personnel.
Walleye Pollock – South Puget Sound	None	Candidate	Yes	Low unknown	Moderate	Walleye Pollock abundance and distribution in South Puget Sound are incompletely known. Declines in encounter rate have led to increased fishery regulation and decreased harvest in recent years, especially in southern Puget Sound.
ANADROMOUS FISH – NON-SALMONIDS						
Eulachon – Southern DPS	Threatened	Candidate	Yes	Highly variable/ highly variable	Moderate-High	A complete population assessment for this species is unavailable but precipitous declines in spawner abundance in the Fraser and Columbia Rivers led to the Southern DPS being ESA-listed in 2010.

FISH SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Pacific Lamprey	None	Monitor	Yes	Unknown/ unknown	Moderate-High	The declining status of Pacific Lamprey led to a west coast-wide joint tribal/federal/state "Pacific Lamprey Conservation Initiative". Limiting factors include passage obstruction and mortality at mainstem dams and tributary water diversion dams and intakes, and low abundance in upper Columbia.
River Lamprey	None	Candidate	Yes	Unknown/ unknown	Moderate-High	Abundance and distribution information is inadequate for status assessment. Breeding and rearing freshwater habitats are likely at risk throughout much of distribution from land-use degradation; dams and other passage barriers (e.g., culverts) impede or prevent migration.
Green Sturgeon – Southern DPS	Threatened	None	Yes	Medium/ declining	Moderate	Southern DPS Green Sturgeon has one spawning population with multiple habitat-related threats, and juvenile production may be declining. Harvest-related risks and estuarine degradation are threats in Washington.
White Sturgeon – Columbia River	None	None	Yes	Low to abundant/ declining to stable	Moderate	Although stable and numerous in lower Columbia River, they are increasingly rare upstream. Dams impede and prevent passage and have negatively impacted spawning habitat.
SALMONIDS						
Lower Columbia River Chinook Salmon ESU	Threatened	Candidate	Yes	Low/stable	Moderate-High	Overall, this ESU is at substantial risk because of very low natural-origin spawner abundance, high hatchery fraction, habitat degradation, and harvest impacts.
Puget Sound Chinook Salmon ESU	Threatened	Candidate	Yes	Low/stable	Moderate-High	All populations in ESU are well below recovery plan target ranges for spawner levels. Risk factors are still present, including high fractions of hatchery fish and widespread habitat loss and degradation.
Upper Columbia River Spring Chinook ESU	Endangered	Candidate	Yes	Low/stable	Moderate-High	Although there have been increases in natural-origin spawner abundance, average productivity levels remain extremely low. Risks due to relatively high percent of hatchery-origin fish on spawning grounds, habitat degradation, and dam impacts are major concerns.
Snake River Fall Chinook Salmon ESU	Threatened	Candidate	Yes	Medium/ increasing	Moderate-High	This ESU includes one extant population. Abundance has improved substantially since ESA-listing, however hatchery-origin spawner proportions are high and dams continue to compromise habitat.
Snake River Spring/Summer Chinook Salmon ESU	Threatened	Candidate	Yes	Low/ increasing	Moderate-High	The entire ESU is rated at high extinction risk. Besides low abundance, risks due to percent of hatchery-origin fish on spawning grounds, habitat degradation, and dam impacts are major concerns.
Columbia River Chum Salmon ESU	Threatened	Candidate	Yes	Low/declining	Moderate	After near extirpation, abundance of this ESU remains very low, and extinction risk was rated very high.

FISH SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Hood Canal Summer Chum Salmon ESU	Threatened	Candidate	Yes	Medium/ increasing	Moderate-High	Abundance has improved significantly since time of ESA-listing, but viability conditions have not been met completely. Evaluation of efficacy of habitat improvements and reintroductions is needed.
Lower Columbia Coho ESU	Threatened	None	Yes	Low/ unknown	Moderate-High	Washington coho populations in this ESU are dominated by hatchery-origin spawners, are not demonstrably self-sustaining, and considered at very high extinction risk.
Ozette Sockeye ESU	Threatened	Candidate	Yes	Low/stable	Moderate	Ozette Sockeye are at very low abundance compared to historic condition, and quantity and quality of adequate lake beach spawning habitat may be declining.
Lower Columbia Steelhead DPS	Threatened	Candidate	Yes	Low/stable	Moderate-High	Most populations are rated at high or very high extinction risk, and dams block several large areas of historic range. Habitat degradation and hatchery-related impacts are other limiting factors.
Middle Columbia Steelhead DPS	Threatened	Candidate	Yes	Intermediate/ stable	Moderate	Many populations are rated at high extinction risk. Dams impede passage and reduce or modify access to large areas of historic range, and other habitat degradation limits distribution and productivity.
Puget Sound Steelhead DPS	Threatened	None	Yes	Low/declining	Moderate-High	In 2011, most populations showed declining growth rates and extinction risks were relatively high overall, especially for central/south Puget Sound populations. Habitat degradation and poor early marine survival may be impeding productivity.
Snake River Basin Steelhead DPS	Threatened	Candidate	Yes	Low/stable	Moderate-High	Extant populations are at moderate to high extinction risk. Dams impede passage, reduce access to large areas of historic range, and limit productivity. Proportions of hatchery-origin spawners are a concern.
Upper Columbia Steelhead DPS	Threatened	Candidate	Yes	Low/ increasing	Moderate-High	Extant populations are rated at high extinction risk. Dams impede passage and reduce access to large areas of historic range, and limit productivity. Proportions of hatchery-origin spawners are a concern.
Bull Trout – Coastal Recovery Unit	Threatened	Candidate	Yes	Unknown/ unknown	Moderate-High	Many of the Washington core area populations have unknown status. Bull trout face threats from habitat degradation and fragmentation, poor water quality, and introduced non-native fish species.
Bull Trout – Mid-Columbia Recovery Unit	Threatened	Candidate	Yes	Unknown/ unknown	Moderate	Many of the Washington core area populations have unknown status. Bull trout face threats from habitat degradation and fragmentation, poor water quality, and introduced non-native fishes.
Inland Redband Trout	None	None	Yes	Unknown/ unknown	Moderate-High	Species is widespread, but some populations are at risk from non-native hatchery trout competition and interbreeding. Water quality issues threaten most locations, and barriers fragment populations.

FISH SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Westslope Cutthroat Trout	None	None	Yes	Medium/ stable	Low-Moderate	Westslope Cutthroat Trout is stable and abundant in its range, but faces threats to its habitat and threats from genetic introgression.
FRESHWATER FISH						
Burbot	None	None	No	Unknown/ unknown	Moderate	Burbot are restricted to only 11 deep, cold-water lakes in Washington. Little is known about abundance, age structure, or productivity of any of the populations.
Lake Chub	None	Candidate	Yes	Unknown/ unknown	Moderate	The status of this species is unknown and its major threat is habitat alteration.
Tui Chub	None	None	No	Unknown/ unknown	Low-Moderate	This species is confined to a small part of the Columbia Basin and its biggest threat is predation by non-native predators.
Leopard Dace	None	Candidate	Yes	Unknown/ unknown	Moderate-High	The status of this species is unknown and it faces threats to its habitat.
Umatilla Dace	None	Candidate	Yes	Unknown/ unknown	Moderate	This species' status is unknown and it faces threats from human development and habitat alterations.
Olympic Mudminnow	None	Sensitive	Yes	Unknown/ unknown	Moderate	Populations of this endemic species are confined to a very small lowland portion of western Washington and its biggest threat is loss of habitat.
Margined Sculpin	None	Sensitive	Yes	Medium/ unknown	Moderate	This species is confined to three rivers in southeastern Washington and faces threats to its habitat.
Mountain Sucker	None	Candidate	Yes	Unknown/ unknown	Low-Moderate	The status of this species is unknown and it faces threats to its habitat.
Salish Sucker	None	Monitor	No	Unknown/ unknown	Moderate-High	This species is only found in western Washington and faces threats from loss of habitat and degradation to water quality.
Pygmy Whitefish	None	Sensitive	Yes	Unknown/ unknown	Low-Moderate	Pygmy Whitefish status in Washington is unknown and it faces threats to habitat and water quality.

3.1.5 INVERTEBRATES

Invertebrates Overview

The Species of Greatest Conservation Need (SGCN) list for Washington includes 95 invertebrate taxa; a diverse group that includes butterflies, moths, beetles, bumblebees, stoneflies, dragonflies, caddisflies, terrestrial and freshwater snails and mussels, an earthworm, and a millipede. The increased number of SGCN invertebrates since 2005, reflects the increased information available for some invertebrate groups, such as terrestrial snails and slugs, and new threats and population declines in others, such as bumblebees. Worldwide, invertebrate species represent about 99 percent of animal diversity. Invertebrates play critical roles in nutrient cycling, soil formation, pollination, seed dispersal, water filtration, and as food for birds, fish, amphibians and reptiles, and bats and other mammals. Some species, such as bees and freshwater mussels and bivalves, are good indicators of environmental quality, the 'canary in the coal mine' that we ignore at our peril. Given their tremendous diversity, ecological importance, restricted species distributions, and vulnerability to pollution and habitat loss, the conservation of invertebrates has been historically underemphasized, and relatively few have received any conservation attention or regulatory protection. Although terrestrial vertebrate extinctions are well documented, invertebrate extinctions often go unnoticed by the general public, by most biologists, and by many conservation agencies.

Some species groups have been severely affected by human activities. For example, North America has a greater diversity of freshwater bivalves than any other region in the world, and an extraordinary number of species are imperiled or extinct as a result of dams, strip-mining, and pollution. In the United States alone, 37 species of freshwater mussels are presumed extinct. Though Washington has few freshwater bivalve species, it hosts a high diversity of slugs and terrestrial snails, as well as insects associated with mountain streams. In addition to the taxa recognized in this list, there are groups, such as native earthworms, that likely contain additional taxa at risk that may need to be added to the SGCN list in the future, but information is generally insufficient to evaluate at this time.

Distribution

Many of the SGCN invertebrates have very limited distributions. Some species have very special ecological requirements, such as stonefly species only found in alpine springs and seeps, and some snails are associated with lowland forest with old Big-leaf Maples and hardwood debris. Other species may have become differentiated from related taxa in place and never spread very far, while many others were formerly widespread, but only survive in discrete sites where the environment has been less affected by climate and habitat changes since the last glaciation, or land cover changes associated with human activities. For example, species with limited distributions include several snails only known from eastern Chelan County, others only from the Snake River Canyon, and others only from the Columbia Gorge – relative 'hotspots' of endemic snails; some butterflies have declined with their associated prairie habitat, and some freshwater bivalves were eliminated from much of the Columbia and Snake Rivers by dams.

Populations and Trends

Almost without exception, there are few data on historical populations of SGCN invertebrates. Population trends are assumed based on loss or degradation of their habitat, and the absence of the species at historical sites. Many of these species have been selected either because their habitat has been reduced dramatically (e.g. west-side prairie, undammed rivers), or because their populations are only found at a few sites that are very vulnerable to land use activities. Some formerly very abundant species are still relatively widespread, but have declined dramatically. For example, freshwater mussels are still abundant in scattered locations, but some of the populations have been unable to reproduce for over 20 years, and will go extinct without substantial improvement in water quality.

Threats and Conservation Actions Needed

The major threats to SGCN invertebrates include habitat loss and degradation through siltation and pollution of surface waters, development, unsustainable agricultural and logging practices, wildfires, mining of talus, unsustainable grazing of riparian sites, pesticides, introduced species (diseases, invasive animals, invasive plants), and drying of seeps, springs, and streams with water withdrawals or climate change. Basic information needs are much more often a priority conservation action for invertebrates than for better known vertebrates. Many of these species need additional inventory surveys to more clearly delineate their distribution, or for the rarer taxa, to identify key sites in need of protection. Some of these taxa, though recognized as a unique form, have not yet been formally described and named, and some groups need to be studied to clarify relationships and the number of species present in Washington. Dramatic technological advances in recent years in genetic analysis provide the tools to investigate these questions. The life history of some species, for example some stoneflies, is largely unknown. Some of these investigations are more likely to be done by taxa experts at universities than by WDFW. Addressing these taxonomic, distribution, and life history information needs, will help in the development of management recommendations needed for conservation of these invertebrates. See Table 3-8 for more information on species status and conservation concerns.

While the conservation of so many invertebrate species may seem like a daunting task, the good news is that the conservation of many of these species can be addressed by identifying and protecting the small number of sites where they are found. Protection may require landowner incentive programs, conservation easements, acquisition of water rights, or a management plan for sites on public lands.

Figure 3-1: Pollination: An Essential Function

Pollination:
An Essential Function for Ecosystems

The term 'pollination' encompasses vital relationships between many plants and animals. Around 75% of the world's flowering plants rely on pollinators for an essential act of survival: reproduction. Pollinators include a diverse group of species, from mammals to birds and insects, though the majority are insects: wasps, flies, beetles, ants, bees and others.

The importance of insect pollinators for both natural systems and crops has come to light recently as their vital ecological function has become better understood and as populations of key pollinator species have dramatically declined. The Obama Administration highlighted this situation with a Presidential Memorandum in 2014, directing federal agencies to promote the health of pollinators. As a group, insect pollinators are threatened by many of the same factors as other wildlife species, namely habitat loss and fragmentation, but are also uniquely threatened by disease and exposure to pesticides.

This SWAP includes several key pollinators as SGCN that have information sufficient to document significant declines in abundance and distribution; however, there is a vast number of insect pollinator species in Washington for which little is known. Additional study and action by WDFW and other state, federal, tribal, research institutions, and NGO partners focused on identifying and conserving key pollinator species is an important need for future research to best protect this ecologically and economically important group of animials.

If there is a need in the next 10 years to use State Wildlife Grants to address conservation needs for a species not identified as SGCN, the need could be addressed by working with the USFWS to identify an "emerging issue" to fund work for the new species or habitat.

Alphabetical list of Invertebrate SGCN

1. Caddisflies (six taxa included)
7. Mayflies (four taxa included)
11. Noctuid Moths (three taxa included)
14. Ashy Pebblesnail
15. Barren Juga
16. Beller's Ground Beetle
17. Bluegray Taildropper
18. Brown Juga
19. California Floater
20. Cascades Needlefly
21. Chelan Mountainsnail
22. Chinquapin Hairstreak
23. Columbia Clubtail
24. Columbia Oregonian
25. Columbia River Tiger Beetle
26. Crowned Tightcoil
27. Dalles Hesperian
28. Dalles Juga
29. Dalles Sideband
30. Dry Land Forestsnail
31. Giant Palouse Earthworm
32. Great Arctic
33. Hatch's Click Beetle
34. Hoary Elfin
35. Hoder's Mountainsnail
36. Hoko Vertigo
37. Idaho Vertigo
38. Island Marble
39. Johnson's Hairstreak
40. Juniper Hairstreak
41. Leschi's Millipede
42. Limestone Point Mountainsnail
43. Mad River Mountainsnail
44. Makah Copper
45. Mann's Nollusk-eating Ground Beetle
46. Mardon Skipper
47. Masked Duskysnail
48. Meadow Fritillary
49. Mission Creek Oregonian
50. Monarch
51. Morrison's Bumblebee
52. Nimapuna tigersnail
53. Northern (pinto) abalone
54. Northern Forestfly
55. Olympia oyster
56. Olympia Pebblesnail
57. One-band Juga
58. Oregon Branded Skipper
59. Oregon Megomphid
60. Oregon Silverspot
61. Pacific Clubtail
62. Pacific Needlefly
63. Pacific Vertigo
64. Poplar Oregonian
65. Propertius' Duskywing
66. Puget Blue
67. Puget Oegonian
68. Puget Sound Fritillary
69. Rainier Roachfly
70. Ranne's Mountainsnail
71. Salmon River Pebblesnail
72. Sand-verbena Moth
73. Sasquatch Snowfly
74. Shortface Lanx
75. Silver-bordered Fritillary
76. Siuslaw Sand Tiger Beetle
77. Sonora Skipper
78. Spotted Taildropper
79. Straits Acmon Blue
80. Subarctic Bluet
81. Suckley Cuckoo Bumblebee
82. Talol Springfly
83. Taylor's Checkerspot
84. Three-band Juga
85. Valley Silverspot
86. Washington Duskysnail
87. Wenatchee Forestfly
88. Western Bumblebee
89. Western Pearlshell
90. Western Ridged Mussel
91. White-belted Ringtail
92. Winged Floater
93. Yosemite Springfly
95. Yuma Skipper

Table 3-8: SGCN Invertebrates Summary of Conservation Status

Please see Appendix A for a complete discussion of key threats and conservation actions needed for these species

Please see Section 3.3 at the end of this chapter for an explanation of the terms used in the headings

INVERTEBRATE SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
MILLIPEDE						
Leschi's Millipede	None	Candidate	Yes	Unknown/unknown	N/A	Very little is known of this cryptic species, which was discovered and identified in 2004. It has only been detected within a small area in Thurston County.
MAYFLIES						
Cinygmula gartrelli	None	None	No	Low/unknown	Low-Moderate	These mayfly species are generally rare and have very restricted distributions. Mayflies are very sensitive to pollution, and as such are usually only found at high quality, minimally polluted sites. Mayflies are a commonly used index of water quality and aquatic ecosystem health.
Paraleptophlebia falcula	None	None	No	Low/unknown	Low-Moderate	
Paraleptophlebia jenseni	None	None	No	Low/unknown	Low-Moderate	
Siphlonurus autumnalis	None	None	No	Low/unknown	Low-Moderate	
DRAGONFLIES AND DAMSELFLIES						
Subarctic Bluet	None	None	No	Low/unknown	Moderate-High	The Subarctic Bluet is a species of damselfly that is restricted to boreal fens and bogs in the northeastern corner of the state. Only two populations of Subarctic Bluet have been located in Washington.
Family Gomphidae – CLUBTAIL DRAGONFLIES						
Columbia Clubtail	None	Candidate	Yes	Low/unknown	Moderate-High	These three dragonflies in the Gomphidae family are SGCN in Washington due to the small number of isolated populations and continued threats to aquatic habitats.
Pacific Clubtail	None	Candidate	Yes	Critical/declining	Moderate-High	
White-belted Ringtail	None	None	No	Low/unknown	Moderate-High	
STONEFLIES						
Sasquatch Snowfly	None	None	No	Low/unknown	Moderate	Stoneflies generally require cold, clear, running water and are especially sensitive to human disturbance; they are excellent indicators of water quality. An estimated 43% of North American stoneflies are vulnerable to extinction, imperiled, or extinct. Adults are weak fliers, and there is a high level of endemism; four of these species have only been found in Washington. Some of these species are restricted to glacier-fed streams, and likely to be at-risk due to climate change.
Northern Forestfly	Candidate	None	No	Low/unknown	High	
Wenatchee Forestfly	None	None	No	Low/unknown	Moderate-High	
Pacific Needlefly	None	None	No	Low/unknown	Moderate-High	
Cascades Needlefly	None	None	No	Low/unknown	Moderate-High	
Yosemite Springfly	None	None	No	Low/unknown	High	
Talol Springfly	None	None	No	Low/unknown	Moderate	
Rainier Roachfly	None	None	No	Low/unknown	Moderate-High	
BEETLES						
Hatch's Click Beetle	None	Candidate	Yes	Low/declining	Moderate-High	Hatch's Click Beetle is a species of conservation concern due to its small number of isolated populations, highly limited distribution and range, and use of specialized, highly restricted, and threatened Sphagnum moss bog habitat.

INVERTEBRATE SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Family Carabidae – GROUND AND TIGER BEETLES						
Mann's Mollusk-eating Ground Beetle	None	Candidate	Yes	Low/unknown	Moderate-High	These four beetle species are Species of Greatest Conservation Need due to the small number of isolated populations, highly limited distribution and range, and dependence on specialized, restricted and threatened habitats.
Beller's Ground Beetle	None	Candidate	Yes	Low/unknown	Moderate-High	
Columbia River Tiger Beetle	None	Candidate	Yes	Possibly Extirpated	Moderate	
Siuslaw Sand Tiger Beetle	None	Monitor	No	Critical/unknown	Moderate-High	
CADDISFLIES						
Allomyia acanthis	None	None	No	Low/unknown	High	Caddisflies are aquatic insects. They are very sensitive to water quality and changes in water flow. Certain species have been used as biotic indicators of pollution.
Goereilla baumanni	None	None	No	Low/unknown	High	
Limnephilus flavastellus	None	None	No	Low/unknown	Moderate-High	
Psychoglypha browni	None	None	No	Low/unknown	Moderate-High	
Rhyacophila pichaca	None	None	No	Low/unknown	Moderate	
Rhyacophila vetina	None	None	No	Low/unknown	High	
MOTHS						
Genus Copablepharon						
Sand Verbena Moth	In review	Candidate	No	Low/unknown	Moderate-High	These four Copablepharon moths (Family Noctuidae) are imperiled due to rare habitat types, small number of isolated populations, extremely limited range, and known threats to their habitats. Sand Verbena Moth was petitioned for listing under the Endangered Species Act and received a positive 90-day finding indicating that "the petition presents substantial information indicating that listing the sand verbena moth may be warranted".
Copablepharon columbia	None	None	No	Critical/declining	Moderate	
Copablepharon mutans	None	None	No	Critical/declining	Moderate	
Copablepharon viridisparsa hopfingeri	None	None		Critical/declining	Moderate	
BUTTERFLIES						
Great Arctic	None	Candidate	Yes	Critical/unknown	Low-Moderate	A Pacific Northwest endemic, this butterfly has been found on a single site within the United States, in northwestern Washington; it also occurs in southwestern British Columbia, and may occur on other sites with similar habitat. It is a species of conservation concern due to its restricted range and many threats to its grassland-forest edge habitat.
Island Marble	In review	Candidate	Yes	Critical/declining	Moderate-High	The Island Marble is a rare butterfly, restricted to two San Juan Islands. The species was petitioned for listing under the Endangered Species Act and received a positive 90-day finding indicating that "the U.S. Fish and Wildlife Service found "listing the island marble butterfly as an endangered species may be warranted".

INVERTEBRATE SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Monarch Butterfly	In review	None	No	Low/declining	Moderate	The Monarch butterfly faces significant threats in both summer and winter habitats, and action is needed to restore populations. Western Monarchs, including those breeding within Washington have declined by more than 50% since 1997.
Taylor's Checkerspot	Endangered	Endangered	Yes	Critical/stable	Moderate-High	This subspecies is currently restricted to a small scattering of 8 populations in Washington, a single population in British Columbia, and 2 populations in Oregon. The decline of Taylor's Checkerspot has accompanied the loss of open, prairie and grassland habitats. Taylor's Checkerspot was listed by the Washington Fish and Wildlife Commission as endangered in 2006, and listed as federally endangered by the U.S. Fish and Wildlife Service in 2013.
Family Lycaenidae – GOSSAMER WING BUTTERFLIES						
Makah Copper	None	Candidate	Yes	Low/declining	Moderate-High	Seven Lycaenid butterflies were recognized as Species of Greatest Conservation Need due to their rare and restricted host plants and habitat types, small number of isolated populations, highly limited range and distribution, and threats to their habitat.
Golden Hairstreak	None	Candidate	Yes	Critical/declining	N/A	
Johnson's Hairstreak	None	Candidate	Yes	Low/unknown	Moderate-High	
Juniper Hairstreak	None	Candidate	Yes	Low/unknown	Moderate	
Hoary Elfin	None	Monitor	No	Critical/declining	Low-Moderate	
Puget (Blackmore's) Blue	None	Candidate	Yes	Low/declining	N/A	
Straits Acmon Blue	None	None	No	Critical/declining	Moderate-High	
Subfamily Heliconiinae – FRITILLARY BUTTERFLIES						
Puget Sound Fritillary	None	None	No	Low/declining	Low-Moderate	These species were recognized as Species of Conservation Need in Washington due to their rare and restricted host plants and habitat types, small number of isolated populations, limited range and distribution, and known threats to their habitats.
Valley Silverspot	None	Candidate	Yes	Critical/declining	Low-Moderate	
Oregon Silverspot	Threatened	Endangered	Yes	Extirpated	Moderate	
Meadow Fritillary	None	None	No	Low/declining	Low-Moderate	
Silver-bordered Fritillary	None	Candidate	Yes	Low/declining	Moderate-High	
Family Hesperiidae – SKIPPER BUTTERFLIES						
Propertius Duskywing	None	None	No	Low/declining	Moderate	These five butterflies in the Skipper Family were recognized as Species of Greatest Conservation Need throughout their ranges due to the small number of isolated populations, specialized and restricted habitat, and known threats to their habitat.
Oregon Branded Skipper	None	None	No	Critical/declining	Moderate	
Mardon Skipper	None	Endangered	Yes	Low/declining	Moderate-High	
Sonora Skipper	None	None	No	Critical/declining	Low-Moderate	
Yuma Skipper	None	Candidate	Yes	Critical/declining	Moderate	
BUMBLE BEES						
Genus Bombus – BUMBLE BEES						
Western Bumble Bee	None	None	No	Low/declining	Moderate-High	Bumble bees have recently become the focus of conservation concern and efforts due to their precipitous population
Morrison's Bumble Bee	None	None	No	Critical/unknown	Moderate	

INVERTEBRATE SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Suckley Cuckoo Bumble Bee	None	None	No	Critical/declining	Moderate	declines and prodigious capabilities as pollinators. In a recent status assessment, IUCN (International Union of Conservation of Nature) identified three Washington species as facing high or extremely high risk of extinction: Western Bumble Bee and Morrison's Bumble Bee were ranked Vulnerable, and Suckley Cuckoo Bumble Bee was ranked Critically Endangered.
MOLLUSKS						
Family Oreohelicidae -- MOUNTAINSNAILS						
Chelan Mountainsnail	In review	None	No	Critical/declining	Low-Moderate	Many Mountainsnail species and subspecies have specialized habitat requirements and very restricted ranges, low ability to disperse, and are vulnerable to disturbances such as logging, fire, intensive grazing, or introduced predators. Most mountainsnail species and subspecies (approximately 91 percent) are considered imperiled or critically imperiled by NatureServe.
Hoder's Mountainsnail	None	None	No	Critical/declining	Low-Moderate	
Mad River Mountainsnail	None	None	No	Critical/declining	Low-Moderate	
Ranne's Mountainsnail	None	None	No	Critical/declining	Low	
Limestone Point Mountainsnail	None	None	No	Critical/declining	Low-Moderate	
Family Polygyridae – FORESTSNAILS, DUSKYSNAILS, OREGONIANS, AND HESPERIANS						
Dry Land Forestsnail	None	None	No	Low/unknown	Low-Moderate	These snails are of conservation concern because they have specialized habitat requirements, such as moist mature forest with a hardwood component, or moist sites in otherwise dry environments. Snails do not readily disperse and populations are isolated. They are vulnerable to alteration of these sites, including from logging, development, use of talus for road-building, and unsustainable livestock grazing at springs.
Washington Duskysnail	None	None	No	Low/declining	Low-Moderate	
Columbia Oregonian	In review	Candidate	Yes	Critical/declining	Moderate-High	
Puget Oregonian	In review	None	No	Low/declining	Low-Moderate	
Poplar Oregonian	None	Candidate	Yes	Low/declining	Low	
Mission Creek Oregonian	None	None	No	Low/unknown	N/A	
Cryptomastix mullani hemphilli	None	None	No	Low/unknown		
Dalles Hesperian	None	None	No	Low/unknown	Moderate-High	
Family Vertiginidae						
Hoko Vertigo	In review	None	No	Critical/unknown	Low-Moderate	These three very rare Vertigo species are small snails are found in small isolated populations, perhaps remnants of a previously much wider range. These small populations, associated with old growth and/or riparian hardwoods are very vulnerable to logging, road building, fires, and other disturbances.
Pacific Vertigo	None	None	No	Critical/extirpated?	Low-Moderate	
Idaho Vertigo	None	None	No	Critical/unknown	Low-Moderate	
OTHER TERRESTRIAL SNAILS						
Oregon Megomphix	None	None	No	Low/unknown	Low-Moderate	These terrestrial snails are very rare and have distributions that include small isolated populations, perhaps remnants of previously much wider ranges. These small isolated populations, often associated with old growth and/or riparian hardwoods, are very vulnerable to logging, road building, fires, and other disturbances.
Dalles Sideband	In review	Candidate	Yes	Low/unknown	Low-Moderate	
Crowned Tightcoil	None	None	No	Low/unknown	Low-Moderate	
Nimapuna Tigersnail	None	None	No	Critical/unknown	N/A	
Families – Lymnaeidae and Hydrobiidae						

INVERTEBRATE SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Shortface Lanx *or* Giant Columbia River Limpet	None	Candidate	Yes	Uncommon/declining	Moderate	These species require clear, cold, well-oxygenated waters, and are threatened by pollution and siltation. North America once had approximately 700 species of native freshwater snails from 16 families. Currently, 67 species (10 percent) are considered likely extinct, 278 (40 percent) endangered, 102 (15 percent), threatened, 73 (10 percent) vulnerable, and 26 (4 percent) have uncertain taxonomic status.
Masked Duskysnail	None	None	No	Critical/declining	Low-Moderate	
Olympia Pebblesnail	None	None	No	Low/unknown	Low-Moderate	
Salmon River Pebblesnail	None	None	No	Low/unknown	N/A	
Ashy Pebblesnail	None	Candidate	Yes	Uncommon/declining	Moderate	
Family Pleuroceridae (Genus *Juga*) – FRESHWATER AQUATIC SNAILS						
Barren Juga	None	None	No	Low/unknown	Moderate-High	These species require cold, clear, well-oxygenated water; they are sensitive to pollution, and intolerant of warm waters, low dissolved oxygen, or major seasonal fluctuations. Destruction of springs by historical unsustainable grazing and logging practices, and diversions (e.g. for water supply, fish hatcheries) has already caused extensive extinction of species throughout western North America.
Dalles Juga	None	None	No	Low/unknown	Moderate-High	
Brown Juga	None	None	No	Low/unknown	Moderate-High	
Three-band Juga	None	None	No	Low/unknown	Moderate-High	
One-band Juga	None	None	No	Low/unknown	Moderate-High	
SLUGS						
TAILDROPPER SLUGS						
Bluegray Taildropper	None	Candidate	Yes	Low/declining	Low-Moderate	These endemic taildropper slugs are of concern due to their rarity. The Spotted Taildropper is only found in part of one county, and the rarity of both species suggest they have specific habitat needs that may make them sensitive to land use activities, such as logging and loss of coarse woody debris.
Spotted Taildropper	None	None	No	Critical/unknown	Low-Moderate	
FRESHWATER BIVALVES						
Families Unionidae and Margaritiferidae: FRESHWATER MUSSELS						
California Floater	None	Candidate	Yes	Low/declining	Moderate	Freshwater mussels have been greatly affected by dams and annual water drawdowns, as well as degraded water quality resulting from development and unsustainable agriculture. Many historical sites no longer support mussels, and many local populations no longer successfully reproduce.
Winged Floater	None	None	No	Low/declining	Moderate	
Western Ridged Mussel	None	None	No	Uncommon/declining	Moderate	
Western Pearlshell	None	None	No	Uncommon/declining	Moderate	
MARINE BIVALVE						
Olympia Oyster	None	Candidate	Yes	Low/stable	High	Washington's only native oyster, it is currently present in diminished abundance (less than 5 percent) due to overharvest and habitat alterations throughout most of the species historical range (ca 1850) in Washington. Evidence of natural recruitment and restoration success observed but lack of suitable habitat limits further increases.
MARINE GASTROPOD						

INVERTEBRATE SPECIES	Federal Status	State Status	PHS	Population size/trend	Climate Vulnerability	Summary of Conservation Concern
Pinto Abalone	None	Candidate	Yes	Uncommon/declining	N/A	The Pinto Abalone has failed to recover from dramatic declines resulting from excessive recreational and illegal harvest, despite fishery closure. There is strong evidence of recruitment failure, perhaps because the densities of remaining populations are below the threshold for successful reproduction.
EARTHWORM						
Giant Palouse Earthworm	None	Candidate	Yes	Unknown/unknown	Low-Moderate	Data on this species are sparse. It is difficult to detect and few surveys have been performed to determine its distribution and abundance. There has been an obvious reduction of range in the Palouse region of Washington with conversion of prairie to cropland. Introduced worm species appear to exclude native species, including this one.

3.2 Summary of Threats and Conservation Actions

3.2.1 Methodology

Stressors and conservation actions for each SGCN species were categorized in "TRACS" (Tracking and Reporting Actions for the Conservation of Species) terminology, which comes from the tracking and reporting system for conservation and related actions funded by the US Fish and Wildlife Services (USFWS), and the Wildlife and Sport Fish Restoration (WSFR) Program. We used this tracking and reporting system for categorizing stressors and conservation actions for the following reasons:

- The State Wildlife Action Best Practices guide encourages the use of standardized descriptions of threats and actions.
- The Wildlife TRACS system will be used for application for and reporting on State Wildlife Grants (SWG). Understanding stressors and needed actions for SGCN in terms of this language will help in identifying projects appropriate for funding through the SWG program.
- The Wildlife TRACS system potentially enables cross referencing of Washington's data on key stressors with other states or other organizations also using this system.
- Standardized descriptions facilitate "roll up" of data to determine trends or patterns for additional investigation.

For each threat or stressor, a conservation action was identified and several qualifiers added to the action, including adequacy of investment and lead. The adequacy of investment in the conservation action was based on whether it was sufficient (action is currently underway and we should stay the course), or insufficient (some action underway, but more needed), or whether a new action was needed (meaning no action was underway and new action needed to be initiated). The lead entity qualifier concerned whether WDFW or another partner was the appropriate lead for an action, or whether there was a co-lead role.

3.2.2 Discussion

Looking at these data collectively is a way to surface possible trends and opportunities to increase the effectiveness of our investments. For example, habitat loss and degradation as well as a lack of baseline and monitoring data were most frequently cited as the primary stressors or needs for SGCN species. Further evaluation could include assessing the adequacy of the resources dedicated towards these needs, and explore other opportunities to address these needs. For fishes, dams/barriers and overharvesting are the most frequently cited stressors, and climate change appears as a prominent threat for both fish and invertebrates as compared with the other taxa. Further evaluation of the focus of our conservation investments relative to needs may help identify ways to increase effectiveness.

The biologists preparing this information were asked if the lead for a given action was primarily WDFW, primarily an external partner, or shared by both. It is interesting to note that the vast majority ranked both WDFW and conservation partners as shared lead, emphasizing the importance of investing in partnerships in achieving our conservation outcomes. Finally, biologists were also asked to assess the adequacy of our collective (WDFW or partners) investment for each threat and corresponding action. In many instances, the adequacy was determined to be insufficient, meaning the need to secure resources and funding continues to be one of the most important overarching actions we can take.

Please see the figures below for a graphical representation of some of these data.

Figure 3-2: SGCN Threats, by taxa

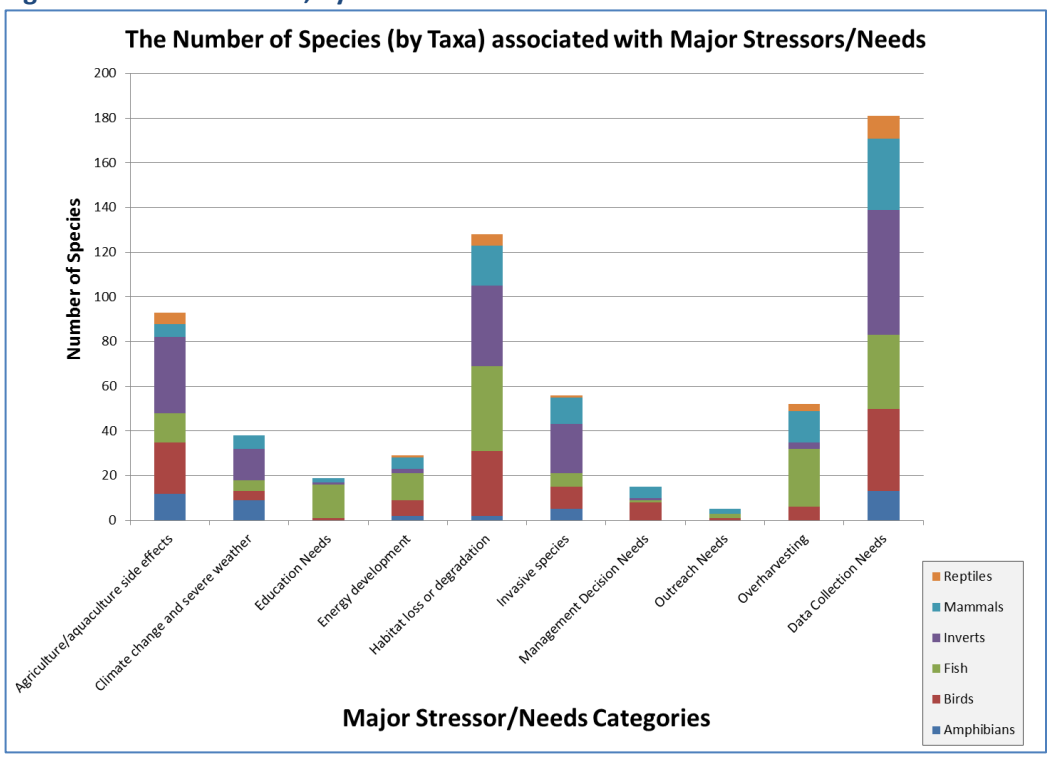


Figure 3-3: SGCN Needed Actions by Taxa

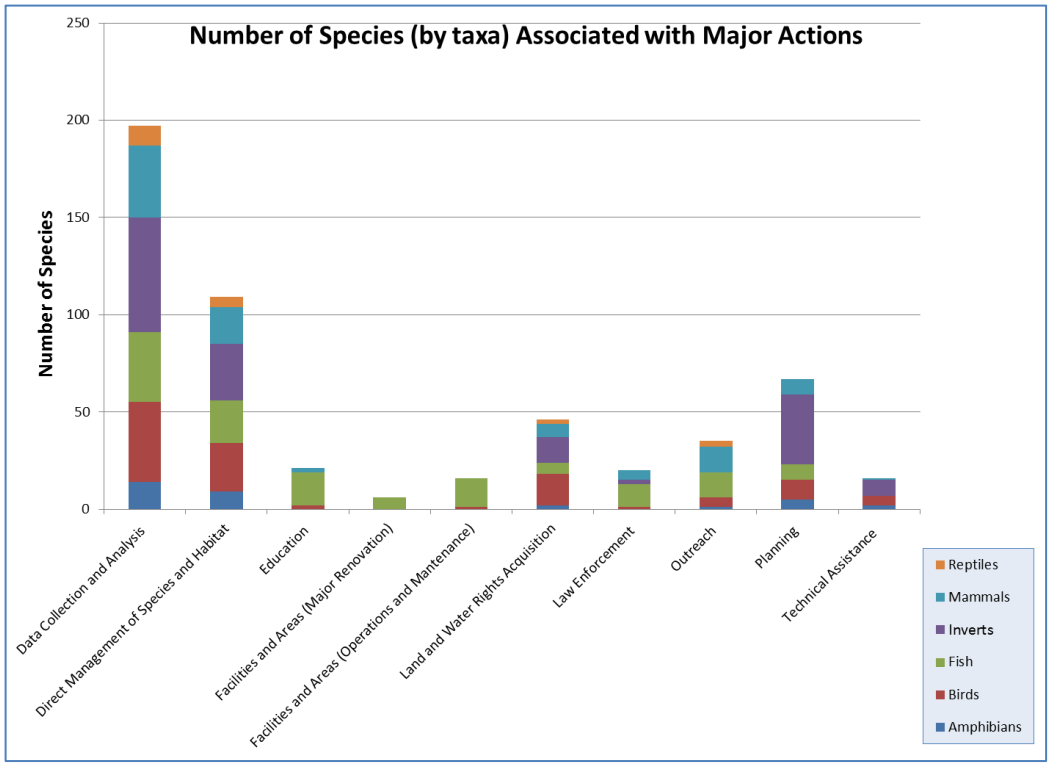


Figure 3-4: SGCN Adequacy of Investment

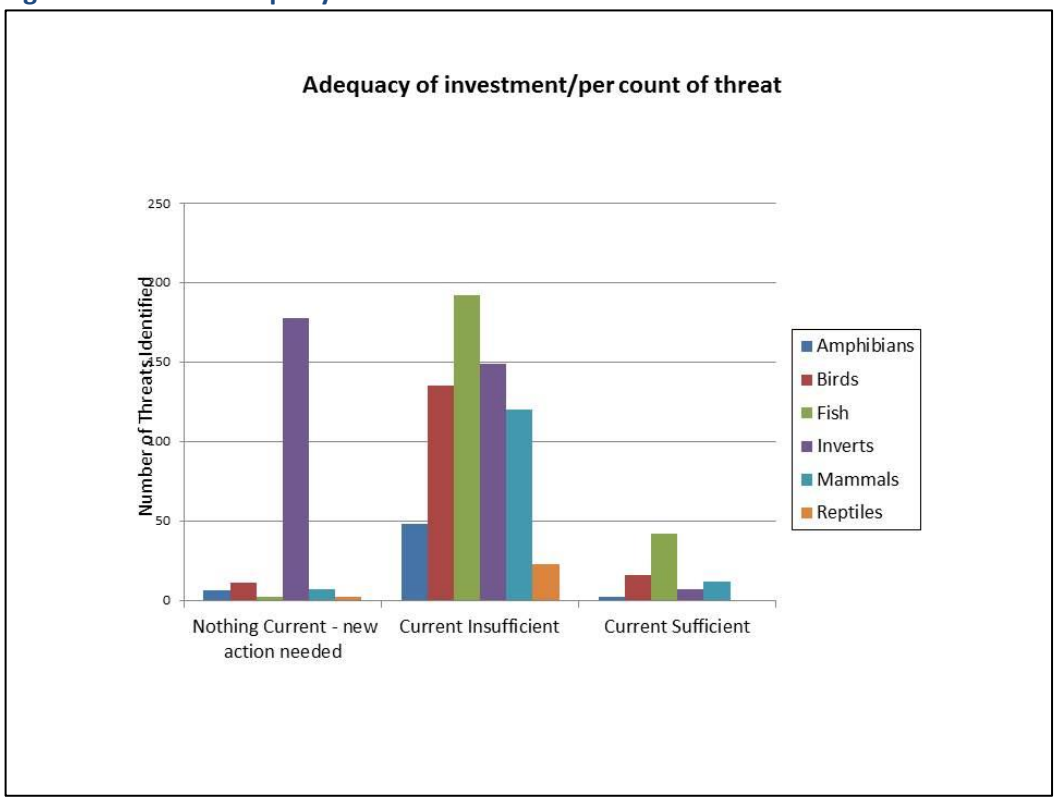
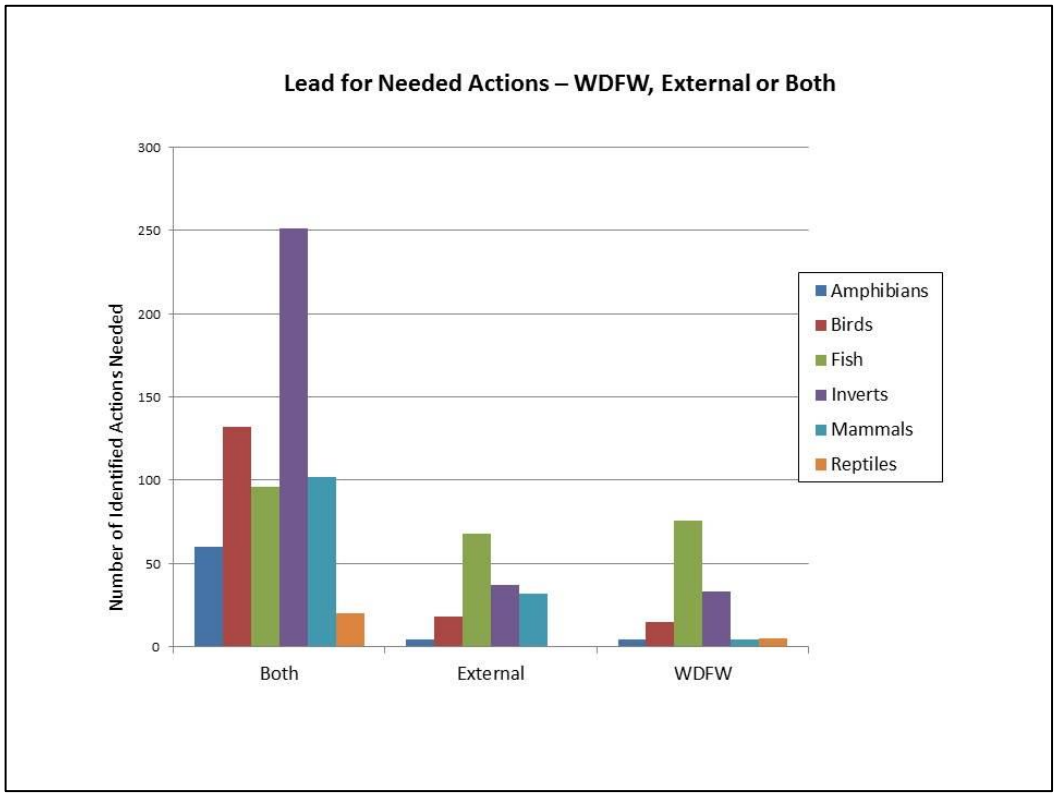


Figure 3-5: SGCN Lead Entity for Actions



3.3 Reference Information

Explanation of Terms Used in Conservation Status Tables

Federal Status
Refers to legal designations under the Federal ESA (listed as Endangered or Threatened or recognized as a Candidate species for listing), or designated as a Sensitive species.

State Status
The Washington Fish and Wildlife Commission has classified 46 species as Endangered, Threatened or Sensitive, under WAC 232-12-014 and WAC 232-12-011. Species can also be designated Candidate Species for state listing by WDFW policy.

PHS (Priority Habitats and Species Program)
A species listed under the PHS program is considered to be a priority for conservation and management and requires protective measures for survival due to population status, sensitivity to habitat alteration and/or tribal, recreational or commercial importance. Management recommendations have been developed for PHS species and habitats, and can assist landowners, managers and others in conducting land use activities in a manner that incorporates the needs of fish and wildlife.

Climate Vulnerability
The vulnerability assessment method used in this process was comprised of evaluating sensitivity and exposure for each species or habitat, assessing confidence for each sensitivity and exposure evaluation, and scoring overall vulnerability and confidence for a species or habitat. Each evaluation of sensitivity includes assigned rankings as well as short summaries describing key information from the scientific literature (see Appendix C). The aim of the summaries that accompany rankings is to make transparent the rationales and assumptions underlying the rankings and confidences assigned. Each evaluation of exposure includes assigned rankings as well as a bulleted list of the key climate exposure factors for a given species or habitat. This list of exposure factors, along with the spatial location of a resource, was used to guide the literature review for future climate projections in order to assign rankings.

Based on the literature review, one of five rankings (High-5, Moderate-High-4, Moderate-3, Low-Moderate-2, or Low-1) was assigned each to sensitivity and exposure for a given species or habitat. Assigned rankings for sensitivity and exposure were then averaged (mean) to generate an overall vulnerability score for that particular species or habitat:

$$\textbf{Vulnerability} = \frac{\textbf{Climate Exposure + Sensitivity}}{\textbf{2}}$$

Sensitivity and exposure evaluations were also assigned one of three confidence rankings (High-3, Moderate-2, or Low-1); confidence reflects the sureness assessors had in a given sensitivity or exposure ranking. These approximate confidence levels were based on Manomet Center for Conservation Sciences (2012), which collapsed the 5-category scale developed by Moss and Schneider (2000) for the IPCC Third Assessment Report into a 3-category scale to avoid implying a greater level of certainty precision. Confidence rankings for sensitivity and exposure were also averaged (mean) to generate an overall confidence score.

For more on the methodology, please see Chapter 5 – Climate Change.

Rankings

Global (G) and State (S) Rankings: Refers to NatureServe status rankings provided by the Natural Heritage Program. These conservation status ranks complement legal status designations and are based on a one to five scale, ranging from critically imperiled (1) to demonstrably secure (5). The global (G) and state (S) geographic scales were used for the SGCN species fact sheets. For more on the methodology used for these assessments, please see: Methodology for Assigning Ranks - NatureServe.

State Rank: characterizes the relative rarity or endangerment within the state of Washington.
S1 = Critically imperiled
S2 = Imperiled
S3 = Rare or uncommon in the state – vulnerable
S4 = Widespread, abundant, and apparently secure i
S5 = Demonstrably widespread, abundant, and secure in the State
SA = Accidental in the state.
SE = An exotic species that has become established in the state.
SH = Historical occurrences only are known, perhaps not verified in the past 20 years, but the taxon is suspected to still exist in the state.
SNR = Not yet ranked. Sufficient time and effort have not yet been devoted to ranking of this taxon.
SP = Potential for occurrence of the taxon in the state but no occurrences have been documented.
SR = Reported in the state but without persuasive documentation which would provide a basis for either accepting or rejecting the report (e.g., misidentified specimen).
SRF = Reported falsely in the state but the error persists in the literature.
SU= Unrankable. Possibly in peril in the state, but status is uncertain. More information is need.
SX = Believed to be extirpated from the state with little likelihood that it will be rediscovered.
SZ = Not of conservation concern in the state.

Qualifiers are sometimes used in conjunction with the State Ranks described above:
B - Rank of the breeding population in the state.
N - Rank of the non-breeding population in the state.

Global Rank: characterizes the relative rarity or endangerment of the element world-wide.
G1 = Critically imperiled globally
G2 = Imperiled globally
G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range - vulnerable
G4 = Widespread, abundant, and apparently secure globally
G5 = Demonstrably widespread, abundant, and secure globally, though it may be quite rare in parts of its range
GH = Historical occurrences only are known, perhaps not verified in the past 20 years, but the taxon is suspected to still exist somewhere in its former range.
GNR = Not yet ranked. Sufficient time and effort have not yet been devoted to ranking of this taxon.
GU = Unrankable. Possibly in peril range-wide but status uncertain. More information is needed.
GX = Believed to be extinct and there is little likelihood that it will be rediscovered.

Qualifiers are used in conjunction with the Global Ranks described above:
Tn Where n is a number or letter similar to those for Gn ranks, above, but indicating subspecies or variety rank. For example, G3TH indicates a species that is ranked G3 with this subspecies ranked as historic.