IV. SPECIES OF GREATEST CONSERVATION NEED

Washington's Species of Greatest Conservation Need (SGCN) list is the driving force behind Washington's CWCS. It builds on current efforts to protect fish and wildlife species, including those listed on state and federal endangered, threatened and sensitive species lists, as well as species not yet listed but for which conservation actions or additional information is needed.

Construction of the SGCN list began by ranking a source list of almost 700 fish and wildlife species derived from previously evaluated lists, including the Property Habitats and Species (PHS) list, and ended with an initial statewide SGCN list of approximately 200 species. The full list of 600 fish and wildlife species, including the SGCN, is shown as Appendix 1. A separate Appendix 2 lists the anadromous salmonids included on the full SGCN list. The salmonids were ranked by genetically distinct unit (GDU) rather than by species. The criteria used to evaluate over 700 fish and wildlife species is included as Appendix 3.

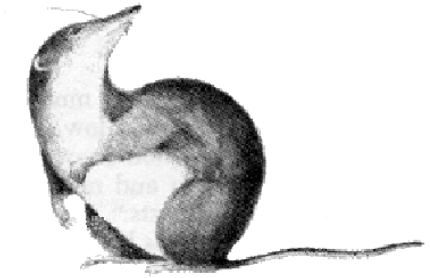
In Appendices 1 and 2, the Species of Greatest Conservation Need are those wildlife species listed above the heavy blue line. In appendix 1, the blue line is on page 623.

On the following pages of this chapter, we have included a large table with current information on population, distribution, problems, strategies and actions for all 200 Species of Greatest Conservation Need. Appendices 9 and 10 provide additional information on SGCN. A regional subset of SGCN and Associated Priority Habitats is also provided within each of the ecoregional chapters in Chapter VI.

Many of the wildlife species on this SGCN list ranked high because of biological concerns such as threat and vulnerability. Some were targeted for the list because it was determined that their recovery or conservation efforts were not adequately funded. Others were included because their life histories and habitat relationships are not well understood and need more research, surveys and/or management dollars directed to them. Only native animal species were considered in developing this list; however, no major groups of wildlife (taxa) were excluded from consideration. Game and commercially harvested species were included if they met other ranking criteria such as inclusion on WDFW's PHS list or the list of global or state ranked species of concern developed by the Washington Natural Heritage Program. Guidelines for the Natural Heritage Program can be accessed at: http://www.natureserve.org/explorer/aboutd.htm or http://www.dnr.wa.gov/nhp.

The process and criteria for developing the SGCN list and Associated Habitats of Conservation Concern list is provided in Volume Two: Approach and Methods.

MAMMALS

Preble's shrew *Sorex preblei*	**Biology and Life History**	**Population**	**Distribution**
 from Ingles 1965	Forest floor insectivore	Species status in Washington is unknown	Only recorded from limited area of the Blue Mountains in Garfield County in habitat atypical for species
Monitoring Activities ➔	No formal surveys/protocol; information gained from research projects and scientific collection permits, and museum specimen collections.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited distribution	small, isolated population vulnerable to extinction	Determine status	Conduct trapping surveys at historical sites

Merriam's shrew *Sorex merriami*	**Biology and Life History**	**Population**	**Distribution**
 from Ingles 1965	Steppe insectivore	Low, unknown	Found in the Columbia Basin and Blue Mountains.
Monitoring Activities ➔	No formal surveys/protocol; information gained from research projects and scientific collection permits, and museum specimen collections.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Loss, degradation and fragmentation due to agriculture, grazing, pesticides and altered fire regimes	Conserve suitable habitat	Conserve and protect habitat through landowner cooperation, land acquisition, and management of land use practices. Survey for potential sites.
Lack of information	Few surveys of shrews associated with arid habitats have been conducted.	Determine status	Conduct surveys to determine abundance and status and habitat requirements. Research and monitor life history and limiting factors.

Keen's myotis *Myotis keeni*	**Biology and Life History**	**Population**	**Distribution**
 Bat Conservation International	Coastal forest insectivore, roosts in tree cavities, rock crevices and small caves.	Unknown	Olympic Peninsula and along shore of northern Puget Sound
Monitoring Activities ➔	USDA Forest Service-initiated survey on multiple long-eared bat species on the Olympic Peninsula will collect opportunistic data on this species' distribution. Limited information has been gained from research projects, scientific collection permits, and museum specimen collections.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Little is known about behavior and population status.	Assess life history and behavior, limiting factors and habitat requirements.	Conduct research and surveys to determine abundance, status and habitat requirements. Research and monitor life history and limiting factors.
Limited distribution	One of the smallest distributional ranges of any North American bat.	Determine status.	Conduct coordinated surveys throughout known range to determine population and distribution.
Habitat loss	Loss and fragmentation due to logging and human disturbance	Conserve and protect existing habitat.	Conserve and protect existing habitat, identify suitable habitat.

Pallid Townsend's big-eared bat *Corynorhinus townsendii pallascens*	**Biology and Life History**	**Population**	**Distribution**
 Arizona Department of Game & Fish	Sagebrush steppe, grasslands, riparian. Roosts in caves and tunnels.	Low, unknown	Low to mid-elevation areas throughout Washington east of the Cascades.
Monitoring Activities ➔	Periodic surveys conducted of known colonies statewide by multiple partners. Implement standard survey protocols developed by the Western Bat working Group to determine distribution and abundance.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Disturbance	Reclamation of abandoned mines, vandalism and disturbance of critical maternity roosts and hibernacula	Conserve and protect roosting habitat, particularly identified maternity roosts.	Identify roosting sites and limit access to these areas. Protect and conserve preferred roost and hibernacula sites.
Habitat loss	Possible degradation of habitat through conversion to agriculture.	Determine suitability of agricultural land as habitat.	Conduct distribution and abundance surveys in agricultural areas.

Pacific Townsend's big-eared bat *Corynorhinus townsendii townsendii*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Low-elevation deciduous and conifer forests, riparian. Roosts in caves and tunnels; tree cavities at night.	Low, unknown	Low to mid-elevation areas throughout Washington west of the Cascades.
Monitoring Activities ➔	Periodic surveys conducted of known colonies statewide by multiple partners. Implement standard survey protocols developed by the Western Bat working Group to determine distribution and abundance.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Disturbance	Reclamation of abandoned mines, vandalism and disturbance of maternity roosts and hibernacula	Conserve and protect roosting habitat, particularly identified maternity roosts.	Identify roosting sites and limit access to these areas. Protect and conserve preferred roost and hibernacula sites.
Habitat loss	Possible degradation of habitat through conversion to agriculture.	Determine suitability of agricultural land as habitat.	Conduct distribution and abundance surveys in agricultural areas.

White-tailed jackrabbit *Lepus townsendii*	**Biology and Life History**	**Population**	**Distribution**
 S. McDonald, Cal Photos	Herbivore inhabiting open shrub-steppe	declining	Limited to Columbia Plateau and Okanogan ecoregions in WA
Monitoring Activities ➔	Survey protocol may be developed by University of Washington genetics research project partially funded by the Washington Falconers Association in coordination with Washington Falconers Association.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited Habitat, Habitat loss	Conversion of shrub steppe to cropland; overgrazing	Conserve suitable habitat	Conserve suitable habitat
Disease; Limited distribution	disease may be responsible for recent decline	Test and monitor for disease, Population monitoring and research,	assess need of reintroductions
Lack of information	jackrabbits have undergone mysterious declines	determine status	Determine and map distribution; investigate cause of declines

Black-tailed jackrabbit *Lepus californicus*	**Biology and Life History**	**Population**	**Distribution**
 Alison M. Sheehey, Cal Photos	Herbivore inhabiting shrub steppe	declining	Limited to Columbia Plateau in WA
Monitoring Activities ➔	Survey protocol may be developed by University of Washington genetics research project partially funded by the Washington Falconers Association in coordination with Washington Falconers Association.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	jackrabbits have undergone mysterious declines	Determine status	Determine and map distribution; investigate cause of declines
Habitat Loss	Conversion of shrub steppe to agriculture	Conserve suitable habitat,	Management agreements,
Disease; Limited distribution	disease may be responsible for recent decline	Test and monitor for disease, Population monitoring and research,	Assess need of reintroductions

Pygmy rabbit *Brachylagus idahoensis*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Herbivore inhabiting sagebrush habitat with deep soils	critically low population; remaining individuals captured for captive breeding recovery project.	Was limited to small area in Douglas Co., before being placed in captivity. No known individuals occurring in the wild.
Monitoring Activities ➔	Intensive surveys conducted WDFW and Washington State University for occurrence of remnant populations; will resume set protocol annual surveys once captive animals are returned to the wild.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Severe population decline	Small population size	Increase distribution	Reintroduce sufficient numbers through captive breeding
Loss of deep soil sagebrush habitat	Loss of genetic diversity	Restore degraded habitats	Increase amount and connectivity of suitable habitat

Olympic marmot *Marmota olympus*	**Biology and Life History**	**Population**	**Distribution**
 Sunny Walter, WWW Photography	*Marmota olympus*	Herbivore inhabiting alpine parklands with rock slide, boulder piles, herbaceous vegetation, and few to no trees	Exists largely in protected areas of Olympic National park and National forest
Monitoring Activities ➔	Surveys conducted annually by Olympic National Park, U.S. Geological Survey Biological Resources Division, and universities as part of long-term ongoing research projects.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Disturbance	Human disturbance and potentially increased rate of predation caused by visitors feeding coyotes at visitor areas near marmot colonies	Education and enforcement	Control and monitor human disturbance; enforce park rules regarding interactions with wildlife.
Limited habitat and distribution	demographic and genetic effects of small population size and metapopulation structure.	Determine Status; Monitor and research populations and habitat.	Develop survey protocols in cooperation with other agencies.

Townsend's ground squirrel ssp. *Spermophilus townsendii townsendii*	**Biology and Life History**	**Population**	**Distribution**
 Herbert Clarke, Burke Museum, U of WA	Shrub-steppe species, found in small to large colonies, hibernates up to 8 mo./year	Believed to be declining; extirpation of some historical populations	Endemic to south-central Washington
Monitoring Activities ➔	Ongoing research/surveys to detect colony occurrence and numbers, survey protocol to be developed. Current survey activity ongoing by WDFW, U.S. Army, universities.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Data on population and habitat trend lacking, but suspect both are declining	Determine status; test and monitor for disease	Undertake field surveys for presence and abundance
Harvest	target shooting (plinking)	Education and outreach;	Add to list of protected wildlife
Development; Habitat loss	urban and rural sprawl, conversion and degradation of sagebrush habitats	Monitoring and research on habitat	Gather basic information on habitat use/selection, habitat condition.

Townsend's ground squirrel ssp. *Spermophilus townsendii nancyae*	**Biology and Life History**	**Population**	**Distribution**
SEE ABOVE PHOTO	Shrub-steppe species, found in small to large colonies, hibernates up to 8 mo./year	Size unknown but probably declining.	Endemic to south-central Washington
Monitoring Activities ➔	Ongoing research/surveys to detect colony occurrence and numbers, survey protocol to be developed. Current survey activity ongoing by WDFW, U.S. Army, universities.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Data on population and habitat trend lacking, but suspect both are declining	Determine status, test and monitor for disease	Undertake field surveys for presence and abundance
Harvest	target shooting (plinking)	Education and outreach;	Add to list of protected wildlife
Development; Habitat loss	urban and rural sprawl, conversion and degradation of sagebrush habitats	Monitoring and research on habitat	Gather basic information on habitat use/selection, habitat condition.

Washington ground squirrel *Spermophilus washingtoni*	**Biology and Life History**	**Population**	**Distribution**
 U.S. Fish & Wildlife Service	Shrub-steppe species, found in small to large colonies, hibernates up to 8 mo./year	Size unknown but declining.	Endemic to southeastern Washington and north-central Oregon.

Monitoring Activities ➔	Ongoing research/surveys to detect colony occurrence and numbers, survey protocol to be developed. Current survey and research activity ongoing by WDFW, universities and U.S. Fish & Wildlife.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Conversion to agriculture and development, and fragmentation of habitat may isolate remaining populations	Monitoring and research of habitat	Use land acquisitions, conservation easements, and landowner agreements to protect significant colonies, and increase habitat connectivity. Buy vacuum truck for relocations.
Invasive plant species	Cheatgrass invasion and fires	Restore degraded habitats	Manage degraded habitat at colonies.
Harvest; illegal target shooting (plinking)	Illegal target shooting continues despite legal protection	Education and outreach; Control and monitor disturbance; enforce existing protective regulations	Efforts are needed to reduce the amount of illegal shooting.
Lack of information	Causes of recent declines uncertain; range not well known.	Determine Status; Research into causes of recent declines, test and monitor for disease	Conduct research on current status and causes of decline, continue surveys for range.

Western gray squirrel *Sciurus griseus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Habitat specialist tree squirrel, strongly associated with oak/ponderosa pine or oak/Douglas fir forests	Historical declines; occurs in 3 isolated subpopulations;	Limited to 3 subpopulations: Klickitat County, southern Okanogan-eastern Chelan Cos., and Fort Lewis in Pierce County.
Monitoring Activities ➔	Intensive surveys conducted by WDFW through research projects in Klickitat and Okanogan Counties and Fort Lewis in Thurston County. Survey and monitoring partners have included WDFW, The Nature Conservancy, University of Washington, and timber industry. Need future survey protocols for long-term management.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Timber harvest, fire, residential development	Conserve suitable habitat, Habitat and population monitoring and research	Protect areas with concentrations of squirrel nests from timber harvest; provide protective buffers around trees with nests; develop critical habitat rule; work with counties to conserve habitat
Invasive animals	Competition from non-native eastern gray and fox squirrels	Monitor and control invasive animal	Conduct limited control of eastern gray and fox squirrels

Limited distribution	At risk from loss of genetic diversity, disease and demographic factors	Increase distribution	Monitoring and research of population and habitat; assess feasibility of population augmentations, and implement where feasible

Brush Prairie pocket gopher *Thomomys talpoides douglasi*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Fossorial herbivore; occurs in open areas with low herbaceous vegetation.	Isolated subspecies of the northern pocket gopher; trend unknown	Limited in distribution to south-central Clark County.
Monitoring Activities ➔	No routine surveys, occurrence information from museum collections, historic research and survey projects, and scientific collection permit information.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Development	loss and fragmentation of habitat	Conserve suitable habitat	Protection of prairies, meadows, grasslands; grassland restoration through voluntary and legal means
Harvest and persecution	trapping by landowners and mortality by pets	Outreach and education;	Inform local residents of gopher colonies, prohibit trapping; promote non-lethal methods of damage control
Limited distribution	genetic and demographic effects of small population size, catastrophic events	Population monitoring and research	Determine status and conduct surveys to monitor presence and relative abundance

Invasive plant species	Degradation of suitable habitat	Restore degraded habitats	Remove invasive trees, scotch broom from prairie/grassland areas.

Mazama pocket gopher *Thomomys mazama*	**Biology and Life History**	**Population**	**Distribution**
 Burke Museum, University of Washington	Fossorial herbivore; occurs in prairies, grasslands and alpine meadows; require herbs and loose, dry soil for burrowing.	Declining; several populations extinct	Occurs in the southern Puget Sound area the alpine meadows in northern Olympic Mountains.
Monitoring Activities ➔	No routine surveys, periodic spot surveys by WDFW, limited historic by University of Puget Sound, University of Washington as part of research projects, recent local surveys by The Evergreen State College. Occurrence information from museum specimen collections, research projects, and scientific collection permits.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Development	loss and fragmentation of habitat	Conserve suitable habitat	Protection of prairies; prairie/grassland restoration through voluntary and legal means
Harvest and persecution	trapping by landowners and mortality by pets	Outreach and education; enforcement of existing laws	Inform local residents of gopher colonies, prohibit trapping; promote non-lethal methods of damage control

Limited distribution	genetic and demographic effects of small population size, catastrophic events	Population monitoring and research	Determine status and conduct surveys to monitor presence and relative abundance
Invasive plant species	Degradation of suitable habitat	Restore degraded habitats	Remove invasive trees, scotch broom from prairie/grassland areas.

Kincaid meadow vole *Microtus pennsylvanicus kincaidi*	**Biology and Life History**	**Population**	**Distribution**
 Michael R. Fryda, Cal Photos	Large vole	Poorly known.	Columbia Plateau, Grand Coulee area
Monitoring Activities ➔	No formal surveys. Occurrence information from museum specimen collections, research projects, and scientific collection permits.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Unknown	Determine Status;	Survey for presence in suitable habitat

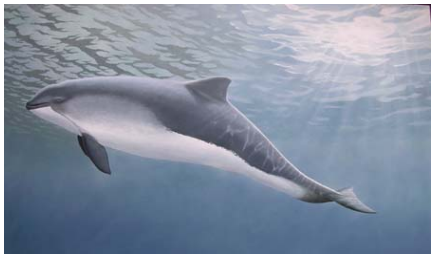
Shaw Island Townsend's vole *Microtus townsendii pugeti*	**Biology and Life History**	**Population**	**Distribution**
 Burke Museum, U of Washington	Shaw Island vole is smaller than other forms of Townsend's which is a larger, longer-furred vole; found in open meadow and marsh areas; feeds on succulents and herbaceous vegetation.	Poorly known	Neck Point on Shaw Island, San Juan County
Monitoring Activities ➔	No formal surveys. Occurrence information from museum specimen collections, research projects, and scientific collection permits.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	isolated, small population size; genetic and demographic effects of small, isolated populations	Determine Status	Survey for presence in potentially suitable habitat

Gray-tailed vole *Microtus canicaudus*	**Biology and Life History**	**Population**	**Distribution**
 Oregon State University	Medium sized vole, limited distribution, occurs in hayfields, pastures, fallow grassy areas, and grain fields.	Common in limited area	Limited in distribution to the Willamette Valley of Oregon and Clark County, WA.

Monitoring Activities ➔	No formal surveys. Occurrence information from museum specimen collections, research projects, and scientific collection permits.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Unknown status; lack of survey effort.	Determine status; population monitoring and research	Small mammals surveys to detect presence and define small mammal community composition in range of the gray-tailed vole.
Development	Loss and fragmentation	Conserve habitat	Protect and restore habitat through voluntary and legal means
Limited habitat, habitat loss, development, and lack of information	Demographic and genetic effects of small population size and disjunct	Habitat monitoring and research	Evaluate/model habitat based on surveys of potentially suitable areas.

Killer whale *Orcinus orca*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Cetacean that feeds on salmon and other fish (residents and offshore ecotypes), or marine mammals (transients)	Southern resident population is 88 in May 2005; transients 300-400, trend unknown; offshore population is >350, trend unknown.	Marine waters throughout Washington: Pacific coast, Strait of Juan de Fuca, San Juan Islands, Haro Strait, Strait of Georgia and Puget Sound

Monitoring Activities ➔	Intensive population, productivity and behavioral surveys conducted through NOAA Fisheries, Fisheries & Oceans Canada, and NGO partners and cooperators.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lower prey abundance	Reduction in salmon abundance	Restore prey populations	Rebuild depleted populations of salmon and other prey through multiple restoration activities, including management of harvest, habitat, and hatcheries.
Environmental Contamination	Known to contain high conc. of PCBs, PBDEs	Restore degraded habitats	Control and Monitor pollution in aquatic habitat; minimize risk of oil spills.
Human disturbance	Disturbance by whale-watching vessels	Education and outreach	Minimize disturbance of whales through adherence to voluntary guidelines for whale watching.

Pacific harbor porpoise *Phocoena phocoena*	**Biology and Life History**	**Population**	**Distribution**
 Rob Van Assen, Cal Photos	Small cetacean of shallow coastal and inland marine waters (typically <200m); prey on squid, herring and hake.	About 3,500 in inland marine waters; declined in southern Puget Sound	Occur along Pacific coast, Strait of Juan de Fuca, Strait of Georgia, San Juan Islands and Puget Sound.
Monitoring Activities ➔	Biennial occurrence and population surveys conducted in conjunction with NOAA Fisheries.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**

Harvest	Gill netting, salmon trolls, hake trawls incidentally capture and kill porpoises	Monitor and Research population; Determine status	Continue efforts to reduce gill entanglement with tribal fisheries
Human disturbance	Vessel disturbance, noise and acoustic deterrent devices, and highly developed areas can displace porpoises	Monitor and Research population; Determine status	Periodic surveys conducted to assess presence and abundance
Environmental contamination	Accumulation of persistent toxins: dioxins, furans, organochlorines and heavy metals. Steady shipping traffic and associated oil spills.	Restore degraded habitats	Control and Monitor pollution in aquatic habitat; minimize risk of oil spills.

Gray wolf *Canis lupus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Wide ranging social carnivore, habitat generalist, relies on ungulate populations for prey, avoids humans and development.	Believed extirpated as a breeder, but occasional transients occur; may become re-established by expanding from Idaho	Limited to remote areas of North Cascades and Selkirks.
Monitoring Activities ➔	No formal surveys. Informal howling surveys done by NGOs and volunteers. Occurrence data collected in conjunction with U.S. Fish & Wildlife, USDA Forest Service, NGOs and other cooperators. Protocols being developed.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**

Human disturbance	Persecution through being shot or shot at, or being poisoned	Control and monitor disturbance	Enforce existing protection; outreach and education
Reduced prey resources	Reduction in important ungulate winter range	Conserve suitable habitat; habitat monitoring and research	Develop conservation protection (acquisitions, easements, agreements) for important ungulate winter range.
Habitat loss	Large highway corridors and development (including HWYs 20, 2, 12, and I-90) fragment suitable habitat and create barriers or impediments to movement	Restore degraded habitat	develop highway overpasses/underpasses to facilitate access to suitable habitats in central and southern Cascades. Promote forest management that improves habitat connectivity and facilitates dispersal of wolves from BC.
Limited distribution	Habitat fragmentation, and loss of important ungulate winter range.	Education and outreach	Conservation target species for ecoregional assessments which identify important areas for conservation

Grizzly bear *Ursus arctos*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Wide ranging carnivore, avoids humans and development, low reproductive capacity.	Population is small, 0-20 bears, and is likely the periphery or periodic expansion of the BC population.	Largely restricted to remote areas of the North Cascades and Selkirks as these areas support the best habitat.

Monitoring Activities ➔	No structured ongoing surveys. Occurrence data collected in conjunction with U.S. Fish & Wildlife, USDA Forest Service, NGOs and other cooperators. Prior WDFW and university research projects conducted surveys in conjunction with trapping attempts, and follow-up verification of observations, tracks and hair. Protocols being developed.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited distribution	Demographic and genetic effects of small population size	Enforce protected status	Population monitoring; Request reports of incidental observations.
Habitat loss	Large highway corridors and development (including HWYs 20, 2, 12, and I-90) fragment habitat and create barriers or impediments to movement	Restore degraded habitat	Develop highway overpasses/underpasses to facilitate access to suitable habitats. Promote forest management that improves habitat connectivity and facilitates dispersal of bears from BC.
Human disturbance	Back-country recreation (e.g., hiking, biking, motorized vehicles can disturb or displace grizzlies.	Control and monitor disturbance	Limit or restrict disturbance/access to important areas for grizzlies.

Steller's sea lion *Eumetopias jubatus*	**Biology and Life History**	**Population**	**Distribution**
 Gerald & Buff Corsi, Cal Photos	Large pinniped, feeds on a variety of fish, occurs in coastal and inland marine waters; does not breed in WA.	Rangewide declines	Coastal and inland marine waters of WA. Distribution is focused at <10 haul outs along the coast.

Monitoring Activities ➔	Set protocol for annual surveys of haul-out sites.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited habitat	Vulnerable because of limited number of haul outs used/available	Monitoring and research population	Tracking movements and foraging ecology of tagged sea lions
Reduced prey resources; competition for prey resources with fisheries	Commercial fisheries may reduce important prey species	Monitoring and research of prey base	Tracking movements and foraging ecology of tagged sea lions
Incidental mortality through commercial fisheries	entanglement in gill nets and other fishery gear	Monitoring and research population	assess impact of incidental mortality
Oil spills	Limited distribution makes oil spills particularly significant	Prevention and preparation for oil spills	maintain oil spill response capabilities

Marten (coastal population) *Martes americana*	**Biology and Life History**	**Population**	**Distribution**
 L.L.C. Jones	Small to mid-sized terrestrial/arboreal carnivore, associated with older conifer forests, prey generalist, occupied lower elevation forests than Cascades populations	Possibly extirpated from the Olympic Peninsula and southwest Washington. No verifiable detections since 1991.	Historically, the distribution included the Olympic Peninsula and southwest Washington. May now be extirpated.

Monitoring Activities ➔	Population and occurrence inferred through harvest management reports and standardized camera-set surveys. Occurrence information from museum specimen collections, research projects and scientific collection permit information.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited distribution	Demographic and genetic effects of small population size	Determine Status	Determine and map distribution of any remaining population
Lack of information and lack of protected status.	Possible extirpation	Increase distribution	Consider future reintroduction

Fisher *Martes pennanti*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Wide ranging, mid-sized forest carnivore, associated with older coniferous forest, prey generalist.	Extirpated	Historically found in forested areas of Western WA, northeastern WA, and the Blue Mountains. Now extirpated. However, in 1996, there were two sightings at Lake Quinault within one week.
Monitoring Activities ➔	Intensive camera and track plate surveys conducted in the past determined no viable population exists in the state. Survey protocols being developed to monitor fishers post-reintroduction. Occurrence information from museum specimen collections, trapping reports and incidental observations.		

General Problems	Specific Problems	Conservation Strategies	Specific Conservation Actions
Limited distribution	Historical commercial trapping,	Increase distribution; Population monitoring and research	Reintroduce fishers; Monitoring release animals to evaluate reintroduction success and to determine feasibility of additional reintroductions within the historical range
Habitat loss	Loss and fragmentation of late-successional coniferous forests	Habitat monitoring and research	Evaluate habitat use and selection for reintroduced fishers at multiple scales.
Lack of information	No state-specific information on habitat associations, demography, or food habits	Population monitoring and research	Conduct research on habitat use, demography, and food habits, and methods of habitat protection.

Wolverine *Gulo gulo*	Biology and Life History	Population	Distribution
 Washington Dept. of Fish & Wildlife	Wide ranging mid-sized carnivore, avoids humans and developed areas, occurs in remote habitats, prey generalist, very large area requirement in relation to body size, low reproduction capacity.	Small, probably <25. Approximately 5 verifiable detections in WA since 1990.	Limited in distribution to high-elevation, remote areas of North Cascades and northeastern WA. Central Cascades may support individuals as suggested by verifiable wolverine detections in that area since 1990.

Monitoring Activities ➔	Population and occurrence surveys conducted intermittently by WDFW with additional funding from U.S. Fish & Wildlife and USDA Forest Service. Surveys have been conducted using camera sets and aerial post denning track surveys. Occurrence information from museum specimen collections and observations.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited Distribution	Effects of small population size; dependence on recruitment of dispersers from BC	Population monitoring and research; determine status; Conserve suitable habitat	protect habitat from recreational development
Habitat loss	Large highways and associated corridors (including HWYs 20, 2, 12, and I-90) fragment habitat and create barriers or impediments to movement	Restore degraded habitat	improve highway overpasses/underpasses to promote effective movement across highway corridors to facilitate access to suitable habitats in central and southern Cascades.
Human disturbance	Backcountry skiers, heli-skiers, snowmobiles, motorized vehicles can disturb or displace wolverines.	Control and monitor disturbance	Limit access to roadless, wilderness and primitive areas; prevent disturbance of known denning areas for wolverines.

American Badger *Taxidea taxus*	**Biology and Life History**	**Population**	**Distribution**
 Sunny Walter, WWW Photography	Fossorial carnivore; predator of other fossorial mammals, especially ground squirrels; large area requirements; inhabits shrub-steppe and other open habitats.	Very few reported caught by trappers since 1995. Apparently declining.	Historical distribution likely included most of eastern Washington from eastern Cascade foothills to Idaho. Current distribution unknown, but is limited to portions of eastern Washington.
Monitoring Activities ➔	Current occurrence data from WDFW research project in shrub-steppe, occurrence and relative abundance data from trapper harvest reports. Occurrence information from museum collection specimen records, observations and incidental information from research projects.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Lack information on distribution, abundance, Problems, and habitat associations.	Determine status; Population monitoring and research	Study recently initiated to investigate ecology of badgers by Spokane BLM. Need to conduct badger surveys in large landscapes capable of supporting badger populations

Habitat loss	The badger's association with shrub steppe and other more open habitats places at risk to habitat loss and fragmentation via agriculture and development.	Habitat monitoring and research.	Conduct research/modeling of habitat using findings of habitat associations from the BLM study and badger surveys.

Sea otter *Enhydra lutris*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Near shore marine carnivore; feed on urchins, crab, clams, and mussels; associated with rocky substrates and kelp; keystone species	Small but increasing; Population is the result of a reintroduction of 59 sea otters in 1969-1970	Limited in distribution to the marine waters from just south of Destruction Island north and east to Pillar Point in the Strait of Juan de Fuca.
Monitoring Activities ➔	Annual surveys with rigorous protocols conducted in conjunction with U.S. Fish & Wildlife.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited Distribution	Small population and limited distribution make them vulnerable to catastrophic events, disease outbreaks, and could have demographic and genetic effects.	Implement existing recovery plan	Annual surveys for populations trends

Environmental contaminants	Oil spills are the most threatening catastrophic event. Shipping commerce is an ongoing occurrence within the limited Washington range	Prevention and preparation for oil spills	Maintain oil spill response capabilities
Incidental mortality through commercial fisheries	Entanglement in gill nets results in mortality.	Population monitoring and research	Annual surveys for populations trends
Persecution/harvest	Considered competitors of fishermen for shellfish, creating fisheries management issues. Incidental mortality from gillnet fishery.	Outreach and education; cooperative management approaches	Outreach and education to reduce misperceptions of otters as competition for fishermen. Monitor mortalities from gillnet entanglement and develop strategies to reduce mortalities.

Lynx *Lynx canadensis*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Mid-sized felid. Prey specialist on snowshoe hares; physically adapted for foraging in deep snow. Strongly associated with subalpine and boreal forests.	Small population, probably <100; apparently stable. Maintenance of the WA population is likely dependent upon the demographic support from populations in BC and AB.	Eastern slope of north Cascades; Okanogan, Chelan, Ferry, Stevens and Pend Oreille Counties. Historically the species may have occurred throughout the WA Cascades.
Monitoring Activities ➔	Annual snow track surveys by WDFW in Cascades and northeastern Washington to detect occurrence. Prior years' surveys and radio telemetry by cooperative research projects of WDFW, University of Idaho, Washington State University, USDA Forest Service PNW Research Station, and NGOs.		

General Problems	Specific Problems	Conservation Strategies	Specific Conservation Actions
Limited distribution	Demographic effects of small population size; catastrophic events such as large scale fires	Population monitoring and research	Continued surveys to determine occupancy and relative abundance in recovery zones.
Habitat loss	Habitat degraded by some silvicultural practices; roads, snowmobile trails, and natural succession, grazing; roads may facilitate winter competition with coyotes	Habitat monitoring and research; Conserve suitable habitat	Provide input on timber harvest and fire mgt activities on state, private, and federal lands to perpetuate adequate amounts and distribution of denning and foraging habitats.
Limited habitat	naturally limited to high elevation boreal forest types	Conserve suitable habitat	Work with landowners to maintain sufficient foraging habitat, travel corridors and denning sites

Elk – Nooksack herd, mixed *Cervus elaphus nelsoni, roosevelti*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Large social ungulate; occurs in herds of various sizes; herds have large area requirements and have distinct summer and winter ranges.	Population is a combination of reintroduced *C. nelsoni* and possibly remnant *C. roosevelti*; herd mix is not conclusive. Smallest elk herd in Washington. Currently protected from hunting. Declined to 300 animals and has rebounded to 450 animals.	Occurs in the west slope and western foothills of the north Cascades.

Monitoring Activities ➔	Currently developing more rigorous population surveys, including population estimates, bull/cow ratios and productivity. Monitoring conducted to document thresholds required to restore a population able to sustain hunting.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited habitat	Crucial winter range is limited; overlaps with private land holdings where elk may cause damage and create management conflicts.	Permanent conservation of habitat; habitat monitoring and research.	Acquisition of important winter range on private lands. Habitat quality enhancements. Minimize elk damage on private lands through compensation, special hunts and permits, fencing and other approaches.
Limited Distribution	Effects of small population size, and proximity of elk to humans and roads.	Population monitoring and research; herd augmentation.	Habitat acquisitions and enhancements are expected to result in expanded elk distributions and increased numbers. Augmentation from the Mt. St. Helens herd has been conducted in the past and should continue as necessary.
Mortality	Illegal harvest, predation and winter mortality limit population growth and recovery.	Monitor and control mortality.	Habitat acquisitions may reduce or limit access thereby reducing illegal harvest. Increase enforcement could also limit illegal harvests. Control predator population.

Columbian white-tailed deer *Odocoileus virginianus leucurus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Pacific northwest coastal subspecies of White-tail; restricted in range; occupies mosaics of lowland marshes, woodlands and grasslands.	An estimated 600-700 animals WA population.	Limited to the Julia Butler Hansen National Wildlife Refuge in Wahkiakum and Cowlitz Counties: 5 islands in the lower Columbia River, and 2000 acres of uplands near Skamokawa in Pacific County.
Monitoring Activities ➔	Rigorous protocol population surveys conducted in conjunction with U.S. Fish and Wildlife Refuge System in lower Columbia River area.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited distribution based on historical harvest and habitat loss	Genetic and demographic effects of small population size, catastrophic events (floods) and proximity of deer to humans and roads.	Increase distribution; population monitoring and research; Test and monitor disease;	Refuge has acquired Crimms Island and population augmentation is currently in progress. Conduct predator control to reduce coyote predation of fawns.

Limited habitat	Competition with elk for food; flooding	Conserve suitable habitat; reduce competition with elk; control water levels to prevent flooding	Extensive fencing is used to exclude and reduce elk numbers on the refuge. Allow limited entry, special permit hunt for elk. Use water control structures on refuge to manage water levels in sloughs and marshes. Manage vegetation to maintain/expand a mosaic of marshes, woodlands and grasslands.

Woodland caribou *Rangifer tarandus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	mid-sized social ungulate; associated with mature forests; depend on lichens for food especially during the winter; occur in lowland cedar and hemlock forests and higher elevation spruce and subalpine fir forests.	<50 individuals; translocations have occurred with minimal success at maintaining a population.	Limited to a small portion of northeastern Pend Oreille County.
Monitoring Activities ➔	Annual herd counts conducted in conjunction with U.S. Fish and Wildlife, Idaho Fish & Game and Canada.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited Distribution	genetic and demographic effects of small population size; inability of reintroduced animals to adapt to conditions in WA.	Increase distribution	A number of reintroductions have been undertaken to increase the number and distribution with little success. Source populations for further reintroductions are now unavailable.

Limited habitat	Suitable habitat may be limited by elevation and by timber management activities	Conserve suitable habitat	Protect mature forest from harvest and important calving areas.
Vulnerability to predation	Caribou appear excessively vulnerable to predation, especially by cougars	Enhanced predator management	Increase harvest of cougars in recovery areas.

Pronghorn antelope *Antilocapra americana*	**Biology and Life History**	**Population**	**Distribution**
 Gerald & Buff Corsi, Cal Photos	Small social ungulate of open, arid areas; occurs in shrub-steppe and steppe habitats;	Pronghorns were reintroduced in the 40s, 50s and 60s. No populations are thought to remain in the state. Status as an historical resident has been questioned.	
Monitoring Activities ➔	No surveys conducted. Survey protocols to be developed if pronghorns are reintroduced.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**

Limited distribution	lack of a viable population	Increase distribution	Feasibility study is underway which may lead to a reintroduction
Limited Habitat	Amounts and configuration of suitable habitat may not support a viable population	Conduct a reintroduction feasibility study; develop a recovery/mgt plan	Feasibility study should evaluate habitat quality, quantity and distribution.

BIRDS

Common loon *Gavia immer*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Inhabits lowland lakes and reservoirs and nearshore marine waters	Rare	Breeding in north counties. Non-breeders concentrated in marine waters, but also inland freshwater bodies.
Monitoring Activities ➔	Annual productivity surveys conducted on known nesting lakes by WDFW in conjunction with USDA Forest Service Loon Lake NGO loon conservationists Daniel Poleeschook and Ginger Gum.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Development	Residential development of lakeshores	Conserve Suitable Habitat	Protection and education programs targeting suitable breeding lakes to curtail development and recreational pressure.
Habitat Loss	Loss and degradation of suitable shoreline nesting habitat	Conserve Suitable Habitat	Protection and education programs targeting suitable breeding lakes to curtail development and recreational pressure.
Human Disturbance	Recreational boating	Education and Outreach	Education programs targeting suitable breeding lakes to curtail recreational pressure.

Water Development	Water level manipulations from hydroelectric dams	Conserve Suitable Habitat	Cooperate with Hydroelectric companies to provide floating platform nest structures where water levels fluctuate dramatically.
Environmental Contamination	Lead poisoning from lead sinkers and oil spills	Control Contaminants	Advocate use of non-toxic alternatives to lead fishing sinkers in loon areas.

Western grebe *Aechmophorus occidentalis*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Inhabits lowland lakes and reservoirs and nearshore marine waters.	Common to locally abundant winter visitor in saltwater, uncommon to locally common on freshwater; locally common summer breeder and migrant.	Concentrations in protected marine waters of Puget Sound during winter. Breeds in eastern Washington, primarily in the Columbia Basin.
Monitoring Activities ➔	Intensive protocol-driven wintering population survey conducted by WDFW through Puget Sound Ambient Monitoring Program (PSAMP). Distribution, nesting and productivity surveys need to be developed for lakes.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental Contamination	Oil spills	Determine and Map Distribution	Identify winter concentration areas and incorporate into oil spill plans.
Loss of Prey Base	Prey base may be declining in marine waters.	Determine causes of wintering population declines.	Monitor prey base populations.
Harvest	Incidental harvest in gillnet fishery	Protect Significant Areas	Determine extent of mortality from gillnet fishery

Human Disturbance	Recreational boating near colonies may cause abandonment or gull predation	Control and Monitor Disturbance, Conserve Suitable Habitats	Identify wake-free zones near breeding colonies to minimize human disturbance.

American white pelican *Pelecanus erythrorhynchos*	**Biology and Life History**	**Population**	**Distribution**
 Sunny Walter, WWW Photography	Inhabits deltas and sandbars of slow-flowing rivers, and breeds on lakes and impoundments.	Locally uncommon to common visitor and migrant, very local breeder in eastern part of state. Rare visitor in western Washington.	Local breeder in Columbia Basin
Monitoring Activities ➔	Annual nesting, productivity surveys conducted in conjunction with US Fish & Wildlife. Research on distribution along the Columbia being conducted by WDFW, Oregon State University, Bonneville Power Administration, and Yakama Indian Nation. WDFW conducts surveys on selected lakes. Sprague Lake currently being monitored for nesting evidence.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Water draw-down for irrigation, hydroelectricity	Conserve Suitable Habitat	Work with stakeholders on amount and timing of water level manipulations
Human Disturbance	Human proximity and entry into breeding colonies	Control and Monitor Disturbance	Post no disturbance signs around colonies and establish colony stewardship program where needed
Harvest	Shooting because of perceived salmon predation	Population Monitoring & Research, Education and Outreach	Inter-governmental agreements

Environmental Contamination	Pesticides and mercury	Monitor Contaminants	Reproductive success not currently impaired, but warrants periodic monitoring

Great blue heron *Ardea herodias*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Forages in low elevation wetlands and nests in nearby woodlots	Common resident statewide, especially in Puget Sound and lower Columbia R. Uncommon to rare in mountains and in arid uplands of eastern Washington	Breeding birds concentrated near shorelines of Puget Sound in western Washington, and along Yakima R. and Columbia R. in eastern part of state.
Monitoring Activities ➔	Periodic surveys of adults at breeding colonies. Currently developing standard survey protocol with provincial and federal wildlife agencies in Canada.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Development	Construction of buildings, subdivisions, roads and other structures near breeding colonies	Conserve Suitable Habitat, Permanent Conservation of Habitat, Education and Outreach	Protect land around large colonies through fee title or conservation easement. Inform public on minimizing disturbance during breeding period
Habitat Loss	Continued clearing of woodlands adjacent to high value foraging areas reduces heron populations	Conserve Suitable Habitat, Determine and Map Distribution, Habitat Monitoring, Permanent Conservation of Habitat	Protect land around large colonies through fee title or conservation easement. Inform public on minimizing disturbance during breeding period

Lack of Information	Forms vulnerable aggregations during breeding period	Research and Conservation	Develop standard survey protocol to monitor populations statewide
Human Disturbance	Human proximity and entry into breeding colonies	Education and Outreach	Inform public on minimizing disturbance during breeding period

Trumpeter swan *Cygnus buccinator*	**Biology and Life History**	**Population**	**Distribution**
 Dr. Lloyd Glenn Ingles, Cal Photo	Winters in protected marine waters of northern Puget Sound and adjacent agricultural lands. Delayed maturation and low reproductive rate.	Historic decline and rebound; Up to 3,000 winter; large segment of Alaska breeding population winters around north Puget Sound; attempts to establish breeding population unsuccessful	winters around northern Puget Sound, Hood Canal, and southwestern Washington river valleys; summer at I or more isolated lakes in Spokane County
Monitoring Activities ➔	Annual protocol-driven midwinter surveys conducted in conjunction with U.S. Fish & Wildlife and the Trumpeter Swan Society in portions of western Washington. Current research project on lead shot poisoning is providing detailed information on locations and numbers in northern Puget Sound.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental Contamination	Lead shot poisoning from ingestion on wintering grounds	Habitat Research	Identify and remediate sources of lead poisoning
Habitat Loss	Conversion of agricultural lands	Conserve Suitable Habitat	Conservation easements on agricultural lands and wetlands

Tule greater white-fronted goose *Anser albifrons gambelli*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Feeds on grasses and grains in agricultural fields and on tubers in wetlands, uses open water for roosting at night; nests in Arctic	Uncommon	Migrant to coastal and adjacent areas of Puget Sound, Washington's outer coast, and the lower Columbia River
Monitoring Activities ➔	Annual protocol-driven winter waterfowl survey conducted by WDFW in conjunction with U.S. Fish & Wildlife.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Decline in suitable habitat due to degradation and loss of marshes, and loss of upland habitat from development and changing land use practices	Permanent conservation of habitat, conserve suitable habitat, restore degraded habitats	Purchase and manage wetlands used for roosting and uplands used for foraging
Lack of information	Better information needed on population size	Determine status	Improved monitoring of this subspecies is needed in wintering areas
Environmental contamination	Use of agricultural chemicals may contaminate foraging areas	Control and monitor contamination	Monitor contamination loads in birds

Brant *Branta bernicla*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Forages heavily on eelgrass in intertidal estuaries; nests in Arctic	Fairly common to locally abundant. Declining trend	Migrant to western Washington
Monitoring Activities ➔	Intensive winter survey in Puget Sound, midwinter waterfowl population surveys in the remainder of the state by WDFW in conjunction with U.S. Fish & Wildlife.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Local declines in eelgrass reduce foraging habitat	Conserve suitable habitat	Protect eelgrass beds from human activity, pollution, invasive species, and other disturbance
Human disturbance	Disturbance from increased development and greater amounts of human activity (e.g., boating) along shorelines	Protect significant areas	Restrict public use of critical wintering areas through acquisitions and easements
Environmental contamination	Chemical contamination and heavy metal accumulation of winter food supplies may affect reproductive success, oil spills represent another threat	Control and monitor contamination, restore degraded habitats	Minimize sources of ongoing pollution, clean up contaminated sites, prevent oil spills

Northern pintail *Anas acuta*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Inhabits estuaries, freshwater wetlands, and agricultural fields; feeds on grains, aquatic plants, and invertebrates	Common to locally abundant in western Washington, common in eastern Washington	Migrants and wintering birds found throughout state, nests only in eastern Washington
Monitoring Activities ➔	Annual protocol-driven winter waterfowl surveys conducted by WDFW in conjunction with U.S. Fish & Wildlife.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Decline in suitable habitat due to degradation and loss of marshes and intertidal areas, and loss of upland habitat from development and changing land use practices	Permanent conservation of habitat. Conserve suitable habitat. Restore degraded habitats	Preserve wintering habitat through land purchase and management programs
Harvest	Vulnerable to overhunting	Manage hunting	Maintain conservative hunting regulations

Redhead *Aythya americana*	**Biology and Life History**	**Population**	**Distribution**
 Kay Boulter, Cal Photos	Breeds in lakes, ponds, permanent wetlands. Winters on lakes and large rivers and westside sewage treatment ponds.	Fairly common, wintering population low.	Year-round in eastern Washington; rarely winter in western Washington; most wintering populations further south.
Monitoring Activities ➔	Annual protocol-driven winter population and spring productivity surveys conducted by WDFW in conjunction with U.S. Fish & Wildlife and other NGOs and conservation partners.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Continued loss and degradation of easily drained shallow wetlands. Problems in winter range include loss of aquatic vegetation for feeding.	Conserve Suitable Habitat	Protection and education programs targeting suitable breeding wetlands to curtail development and recreational pressure. Restoration of degraded habitats.
Harvest	Species can be overharvested if not regulated.	Control and Monitor Harvest	Establish and monitor hunting regulations, continue conservation regulations.
Human Disturbance	Increased recreational and industrial use of preferred habitats, recreational boating and fishing.	Education and Outreach	Education programs targeting suitable wetlands to curtail recreational pressure.

Greater scaup *Aythya manila*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Winters in shallow nearshore waters, particularly with soft substrate and eelgrass, in open to protected embayments.	Wintering population only in WA. Fairly common, but declining statewide.	Winters in nearshore and inland waters in western Washington, some in eastern Washington. Largest densities in bays and estuaries.
Monitoring Activities ➔	Annual protocol-driven winter surveys by WDFW in conjunction with U.S. Fish & Wildlife and the PSAMP program.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental Contamination	Poor water quality affecting food sources, poor reproduction due to contaminants. Oil spills, DDE and PCBs.	Control and Monitor Contaminants	Tighten shipping contaminant regulations and industrial waste regulations. Monitor and regulate contaminant levels in cooperation with state and federal agencies.
Habitat Loss	Preferred migration stopover sites and winter habitats place species within heavily urbanized zones (degraded habitat due to contaminants and industrial and recreational activity).	Control and Monitor Disturbance and Restore Degraded Habitats	Control disturbance through regulation and enforcement, and restore degraded habitats.
Human Disturbance	Species is sensitive to nearby human activity, particularly recreational boating of all kinds.	Education and Outreach	Education programs targeting species sensitivity and suitable wintering spots in bays and estuaries.

Harvest	Species can be overharvested if not regulated.	Control and Monitor Harvest	Establish and monitor hunting regulations, continue conservation regulations.

Lesser scaup *Aythya affinis*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Usually nests near small ponds and lakes, sedge meadows, creeks. During migration and when not breeding, found along coast in sheltered bays, estuaries, and marshes or inland on lakes, ponds, and rivers	Fairly common, historically low breeding population in state.	Breeding resident in northeastern Washington; wintering resident in western and central Washington.
Monitoring Activities ➔	Annual protocol-driven winter surveys by WDFW in conjunction with U.S. Fish & Wildlife and the PSAMP program.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Human Disturbance	Mortality from fishing nets and lines may be substantial.	Education and Outreach	Develop educational materials and programs targeted to fishermen.
Habitat Loss	Drainage of wetlands and conversion to agriculture have decreased quality and quantity of breeding and wintering habitat.	Conserve Suitable Habitat, Permanent Conservation of Habitat	Preserve wetlands through land purchase and management programs
Harvest	Species can be overharvested if not regulated.	Control and Monitor Harvest	Establish and monitor hunting regulations, continue conservation regulations.

Long-tailed duck *Clangula hyemalis*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Occurs in marine waters, diet consists of bottom-dwelling invertebrates and small fish, breeds in Arctic	Uncommon, declining	Marine waters of western Washington
Monitoring Activities ➔	Annual protocol-driven winter surveys by WDFW in conjunction with U.S. Fish & Wildlife and the PSAMP program.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss, development, declining prey populations	Urbanization and industrialization of coastal shorelines have degraded some winter habitat and reduced food abundance	Conserve suitable habitats, restore degraded habitats, habitat monitoring and research	Manage marine areas to reduce impacts of urbanization and industrialization, monitor prey populations
Environmental contamination	Chemical contamination and heavy metal accumulation of winter food supplies may affect reproductive success, oil spills represent another threat	Control and monitor contamination, restore degraded habitats	Minimize sources of ongoing pollution, clean up contaminated sites, prevent oil spills
Harvest	Vulnerable to overhunting	Manage hunting	Monitor harvest levels and reduce take as necessary

Black scoter *Melanitta nigra*	**Biology and Life History**	**Population**	**Distribution**
 Ole Krogh, Cal Photos	Inhabits marine waters, feeds mainly on mollusks, nests in Canada and Alaska	Uncommon, declining	Marine waters of western Washington
Monitoring Activities ➔	Annual protocol-driven winter surveys by WDFW in conjunction with U.S. Fish & Wildlife and the PSAMP program.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss, development, declining prey populations	Urbanization and industrialization of coastal bays and estuaries have degraded some winter habitat and reduced food abundance	Conserve suitable habitats, restore degraded habitats, habitat monitoring and research	Manage marine areas to reduce impacts of urbanization and industrialization, monitor prey populations
Environmental contamination	Chemical contamination and heavy metal accumulation of winter food supplies may affect reproductive success, oil spills represent another threat	Control and monitor contamination, restore degraded habitats	Minimize sources of ongoing pollution, clean up contaminated sites, prevent oil spills
Harvest	Vulnerable to overhunting	Manage hunting	Monitor harvest levels and reduce take as necessary

Surf scoter *Melanitta perspicillata*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Occurs in shallow marine waters and less frequently on rivers and lakes, feeds on mollusks and herring eggs, nests in Canada and Alaska	Common to abundant, declining	Widespread, especially in western marine waters
Monitoring Activities ➔	Annual protocol-driven winter surveys by WDFW PSAMP program in conjunction with U.S. Fish & Wildlife.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss, development, declining prey populations	Urbanization and industrialization of coastal bays and estuaries have degraded some winter habitat and reduced food abundance, commercial shellfish production has reduced access to some productive foraging areas	Conserve suitable habitats, restore degraded habitats, habitat monitoring and research	Manage marine areas to reduce impacts of urbanization and industrialization, maintain access to important feeding areas through acquisitions or easements, restore herring stocks, monitor prey populations
Environmental contamination	Chemical contamination and heavy metal accumulation of winter food supplies may affect reproductive success, oil spills represent another threat	Control and monitor contamination, restore degraded habitats	Minimize sources of ongoing pollution, clean up contaminated sites, prevent oil spills
Harvest	Vulnerable to overhunting	Manage hunting	Monitor harvest levels and reduce take as necessary

White-winged scoter *Melanitta fusca*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Occurs in shallow marine waters, feeds on mollusks and herring eggs, nests in Canada and Alaska	Common, declining	Widespread, especially in western marine waters
Monitoring Activities ➔	Annual protocol-driven winter surveys by WDFW PSAMP program in conjunction with U.S. Fish & Wildlife.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss, development, declining prey populations	Urbanization and industrialization of coastal bays and estuaries have degraded some winter habitat and reduced food abundance, commercial shellfish production has reduced access to some productive foraging areas	Conserve suitable habitats, restore degraded habitats, habitat monitoring and research	Manage marine areas to reduce impacts of urbanization and industrialization, maintain access to important feeding areas through acquisitions or easements, restore herring stocks, monitor prey populations
Environmental contamination	Chemical contamination and heavy metal accumulation of winter food supplies may affect reproductive success, oil spills represent another threat	Control and monitor contamination, restore degraded habitats	Minimize sources of ongoing pollution, clean up contaminated sites, prevent oil spills
Harvest	Vulnerable to overhunting	Manage hunting	Monitor harvest levels and reduce take as necessary

Bald eagle *Haliaeetus leucocephalus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Nests in large trees, territory is usually near marine shore, large lake or river. Prey on fish, waterfowl, and small mammals, or scavenge. Many birds that nest in Canada and Alaska migrate south to winter in Washington concentrating on rivers with spawned out salmon, especially chum.	Resident population of about 700 breeding pairs; up to 4,000 winter in Washington	Nests primarily along marine shorelines and major rivers of western and northeastern Washington. Nests are rare or absent from the Columbia Basin and southeastern Washington, but wintering birds can be locally common.
Monitoring Activities ➔	Intensive statewide nest occupancy and productivity monitoring surveys conducted by WDFW, USFWS, Weyerhaeuser, utility companies, Oregon State University, Indian tribes, National Park Service, other cooperators, and citizen volunteers since the late 1970's to the present. In recent years comprehensive statewide monitoring efforts, especially productivity, have been reduced, or conducted on a periodic and regional basis due to the reduced need to closely monitor the species as it has shown a spectacular recovery. In 2005, the USFWS selected the WDFW as 1 of the 4 sites in the nation to conduct an experimental post delisting pilot project to develop a monitoring protocol that would survey sample blocks of bald eagle habitat on a 5 year rotation for 25 years subsequent to final delisting. WDFW continues to conduct l localized management oriented bald eagle surveys in conjunction with monitoring bald eagle site management plan needs.		
General Problems	**Specific Problems**	**General Problems**	**Specific Problems**
Human development	Loss of shoreline trees for nesting, perching	Protect large trees in nesting territories,	Continue to require bald eagle habitat plans that require retention of trees; enforce/strengthen Shoreline Management Act
Forest practices	Clearcutting of communal roost sites	Protect known locations	Maintain and enforce Forest Practice rules protecting bald eagle roost sites, and nests

Environmental contaminants	Concentration of DDE, PCBs, dioxins from prey causes reduced reproduction of birds on Columbia River, possibly Hood Canal; lead poisoning acquired from scavenging waterfowl; oil from oil spills	Control and monitor contaminants	Work with other agencies to decrease and remediate sources of contamination; enforce nontoxic shot requirements; maintain and improve oil spill response capabilities; monitor eagle population for declines that might indicate new contaminant problems
Loss of prey	Declines in scoters, scaup, some salmon stocks, and other prey	Protect or manage prey base	Implement salmon recovery strategies; investigate declines in waterfowl and seabirds
Human disturbance	Many eagles are still sensitive to disturbance while nesting; and by boaters while foraging; eagles often avoid foraging in water around stationary boats;	Control disturbance	Disseminate education materials to minimize disturbance of nests from construction, logging activities; educate boaters about disturbance
Harvest, persecution	Illegal killing for black market in eagle parts.	Enforcement	Enforce prohibitions on killing and illegal possession of body parts.

Northern goshawk *Accipiter gentilis*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Nests in mature to old timber; territory contains several nests; eat variety of birds, mammals; non-migratory in Washington	338 known territories in 2003; declined in Puget Trough and southwest Washington	All forested regions of Washington
Monitoring Activities ➔	Periodic management driven protocol nesting, territory and productivity surveys. Periodic analysis of little-known nest areas for habitat change and occupancy status.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	excessive logging of mature/old timber; conversion of forest for residential development; wildfire	Protect significant areas; Conserve suitable habitat	Protect nests, and nesting and pre-fledge stands from logging; thin to reduce fire hazard in pine forest; encourage longer rotations
Lack of information	status and trend in population unknown	Population monitoring and research	Assess status and trend in populations with surveys

Ferruginous hawk *Buteo regalis*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Nests on rock outcrops, cliffs, isolated trees; needs uncultivated lands for hunting and nesting; eats pocket gophers, ground squirrels, snakes, etc.;	Uncommon breeder; recent decline; populations decline when cultivated land exceeds 30% of area.	Columbia Basin
Monitoring Activities ➔	Periodic protocol-driven nest/productivity surveys. Research project on wintering distribution using telemetry.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss, limited habitat	Conversion of steppe to agriculture; residential development; habitat degradation by wildfire	Conserve suitable habitat;	Protect shrub-steppe habitat
Human disturbance	causes nesting failure, nest abandonment	Protect significant sites	Protect nest sites from disturbance;
Reduced prey populations	poisoning of ground squirrels, low prey prevents reproduction	Outreach and education; restore habitat	Facilitate restoration projects; consider reclassifying some ground squirrels as Protected Wildlife

Golden eagle *Aquila chrysaetos*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Occurs primarily in dry open forests, shrub-steppe, canyons, and alpine areas. Nests mostly on cliffs. Feeds largely on marmots, jackrabbits, ground squirrels, and carrion	Locally fairly common	Breeds widely in mountainous areas of the state, especially in eastern Washington
Monitoring Activities ➔	Periodic protocol-driven nesting/productivity surveys.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Habitat loss, degradation, and fragmentation may directly impact golden eagles and cause declines in major prey species, especially jackrabbits and ground squirrels. Control programs for prey have contributed to decreases in food availability	Restore degraded habitats, conserve suitable habitat, conserve prey populations, control and monitor invasive species	Habitat and prey populations should be protected and increased through restoration of grasslands and shrub-steppe via reduced grazing, removal of trees and exotic vegetation, and reseeding with native grasses. Large blocks of suitable habitat should be retained. Prey populations should be conserved by reducing control programs.
Energy development	Electrocution on power lines	Eliminate human-related sources of mortality	Power lines near breeding and foraging areas should be constructed or modified to reduce electrocutions
Human disturbance	Development and activities such as rock climbing may disturb nesting birds	Control and monitor disturbance	Maintain buffer zones of no activity during nesting

Environmental contamination	Lead poisoning from ingestion of lead shot	Control and monitor contaminants	Advocate use of steel shot

Peregrine falcon *Falco peregrinus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Territorial predator of pigeons, doves, shorebirds, waterfowl, seabirds, and other birds; nests on high cliffs, and occasionally tall buildings, bridges.	About 120 nesting pairs	Throughout the state, but with major concentrations on the northwest coast, San Juan Islands, Cascade foothills and along the Columbia River

Monitoring Activities ➔	Prior to 1978, baseline search type surveys to locate peregrine falcon nest sites (eyries) were conducted on an ad hoc basis in localized regions of the state by raptor researchers and falconers. Some opportunistic observational data was recorded incidental to other species surveys. In 1978 the newly created Nongame Program of the Department of Game initiated comprehensive surveys statewide to survey historic and potentially occupied habitat. Intensive annual statewide baseline surveys and monitoring for occupancy and productivity expanded as the population grew and were conducted by the WDFW, the Falcon Research Group (FRG), Washington Department of Transportation (WSDOT), cooperators, and independent citizens. In 2003 in addition to statewide monitoring surveys of all known eyries and potential sites, the WDFW participated in the first nationwide post – delisting monitoring survey organized by the USFWS, that involved sampling a number of randomly chosen eyries for each state. After 2003 the WDFW reduced the statewide survey emphasis, but along with other cooperators including the FRG Group, and WSDOT, continued region specific surveys of selected eyries and potential sites. In 2006 the WDFW and cooperators will participate in the second periodic (4 year interval) nationwide post – delisting monitoring survey organized by the USFWS. Was part of the statistical verification, the WDFW and cooperators will conduct statewide comprehensive monitoring and search surveys.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental contaminants	Concentrate persistent chemicals (DDE, PCB) that can cause eggshell thinning; vulnerable to any persistent chemical	Control and monitor contaminants	Monitor peregrine population for signs of decline; work with other agencies to reduce and remediate sources of contaminants that contribute to prey contamination
Human disturbance	Nesting peregrines vulnerable to disturbance from blasting, beach walkers, rock climbers.	Control and monitor disturbance	Use access restrictions on public lands as needed; work with permitting agencies to prevent blasting or construction disturbance; Inform rock climbers of sensitive periods and locations to reduce disturbance of nesting pairs

Prairie falcon *Falco mexicanus*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Nest on cliffs; depend on abundant prey in steppe and shrub-steppe; prey on horned larks, meadowlarks, other birds, small mammals.	Low density; likely declining with uncultivated habitat	Columbia Basin and surrounding foothills
Monitoring Activities ➔	No current surveys. Falconry capture reports provide limited information on an annual basis. Historic distribution surveys in 1970s and early 1980s.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss, limited habitat	Conversion of steppe to agriculture; residential development;	Conserve suitable habitat;	Protect shrub-steppe habitat
Reduced prey populations	poisoning of ground squirrels; habitat degradation by wildfire; reduced prey prevents successful reproduction	Conserve suitable habitat;	Discourage widespread control of rodents; protect shrub-steppe from fire
Human disturbance	causes nesting failure, nest abandonment;	Protect significant sites, Control and monitor disturbance	Protect nest sites from disturbance;

Greater sage-grouse *Centrocercus urophasianus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Inhabits shrub-steppe; mating occurs at leks	Total population holds about 1,000 birds; declining trend	Two remnant populations occur in Douglas, Grant, Yakima, and Kittitas counties
Monitoring Activities ➔	Annual lek surveys, WDFW, U.S. Army, and BLM using Western States Sage Grouse Working Group protocols. Monitoring of reintroduced birds using telemetry.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Habitat loss and degradation results from large-scale fires, conversion of shrub-steppe to cropland, overgrazing, encroachment by invasive weeds, and inappropriate use of herbicides	Conserve suitable habitat, protect significant areas, restore degraded habitats	Protection and enhancement of habitat is needed, including fire prevention, continuation of Conservation Reserve Program lands, and management of grazing practices and military training activities
Limited distribution	Only small isolated populations remain	Increase distribution	Improve habitat and conduct transplants to increase population sizes
Energy development	Development of wind energy projects may be harmful	Control and monitor disturbance, protect significant areas	Prevent construction of wind energy projects in areas important for sage grouse recovery

Disease	Expansion of West Nile Virus into Washington poses a threat	Test and monitor disease	Monitor the expansion of West Nile Virus into areas occupied by the species

Sharp-tailed grouse Tympanuchus phasianellus	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Inhabits meadow-steppe and riparian/deciduous habitats; mating occurs at leks	Total population numbers fewer than 1,000 birds; declining trend	Eight remnant populations remain in Douglas, Lincoln, and Okanogan counties
Monitoring Activities ➔	Annual lek surveys using Western States Sage Grouse Working Group. Monitoring of reintroduced birds using telemetry.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Overgrazing and conversion of habitat to agriculture and pastureland	Conserve suitable habitat, protect significant areas, restore degraded habitats	Protection and enhancement of high quality habitat is needed, including restoration of low elevation winter sites
Limited distribution	Only small isolated populations remain	Increase distribution	Conduct transplants to increase population sizes
Energy development	Development of wind energy projects may be harmful	Control and monitor disturbance, protect significant areas	Prevent construction of wind energy projects in areas important for the species

Disease	Expansion of West Nile Virus into Washington poses a threat	Test and monitor disease	Monitor the expansion of West Nile Virus into areas occupied by sharp-tailed grouse

Mountain quail *Oreortyx pictus*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Require tall, dense cover; brushy, riparian habitat in dry areas; brushy slopes; eat seeds, berries, mast	Modest populations in scattered localities; some result from introductions; declined in recent years	Primarily Kitsap, Mason, Grays Harbor, Klickitat Counties; Also Asotin, Garfield, and Columbia counties.
Monitoring Activities ➔	Annual occurrence and productivity survey, monitoring of reintroduced birds by WDFW and University of Idaho.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss, Limited habitat	habitat degraded by overgrazing, herbicides, development	Restore degraded habitat; conserve suitable habitat	prevent grazing riparian habitat; discourage harmful forest practices

Sandhill crane (greater) *Grus canadensis tabida*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Breeding territories contain wetlands, grassy uplands, partially forested uplands, and wet meadows. Reproductive rates are low and birds often mate for life. The Washington population winters in the Central Valley of California	Breeding population in Washington numbers only about 50 birds and is increasing. Larger numbers nest in Oregon and British Columbia	Formerly nested at a small number of sites throughout eastern Washington, but now breeds only at four locations in Yakima and Klickitat counties
Monitoring Activities ➔	Annual nesting/productivity surveys conducted by WDFW in conjunction with U.S. Fish & Wildlife and the Yakama Indian Nation.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Wetlands and meadows may be harmed by grazing and haying practices and various water projects. Maintenance of water levels needed during breeding season	Conserve suitable habitat, restore degraded habitats, implement existing conservation plan	Protect important areas from habitat loss and degradation through acquisitions, easements, conservation agreements, and management plans. Restore wetlands and protect from harmful livestock grazing.
Water development	Drainage and damming projects in or near territories may impact breeding success	Conserve suitable habitat	Discourage water projects that impact breeding habitat

Human disturbance	Mowing may accidentally destroy nests and chicks. New road and building construction near territories may cause excessive disturbance.	Control and monitor disturbance	Prevent construction of roads and buildings within 0.5 mile of territories, discourage detrimental mowing practices during sensitive periods

Snowy plover *Charadrius alexandrinus nivosus*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Inhabits sandy beaches and coastal dunes, some Washington birds are probably migratory	Less than 100 birds, stable	Pacific and Grays Harbor counties
Monitoring Activities ➔	Intensive, annual protocol-driven nesting/productivity surveys by WDFW in conjunction with U.S. Fish & Wildlife Service.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Invasive plant species	Dense growth of European beachgrass reduces nesting and foraging habitat	Control and monitor invasive species	Reduce the occurrence of European beachgrass in coastal areas
Human disturbance	Beach walkers, pets, and cars disturb and kill birds and destroy nests	Control and monitor disturbance	Expand efforts to reduce disturbance by limiting human access to areas used by plovers, restrict pets from breeding areas

Habitat loss	Cars compact beach soils, thereby reducing prey availability	Protect significant areas	Limit vehicle traffic along beaches used by birds
Environmental contamination	Oil spills may kill birds, or damage or destroy foraging and nesting habitat	Control and monitor contamination	Prevent oil spills, clean up to spills rapidly

Black oystercatcher *Haematopus bachmani*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Feeds on rocky marine intertidal shorelines; nests on rocks of islands, non-migratory	Small population of several hundred birds is limited by habitat	Rocky shores of outer coast, San Juan Islands, and eastern Strait of Juan de Fuca
Monitoring Activities ➔	Intermittent population surveys conducted in conjunction with U.S. Fish & Wildlife, NGOs and other conservation partners. WDFW initiated intensive San Juan surveys in 2005.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental contamination	Oil spills may kill birds, or damage or destroy foraging and nesting habitat	Control and monitor contamination	Prevent oil spills, clean up to spills rapidly
Lack of information	Need information on population status and trends	Gather data on populations	Conduct population monitoring surveys
Human disturbance	Fishing, kayaking, and other activity may disturb nesting birds	Control and monitor disturbance	Consider limitations on human activity near nesting sites during breeding season

Willet *Catoptrophorus semipalmatus*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Occupies estuaries and sandy beaches, migratory	Rare, stable	Primarily northern Willapa Bay
Monitoring Activities ➔	Is not formally monitored. Specific site on Willapa Bay is observed annually by bird watchers. Intensive shorebird surveys were conducted by The Evergreen State College in 1980s.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental contamination	Oil spills may kill birds, or damage or destroy foraging habitat	Control and monitor contamination	Prevent oil spills, clean up to spills rapidly
Development	Modifications of the Tokeland marina could eliminate an important roost site	Conserve suitable habitat	Work with local authorities to protect roosting areas in Tokeland

Upland sandpiper *Bartramia longicauda*	**Biology and Life History**	**Population**	**Distribution**
 Peter S. Weber, Cal Photos	Nests in grasslands, but uses various open habitats during migration, migratory	Very rare, no longer breeds in state	Scattered sites in eastern Washington
Monitoring Activities ➔	No surveys except for gathering data on occasional occurrences. Regular annual surveys of the Spokane County breeding site ceased when species became extirpated there. Future surveys should follow up recent reports, and survey suitable habitat in eastern and southeastern Washington.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Residential development, wetland drainage, and overgrazing have reduced or degraded habitat	Conserve suitable habitat, protect significant areas	Work with private landowners to manage and restore grassland habitats
Invasive plant species	Spread of spotted knapweed has reduced habitat quality	Control and monitor invasive species	Work with private landowners to reduce spotted knapweed

Marbled godwit *Limosa fedoa*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Forages on tidal mud flats, migratory	Probably numbers fewer than 1,000 birds, increasing	Primarily northern Willapa Bay and Grays Harbor County
Monitoring Activities ➔	No formal ongoing surveys. Shorebird survey strategies under discussion and development. Implementation date uncertain.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental contamination	Oil spills may kill birds, or damage or destroy foraging habitat	Control and monitor contamination	Prevent oil spills, clean up to spills rapidly
Development	Modifications of the Tokeland marina could eliminate a major roost site	Conserve suitable habitat	Work with local authorities to protect roosting areas in Tokeland

Red knot *Calidris canutus*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Mainly forages on intertidal flats and roosts in sandy coastal habitats;	Relatively common, rangewide declines reported	Outer coast, primarily in Pacific and Grays Harbor counties; Willapa Bay and Grays Harbor are major stopover sites along the Pacific Flyway
Monitoring Activities ➔	No formal ongoing surveys. Shorebird survey strategies under discussion and development. Implementation date uncertain.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Invasive plant species	Spread of *Spartina* spp. threatens habitat quality in Willapa Bay	Control and monitor invasive species	Continue programs to control and eradicate *Spartina* spp.
Environmental contamination	Oil spills may kill birds, or damage or destroy foraging habitat	Control and monitor contamination	Prevent oil spills, clean up to spills rapidly

Rock sandpiper *Calidris ptilocnemis*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Occupies rocky shoreline habitats, migratory	Rare, with perhaps fewer than 100 birds overwintering, numbers have declined slightly in recent decades	Primarily outer coast
Monitoring Activities ➔	No formal ongoing surveys. Shorebird survey strategies under discussion and development. Implementation date uncertain.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental contamination	Oil spills may kill birds, or damage or destroy foraging habitat	Control and monitor contamination	Prevent oil spills, clean up to spills rapidly

Arctic tern *Sterna paradisaea*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Marine waters, especially along the continental shelf; breeds on dredge-spoil and waterfront open space, mainly a passage migrant in Washington, with a tiny breeding population.	Fairly common migrant, rare breeder.	Marine waters, especially along the outer coast; a few pairs nests at Everett, Snohomish County.

Monitoring Activities ➔	No population surveys conducted other than occurrence or potential nesting shorebird areas.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Human disturbance	Any changes in management of Jetty Island, Everett, may affect nesting birds; human activity on the island and at waterfront nest locations may impact nest success	Control and monitor disturbance	Work with community officials and private businesses to manage Jetty Island for benefit of terns and to reduce disturbance during the nesting season
Environmental contamination	Oil spills may kill birds, or damage or destroy foraging and nesting habitat	Control and monitor contamination	Prevent oil spills, clean up to spills rapidly

Common murre *Uria aalge*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Colonial breeder on rocks, islands, and coastal cliffs, forages in nearshore continental shelf waters and deeper inland waters	Varies between years from about 50,000-200,000 birds during winter and from about 4,000-10,000 birds during breeding season; stable	Marine waters throughout the state; breeding colonies distributed along outer coast from Clallam to Grays Harbor counties

Monitoring Activities ➔	Periodic colony surveys by U.S. Fish & Wildlife and University of Washington. WDFW conducts pelagic breeding season surveys of all seabird species on outer coast and winter in Puget Sound.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental contamination	Oil spills and chronic oil pollution can kill large numbers of murres; toxic pollutants (e.g., DDTs and PCBs) may affect survival and reproduction	Control and monitor contamination	Prevent oil spills and chronic oil pollution, clean up to spills rapidly; reduce sources of ongoing toxic pollution
Harvest	Gill net fisheries result in the accidental bycatch of sizable numbers of birds	Address harvest concerns, education and outreach	Continue requirements on net design and daily and seasonal fishing activity
Human disturbance	Birds at breeding colonies are sensitive to the close approach of people, boats, and aircraft	Control and monitor human disturbance, education and outreach	Restrict human activity in and around breeding colonies
Declines in prey abundance	Commercial fisheries harvests may reduce food availability	Address harvest concerns	Manage fisheries harvests to reduce competitive impacts on seabirds
Excessive nest predation	Predation from gulls and introduced mammals at breeding colonies may impact populations	Control and monitor predators	Conduct predator control programs as necessary

Marbled murrelet *Brachyramphus marmoratus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Seabird that nests in mature or old-growth forests, and younger forests with old-growth tree components within 50 miles of marine waters; depends on availability of large platforms. Breeds solitarily and attends nests during periods of low light.	Uncommon to fairly common resident in marine waters, rare in freshwater	Nests in low to mid-elevation coniferous forests w. of Cascade crest
Monitoring Activities ➔	Forest Practices Rules for Washington provide requirements for protocol surveys for landowners with >500 acres. Use current Pacific Seabird Group (PSG) protocol, as modified by WDFW guidance document, to survey potential nesting habitat prior to timber harvest and follow existing federal and state statutes regarding occupied site management. Regular monitoring of selected sites with history of murrelet detections. WDFW and DNR conduct surveys on state-managed lands.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Logging of old-growth forests and forests with old components removes nesting habitat; fragmentation of old growth may enhance nest predation in remnant stands.	Conserve Suitable Habitat, Determine and Map Distribution, Habitat Monitoring and Research, Permanent Conservation of Habitat, Protect Significant Areas	Finalize and implement federal recovery plan. Use fee title and conservation easements to protect habitat. Identify at-sea foraging habitat as well as nearby nesting habitat and include in conservation strategy. Conduct research needed to fill gaps for developing delisting criteria.
Harvest	Gill-net fishery accidental bycatch is a source of mortality, but limited data for Washington. Reduced mortality primarily due to Fisheries modification since mid-1990s.	Determine and Address Limiting Factors	Update and evaluate potential impact of gill-net mortality in state.

Lack of Knowledge	Standard survey protocols to determine status and trends of at-sea populations	Research, natural history and Conservation	Develop standard survey protocols for determining status and trends based on at-sea counts of murrelets with other agencies.
Environmental Contamination	Very vulnerable to periodic and chronic oil spills because most time is spent at sea; lethal and may have sublethal, physiological and reproductive consequences that affect local populations.	Control and Monitor Contaminants	Identify important nearshore foraging areas along coast and include in oil spill response team databases for boom placement.

Ancient murrelet *Synthliboramphus antiquus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Winter migrant to continental shelf and inland marine waters; breeds in Alaska and British Columbia, but a handful of breeding season records in Washington suggest that very small numbers may nest in the state	Fairly rare during the breeding season but common to abundant migrant and during the winter, trend unknown	Outer coast, Strait of Juan de Fuca, and northern Puget Sound
Monitoring Activities ➔	No ongoing surveys except for gathering incidental data on occurrences by WDFW and U.S. Fish & Wildlife Service.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental contamination	Oil spills and chronic oil pollution can kill large numbers of murrelets	Control and monitor contamination	Prevent oil spills and chronic oil pollution, clean up to spills rapidly
Harvest	Gill net fisheries result in the accidental bycatch of sizable numbers of birds	Address harvest concerns, education and outreach	Continue requirements on net design and daily and seasonal fishing activity

Cassin's auklet *Ptychoramphus aleuticus*	**Biology and Life History**	**Population**	**Distribution**
 Alaska Dept. of Fish & Game	Forages along the outer continental shelf and slope and in deeper inland marine waters, nests on forested offshore rocks	Common to abundant; 90,000 estimate to nest in Washington, possibly declining	Outer coast, Strait of Juan de Fuca, and some adjacent inland marine waters
Monitoring Activities ➔	Periodic historic burrow surveys by U.S. Fish & Wildlife and other researches on selected colonies.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental contamination	Oil spills and chronic oil pollution can kill large numbers of auklets	Control and monitor contamination	Prevent oil spills and chronic oil pollution, clean up to spills rapidly
Harvest	Gill net fisheries result in the accidental bycatch of sizable numbers of birds	Address harvest concerns, education and outreach	Continue requirements on net design and daily and seasonal fishing activity
Human disturbance	Birds at breeding colonies are sensitive to the close approach of people, boats, and aircraft	Control and monitor human disturbance, education and outreach	Restrict human activity in and around breeding colonies
Excessive nest predation	Predation from gulls, eagles, and other avian and mammalian predators at breeding colonies can impact populations	Control and monitor predators	Conduct predator control programs as necessary

Tufted puffin *Fratercula cirrhata*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Breeds over vast geographic range and extreme climatic conditions; pelagic; diet mainly of squid, euphausiids, and pelagic fishes. Breeds colonially.	Locally common breeder on n. outer coast, uncommon elsewhere in marine waters, rare s. of Admiralty Inlet. Very rare in winter.	Occurs on offshore islands along the outer coast and inland waterways from grays harbor to western Skagit and Island Counties
Monitoring Activities ➔	Periodic nesting colony and current pelagic surveys conducted by WDFW in conjunction with U.S. Fish & Wildlife.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Harvest	Gill-net fishery (both high seas drift net fisheries and coastal gill-net fisheries) kills individuals. Coastal gill-net fishery may be a significant source of mortality on Washington coastline.	Determine and Address Limiting Factors	Evaluate potential impact of gill-net mortality in state.
Lack of Information	Unknown why populations in Washington are declining	Research, Natural History and Conservation	Conduct demographic studies along coast to determine causes of 20 yr decline in populations
Environmental Contamination	Oil spills kill individuals and breeding population most at risk. Plastic pollution and ingestion at sea widespread, but detrimental affects not documented.	Control and Monitor Contaminants	Identify important nearshore foraging areas along coast and include in oil spill response team databases for boom placement.

Yellow-billed cuckoo *Coccyzus americanus*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Onset of breeding is correlated with abundant food supply and once initiated requires only 17 days from egg-laying to fledging of young	Formerly an uncommon westside breeder, now very rare visitor statewide and may be extirpated.	Primarily riparian woodlands
Monitoring Activities ➔	No monitoring or surveys conducted except collect information on occurrences from all sources.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Loss of suitable riparian habitat	Determine and Map Distribution; restore degraded habitat	Survey former breeding locations for occupancy to determine if extant population occurs in the state.

Flammulated owl *Otus flammeolus*	**Biology and Life History**	**Population**	**Distribution**
 Judd Patterson, Cal Photos	Occupies open forests with brushy understory with high nocturnal arthropod density, low reproductive rate among owls	Uncommon to fairly common summer resident in ponderosa pine zone on e. slope Cascades, Kettle Range, Selkirk Mtns., and Blue Mtns.	Mature ponderosa pine and Douglas-fir forests in eastern Washington
Monitoring Activities ➔	No forma surveys conducted. Incidental observations during spotted owl monitoring and surveys.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss, Limited Habitat	Loss of nest cavities and lack of snag recruitment; degradation of foraging habitat by application of forest pesticides that kill non-target moths	Conserve Suitable Habitat, Restore Degraded Habitats	Conserve existing old-growth ponderosa pine and Douglas-fir forests, restore function to managed forests by providing functional nest cavities and foraging habitat
Lack of Information	Population status	Research, Natural History and Conservation; assess population status	Conduct habitat selection studies at multiple spatial scales and evaluate demography. Conduct population surveys.

Burrowing owl *Athene cunicularia*	**Biology and Life History**	**Population**	**Distribution**
 Paul Bannick, Cal Photos	Inhabitant of shrub-steppe and steppe; uses abandoned mammal burrows for nesting; diet of small mammals and insects; largely migratory, wintering in the southwest and Mexico	Locally fairly common to uncommon breeder in shrub-steppe in e. Washington. Rare in winter in eastern Washington.	Shrub-steppe and grassland habitats in eastern Washington
Monitoring Activities ➔	Periodic surveys for nests/productivity by WDFW, BLM, U.S. Fish & Wildlife refuges and universities. Intensive research project on populations and life history conducted through Washington State University and University of Arizona Cooperative Wildlife Unit.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited Habitat	Cultivation of grasslands and native prairies destroys nesting burrows and foraging habitat, degrades habitat quality, and may increase vulnerability to predators.	Conserve Suitable Habitat, Restore Degraded Habitats, permanent Conservation of Habitat, Education and Outreach	Work with land owners to restore native vegetation and conserve local populations of burrowing mammals around breeding colonies of owls. Implement voluntary agreements and conservation easements to conserve habitat for long-term.
Habitat Loss	Decline in burrowing mammals due to poisoning, trapping, shooting.	Education and outreach, enforcement	Reduce persecution of burrowing mammals through regulation, outreach and education.

Lack of information	Lack of information about local populations and population trends	Complete status assessments	Conduct systematic surveys periodically to monitor population trends.

Northern spotted owl *Strix occidentalis caurina*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Inhabits late seral coniferous forests at mid- to low-elevations; majority of pairs do not breed every year	Widespread, uncommon resident on Olympic Peninsula and in Cascade Mtns.; rare in SW Washington, and rare elsewhere away from Cascade foothills.	Mid and late-seral closed canopy forests in western Washington and eastern Cascade slope

Monitoring Activities ➔	No statewide comprehensive surveys have been done for many years. Intensive monitoring as part of demographic studies on the Olympic Peninsula, Cle Elum, and the Rainier North and I-90 SOSEA'S, Eastern Cascades by NCASI. Timber industry conducts limited surveys to selected sites. WADNR conducts site-specific surveys for site-specific management needs. WDFW conducts site-specific surveys for site-specific HCP management needs and compliance monitoring. Habitat-change analysis and remote sensing of habitat monitoring project, funded by WADNR, was conducted by WDFW in 2004 and 2005. USFWS will write new owl rescue "blueprint". WFPA may rewrite state rules governing logging of private forests designated to supplement federal efforts.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Short-rotation even-aged silviculture, threat of fire eliminating isolated habitats	Conserve Suitable Habitat, Restore Degraded Habitat, Develop Recovery Plan	Preserve existing old-growth forests at landscape scale and restore habitat. Manage for and retain snags, large trees with cavities, and coarse woody debris in selectively logged forests.
Pathogens	Advent of West Nile virus into the state; possible threat to owls	Monitor spread of virus in the state.	Monitor spread and occurrence of virus in all bird species
Invasive species	Potential competition for habitat with barred owl	Population monitoring and research	Evaluate effect of timber harvest at landscape scale on occupancy of spotted owl habitat by barred owls

Great gray owl *Strix nebulosa*	**Biology and Life History**	**Population**	**Distribution**
 Paul Bannick, Cal Photos	Can be resident or nomadic with stable and irruptive populations. Delayed maturity (commonly breeds at 3 yr)	Rare local breeder in north-central. Washington, very rare winter visitor in n. counties.	Occupies mid-seral to mature forests adjacent to meadows in eastern Okanogan and western Ferry Counties
Monitoring Activities ➔	No formal surveys conducted. Incidental observations during spotted owl monitoring and surveys. Winter observations in lowlands reported by NGOs and bird watchers.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Timber harvest; intensive forestry simplifies forest structure degrading habitat.	Conserve Suitable Habitat	Develop management guidelines to protect nesting structures, restrict harvest unit size, maintain hunting perches in cutover areas.
Lack of Information	Lack of knowledge of nesting and foraging habitats and their juxtaposition	Research, Natural History and Conservation	Conduct habitat studies in occupied range and map habitat across larger area to focus additional survey work.

Vaux's swift *Chaetura vauxi*	**Biology and Life History**	**Population**	**Distribution**
 Richard B. Forbes, Cal Photos	Nests and roosts in large diameter hollow trees in stands of high canopy closure, attaches nest to inside wall of tree cavity	Fairly common summer resident and migrant in w., uncommon in e. Widespread spring and fall migrant, locally abundant during migration.	Occurs in forests throughout the state below Alpine/Parkland and above steppe where suitable cavity trees are available
Monitoring Activities ➔	No formal surveys conducted. Incidental observations and data from BBS routes and other neotropical migrant surveys.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Loss of hollow old-growth trees used as nesting and roosting sites	Conserve Habitat, Protect Significant Areas, Habitat Research	Maintain old growth forests
Lack of Information	Poor knowledge of population status	Research, Natural History and Conservation, assess population status	Evaluate habitat selection at forest stand and landscape scales. Conduct periodic population surveys/monitoring.

Lewis' woodpecker *Melanerpes lewisi*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Requires snags of advanced decay for nesting, switches diet from insects in summer to acorns in winter; catches insects by fly catching and gleaning, rarely drills bark.	Locally common to uncommon summer resident, rare to locally common winter resident in e. Washington. Rare migrant and very rare winter visitor.	Open forests and woody riparian corridors of eastern Washington in the ponderosa pine zone and below. In the Columbia Basin, occupies transition zone between ponderosa pine and sagebrush.
Monitoring Activities ➔	No formal surveys conducted. Incidental observations and data from BBS routes and other neotropical migrant surveys.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Fire suppression, grazing, selective timber harvesting and replanting with high densities of seedlings have degraded open ponderosa pine forests. Extent of cottonwood forests has also declined. Loss of large snags for nest sites.	Conserve Suitable Habitat	Restore open ponderosa pine forest conditions; restore natural fire regimes; maintain and recruit large diameter snags Preserve mature cottonwood riparian forests, restore natural hydrology regimes, and exclude cattle from riparian areas.

Lack of Information	Information on habitat selection at nest site, stand and landscape scales and population demography	Research, Natural History and Conservation	Conduct habitat selection studies and estimate vital rates to determine source habitats/landscapes.
Invasive Animal Species	Potential competition for nest cavities with starlings	Control and Monitor Invasive Species	Determine extent of competition for cavities and if necessary control
Development	Urbanization and residential development in breeding and overwintering habitat may result in habitat loss	Conserve Suitable Habitat	Work with county planners in establishing reserve areas of suitable habitat

Acorn woodpecker *Melanerpes formicivorus*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Dependent on snags for nesting and roosting, cooperative breeder, acquires prey items by gleaning and fly-catching	Very localized, uncommon resident in Klickitat Co.	Confirmed nesting only from Klickitat County.

Monitoring Activities ➔	No formal surveys conducted. Incidental observations and general data reported from multiple sources that visit the known site.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of Information	Extent of occurrence in pine-oak woodlands in Klickitat Co.	Determine and Map Distribution	Survey oak and pine-oak woodlands in Klickitat and other counties where potentially suitable habitat occurs to determine extent of distribution in the state at northern part of its range.

White-headed woodpecker *Picoides albolarvatus*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Pine seeds dominate diet during most of year, flakes bark and gleans prey items, rarely drills into bark	Uncommon to locally fairly common resident in ponderosa pine forest on e. slope of cascades, NE. mountains and Blue Mtns. Very rare in w. Washington.	Occupies ponderosa pine forests in eastern Cascades and east of Okanogan River, local in Blue Mountains

Monitoring Activities ➔	No formal surveys conducted. Incidental observations and general data reported from multiple sources. Recent survey and habitat relationships project of known and historical nest areas completed by WDFW in 2003 (Rogers and Buchanan) and intensive research by R. Dixon, University of Idaho.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Loss of and degradation of large diameter pine forests that are needed to provide abundant and reliable seed sources and nest cavities.	Conserve Suitable Habitat, Restore Degraded Habitat	Develop conservation strategy that addresses management of pine forest types. Maintain and recruit suitable snag as nesting structures to maintain populations.
Lack of Information	Limited data on distribution	Determine and Map Distribution, Habitat Monitoring and Research, Population Monitoring and Research	research habitat needs at stand and landscape scales incorporating measures of population demography; develop methods to monitor extent of suitable source habitats using landscape imagery, assess population status.

Black-backed woodpecker *Picoides arcticus*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Irruptive species dependent on fire landscapes.	Rare to locally uncommon resident in mid to high-elevation coniferous forests e. of Cascade crest, rare w. of crest.	Primarily inhabits forests above ponderosa pine, but peripherally within ponderosa pine on east slope of Cascades. On w. side of the crest occurs in western hemlock, subalpine fir, and alpine/parkland forest types. Also occurs in Blue Mtns.
Monitoring Activities ➔	No formal surveys conducted. Incidental observations and data from BBS routes and other neotropical migrant surveys.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Degradation of habitat by fire suppression and loss of snags for nest sites.	Conserve Suitable Habitat, Habitat Monitoring & Research, Restore Degraded Habitats	Establish management areas where mature and old stands develop and natural processes of disease and decay occur without logging. Monitor populations to evaluate effectiveness of management areas. Allow wildfires to burn in some forests to create suitable habitat.

Lack of Information	Knowledge of population status	Research, Natural History and Conservation	Evaluate habitat selection at forest stand and landscape scales and method of tracking habitat using remote sensing techniques, assess population status.

Pileated woodpecker *Dryocopus pileatus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Dependent on large diameter snags typically in mature forest for nest and roost sites, forages in mature forest stands	Fairly common resident in coniferous forest, deciduous, and mixed forests over wide range statewide.	Below western hemlock zone in w. Washington, and below alpine/parkland zone in e. Washington.
Monitoring Activities ➔	No formal surveys conducted. Incidental observations and data from BBS routes and other neotropical migrant surveys.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Timber harvest; removal of large diameter live and dead trees, downed woody material.	Conserve Suitable Habitat, Protect Significant Areas, Restore Degraded Habitats;	Evaluate whether existing management prescriptions are adequate to maintain populations.

Lack of Information	Data on population dynamics is needed to determine sustainable populations	Population monitoring and research; Research natural history and conservation	Study populations in landscapes of different forest age class distributions and amounts, and evaluate demographic parameters (vital rates, juvenile dispersal) to assess habitat conditions needed for sustainable populations.

Streaked horned lark *Eremophila alpestris strigata*	**Biology and Life History**	**Population**	**Distribution**
 Ruth Sullivan	Breeds on remnant prairie and grassland of south Puget Sound, coastal beaches and islands in the lower Columbia; winters in Oregon and on lower Columbia sites	Entire population about 330 birds in Washington, and 450 in Oregon	Local breeder in remnant grasslands in prairies and beaches of western Washington endemic subspecies of Washington and Oregon; likely extirpated in BC.
Monitoring Activities ➔	Current intensive monitoring and research by Scott Pearson, WDFW, formerly WADNR. Previous rangewide surveys by Russell Rogers (1999 and 2000), WDFW and formerly The Evergreen State College and WDFW P. MacLaren (2000).		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Loss of habitat to development, fire suppression, and introduction of exotic plants all have been or continue to be factors in decline of populations.	Conserve Suitable Habitat, Restore Degraded Habitats; Protect significant areas. Manage spoil disposition to maintain open habitat.	Conserve and restore function to remaining prairie habitat. Develop conservation strategies with Fort Lewis, McChord Air Force Base, and area airports; Protect and manage dredge spoil islands in Columbia River as nesting habitat.

Invasive plant species	Dense growth of European beachgrass reduces nesting and foraging beach habitat	Control and monitor invasive species	Reduce the occurrence of European beachgrass in coastal areas
Human disturbance	Disturbance of nesting beaches by recreational activity	Enforcement, outreach	Protect nesting sites on public beaches.
Predation	Crow predation on nests	Control and monitor predators	Conduct predator control programs as necessary
Limited Distribution	Populations have been extirpated from San Juan Islands and most of Puget Trough	Determine and Address factors Limiting Recovery, Increase Distribution	Where habitat is restored, reintroduce populations to formerly occupied sites.

Purple martin *Progne subis*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Secondary cavity user	Primarily depends on artificial nest structures	Occurs in Puget Trough, Grays Harbor, Willapa Bay and lower Columbia River.

Monitoring Activities ➔	Local intensive surveys of artificial nest boxes and natural nests. Otherwise, no formal surveys conducted. Incidental observations and data from BBS routes and other neotropical migrant surveys.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Invasive animal species	Competition for nest cavities in snags and birdhouses by European Starlings and House Sparrows	Control and Monitor Invasive Species	Trap and kill European starlings and House Sparrows near remaining and former breeding areas of martins.
Limited habitat	Limited nesting habitat	Enhancement of nesting site availability.	Install single-cavity birdhouses and gourds to enhance martin populations.

Slender-billed white-breasted nuthatch *Sitta carolinensis aculeata*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Secondary cavity user for nest sites	Very local, rare and in decline in w. Washington	Confined to Vancouver vicinity, especially Ridgefield NWR. Rare and local in Skamania Co.; may be extirpated in Steilacoom/Fort Lewis area.

Monitoring Activities ➔	No formal surveys conducted. Incidental observations and general data reported from multiple sources. Will develop protocol when and if reintroduced.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Conversion of oak and oak-conifer woodlands	Conserve Suitable Habitat	Work with landowners to incorporate conservation of this species and oak woodlands into long-term land management
Limited distribution	small size and isolation of Washington populations	Increase distribution	conduct feasibility study for reintroductions; implement translocations
Lack of Information	Current status is unclear without systematic surveys	Research, Natural History & Conservation; Determine & Address Factors Limiting Recovery	Conduct surveys where pairs were historically found, characterize habitat, and identify additional areas to target surveys. Assess factors that may account for loss of pairs at formerly occupied sites.

Pygmy nuthatch *Sitta pygmaea*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	One of the few cooperatively breeding passerines in North America, strong preference for long-needled pine forests	Fairly common to uncommon resident in NE. counties and along e. slope of Cascades, local in some areas.	Occupies dry, open ponderosa pine forests at low elevations in eastern Washington. Local in Blue Mtns.

Monitoring Activities ➔	No formal surveys conducted. Incidental observations and data from BBS routes and other neotropical migrant surveys.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Logging, fire suppression, grazing and commercial and residential development that degrades mature ponderosa pine habitat and reduces quality of nests sites and adequate food supply	Conserve Suitable Habitat, Restore Degraded Habitats	Maintain mature and old-growth ponderosa pine. Restore degraded pine forests by thinning dense understory fir, return natural fire regime, and maintain snags.
Lack of Information	Better define the range of the species	Determine and Map Distribution	Conduct standard surveys to better define range

Western bluebird (W WA) *Sialia mexicana*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Inhabits open, park-like forests and edge habitats with sufficient number of larger trees and snags to provide nest and perch sites; secondary cavity user.	Locally fairly common and widely distributed summer resident in e. Washington and c. and SW. Washington except for high elevation, dense forests, and the Columbia Basin	Inhabits woodland/prairie mosaic and Puget Sound Douglas-fir in w. Washington
Monitoring Activities ➔	Intensive nest box monitoring in Pierce and Thurston Counties by George Walter. Similar efforts by NGOs at local sites throughout the state, especially Klickitat County. No formal surveys conducted. Incidental observations and data from BBS routes and other neotropical migrant surveys.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	clearcut logging, fire suppression, and snag removal, as well as commercial and residential development reduce and degrade open forest and edge habitats. Competition for cavities by starlings and house sparrows	Conserve Suitable Habitat, Restore Degraded Habitats	Conserve/restore habitat by management of snags and using prescribed fire. Conserve habitat for primary cavity excavators in order to provide nest sites. Provide nest boxes as short term solution to cavity limitation.

Invasive Animal Species	Competition for nest cavities in snags and birdhouses by European starlings and house sparrows	Control and Monitor Invasive Species	Trap and kill European starlings and House Sparrows near remaining and former breeding areas of martins. Install single-cavity birdhouses and gourds to enhance martin populations.
Lack of Information	Monitor trend in population	Research natural history and conservation; Population monitoring & research	Conduct surveys to determine trend in population and whether listing is needed

Sage thrasher *Oreoscoptes montanus*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Sagebrush obligate	Fairly common breeder in shrub-steppe of eastern Washington.	Sagebrush and bitterbrush habitats in the Columbia Basin, north to Omak. Not present in Methow Valley and locally uncommon in Okanogan Valley.

Monitoring Activities ➔	Selected local populations are monitored in study areas of the WDFW research project for shrub-steppe habitat relationships and avian population dynamics.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Habitat loss to residential development, agricultural conversion, burning, herbicide and pesticide treatments, and heavy grazing by livestock. Fragmentation of remaining habitat patches.	Conserve Suitable Habitat, Restore Degraded Habitat, Protect Significant Areas	Protect core areas of good habitat; control cheatgrass; Identify degraded habitat for restoration and establish connectivity with core areas. Work with other agencies to protect and restore habitat; evaluate CRP leases to provide functional habitat on private lands.
Lack of Information	Effects of land management activities on population persistence in landscapes	Research, Natural History & Conservation	Conduct studies on use of sagebrush patches in landscapes of differing patchiness and connectivity to design conservation strategy

Loggerhead shrike *Lanius ludovicianus*	**Biology and Life History**	**Population**	**Distribution**
 Peter La Tourrette	Small avian predator; impales prey on thorns and barbed wire, an adaptation for eating large prey without the stronger feet and talons of raptors. Shrike occupies unique position in the food chain as both passerine and a top level predator. Some have been found impaled on barbed wire themselves; horny toad revenge?	Fairly common local summer resident in e., rare in winter.	Occurs in eastern Washington where it prefers alternating patches of shrub-steppe and grassy areas
Monitoring Activities ➔	Selected local populations are monitored in study areas of the WDFW research project for shrub-steppe habitat relationships and avian population dynamics.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Conversion of shrub-steppe to agriculture.	Conserve Suitable Habitat, Restore Degraded habitat	Conserve existing shrub-steppe habitat and restore function of degraded shrub-steppe.
Lack of Information	Lack of knowledge of source vs. sink landscapes	Research, Natural History and Conservation	Studies of populations in landscapes of varying levels of shrub-steppe amount, patchiness and connectivity with corresponding measures of demography are needed to evaluate source/sink populations and landscape characteristics.

Oregon vesper sparrow *Pooecetes gramineus affinis*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	A ground-dwelling species that breeds in dry, open habitats with short, sparse and patchy herbaceous vegetation; some bare ground; and scattering of low to moderate shrubs.	In danger of extirpation	Occupies remnant prairies and grasslands in western Washington
Monitoring Activities ➔	No formal surveys conducted. Incidental observations, data and combined surveys from streaked horned lark research (Rogers 2000), BBS routes, and other neotropical migrant surveys.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss, Invasive plant species	Conversion of prairie habitat to residential development, farmland; succession to forest due to fire suppression; Scotch broom invasion	Conserve Suitable Habitat; Restore Degraded Habitat; Research, Natural History & Conservation	use easements, acquisitions, or agreements to conserve habitat; restore prairies
Lack of Information	Potential threat from herbicide and pesticide spraying	Research, Natural History and Conservation	Conduct research to evaluate potential exposure to toxins from pesticide and herbicide applications

Sage sparrow *Amphispiza belli nevadensis*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Obligate shrub-steppe species	Uncommon migrant and summer resident in shrub-steppe of e. Washington, rare migrant w. of Cascades	Sagebrush landscapes of the Columbia Basin
Monitoring Activities ➔	Selected local populations are monitored in study areas of the WDFW research project for shrub-steppe habitat relationships and avian population dynamics.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Invasive Plant Species	Habitat degradation by cheatgrass; increased fire frequency kills native plants and depletes grass and shrub seed reservoirs while replacing native species with exotic annuals.	Conserve Suitable Habitat; Habitat Monitoring and Research	Conserve existing big sagebrush habitats from cheatgrass invasion, and develop options for management of cheatgrass to restore ecological function.
Lack of Information	Lack of knowledge about general life history and ecology of this subspecies	Population monitoring and research, Habitat Monitoring and Research	Conduct studies at landscape scales in areas of differing land management uses to determine amount, quality and connectivity of sagebrush needed to sustain populations.

Habitat Loss	Loss of big sagebrush; residential development, agricultural conversion, and road and power line rights-of-way that remove shrub-steppe habitat. Fragmentation of shrub-steppe habitat detrimental to populations.	Conserve Suitable Habitat; Restore Degraded Habitats; Research natural history and conservation	quantify effects of fragmentation of shrub-steppe habitat on sage sparrow population persistence at landscape scale. Identify areas of core habitat on public lands to function as reserves and restore function to habitat on private lands, where connectivity occurs with core habitat, through enrollment in CRP.

REPTILES

Western pond turtle *Actinemys (Clemmys) marmorata*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Nests in grassland and open woodland around ponds	Natural populations occur at 2 sites; captive bred and head-started turtles used for reintroductions and augmentation at 3 sites.	Puget Tough and Columbia Gorge
Monitoring Activities ➔	Intensive annual population/nesting/productivity surveys of known and reintroduction sites.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Development	Destruction nesting habitat; isolation of breeding ponds, road mortality	Conserve suitable habitat; protect significant areas	protect or restore nesting habitat at existing and potential sites
Invasive Animal Species	bullfrog and bass predation on hatchlings, non-natives turtles: competition and introduced disease	Control and monitor introduced animals	Implement bullfrog and fish control as needed
Limited distribution	Small number and isolation of sites	Implement recovery plan	continue reintroductions

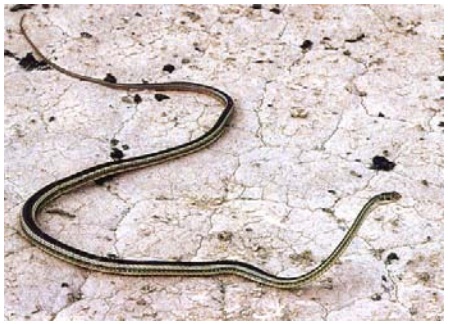
Pygmy horned lizard *Phrynosoma douglasii*	**Biology and Life History**	**Population**	**Distribution**
 William Leonard	Inhabit shrub-steppe; bear live young in summer	Uncommon; trend unknown; extinct in BC	Columbia Basin and Cascade foothills
Monitoring Activities ➔	Nature Mapping surveys conducted in eastern Washington in conjunction with Waterville Elementary School in Douglas County. Current research is being done in Kittitas County by Central WA University graduate student.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Harvest	Mortality after capture for pets	Education and outreach	discourage capture for pets
Lack of information	Trend in population and distribution largely unknown	Determine and map distribution	Record occurrence data during other activities; map locations
Habitat loss	development or conversion of habitat to agriculture	Conserve suitable habitat	Restoration, acquisition, education and citizen science.

Sagebrush lizard *Sceloporus graciosus*	**Biology and Life History**	**Population**	**Distribution**
 Adam P. Summers, Cal Photos	Restricted to sand dune and sandy habitats with shrubs and bare ground; active on sunny days from April -October; young appear in August	Declining due to habitat loss; small isolated populations	Columbia Basin and Okanogan
Monitoring Activities ➔	Ongoing surveys focusing on sand dune habitat in the Columbia Basin and Okanogan by WADNR Natural Heritage Program.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	conversion to agriculture	Conserve suitable habitat	Conserve suitable habitat
Lack of information	incomplete knowledge of distribution	Determine and map distribution	Develop a formal species-specific protocol; use it to complete surveys of historic range
Limited distribution	isolated populations at risk to extinction	Protect significant sites	identify sites and protect with easements, agreements,
Invasive plants	cheatgrass degrades habitat	Restore degraded habitat	control cheatgrass at occupied sites

Racer (W WA) *Coluber constrictor*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. of Fish & Wildlife	Diurnal snake of grassland and talus; high fidelity to communal winter dens	Probably extirpated; no records since 1939	south Puget Sound prairies
Monitoring Activities ➔	Occasional surveys in south Puget Sound prairies by WADNR Natural Heritage and WDFW.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information and loss of habitat	Not enough known about life history and habitat; not seen in western Washington for 65 years.	Determine and map distribution	Develop a formal species-specific protocol; use it to conduct systematic surveys to determine if any extant population

Sharptail snake *Contia tenuis*	**Biology and Life History**	**Population**	**Distribution**
 William Leonard	Little known; surface active in moist conditions, otherwise retreats underground under rocks and woody debris; feeds on slugs	Small isolated populations; little known	Disjunct localities in Chelan, Kittitas, Yakima, Klickitat, Skamania and Pierce counties
Monitoring Activities ➔	Occasional surveys in Pierce County by WADNR Natural Heritage and WDFW.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Undocumented populations may be destroyed; conservation needs little understood	Research natural history and conservation	Limiting factors need to be identified
Limited distribution	small isolated populations vulnerable to extinction	Determine and map distribution	Develop a formal species-specific protocol; use it to survey and map
Habitat loss	disturbance to rock, woody debris, and moisture regime	Protect significant sites; conserve suitable habitat	

California mountain kingsnake *Lampropeltis zonata*	**Biology and Life History**	**Population**	**Distribution**
 Adam P. Summers, Cal Photos	Inhabits moist microhabitats in pine-oak;	Population isolated from rest of range by 200 miles; size and trend unknown	Skamania and Klickitat County
Monitoring Activities ➔	No formal surveys. Occurrence information primarily from incidental observation reports submitted to WDFW.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Harvest	Illegal collecting for pet trade	Education and enforcement	Education project in counties; make special effort to involve the pet trade in self-regulation and education
Lack of information	Habitat needs, limiting factors, largely unknown	Research natural history and conservation; Determine and map distribution	Identify habitat needs, mortality factors; survey potential habitat
Habitat loss	Development, destruction of overwintering sites	Protect significant sites	Seek easements, etc.
Limited distribution	restricted distribution and habitat needs suggest small vulnerable population	Conserve suitable habitat	

Striped whipsnake *Masticophis taeniatus*	**Biology and Life History**	**Population**	**Distribution**
 Jon Beck	Found in intact shrub-steppe; diurnal; overwinters communally with other snake species; reuse hibernacula	very few records	shrub-steppe in Columbia Basin
Monitoring Activities ➔	Annual surveys conducted by WADNR Natural Heritage Program with assistance from BLM, WDFW, in areas where snakes have been observed in the past. Radio-telemetry study in Grant County starting fall 2005 by WADNR Natural Heritage Program.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Loss of sagebrush habitats	Protect significant sites; Conserve suitable habitat	Restore habitat on public land; protect other sites with easements, agreements, etc.
Lack of information	Little data on habitat needs, limiting factors	Research natural history and conservation	Identify specific needs, limiting factors
Development	roadkill mortality; den site destruction	Identify and map sites of mortality	Develop mitigation strategy

Pacific gopher snake (W WA) *Pituophis catenifer catenifer*	**Biology and Life History**	**Population**	**Distribution**
 William Flaxington, Cal Photos	Inhabited prairie and dry woodland; winters in communal dens	Probably extirpated	South Puget Sound prairies
Monitoring Activities ➔	Occasional surveys in south Puget Sound prairies by WADNR Natural Heritage and WDFW.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	No recent records.	Determine and map distribution	Develop a formal species-specific protocol; use it to conduct systematic surveys to determine if any extant population

AMPHIBIANS

Tiger salamander *Ambystoma tigrinum*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	eggs and larvae in ponds in steppe and ponderosa pine; some adults remain gilled and aquatic, transformed adults spend most time underground	Locally abundant	eastern Columbia Basin, northeast Washington and Okanogan Highlands
Monitoring Activities ➔	Tiger salamander surveys every 2-3 years on selected BLM allotments in Lincoln, Whitman and Douglas Counties. Other occurrence information from inventory work in the Columbia Basin (WADNR Natural Heritage Program) and incidental observation records submitted to WDFW.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Hybridization	Potential loss of genetic integrity due to out of state subspecies used for fish bait	Control and monitor genetic pollution	Conduct genetic work to determine extent of problem; control nonnative strains
Introduced animals	Introduced predatory fish	Control and monitor predatory fishes	enforce restrictions on transplantation of fishes
Harvest	use of larvae for fish bait	Deter use of larvae for fish bait	Education
Lack of information	Limiting factors and conservation needs largely unknown	Determine and map distribution, Conduct research	Protect significant areas

Dunn's salamander *Plethodon dunni*	**Biology and Life History**	**Population**	**Distribution**
 William Leonard, CalPhotos	Inhabits cool, moist habitats. Found in forested areas from sea level to 2,000 ft. in Washington. Both juveniles and adults inhabit wet, rocky substrates that are heavily shaded, including wet talus slopes, seepage and stream borders. Majority of occurrences in forests >60 years of age.	Rare, unknown, possibly declining	In Washington, found only in the Willapa Hills in extreme southwestern portion of the state.
Monitoring Activities ➔	N-type stream and down woody debris studies (LWAG).		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	alteration of streams, loss of large woody debris through timber management.	Protect significant areas	survey and map locations; minimize impact by forest management.
Limited distribution	Populations may be isolated by roads, timber harvest	Conserve suitable habitat	protect streams, talus, and moist, older forest
Lack of information	Not enough known about distribution and habitat requirements	Conduct research on distribution and habitat requirements.	Research effects of forest management activities and experimental low impact techniques

Larch Mountain salamander *Plethodon larselli*	**Biology and Life History**	**Population**	**Distribution**
 William Leonard, CalPhotos	Inhabits steep talus, lava tubes, or in some areas old growth timber; surface active in wet spring and fall weather, otherwise subterranean	Population size and trends unknown	Columbia Gorge and isolated sites in the southern Washington Cascades
Monitoring Activities ➔	Chris – contact Charlie Crisafulli at USDA Forest Service (Pacific Northwest Research Station) to see if they are still surveying for PLLA.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	destruction of talus for roads; microclimate disruption due to overstory removal	Protect significant areas	Conserve talus and overstory of forested talus
Lack of information	limiting factors unknown	Determine and Map distribution	Determine and Map distribution

Van Dyke's salamander *Plethodon vandykei*	**Biology and Life History**	**Population**	**Distribution**
 William Leonard, CalPhotos	Associated with streams, seeps, rocks and talus; most abundant in older forest abundant woody debris, large decaying logs near streams; females brood and guard eggs.	small isolated population complexes	3 isolated populations on the Olympic Peninsula, the Willapa Hills, and the south Cascades; only in Washington

Monitoring Activities ➔	Charlie Crisafulli at USDA Forest Service (Pacific Northwest Research Station) to see if they are still surveying for PLVA.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	impacts of timber harvest, road building, and herbicides unknown	Population monitoring and research	research life history, movements, dispersal, impacts of forest practices
Habitat loss	alteration of streams, loss of large woody debris	Protect significant areas	survey and map locations
Limited distribution	Populations may be isolated by roads, timber harvest	Conserve suitable habitat	protect streams, talus, and moist, older forest

Cascade torrent salamander *Rhyacotriton cascadae*	**Biology and Life History**	**Population**	**Distribution**
 William Leonard, CalPhotos	Closely tied to clear cold streams, especially in splash zone; larvae in gravels in deeper water; egg to adult development may require 4.5 years	Can reach high densities in optimal habitat	west slope of southern Cascades south of Nisqually River to the Columbia
Monitoring Activities ➔	Contact Charlie Crisafulli at USDA Forest Service (Pacific Northwest Research Station) to see if they are still surveying for RHCA.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**

Habitat Loss	Degradation of habitat by sediment due to logging, road building	Habitat monitoring and research	stream buffers during timber harvest;
Lack of information	Lack of data on limiting factors, life history and potential for impacts from land uses, and forest practices.	Research life history and conservation needs	identify needed conservation measures
Limited Distribution	Populations may become isolated	Determine and map distribution, Conserve suitable habitat	survey and map sites

Columbia torrent salamander *Rhyacotriton kezeri*	**Biology and Life History**	**Population**	**Distribution**
 William Leonard, CalPhotos	Closely tied to clear cold streams, especially in splash zone; larvae in gravels in deeper water	Locally common in appropriate habitat; may be temporarily extirpated	southwest Washington
Monitoring Activities ➔			
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Degradation of habitat by sediment due to logging, road building	Habitat monitoring and research	stream buffers during timber harvest;
Lack of information	Long term effects of forest management unknown	Research life history, movements	Research life history, movements

Rocky Mountain tailed frog *Ascaphus montanus*	**Biology and Life History**	**Population**	**Distribution**
 Paul Bannick, Cal Photos	Associated with cold, clear, rocky, streams in mature forest; eggs attached to underside of rocks in fast flowing streams.	Current status of populations not known	Blue Mountains
Monitoring Activities ➔	No formal surveys at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Degradation of habitat by sediment due to logging, road building	Habitat monitoring and research	stream buffers during timber harvest;
Lack of information	Potential effects of forest practices, roads, and grazing unknown; status and distribution data needed	Research natural history and conservation	Survey and map distribution; conduct research on impacts of land uses;

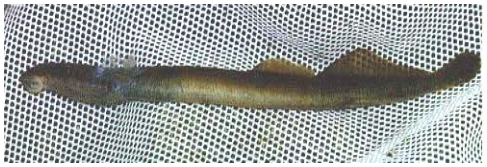
Western toad *Bufo boreas*	**Biology and Life History**	**Population**	**Distribution**
 Paul Bannick, Cal Photos	Breed in ponds, lakes, and still water off-channel river habitats; development to metamorphosis takes about 2 months, after which toadlets disperse en masse.	Locally common, but rapid unexplained declines resulted; absent from portions of historic range	In forest, prairie and canyon grasslands throughout the state; mostly absent from shrub-steppe regions
Monitoring Activities ➔	No formal statewide inventory. Annual monitoring activities at Tahuya State Forest and Ft. Lewis Military Reservation by WADNR Natural Heritage Program and WDFW. Ongoing research activities at Mt. St. Helens by USDA Forest Service. Ongoing surveys to locate breeding sites by WADNR Natural Heritage Program and WDFW. Occasional monitoring activities by some districts of the Colville National Forest.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Taxonomic uncertainty may mean 1 or more taxa are in greater decline; causes of declines not understood; distributional data needed	Research taxonomy, conservation	Survey and map distribution, conduct genetic studies,
Development	Roadkill mortality when moving to and from breeding sites	Conserve suitable habitat	Avoid roadbuilding near breeding sites, or provide crossings

Northern leopard frog *Rana pipiens*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Breed in ponds, lakes, rivers; may stray from water in summer, but little known about habitat use.	Reduced to small areas in the Moses Lake-Potholes Reservoir and Gloyd Seeps areas	Columbia Basin, Okanogan, and northeastern Washington
Monitoring Activities ➔	Intensive surveys as part of research conducted by WDFW at Potholes Wildlife Area. Regular surveys conducted on Kalispell Indian Reservation. Occasional surveys conducted on Colville National Forest Lands near Pend Oreille River.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Conservation needs not understood	Research natural history and conservation	research habitat needs, impacts of exotic species, movements,
Introduced animals	Predation by bullfrogs and predatory fish; habitat degradation by carp and mosquito fish	Control and monitor introduced species	Develop methods to control or otherwise mitigate impacts of bullfrogs and fish
Environmental contamination	agricultural chemicals	Control and monitor contaminants	evaluate need for contaminant studies

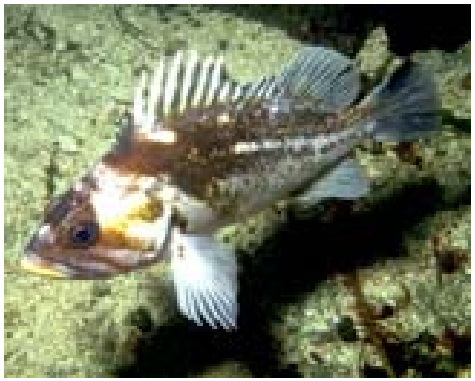
Oregon spotted frog *Rana pretiosa*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Highly aquatic; extant populations inhabit large shallow wetlands associated with streams; breeds in seasonally flooded margins, move underwater in winter. Require source of well-oxygenated water in winter, temperatures above freezing	Declined; only 6 populations remain	Thurston and Klickitat counties
Monitoring Activities ➔	Annual egg mass surveys conducted at 5 of 6 known populations by WDFW, WADNR Natural Heritage Program, USFWS. Decade long population study at Dempsey Creek by WDFW. Spring trapping surveys conducted in Black River Watershed to find new populations and determine dispersal patterns by WDFW.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Water development	Altered hydrology can eliminate habitat	Protect significant areas; conserve suitable habitat	protect known sites; identify and protect potential habitat
Lack of information	Potential impacts of land use, etc not understood	Research natural history and conservation	Investigate limiting factors
Introduced animals	Bullfrogs and introduced fishes	Control and monitor exotic species	Control bullfrogs and predatory fish as needed
Modification of natural processes	Loss of beaver and beaver ponds may be important	Protect natural processes	Conserve beaver populations and dynamic stream processes

Columbia spotted frog *Rana luteiventris*	**Biology and Life History**	**Population**	**Distribution**
 William Leonard, CalPhotos	relatively aquatic, rarely found far from ponds, lakes, creeks; breeds in seasonally flooded margins of wetlands	Common in Okanogan and northern Cascades; declined in other states.	Most of eastern Washington, but largely absent from Columbia Basin
Monitoring Activities ➔	Annual Columbia Spotted Frog egg mass surveys/census of selected BLM allotments in Lincoln and Whitman Counties. Occasional egg mass surveys in some districts of the Colville National Forest.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Water development	Altered hydrology can eliminate habitat	Protect significant areas; conserve suitable habitat	protect known sites; identify and protect potential habitat
Lack of information	Potential impacts of land use, etc not understood	Research natural history and conservation; Determine and map distribution	Investigate limiting factors; survey historic sites and potential habitat
Modification of natural processes	Loss of beaver and beaver ponds may be important	Protect natural processes	Conserve beaver populations and dynamic stream processes
Introduced animals	Bullfrogs and introduced fishes	Control and monitor exotic species	Control bullfrogs and predatory fish as needed

FISH

River lamprey *Lampetra ayresi*	**Biology and Life History**	**Population**	**Distribution**
 U.S. Fish & Wildlife Service	Juveniles spend 3-6 years as filter feeders in streams and rivers, then metamorphose into adults and migrate to ocean. Adults feed on fishes for no more than 1 year, migrate back to freshwater to spawn and die.	Population size and trend unknown.	In Washington, this fish has been documented in only 6-8 coastal rivers and lakes. May occur in other coastal rivers and possibly the Columbia River System.
Monitoring Activities ➔	No past or current monitoring activities. Accumulate incidental data.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Little is known about the population and trend status, but it is perceived as declining.	Determine population status and trends, and species differentiation. Of our 3 lamprey species, the least is known about river lamprey.	Survey and map distribution. Develop methods to differentiate between species of juvenile lamprey.
Hydro development	Dams and other passage barriers.	Determine what is a barrier and how to allow for fish passage.	Identify potential obstacles. Develop methods to pass barrier.
Lack of information	Although general habitat and life history requirements are known, limiting factors and critical needs are not.	Habitat monitoring and research. Determine limiting factors. Again, of the 3 lamprey species, the least is known about river lamprey.	Research habitat needs, availability and usage. Research limiting factors, such as environmental stressors, predation and trophic relationships.

Pacific lamprey *Lampetra tridentata*	**Biology and Life History**	**Population**	**Distribution**
 U.S. Fish & Wildlife Service	Juveniles spend 4-7 years as filter feeders in streams and rivers, then metamorphose and migrate to ocean. Adults parasitic on fishes for 1-2 years, migrate back to freshwater to spawn and die.	Population size and trends unknown. Columbia River lamprey appear to be on the decline according to dam counts and anecdotal information.	In Washington, distributed throughout streams and rivers of Columbia Basin up to Chief Joseph Dam, and throughout streams and rivers west of the Cascade Mountains.
Monitoring Activities ➔	Mid-Columbia Public Utility Districts are actively pursuing development of management plans. WDFW started annual redd counts in 2005. Counts of migrating adults are tallied annually by Columbia River dam operators. No other monitoring activities ongoing or planned by WDFW. Accumulate incidental data.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Little is known about the population and trend status, but it is perceived as declining, particularly in the Columbia River System.	Determine population status and trends, and species differentiation.	Survey and map distribution. Develop methods to differentiate between species of juvenile lamprey.
Hydro development	Dams and other passage barriers.	Determine what is a barrier and how to allow for fish passage.	Identify potential obstacles. Develop methods to pass barrier.
Lack of information	Although general habitat and life history requirements are known, limiting factors and critical needs are not.	Habitat monitoring and research. Determine limiting factors.	Research habitat needs, availability and usage. Research limiting factors, such as environmental stressors, predation and trophic relationships.

Copper rockfish *Sebastes caurinus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Copper rockfish is an important species of the nearshore, benthic rockfish assemblage in Puget Sound. Adults are relatively sedentary and have well defined home ranges. Maximum size is 26 inches. Coppers live to at least fifty years of age with reproduction starting at 4-6 years (surface ages).	Historically coppers have been the most commonly encountered rockfish species in Puget Sound. Copper rockfish populations in both North and South Sound have precipitously declined to low levels. Currently depleted in both North and South Puget Sound.	Copper rockfish live predominantly in rocky areas as adults, schooling with other rockfish species. Coppers are found throughout Puget Sound and nearshore coastal waters. This species inhabits depths of less than 200 ft and associates with high relief rocky habitats throughout the inland marine waters of Washington. Young of the year settle fairly rapidly and inhabit upper layers of kelp canopy, moving to deeper layers and cobble areas before occupying adult habitat.
Monitoring Activities ➔	We have limited capacity to completely assess populations of rockfish in Puget Sound. We conduct basin wide surveys using trawl to develop trend information. Nearshore survey done with quantitative video for copper and quillback including several index sites in MPAs. Lack demographic information for formal stock assessments and information about other life history stages and trophic relationships. Need a system of synoptic trawl and quantitative video surveys in deep and shallow habitats, demographic information, life history, trophic analyses and catch monitoring.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Harvest removals	Coppers are harvested recreationally and commercially and have been one of the most important rockfish species in the recreational fisheries. They are currently vulnerable as bycatch in the recreational fisheries for salmon. These fish are physoclistous (the air bladder is closed to the esophagus), and the gas bladder overextends if fish is pulled up from depth likely causing internal damage and mortality.	Reduce harvest encounters	Restrict retention. Establish Marine Protected Areas or other types of area-gear restrictions.

Predation	Increasing populations of seals, sea lions, lingcod, and other piscivorous fish.	Monitor predator populations	Monitor seal, sea lion and lingcod population trends and food habits (particularly where rockfish populations show some recovery). Conduct assessments of other fish species and evaluate trophic dynamics.
Lack of information	Insufficient information to conduct population assessments by area within Puget Sound (N and S Sound).	Assess populations using fishery independent methods	Conduct synoptic surveys to determine relative abundances periodically.
Lack of information	Areas used by all life history stages and movement of juveniles before selection of adult habitat are poorly understood and not known	Determine and map distribution, relative abundance and contributions to reproduction.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques. Conduct focus studies on the specific habitat requirements for each life history stage. Develop methods to track and measure reproductive contribution from local populations in specific locations.
Toxic chemicals	Copper rockfish are one of the longer lived fish historically common in the urbanized basins of Puget Sound. They accumulate and concentrate persistent organic pollutants, including endocrine disrupters, and heavy metals.	Determine and map distribution and relative concentrations in fish.	Determine effects on populations and life histories, including reproduction using field studies, epidemiological information and/or laboratory studies.

Greenstriped rockfish *Sebastes elongatus*	**Biology and Life History**	**Population**	**Distribution**
 NOAA	Greenstriped rockfish reach a maximum size of 15.6 inches and live to about 54 years. Females reach a larger size than males. Fifty percent of males mature at about 10 years (10.4 inches) and 50% of the females are mature at age 7 years (8.8 inches). In British Columbia larvae are released after June.	Unknown, but this species appears to be a minor species in Puget Sound.	Puget Sound and coastal marine waters. They occur in relatively deep water.
Monitoring Activities ➔	We have limited capacity to completely assess populations of rockfish in Puget Sound. We conduct basin wide surveys using trawl to develop trend information. Lack demographic information for formal stock assessments and information about other life history stages and trophic relationships. Need a system of synoptic trawl and quantitative video surveys in deep and shallow habitats, demographic information, life history, trophic analyses and catch monitoring.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Harvest Removals	In Puget Sound, directed fisheries for rockfish are greatly reduced, but by-catch still occurs in other fisheries, predominantly the recreational salmon fishery. These fish are physoclistous (the air bladder is closed to the esophagus), and the gas bladder overextends if fish is pulled up from depth likely causing internal damage and mortality. Greenstriped rockfish is a minor species and are caught incidentally to other fisheries.	Reduce harvest encounters	Restrict retention. Establish deep-water Marine Protected Areas or other types of area-gear restrictions.
Lack of information	Insufficient information to conduct population assessments by area within Puget Sound (N and S Sound).	Assess populations using fishery independent methods	Conduct synoptic surveys to determine relative abundances periodically.

Lack of information	Areas used by all life history stages and movement of juveniles before selection of adult habitat are poorly understood and not known	Determine and map distribution, relative abundance and contributions to reproduction.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques.
Predation	Increasing populations of seals, sea lions, lingcod, and other piscivorous fish.	Monitor predator populations	Monitor seal, sea lion and lingcod population trends and food habits (particularly where rockfish populations show some recovery). Conduct assessments of other fish species and evaluate trophic dynamics.

Quillback rockfish *Sebastes maliger*	**Biology and Life History**	**Population**	**Distribution**
 Clinton Bauder	Quillback reach a maximum size of 24 inches and live to age 95 years (73 is the oldest age from Puget Sound). Adult quillback exhibit limited movements and often have a small home range. Quillback moved from one location to another often return to their original site.	Historically, quillback rockfish is the second most common rockfish in Puget Sound. Quillback rockfish live longer and grow more slowly than copper rockfish and constitute a limiting population to the management of Puget Sound rockfish fisheries. Currently depleted in both North and South Puget Sound.	Quillback are found throughout Puget Sound and nearshore coastal marine waters. Inhabits nearshore and deep waters to 700 feet in Puget Sound and associates with high relief rocky habitats. Surveys for post-larval quillback rockfish found them in similar but fewer places as settling copper rockfish.
Monitoring Activities ➔	We have limited capacity to completely assess populations of rockfish in Puget Sound. We conduct basin wide surveys using trawl to develop trend information. Nearshore survey done with quantitative video for copper and quillback including several index sites in MPAs. Lack demographic information for formal stock assessments and information about other life history stages and trophic relationships. Need a system of synoptic trawl and quantitative video surveys in deep and shallow habitats, demographic information, life history, trophic analyses and catch monitoring.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**

Harvest pressure	Historically, one of the most important species of rockfish in Puget Sound. Currently, directed fisheries are greatly restricted but by-catch still occurs in other fisheries, predominantly the recreational salmon fishery. These fish are physoclistous (the air bladder is closed to the esophagus), the gas bladder overextends if fish is pulled up from depth likely causing internal damage and mortality.	Reduce harvest encounters	Restrict retention. Establish Marine Protected Areas or other types of area-gear restrictions.
Lack of information	Insufficient information to conduct population assessments by area within Puget Sound (N and S Sound).	Assess populations using fishery independent methods	Conduct synoptic surveys to determine relative abundances periodically.
Toxic contaminations	Because of their longevity and biology, quillback rockfish have relatively high burdens of toxic chemicals. They accumulate a variety of chemicals, particularly in the urbanized basins of Puget Sound. Potential effects on the fish include impacts on both growth and reproduction.	Assess burdens of toxic compounds throughout Puget Sound.	Determine effects on populations and life histories, including reproduction using field studies, epidemiological information and/or laboratory studies.
Predation	Increasing populations of seals, sea lions, lingcod, and other piscivorous fish.	Monitor predator populations	Monitor seal, sea lion and lingcod population trends and food habits (particularly where rockfish populations show some recovery). Conduct assessments of other fish species and evaluate trophic dynamics.

Lack of information	Areas used by all life history stages and movement of juveniles before selection of adult habitat are poorly understood and not known	Determine and map distribution, relative abundance and contributions to reproduction.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques. Conduct focus studies on the specific habitat requirements for each life history stage. Develop methods to track and measure reproductive contribution from local populations in specific locations.

Black rockfish (Puget Sound) *Sebastes melanops*	**Biology and Life History**	**Population**	**Distribution**
 Clinton Bauder	Black rockfish is a species inhabiting the water column in proximity to nearshore rocky habitats. Blacks are a mobile, schooling species often found mid water. Black rockfish tagged in Puget Sound have moved into the coast while one fish tagged off of central Oregon was recaptured in Puget Sound. Black rockfish reach a maximum size of 27.5 inches and have been aged to 50 years (12-14, surface read, is the maximum age documented in Puget Sound).	Insufficient data exist to establish the status of black rockfish in Puget Sound. Given its continued decline in the San Juan Archipelago where this species was once abundant and its rarity in South Sound, this species should be managed in a precautionary manner in both areas. These fish comprise an important recreational catch in coastal waters and the stock is adequate to support the ocean fishery.	Coastal and Puget Sound waters in high and low relief (rocky) areas generally in waters 30-180 feet deep.
Monitoring Activities ➔	Stock monitoring on the coast is adequate to produce a stock assessment. We have limited capacity to completely assess populations of rockfish in Puget Sound. We conduct basin wide surveys using trawl to develop trend information. Nearshore survey done with quantitative video for copper and quillback including several index sites in MPAs. Need a system of synoptic trawl and quantitative video surveys in deep and shallow habitats, demographic information, life history, trophic analyses and catch monitoring.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**

Harvest pressure	In Puget Sound, directed fisheries are greatly restricted, but by-catch still occurs in other fisheries, predominantly the recreational salmon fishery.	Reduce harvest encounters	Restrict retention. Exception is in the western Strait of Juan de Fuca where the ocean population is harvested. Establish Marine Protected Areas or other types of area-gear restrictions.
Predation	Increasing populations of seals, sea lions, lingcod, and other piscivorous fish.	Monitor predator populations	Monitor seal, sea lion and lingcod population trends and food habits (particularly where rockfish populations show some recovery). Conduct assessments of other fish species and evaluate trophic dynamics.
Lack of information	Areas used by all life history stages are poorly understood and not known	Determine and map distribution and relative abundance.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques. Conduct focus studies on the specific habitat requirements for each life history stage. Develop methods to track and measure reproductive contribution from local populations in specific locations.
Lack of information	Insufficient information to conduct population assessments by area within Puget Sound (N and S Sound).	Assess populations using fishery independent methods	Conduct synoptic surveys to determine relative abundances periodically.

China rockfish *Sebastes nebulosus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Chinas reach a maximum size of 18 inches and live to at least age 79 years.	The population of China rockfish is unknown. Reportedly China rockfish were an important commercial species in Puget Sound during the nineteenth century. They are uncommon throughout the Sound now.	Adults prefer high energy, high-relief rocky habitat with the numerous cavities for resting. Appear to be very territorial with small home ranges, moving less than 10 meters within their territories
Monitoring Activities ➔	We have limited capacity to completely assess populations of rockfish in Puget Sound. Nearshore survey done with quantitative video for copper and quillback including several index sites in MPAs. Need a system of synoptic trawl and quantitative video surveys in deep and shallow habitats as well as surveys that target rare or cryptic species (e.g. china, yelloweye, tiger), demographic information, life history, trophic analyses and catch monitoring.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Harvest removals	In Puget Sound, directed fisheries are greatly restricted, but by-catch still occurs in other fisheries, predominantly the recreational salmon fishery. These fish are physoclistous (the air bladder is closed to the esophagus), the gas bladder overextends if fish is pulled up from depth likely causing internal damage and mortality.	Reduce harvest encounters.	Restrict retention. Establish Marine Protected Areas or other types of area-gear restrictions.
Lack of information	Insufficient information to conduct population assessments by area within Puget Sound (N and S Sound).	Assess populations using fishery independent methods	Conduct relative abundance survey every few years.

Lack of information	Areas used by all life history stages and movement of juveniles before selection of adult habitat are poorly understood and not known	Determine and map distribution, relative abundance and contributions to reproduction.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques. Conduct focus studies on the specific habitat requirements for each life history stage. Develop methods to track and measure reproductive contribution from local populations in specific locations.
Predation	Increasing populations of seals and sea lions; Lingcod likely eat the subadult stages.	Monitor predator populations	Monitor seal, sea lion and lingcod population trends and food habits (particularly where rockfish populations show some recovery). Conduct assessments of other fish species and evaluate trophic dynamics.

Tiger rockfish *Sebastes nigrocinctus*	**Biology and Life History**	**Population**	**Distribution**
 Andy Murch	Tiger rockfish are marked with five vertical bands of red, brown or black over a pink or white body. They can reach 24 inches in length, and live to be about 116 years of age. They are active at dawn and dusk but stay hidden most of the day.	This species has apparently always appeared in limited numbers in Puget Sound fisheries. In general, rare rockfish species have become more rare in Puget Sound in recent years.	Puget Sound and coastal waters. Tigers are sometimes seen on flat rocks with caves or cavities nearby to hide in. They live in waters between 60 and 984 feet deep as adults. Juveniles have been seen in drift vegetation.

Monitoring Activities ➔	We have limited capacity to completely assess populations of rockfish in Puget Sound. Nearshore survey done with quantitative video for copper and quillback including several index sites in MPAs. Need a system of synoptic trawl and quantitative video surveys in deep and shallow habitats as well as surveys that target rare or cryptic species (e.g. china, yelloweye, tiger), demographic information, life history, trophic analyses and catch monitoring.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Harvest removals	In Puget Sound, directed fisheries are greatly restricted, but by-catch still occurs in other fisheries. These fish are physoclistous (the air bladder is closed to the esophagus), the gas bladder overextends if fish is pulled up from depth likely causing internal damage and mortality.	Reduce harvest encounters	Restrict retention. Establish Marine Protected Areas or other types of area-gear restrictions.
Lack of information	Insufficient information to conduct population assessments by area within Puget Sound (N and S Sound).	Assess populations using fishery independent methods	Given cryptic habits of this species, targeted surveys are needed to determine relative abundances periodically.
Lack of information	Areas used by all life history stages are poorly understood and not known	Determine and map distribution and relative abundance.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques. Conduct focus studies on the specific habitat requirements for each life history stage. Develop methods to track and measure reproductive contribution from local populations in specific locations.
Predation	Increasing populations of seals, sea lions, lingcod, and other piscivorous fish.	Monitor predator populations	Monitor seal, sea lion and lingcod population trends and food habits (particularly where rockfish populations show some recovery). Conduct assessments of other fish species and evaluate trophic dynamics.

Bocaccio rockfish *Sebastes paucispinis*	**Biology and Life History**	**Population**	**Distribution**
 Clinton Bauder, Cal Photos	Bocaccio are a long-bodied rockfish with few head spines and a very large mouth. They are a large rockfish (up to 36" and 15 lbs) that range in color from pink to gray with some being dark red or golden orange. Black spots (melanistic blotches), a form of skin cancer, are common in adults. Aging for these fish has not been considered reliable, but they may live to be 50 years or more.	Once relatively common in Central Puget Sound and very common in specific habitats. Catch has declined in Puget Sound and these are now rare in the catch.	Juveniles live in nearshore habitats and move deeper with age. Surveys for young bocaccio rockfish in Puget Sound have only found them in the western Strait of Juan de Fuca near Freshwater Bay Adults are a deepwater species often associated with steep slopes consisting of sand or rocky substrate. They also inhabit high relief boulder fields and areas with drop offs.
Monitoring Activities ➔	We have limited capacity to completely assess populations of rockfish in Puget Sound. We conduct basin wide surveys using trawl to develop trend information. Nearshore survey done with quantitative video for copper and quillback including several index sites in MPAs. Lack demographic information for formal stock assessments and information about other life history stages and trophic relationships. Need a system of synoptic trawl and quantitative video surveys in deep and shallow habitats, demographic information, life history, trophic analyses and catch monitoring.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Harvest removals	There were directed fisheries on local populations historically. Now taken as bycatch in other fisheries, especially the recreational salmon fishery. These fish are physoclistous (the air bladder is closed to the esophagus), the gas bladder overextends if fish is pulled up from depth likely causing internal damage and mortality.	Reduce harvest encounters.	Restrict retention. Establish Marine Protected Areas or other types of area-gear restrictions.
Lack of information	Insufficient information to conduct population assessments by area within Puget Sound (N and S Sound).	Assess populations using fishery independent methods	Conduct synoptic surveys to determine relative abundances every few years.

Predation	Increasing populations of seals, sea lions, lingcod, and other piscivorous fish.	Monitor predator populations	Monitor seal, sea lion and lingcod population trends and food habits (particularly where rockfish populations show some recovery). Conduct assessments of other fish species and evaluate trophic dynamics.
Lack of information	Areas used by all life history stages and movement of juveniles before selection of adult habitat are poorly understood and not known	Determine and map distribution, relative abundance and contributions to reproduction.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques. Conduct focus studies on the specific habitat requirements for each life history stage. Develop methods to track and measure reproductive contribution from local populations in specific locations.

Canary rockfish *Sebastes pinniger*	**Biology and Life History**	**Population**	**Distribution**
 Kawika Chetron	Canaries can grow to 29 inches long and at least 84 years old.	Because of their increased rarity, their overfished condition in coastal waters, and a lack of assessment information in Puget Sound, canary rockfish is at a precautionary status in both North and South Sound.	Larvae and juveniles spend several months up in the water column before moving to kelp beds and very shallow water. They move deeper as they grow. A deeper living rockfish associated with a variety of rocky and coarse habitats, adults collect in large numbers around pinnacles and high relief rock, often in high current areas and deeper water (264-660 feet). Some adults tagged in the ocean have moved long distances.

Monitoring Activities ➔	Coastal stock assessments occur. We have limited capacity to completely assess populations of rockfish in Puget Sound. We conduct basin wide surveys using trawl to develop trend information. Nearshore survey done with quantitative video for copper and quillback including several index sites in MPAs. Lack demographic information for formal stock assessments and information about other life history stages and trophic relationships. Need a system of synoptic trawl and quantitative video surveys in deep and shallow habitats, demographic information, life history, trophic analyses and catch monitoring.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Harvest removals	This species is not observed with regularity in commercial trawl fisheries but can make up to 5% of the rockfish catch by other commercial gears in North Sound. It has constituted less than 2% of recreational catch historically but has decreased in the catch. In Puget Sound, directed fisheries for this species are closed, but by-catch still occurs in other fisheries, predominantly the recreational salmon fishery. These fish are physoclistous (the air bladder is closed to the esophagus), the gas bladder overextends if fish is pulled up from depth likely causing internal damage and mortality.	Reduce harvest encounters	Keep bag limits at zero. Establish Marine Protected Areas or other types of area-gear restrictions.
Lack of information	Insufficient information to conduct population assessments by area within Puget Sound (N and S Sound).	Assess populations using fishery independent methods	Conduct synoptic surveys to determine relative abundances every few years.
Predation	Increasing populations of seals and sea lions	Monitor predator populations	Monitor seal, sea lion and lingcod population trends and food habits (particularly where rockfish populations show some recovery). Conduct assessments of other fish species and evaluate trophic dynamics.

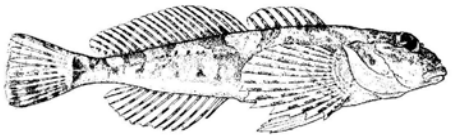
Lack of information	Areas used by all life history stages and movement of juveniles before selection of adult habitat are poorly understood and not known	Determine and map distribution, relative abundance and contributions to reproduction.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques. Conduct focus studies on the specific habitat requirements for each life history stage. Develop methods to track and measure reproductive contribution from local populations in specific locations.

Redstripe rockfish *Sebastes proriger*	**Biology and Life History**	**Population**	**Distribution**
 Richard Jack	Redstripe are a smaller schooling rockfish. Maximum size is about 20 inches and maximum age 55 years. About one half of the fish are sexually mature at age 7 years. Larvae are released April to July.	Found uncommonly throughout most basins in Puget Sound.	Redstripe associates with rocky and coarse habitats in broad range of depths from 60 feet to almost 700 feet that uncommonly occur throughout most basins in Puget Sound.
Monitoring Activities ➔	We have limited capacity to completely assess populations of rockfish in Puget Sound. We conduct basin wide surveys using trawl to develop trend information. Nearshore survey done with quantitative video for copper and quillback including several index sites in MPAs. Lack demographic information for formal stock assessments and information about other life history stages and trophic relationships. Need a system of synoptic trawl and quantitative video surveys in deep and shallow habitats, demographic information, life history, trophic analyses and catch monitoring.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**

Harvest removals	In Puget Sound, directed fisheries are greatly restricted, but by-catch still occurs in other fisheries, predominantly the recreational salmon fishery. During daylight hours, these fish school up off the bottom in their preferred habitats and can be caught by hook and line readily. These fish are physoclistous (the air bladder is closed to the esophagus), the gas bladder overextends if fish is pulled up from depth likely causing internal damage and mortality.	Reduce harvest encounters.	Restrict retention. Establish Marine Protected Areas or other types of area-gear restrictions.
Predation	Increasing populations of seals and sea lions; Lingcod likely eat the subadult stages.	Monitor predator populations	Monitor seal, sea lion and lingcod population trends and food habits (particularly where rockfish populations show some recovery). Conduct assessments of other fish species and evaluate trophic dynamics.
Lack of information	Insufficient information to conduct population assessments by area within Puget Sound (N and S Sound).	Assess populations using fishery independent methods	Conduct synoptic surveys to determine relative abundances every few years.
Lack of information	Areas used by all life history stages and movement of juveniles before selection of adult habitat are poorly understood and not known	Determine and map distribution, relative abundance and contributions to reproduction.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques. Conduct focus studies on the specific habitat requirements for each life history stage. Develop methods to track and measure reproductive contribution from local populations in specific locations.

Yelloweye rockfish *Sebastes ruberrimus*	**Biology and Life History**	**Population**	**Distribution**
 Clinton Bauder	Yelloweye are largest of the local species of rockfish and can reach 36 inches in length and a weight of 25 pounds. Yelloweye can live to an age of 118 years (the oldest aged in Puget Sound to date was 73). About one half of the fish are sexually mature at age 17 for males and 19 for females.	Population is listed as precautionary for management. Yelloweye were never common in Puget Sound but historically available to fishers who targeted very specific locations.	Juveniles occupy shallow water with the common rockfish species (coppers, quillback, etc.) and move into deeper water as they age. Adults are relatively sedentary living in association with high-relief rocky habitats and often near steep slopes. Adults are most common at depths from 300 to 600 feet.
Monitoring Activities ➔	A coastal stock assessment for this species is now done, but it needs additional information about non-trawlable habitat. We have limited capacity to completely assess populations of rockfish in Puget Sound. We conduct basin wide surveys using trawl to develop trend information. Nearshore survey done with quantitative video for copper and quillback including several index sites in MPAs. Lack demographic information for formal stock assessments and information about other life history stages and trophic relationships. Need a system of synoptic trawl and quantitative video surveys in deep and shallow habitats, demographic information, life history, trophic analyses and catch monitoring.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Harvest Removals	In Puget Sound, directed fisheries for this species are closed, but by-catch still occurs in other fisheries, predominantly the recreational salmon fishery. These fish can be caught readily by hook and line in their preferred habitats with specific fishing methods. These fish are physoclistous (the air bladder is closed to the esophagus), the gas bladder overextends if fish is pulled up from depth likely causing internal damage and mortality.	Reduce harvest encounters.	Keep bag limits at zero. Establish deep-water Marine Protected Areas or other types of area-gear restrictions.

Lack of information	Insufficient information to conduct population assessments by area within Puget Sound (N and S Sound).	Assess populations using fishery independent methods	Conduct synoptic surveys to determine relative abundances every few years.
Predation	Increasing populations of seals, sea lions, lingcod, and other piscivorous fish.	Monitor predator populations	Monitor seal, sea lion and lingcod population trends and food habits (particularly where rockfish populations show some recovery). Conduct assessments of other fish species and evaluate trophic dynamics.
Lack of information	Areas used by all life history stages and movement of juveniles before selection of adult habitat are poorly understood and not known	Determine and map distribution, relative abundance and contributions to reproduction.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques. Conduct focus studies on the specific habitat requirements for each life history stage. Develop methods to track and measure reproductive contribution from local populations in specific locations.

Margined sculpin *Cottus marginatus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Margined sculpin are a benthic fish inhabiting pools and glides in streams, usually over small gravel and silt. Spawning takes place in May-June. Most likely they feed on benthic invertebrates, fish eggs and young fish.	Locally common, but very restricted range.	Limited to the Walla Walla and Tucannon River drainages of SE Washington.
Monitoring Activities ➔	Habitat usage study conducted in 1990s by UW graduate student. No monitoring activities at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**

Limited distribution	A restricted distribution puts it at risk to habitat disturbances or alterations.	Monitor relative abundance	Conduct relative abundance survey every few years.
Habitat loss	Logging, agriculture or other activities that elevate temperature, alter hydrology, increase sedimentation, etc.	Conserve suitable habitat.	Identify and protect all known and potential habitat within its range.

Green sturgeon *Acipenser medirostris*	**Biology and Life History**	**Population**	**Distribution**
 Pat Higgins	Most often in marine waters; estuaries, lower reaches of large rivers, salt or brackish water off river mouths. Has been reported 140 miles inland in the Columbia River. No confirmed spawning in Washington.	Low and declining	There are two distinct population segments: the Oregon and Washington segment, which includes south coastal Washington (Grays Harbor and Willapa Bay) and the Columbia River estuary, and the California segment. The Oregon/Washington segment is not listed, however the California segment is listed, and the individuals mix between the two segments.
Monitoring Activities ➔	Standard harvest monitoring of white and green sturgeon is carried out cooperatively by WDFW and ODFW. The emphasis of Bonneville Power Administration and USFWS funded monitoring programs is to track general population status.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Harvest	Overfishing and bycatch in white sturgeon fishery	Sustainable harvest levels cannot be determined until the stock structure of green sturgeon is understood.	Conduct population abundance and distribution surveys. Implement and enforce restricted harvest regulations.
Hydropower	Dams and hydropower development	Determine what is a barrier and how to allow for fish passage.	Identify potential obstacles. Develop methods to pass barrier.

Habitat degradation	Logging, road construction, overgrazing, pollution runoff	Develop and implement environmentally sound land use policies and regulations	Work with public and private landowners through education, planning and regulatory pathways.
Lack of information	Information is needed on abundance and distribution.	Range-wide inventories needed to determine distribution and abundance.	Research and monitor population distribution and abundance, limiting factors, habitat requirements.

Pacific herring (Cherry Point and Discovery Bay stocks) *Clupea pallasi*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Herring spawn by depositing eggs on vegetation or other shallow water substrate in the shallow sub-tidal zone. Following hatching, larvae drift in the ocean currents. After metamorphosis, Puget Sound stocks of young herring spend their first year in Puget Sound. Following the attainment of sexual maturity at age two to four, the herring migrate back to their spawning grounds. Herring formerly lived to ages in excess of 10 years in Puget Sound. However, the mortality rate of adult fish has been increasing in recent years. Fish older than age 6 are now rare.	The population of two of the herring stocks in Puget Sound, Cherry Point and Discovery Bay, is depressed and critical. These declines are in sharp contrast to other stocks in Puget Sound which have been stable.	Herring currently spawn annually at approximately 20 well defined locations in Washington: 2 coastal locations and 18 locations east of Cape Flattery. The spawning period for the Cherry Point stock is different from the other Puget Sound stocks.
Monitoring Activities ➔	Population biomass estimates are conducted annually and have documented precipitous declines. Trophic analyses, disease monitoring, contaminant studies and ecological studies needed to determine cause of declines and develop recovery strategies. Need information on movement of adults when away from spawning areas and distribution of juveniles.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**

Habitat loss and degradation	Maintaining viable spawning grounds is the largest challenge to herring management in Washington. Spawning grounds can be lost or damaged through construction activities, loss of vegetation or oiling. While this is a general threat for all herring populations, it is particularly critical for those stocks in such sharp decline.	Maintenance of herring spawning habitat is of prime importance to the preservation of herring resource. These areas are under pressure as the demand for residential and industrial use of shoreline increases. Spawning grounds are quite specific and there is no known method to successfully replace or mitigate for lost spawning grounds.	Enforcement of shoreline management regulations. Control and monitor pollution in aquatic habitat; minimize risk of oil spills. Minimize or eliminate shading over vegetation in documented herring spawning areas to prevent loss of spawning substrate.
Lack of knowledge	The increase in non-fishing mortality rate is alarming and needs further investigations. Fishing for these stocks on the spawning areas has been closed by all fishers. Sources of continued mortality absent fishing must be determined.	Investigate and partition potentially important sources of mortality: Changes in disease patterns, changes in prey abundances due to oceanographic or environmental changes, changes in predator populations, concentrations of persistent organic pollutants (esp PCBs) in herring, other environmental factors	Research on stock-specific life history attributes, habitat conditions, disease and pollution, predation and other factors contributing to mortality rates.

Westslope cutthroat *Oncorhynchus clarki lewisi*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Adfluvial, fluvial and resident forms, utilizing headwater streams, rivers and lakes. Spring spawners and opportunistic feeders.	Stable	Ubiquitous. Found throughout the mid-and upper Columbia River and tributaries, as well as lakes. Also found in the Pend Oreille River system and tributaries.
Monitoring Activities ➔	WDFW has no formal statewide monitoring program at this time. Current information is an assemblage of field notes taken during field reconnaissance by WDFW staff and other agencies.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Hybridization	Hybridize readily with rainbow	Reduce or eliminate hybridization.	Avoid introduction of rainbows or only introduce sterile fish.
Habitat loss	Degradation and loss due to inappropriate forest management practices, inappropriate agriculture practices, road construction and maintenance, and residential development and urbanization.	Restore and maintain suitable habitat conditions for all life stages.	Protect riparian areas, restore suitable habitat, enforce and encourage proper land-use management practices.

Inland redband trout *Oncorhynchus mykiss gairdneri*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Native to streams east of the Cascade Crest. Anadromous, adfluvial, fluvial and resident forms. Cool waters of lakes, rivers and streams. Spring spawners and opportunistic feeders.	Unknown for most of their distribution around the state. Several populations have been identified in NE Washington but a complete inventory has not been completed. Populations are presumed stable.	Known populations are found in the mid and upper Columbia River System including Spokane, and Snake river systems. Presumed in other parts of the upper Columbia System.
Monitoring Activities ➔	WDFW has no formal statewide monitoring program at this time. Current information is an assemblage of field notes taken during field reconnaissance by WDFW staff and other agencies.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Logging, agriculture or other activities that elevate temperature, alter hydrology, increase sedimentation, etc.	Conserve suitable habitat	Protect riparian areas and conduct proper land-use management
Hybridization	May hybridize with planted hatchery rainbow trout.	Avoid hybridization.	Use local populations of red-ban rainbow trout in connecting waters or stock sterile fish.

Bull trout Salvelinus confluentus	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Bull trout are Washington's only native char species. They require colder waters that other trout species. Bull trout exhibit anadromous, amphidromous, adfluvial, fluvial and resident live history forms, spawning in headwater streams and rivers from late summer – late fall spawners.	29 western WA stocks, 17% healthy, 83% unknown status. 51 eastern WA stocks, 17% healthy, 16% critical or depressed, and 67% unknown status.	Occurs throughout Washington but reduced from historical levels particularly in eastern Washington. Apparently extirpated from Lake Chelan.
Monitoring Activities ➔	Fisheries monitored to ensure that direct and incidental harvest do not adversely impact long-term productivity. Structured stock assessment surveys in the form of spawner surveys, redd counts, and juvenile surveys are conducted in various river systems around the state.		
General Problems	**Specific Problems**	**General Problems**	**Specific Problems**
Harvest	Overfishing was once identified as a cause for decline in bull trout but current fishing regulations adequately protect bull trout populations. Harvest is now limited only to healthy populations.	Impacts from incidental take in other fisheries are not well known.	Creel surveys to determine incidental take in various fisheries.
Habitat loss	Degradation and loss due to inappropriate forest management practices, inappropriate agriculture practices, road construction and maintenance, and residential development and urbanization. Hydropower installations that do not allow for two-way fish passage.	Restore and maintain suitable habitat conditions for all bull trout life stages.	Protect riparian areas, migration corridors, and upper watershed habitat, restore suitable habitat, and encourage proper land-use management practices.

Lack of information	More information is needed on distribution, abundance, and gene flow among populations.	Acquire more complete information on the current distribution and abundance of stocks.	Characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout.
Non-native species	Nonnative species such as brook trout continue to pose a threat through introgression in some core areas.	In areas were naturally spawning brook trout are present, spawning between brook trout and bull trout may occur.	Prevent the interaction of spawning between bull trout and brook trout by removing brook trout populations.

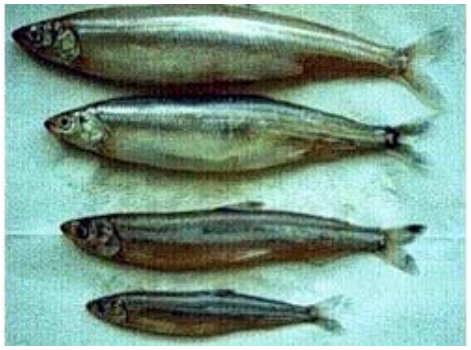
Pygmy whitefish *Prosopium coulteri*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Reside primarily in the deeper sections of lakes, but can be found in streams. Usually found in water with temperature less than 11 degrees C. Late summer-late fall spawners in streams and lake shallows. Live for average of 4-7 years. Diet of macroinvertebrates, crustaceans and fish eggs.	Population size and trends unknown.	In Washington, currently found in 9 lakes. Historically they were known to occur in 15 lakes. Washington is at the southern end of its range.
Monitoring Activities ➔	Baseline distribution survey first conducted by WDFW in the 1990s. No further monitoring activities at this time. University of British Columbia is conducting genetic analyses on some Washington populations.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Water temperature increases	Conserve suitable habitat.	Monitor land use practices or other developments that would increase water temperature.
Environmental contamination	Fish Pesticides	Do not use in lakes with pygmy whitefish.	Do not use piscicides in lakes with pygmy whitefish.

Limited distribution	A small, patchy distribution puts it at risk to habitat disturbances or alterations.	Monitor relative abundance.	Conduct relative abundance survey every few years.
Introduced piscivorous fish	Bass and other piscivorous fish prey on pygmy whitefish	Control fish species introductions.	Monitor lakes for illegal introductions. Do not permit legal introductions.

Eulachon *Thaleichthys pacificus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Adults returns to the Columbia River to spawn in the winter usually starting in December and continuing until spring. Eggs are deposited and adhere to the bottom substrate in the mainstem and tributaries. Certain sites are utilized for spawning each year. Other sites are used sporadically, occasionally being heavily utilized then not utilized for several years. The timing and locations of spawning appears to be highly influenced by river conditions such as water temperature, current and turbidity. There is a high level of mortality of adult eulachon following spawning. Larvae incubate in the gravel until hatching, then rapidly drift downstream and enter the ocean where little is known of their life history. Eulachon larvae have been detected in the lower river as late as June.	Declining. This species has always shown some fluctuations in abundance and frequently selected mainly one of several tributaries in which to spawn. However, this species has had several years of extremely poor runs which can not be explained by changes in spawning locations, etc.	Found in the Columbia River and some of its tributaries. Adult fish spend most of their lives in the Pacific Ocean and may range from Oregon to Vancouver Island.

Monitoring Activities ➔	Some monitoring of fisheries on spawning runs. No other regular monitoring is conducted for this species for any life history stage. Limited information has been gained from research projects, scientific collection permits, and museum specimen collections. Need estimation of run size, description of spawning grounds and estimation of sport catch.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	The portion of the mainstem river utilized for spawning is subject to frequent dredging to maintain shipping lanes. The impact of this dredging on the spawning grounds, on the incubating eggs or on the larvae is unknown. The spawning habitat is poorly known. Despite frequent changes in spawning location, certain characteristics of sediment, stream depth and current may be necessary for successful spawning. Survival may be heavily influenced by oceanic events including oceanographic changes.	Gather information on life histories outside the spawning areas as well as spawning habitat conditions, locations and requirements.	Conduct studies on life history, suitable habitat, population monitoring. Survey river stretches where dredging takes place. Collect information on predation and other environmental factors that may be contributing to the precipitous recent declines. Investigate the relationship between oceanic regimes and other ocean occurrences and smelt run strength.
Harvest	No quantitative stock assessment is conducted. Commercial landings are monitored by tallying the annual catch. There is no annual estimate of the total stock size. Therefore no estimate of the harvest rate is made.	Urgent need of a management plan to control harvest and to ascertain stock size.	Implement management plan to control harvest. Develop a method to determine the abundance of each year's run size so that harvest may be appropriately scaled to the anticipated run size.

Olympic mudminnow *Novumbra hubbsi*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Three habitat requirements: little to no flow, several cm of mud substrate, and abundant aquatic vegetation. Spring spawners that build nests, but offer no parental care. Diet typical of a small, carnivorous fish consisting of crustaceans (zooplankton), mollusks and macroinvertebrates.	Locally common, but limited distribution.	Occurs only in Washington. Occurs in the southern and western lowlands of the Olympic Peninsula, the Chehalis and lower Deschutes River drainages, and South Puget Sound lowlands west of the Nisqually River. Populations also in the Cherry Creek and Issaquah Creek drainages of Snohomish and King Counties.
Monitoring Activities ➔	Monitoring of specific sites conducted in the 1990s. No further monitoring at this time. Accumulate incidental data.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Wetland conversion or drainage.	Conserve suitable habitat.	Survey for mudminnows in potential sites before issuing permits.
Introduced piscivorous fish.	Bass and other piscivorous fish probably prey on Olympic mudminnows.	Control fish species introductions.	Monitor lakes and streams for illegal introductions. Do not permit legal introductions.
Limited distribution	A restricted distribution puts it at risk to habitat disturbances or alterations.	Monitor relative abundance	Conduct relative abundance survey every few years.

Surfsmelt *Hypomesus pretiosus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	The life history other than spawning of the surfsmelt is not known. Surfsmelt are very poorly represented in mid-water research catches, suggesting a tendency to inhabit shallower nearshore zones and/or to remain close to the bottom at all times. Surfsmelt appear to be relatively short-lived fish, with most spawning populations comprised of 1-2 year old fish. Spawning occurs at high tides on mixed sand-gravel substrates in the upper intertidal zone. Surfsmelt eggs adhere tightly to the beach surface substrate. Subsequent wave action disperses the eggs into the top several inches of beach material. Depending on location, surfsmelt spawning activity occurs year-round in Washington State. Although the occurrence of surfsmelt spawning activity on a spawning beach is highly predictable each year, the degree to which spawning surfsmelt may "home" back to their hatching beaches is unknown.	Stable	Surfsmelt are widespread in Washington, occurring in the outer coastal estuaries, the shores of the Olympic peninsula, and the greater Puget Sound basin from Olympia to the US-Canada border.

Monitoring Activities ➔	Spawning beaches are documented. No other regular monitoring is conducted for this species for any life history stage. Limited information has been gained from research projects, scientific collection permits, and museum specimen collections. Need information on the movement of fish when away from the spawning areas.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss and degradation	Prior to 1972, there was no regulation of surfsmelt spawning beaches in the face of widespread shoreline armoring practices, and many miles of such habitat were damaged or destroyed in the Puget Sound basin. Surfsmelt spawning habitats can be damaged or destroyed by physical burial by armoring bulkhead/fill structures intruding into the intertidal zone from adjacent uplands, alteration or disruption of the natural erosion and longshore transport of beach substrate (the "longshore drift"), or by oiling. The habitat quality of surfsmelt spawning beaches used during the hot summer months may be degraded by the routine deforestation of the marine-riparian zone during the course of shoreline development.	Current habitat protection efforts focus on the preservation of all naturally-occurring surfsmelt spawning sites. There is no mitigation methodology known to suitably replace surfsmelt spawning habitat. Surfsmelt spawn survival on those beaches used in the summer months is significantly increased by the occurrence of overhanging, shading canopies from marine-riparian-zone forests bordering the beaches.	The systematic inventory of all shoreline areas to document existing surfsmelt spawning areas needs to be completed, so that all such areas have regulatory habitat protection. Enforcement of zoning and shoreline management regulations. Establishment and enforcement of adequate marine riparian zone buffers for the conservation of shoreline-bordering forests. Consideration of policies to encourage the pro-active re-forestation of degraded marine riparian zones where possible.
Harvest	Recreational fisheries for surfsmelt occur at many traditional sites throughout the marine areas of Washington. Adequate fishery statistics are generally lacking for these fisheries, in spite of their local importance. The sport catch tonnage may exceed that of the commercial catch for this species.	Basic biological information needs to be gathered from a variety of surfsmelt spawning stocks.	Conduct recreational fishery monitoring and fishery-independent net sampling.

Leopard dace *Rhinichthys falcatus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Can occur in lakes and streams, preferring slow to moderate current. Associated with stone substrate covered by fine sediments. Spring spawners.	Population size and status unknown.	In Washington, a Columbia River Drainage fish. Has not been documented east of the Okanogan River. Most often in larger rivers, very few documented records for this fish.
Monitoring Activities ➔	Some WDFW distribution surveys conducted in 1990s. No further monitoring at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Population status unknown.	Determine and map distribution and relative abundance.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques.

Mountain sucker *Catostomus platyrhynchus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Most often found in clear, cold mountain streams, but can occur in lakes and larger rivers over sand, gravel or boulders. Utilizes areas of slow to moderate current and pools. Spawn in riffles in early summer. Diet consists almost entirely of algae and diatoms.	Population size and status unknown.	In Washington, mid and lower Columbia River drainages.
Monitoring Activities ➔	No monitoring activities have been conducted. Incidental data collected from smolt traps.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**

Lack of information	Population status unknown.	Determine and map distribution and relative abundance.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques.

Salish sucker *Catostomus sp.*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Mainly found in low velocity areas of streams and rivers, but also in lakes and ponds. Usually associated with sand-silt substrate and aquatic or overhanging vegetation. Spring spawners in riffles.	Population size and status unknown.	In Washington, in the Puget Trough from the Canadian border to Lake Cushman.
Monitoring Activities ➔	Distribution surveys by WDFW in the 1990s. No further monitoring at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Population status unknown.	Determine and map distribution and relative abundance.	Conduct extensive distribution and relative abundance surveys. Research effective sampling techniques.
Loss of habitat	This fish only occurs in an area of rapid urban development. Impacts are unknown.	Conserve suitable habitat.	Determine suitable habitat.
Limited distribution	A restricted distribution puts it at risk to habitat disturbances or alterations.	Monitor relative abundance.	Conduct relative abundance survey every few years.

Pacific sand lance *Ammodytes hexapterus*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Very little is known about the life history or biology of sand lance populations in Washington. Typically, sand lances are poorly represented in the catches most standard types of net-fishing gear, due to their body shape and behavior. Upper intertidal sand and sand/gravel spawning sites appear to be used year-after-year, during the November-February sand lance spawning season. Incubating sand lance eggs may occur in the same substrate as the eggs of surfsmelt spawning populations, as both species may use the same stretches of beach for spawning at the same times of year. The overlap in use of areas is roughly 10%.	Unknown	A common fish of nearshore marine waters throughout Washington. It is generally acknowledged to be of great ecological importance in local marine food webs.
Monitoring Activities ➔	Spawning beaches are documented. No other regular monitoring is conducted for this species for any life history stage. Limited information has been gained from research projects, scientific collection permits, and museum specimen collections. Need estimation of population size.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	No known sampling program by any local resource agency or research institution has yielded a comprehensive data set for an adult sand lance population in throughout the Puget Sound basin.	Basic biological information needs to be collected for spawning populations. The inventory of sand lance spawning habitats in Washington needs to be completed, so that all sites can be afforded regulatory habitat protection, and none inadvertently destroyed for lack of knowledge of the presence of the resource.	Design and conduct extensive distribution and relative abundance surveys. Research effective sampling techniques.

Habitat loss and degradation	The Pacific sand lance's habit of depositing and incubating its eggs in the upper intertidal zone makes it vulnerable to nearshore habitat alterations of the type commonly being undertaken along the local shorelines. Sand lance spawning habitats can be damaged or destroyed by physical burial under bulkhead-fill structures intruding into the intertidal zone from adjacent uplands, by alteration of the normal supply and movement of beach sediments, and by oiling.	Healthy sand lance spawning habitats can only be maintained by the preservation of erosional sediment inputs, commonly in direct opposition to local trends in increased shoreline armoring to prevent erosion on developing shorelines.	The systematic inventory of all beaches to document existing sand lance spawning areas needs to be completed. The surveys to identify spawning areas need to be conducted so that all such areas have regulatory habitat protection. Enforcement of zoning and shoreline management regulations.

INVERTEBRATES

BEETLES

Columbia River tiger beetle *Cicindela columbica*	**Biology and Life History**	**Population**	**Distribution**
 Pacific Northwest National Laboratory	Predatory beetle	May be extirpated	sandy bars along the eastern Columbia Gorge and Snake River
Monitoring Activities ➔	Coleopterists surveyed in the 1970's and WDFW conducted limited searches in 1995 (Grant, Adams and Franklin Co): no *C. columbica* located. Amateur Coleopterists conduct searches opportunistically; efforts and findings often not reported.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat loss	Habitat inundation from Columbia and Snake River dams	Conserve suitable habitat	Identify extant suitable habitat for protection and possible reintroduction
Lack of information	Distribution, habitat needs poorly known, Survey and identification expertise not widely held	Develop survey and identification expertise, Determine and map distribution, Research natural history and conservation	Survey historic sites and potential habitat

Siuslaw sand tiger beetle *Cicindela hirticollis siuslawensis*	**Biology and Life History**	**Population**	**Distribution**
NO PHOTO AVAILABLE	Restricted to moist sand above normal high tide on coastal beaches	unknown	Grays Harbor County
Monitoring Activities ➔	None at this time		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Distribution, biology, needs poorly known, Survey and identification expertise not widely held	Develop survey and identification expertise, Determine and map distribution, Research natural history and conservation	Survey historic sites and potential habitat, research limiting factors, describe habitat
Invasive plants	European beachgrass	Control and monitor invasive species	Continue beachgrass control (note: does anyone do this?)
Limited distribution	Restricted to parts of Oregon and Washington;	Population monitoring and research	Survey historic sites and potential habitat
Human disturbance	human and vehicle traffic	Protect significant sites	determine if protection of snowy plover and streaked horned lark nesting adequately addresses this species

Beller's ground beetle *Agonum belleri*	**Biology and Life History**	**Population**	**Distribution**
NO PHOTO AVAILABLE	Bog inhabitant; flightless	about 30 known sites	Bogs in western Washington
Monitoring Activities ➔	None at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**

Lack of information	Survey and identification expertise not widely held, Distribution, biology, need poorly known	Develop survey and identification expertise, Determine and map distribution, Research natural history and conservation	Survey historic sites and potential habitat
Limited habitat	Isolated sites at risk of local extinction	Population monitoring and research	Population monitoring and research
Development	Destruction/degradation of bogs; disruption of hydrology	Protect significant sites	protect with easements, agreements, acquisition; fence sites where necessary to protect fragile vegetation

Long-horned leaf beetle *Donacia idola*	**Biology and Life History**	**Population**	**Distribution**
NO PHOTO AVAILABLE	Bright metallic copper leaf beetle reported only from bogs; plant eating	Few known isolated populations	Sphagnum bogs of Puget Sound lowlands; Snohomish, Kitsap counties
Monitoring Activities ➔	None at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Survey and identification expertise not widely held, taxonomic uncertainty, possible synonymous with *Plateumaris dubia*?	Develop survey and identification expertise, Research natural history, conservation, taxonomy; Determine and map distribution	Determine if *Donacia idola* is distinct taxon; survey additional potential sites
Limited habitat	Isolated sites at risk of local extinction	Population monitoring and research	Population monitoring and research
Development	Destruction/degradation of bogs; disruption of hydrology	Protect significant sites	protect with easements, agreements, acquisition; fence sites when necessary to protect fragile vegetation

Hatch's click beetle *Eanus hatchii*	**Biology and Life History**	**Population**	**Distribution**
NO PHOTO AVAILABLE	Restricted to floating Sphagnum mats;	Only 4 or 5 sites	Sphagnum bogs of Puget Sound lowlands
Monitoring Activities ➔	None at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Survey and identification expertise not widely held, Distribution, biology, need poorly known	Develop survey and identification expertise, Determine and map distribution, Research natural history and conservation	Survey historic sites and potential habitat
Limited habitat	Isolated sites at risk of local extinction	Population monitoring and research	Population monitoring and research
Development	Destruction/degradation of bogs; disruption of hydrology	Protect significant sites	protect with easements, agreements, acquisition; fence sites when necessary to protect fragile vegetation

Mann's mollusk-eating ground beetle *Scaphinotus mannii*	**Biology and Life History**	**Population**	**Distribution**
NO PHOTO AVAILABLE	Restricted to moist woodland in canyons; feeds on mollusks	Few isolated populations	Riparian woodland in tributary canyons of Snake and Grand Ronde Rivers
Monitoring Activities ➔	Coleopterists have recently searched most potential habitat.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**

Lack of information	Survey and identification expertise not widely held, Distribution, biology, needs poorly known	Develop survey and identification expertise, Determine and map distribution, Research natural history and conservation	Survey historic sites and potential habitat
Habitat loss, Limited habitat	Habitat inundation from Snake River dams, Rural development, grazing, isolated populations at risk of extinction	Protect extant sites, restore degraded habitat, conserve suitable habitat	seek easements, management agreements, erect livestock fencing

BUTTERFLIES

Propertius' duskywing *Erynnis propertius*	**Biology and Life History**	**Population**	**Distribution**
 Paul Opler, USGS	Associated with Garry oak *(Quercus garryana)*	Eastern WA: Not uncommon where oaks remain intact Western WA: Declining, few isolated populations	Garry oak stands: low-elevation Eastern Cascades, primarily south of I-90; and patchily distributed sites in Puget Sound
Monitoring Activities ➔	Incidental surveys in recent years while conducting searches for other rare butterflies using similar habitat that have overlapping flight times. Focal searches have occurred in SW WA small oak patches. Target species of a recent academic study researching gene flow, abundance, and range impacts from global climate change.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited Habitat	Oak groves	Conserve suitable habitat	seek easements, management agreements , Restore edge and understory habitat

Lack of information	Survey and identification expertise not widely held, Current distribution not known	Develop survey and identification expertise, Determine and map distribution	Survey historic sites and potential habitat
Habitat destruction/degradation, loss	Stands being logged or cleared for development, Encroachment/overtopping by Douglas-fir	Conserve suitable habitat	Seek easements, management agreements, Restore edge and understory habitat, Remove firs, Education, volunteer programs,

Oregon branded skipper *Hesperia Colorado oregonia*	**Biology and Life History**	**Population**	**Distribution**
 Paul Opler, USGS	Grasslands, glacial outwash prairies, grasses are larval food plant	Very irregular and rare	Southwestern Washington Lowlands, San Juan Islands
Monitoring Activities ➔	Incidental surveys for a few sites in recent years while conducting searches for other rare butterflies using similar habitat that have overlapping flight times.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Development, invasive plant species	Invasion of exotics in grasslands, development	Conserve suitable habitat; determine status	Identify sites for protection, develop management recommendations; control invasives and exotics
Lack of information	Survey and identification expertise not widely held, Distribution, biology, needs poorly known	Develop survey and identification expertise, Determine and map distribution, Research natural history and conservation	Survey historic sites and potential habitat

Mardon skipper *Polites mardon*	**Biology and Life History**	**Population**	**Distribution**
 WDFW	Associated with grassland/ grasses are larval food plant	Endangered	Two disjunct areas in Washington, South Puget Sound and vicinity of Mt. Adams
Monitoring Activities ➔	Ongoing surveys to determine distribution and range in southern Puget Sound and in the southern Cascades. Limited monitoring of population on WDFW-managed site. Developed survey protocol.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	grassland conversion, recreational use, inappropriate grazing, fire	Conserve suitable habitat; increase distribution	determine appropriate levels of grazing, benefits of military training to maintain and enhance populations (Fort Lewis)
Limited distribution	Less than 10 locations known in Washington; grassland habitat disappearing.	Conserve suitable habitat; increase distribution	Conduct full surveys of western Washington grasslands and heath/shrublands with respect to the distribution, habitat, and management requirements
Invasive Plant species	Exotic grasses and weeds,	Control and monitor invasive species	Control exotic species,

Dog star skipper *Polites sonora siris*	**Biology and Life History**	**Population**	**Distribution**
 Paul Opler, USGS	grasslands, forest glades/ grasses are larval food plant	Reduced populations in other states, status in WA unknown	Western Washington Lowlands
Monitoring Activities ➔	Incidental surveys for a few sites in recent years while conducting searches for other rare butterflies using similar habitat that have overlapping flight times.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	herbicides along roadsides, exotic species	Conserve suitable habitat; determine status	Identify limiting factors, sites for protection, and develop management recommendations
Lack of information	Survey and identification expertise not widely held, Current distribution not known	Develop survey and identification expertise, Determine and map distribution	Survey historic sites and potential habitat

Yuma skipper *Ochlodes yuma*	**Biology and Life History**	**Population**	**Distribution**
 Paul Opler, USGS	Found at the edges of marshes.	Extremely rare endemic	Approximately 1 population in Grant County.
Monitoring Activities ➔	Little monitoring since discovery of site.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited Distribution	Recreation management, park development	Protect Significant Areas	Develop management recommendations and meet with land managers
Lack of information	Habitat not well understood.	Gather information on suitable habitat.	Conduct surveys for suitable habitat and new sites.

Shepard's parnassian *Parnassius clodius shepardi*	**Biology and Life History**	**Population**	**Distribution**
 Corel, USGS	Found in moist areas of canyons	Local, very rare	Snake River drainages, Southeast Washington
Monitoring Activities ➔	Little monitoring since discovery of taxon and sites.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Invasive plant species	exotic plants, weeds,	Monitor and control invasive species	Conserve and restore suitable habitat, control invasive weeds
Development	Impoundments – Snake and Columbia Rivers	Conserve preferred habitat in moist canyons	Existing sites should be defined, registered, protected, and monitored.
Lack of information	Distribution not well known; known colonies very rare.	Determine and map distribution; research is needed to determine what plants host these butterflies.	Determine distribution, develop and implement management recommendations

Island marble *Euchloe ausonides insulanus*	**Biology and Life History**	**Population**	**Distribution**
 Paul Opler, USGS	Grassland associate	Extremely rare: 2 or 3 known populations	North Puget Sound
Monitoring Activities ➔	Systematic searches of potential habitat were conducted in 2005; a few sites have been searched in multiple years. All known sites were monitored in 2005.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited Distribution, Limited Habitat	Not well known	Determine and map distribution, conserve suitable habitat	Continue searching for new populations and monitoring extant , Determine threats to larval food plants, occupied sites, and nectar species, Seek easements, management agreements, Education, volunteer programs

Makah (Queen Charlotte) copper *Lycaena mariposa charlottensis*	**Biology and Life History**	**Population**	**Distribution**
 Corel, USGS	Found in coastal bogs	restricted distribution	Currently known from Olympic Peninsula
Monitoring Activities ➔	Opportunistic searches during the last few years have been conducted at several coastal bogs. No populations are regularly monitored.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Conversion and destruction of bogs, Road building	Conserve suitable habitat, determine and map distribution	Determine appropriate strategies (shrub and tree removal, hydrology, etc.) to maintain habitat over time
Lack of information	Taxonomic uncertainty, coastal WA taxon possibly a distinct ssp.	Research taxonomy, Determine and map distribution	Determine if coastal WA *mariposa* are distinct taxon; survey additional potential sites

Chinquapin hairstreak *Habrodais grunus herri*	**Biology and Life History**	**Population**	**Distribution**
 Paul Opler, USGS	Associated with stands of golden chinquapin	Rare: one known in WA	Skamania County
Monitoring Activities ➔	Little monitoring since discovery of site.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited habitat, Habitat loss	Herbicides, disease, logging, Current distribution not known	Conserve suitable habitat; Determine and map distribution of habitat and butterfly	Survey historic site and potential SW WA habitat

Johnson's hairstreak *Mitoura johnsoni*	**Biology and Life History**	**Population**	**Distribution**
 Paul Opler, USGS	Associated with Old Growth forests, larvae feed on mistletoe of western hemlock and Douglas-fir trees	Status Unknown; few known locations	Low-elevation Western Washington
Monitoring Activities ➔	None at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Forest management	Determine and map distribution; habitat monitoring and research	Survey likely stands to determine distribution
Environmental contamination	Forestry practices of spraying BTK (*Bacillus thuringiensis k.*) to control tussock moth and spruce budworms.	Alert forestry industry to detrimental effects of spraying.	Avoid spraying in areas where known populations occur.

Juniper hairstreak *Mitoura grynea barryi*	**Biology and Life History**	**Population**	**Distribution**
 Corel, USGS	Associated with juniper	Few populations known	Columbia Basin
Monitoring Activities ➔	None at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Human disturbance	Loss of Juniper from development and nectar plant destruction from land management practices	conserve and protect suitable habitat.	Juniper woodlands should be kept intact and not converted to rangelands or used for off-road recreational vehicles. Grazing should be limited, minimized, or halted to the degree necessary in order to retain nectar plants and to allow them to flower. Existing sites should be defined, registered, and protected.
Lack of information	Fewer than 6 sites known in western U.S.; 3 occur in SE Washington	Research and survey population status and trends.	survey for new populations and monitor existing populations.

Hoary elfin (W WA) *Incisalia polia obscura*	**Biology and Life History**	**Population**	**Distribution**
 Paul Opler, USGS	Prairies, heaths; larval host is kinnikinnick; flight period April-May	Few populations known	South Puget Sound and Kitsap Peninsula
Monitoring Activities ➔	Incidental surveys for a few sites in recent years while conducting searches for other rare butterflies using similar habitat that have overlapping flight times. No populations are regularly monitored.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited distribution	fragmentation of habitat, isolation of populations	Determine and map current distribution	Survey historic sites and potential habitat
Habitat loss, Development	loss of prairie and open woodland, degradation	Conserve suitable habitat; restore degraded habitat	Conserve suitable habitat; restore degraded habitat

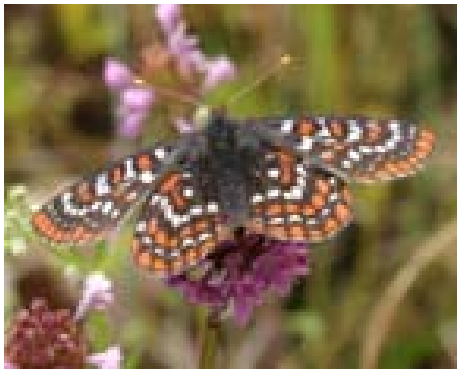
Puget (Blackmore's) blue *Icaricia icarioides blackmorei*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Grassland associate with Lupines	populations isolated, uncommon, declining	Southern Puget Sound lowlands and Olympic Mountains
Monitoring Activities ➔	Coordinated searches have occurred on south Puget Sound grasslands over the last few years. Research being conducted on life history, captive rearing and behavior. No monitoring of Olympic Mtn populations.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Invasive exotic plant species, habitat degradation	Conserve suitable habitat; restore degraded habitat	Manage grassland habitats to maintain *Lupinus albicaulis* in southern Puget Sound

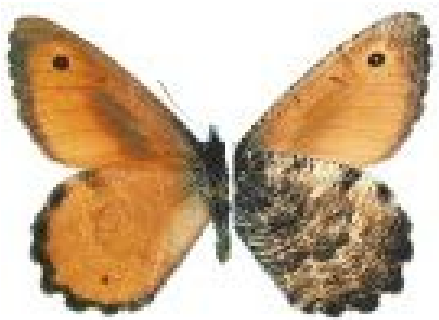
Puget Sound fritillary *Speyeria cybele pugetensis*	**Biology and Life History**	**Population**	**Distribution**
 Paul Opler, USGS	Inhabits grasslands and edges of oak woodlands and forest openings	Status unknown	southern Puget Sound lowlands
Monitoring Activities ➔	Incidental surveys for a few sites in recent years while conducting searches for other rare butterflies using similar habitat that have overlapping flight times. No populations are regularly monitored.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Development, habitat degradation, invasive species	Conserve suitable habitat; determine and map distribution, restore degraded habitat, control and monitor invasive species	Survey, identify, and protect additional sites, develop management recommendations

Oregon silverspot *Speyeria zerene hippolyta*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Associated with coastal grasslands	Endangered Extirpated from Washington	coastal dunes and grasslands south of Westport
Monitoring Activities ➔	Searches were conducted irregularly during the 1980's; regular searches were conducted during the 1990's.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Accelerated succession due to dune stabilization, exotic species	Restore degraded habitats; increase distribution; reintroduction	Work to restore habitat at sites on the Long Beach Peninsula; coordinate with USFWS to facilitate reintroduction from Oregon

Valley silverspot *Speyeria zerene bremnerii*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Grasslands and forest bald associate	Highly localized	Willapa Hills, Puget Trough lowlands, and Olympic Mountains
Monitoring Activities ➔	Incidental surveys for a few sites in recent years while conducting searches for other rare butterflies using similar habitat that have overlapping flight times. No populations are regularly monitored.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss	Degradation of grassland habitat	Conserve suitable habitat; restore degraded habitat; increase distribution	Identify and protect additional sites; control exotics and invasives at protected sites.

Silver-bordered fritillary *Boloria selene atrocostalis*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	True bogs and wet meadows	Status unknown	Eastern Washington
Monitoring Activities ➔	None at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss, Development	Wetland drainage, water table alteration; succession of wetlands	Determine and map distribution; conserve suitable habitat	Survey and monitoring; habitat management at Moxee Bog; development of statewide habitat management recommendations

Taylor's checkerspot *Euphydryas editha taylori*	**Biology and Life History**	**Population**	**Distribution**
 Washington Dept. Fish & Wildlife	Grassland associate in the Puget Lowlands, north Olympic Peninsula coast and San Juan Islands	Recent declines, few populations remaining	Puget Trough, including San Juan Islands and north coast of the Olympic Peninsula
Monitoring Activities ➔	Considerable searching for new sites has occurred during last few years, this includes incidental surveys at many sites conducted while searching for other rare butterflies using similar habitat that have overlapping flight times. Most South Puget Sound sites have been monitored for 2 years. Little monitoring of Olympic Peninsula populations has occurred.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Habitat Loss, development, invasive plant species	Invasive species like scotch broom, exotic grasses, recreation, lack of fire	Conserve suitable habitat, restore degraded habitat,	Improve habitat quality;
Lack of information	Reintroductions/translocation likely necessary: methods have not been developed; Population fluctuations annually and over time unknown	Develop methods for successful reintroduction/translocation; regular monitoring	Test captive rearing, reintroduction and translocation methods, Determine female food plant preference, Standardized annual monitoring

Great arctic *Oeneis nevadensis gigas*	**Biology and Life History**	**Population**	**Distribution**
 Canadian Biodiversity Information Facility	Uncertain; probably forest openings, balds	One known site: No records since 1950	San Juan Islands
Monitoring Activities ➔	None at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of Information	Not known	Determine and map distribution	Surveys are needed

Sand-verbena moth *Copablepharon fuscum*	**Biology and Life History**	**Population**	**Distribution**
 Dr. Jeremy Tatum, Environment Canada	Restricted only to sites with obligate host yellow sand-verbena	5 known sites	sandy coastal sites of northern Puget Sound

Monitoring Activities ➔	Fairly extensive searches have been done. No populations are regularly monitored.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited habitat	small isolated sites vulnerable to extinction	Protect significant sites, Conserve suitable habitat	easements, agreements, acquisitions, habitat restoration
Lack of information	Need information to enable protecting sites	Determine and map distribution	survey remaining potential sites
Invasive plant species	Scotch broom, European beachgrass	Control and monitor invasives	assess needs and implement veg control as needed
Human disturbance	Trampling of host plants	Protect habitat	Education and enforcement; restricted public access

DRAGONFLIES

White-belted ringtail *Erpetogomphus compositus*	**Biology and Life History**	**Population**	**Distribution**
 William Leonard, CalPhotos	streams and rivers	May be extirpated	Crab Creek, Grant County, and Yakima River, Benton County; northernmost extent of range
Monitoring Activities ➔	Unknown. Occasional opportunistic searches by local entomologists.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Limiting factors unknown	Determine and map distribution; Population monitoring	Conduct surveys, survey potential sites, determine if extant
Limited distribution	isolated populations at risk of extinction	Conserve suitable habitat	Protect and restore current habitat, survey for suitable habitat sites

Columbia (Lynn's) clubtail *Gomphus lynnae*	**Biology and Life History**	**Population**	**Distribution**
 Slater Museum, U of Puget Sound	PNW endemic associated with shallow muddy or gravelly rapids	May only be 1 population in Washington	One site in Benton County, Washington and 4 sites in Oregon.
Monitoring Activities ➔	Unknown. Occasional opportunistic searches by local entomologists.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Limiting factors unknown	Determine and map distribution; Research natural history and conservation	Conduct surveys annually, survey potential sites, identify factors affecting population
Invasive animals	Carp, mosquito fish	Limit introduction of invasive species	Enforcement, education.
Environmental contaminants	Agricultural chemicals may be a problem	Determine and address factors limiting recovery	Investigate chemicals present and potential problems
Limited distribution	single population vulnerable	Population monitoring, habitat inventory	Conduct surveys, survey potential sites, determine if extant

Pacific clubtail *Gomphus kurilis*	**Biology and Life History**	**Population**	**Distribution**
 Slater Museum, U of Puget Sound	Lakes, possibly streams	2 known sites	Thurston and Skamania Counties; also Oregon and California
Monitoring Activities ➔	Unknown. Occasional opportunistic searches by local entomologists.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Limiting factors unknown	Determine and map distribution; Population monitoring	Conduct surveys annually, survey potential sites, identify factors affecting population
Limited distribution	isolated populations at risk of extinction	Conserve suitable habitat	Restore and maintain habitat.

Subarctic darner *Aeshna subarctica*	**Biology and Life History**	**Population**	**Distribution**
 Slater Museum, U of Puget Sound	Found in bogs and marshes; lays eggs in floating moss; flight period late July-Sept	1 known site in Washington; boreal species	Ferry County
Monitoring Activities ➔	Unknown. Occasional opportunistic searches by local entomologists.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Limiting factors unknown	Determine and map distribution; Population monitoring	Survey potential sites, identify factors affecting population
Limited distribution	isolated populations at risk of extinction	Conserve suitable habitat	Restrict public access, restore and maintain habitat.

Boreal whiteface *Leucorrhinia borealis*	**Biology and Life History**	**Population**	**Distribution**
 U.S. Geological Survey	marshy ponds; flight period June-July	1 site in Washington	Okanogan County
Monitoring Activities ➔	Unknown. Occasional opportunistic searches by local entomologists.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Limiting factors unknown	Determine and map distribution; Population monitoring	Survey potential sites, identify factors affecting population
Limited distribution	isolated populations at risk of extinction	Conserve suitable habitat	Restrict public access, restore and maintain habitat.

Subarctic bluet *Coenagrion interrogatum*	**Biology and Life History**	**Population**	**Distribution**
 Slater Museum, U of Puget Sound	prefers open fens, bogs, and marshes especially those with sphagnum moss.	1 known site	Ferry County
Monitoring Activities ➔	Unknown. Occasional opportunistic searches by local entomologists.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Limiting factors unknown; life history, habitat needs, etc. poorly understood	Determine and map distribution; Population monitoring and research	Survey potential sites, identify factors affecting population; monitor known sites; research life history, habitat needs
Limited distribution	isolated populations at risk of extinction	Conserve suitable habitat	Restrict public access, restore and maintain habitat.

MOLLUSKS

California floater *Anodonta californiensis*	**Biology and Life History**	**Population**	**Distribution**
 from Nedeau, et al. 2005	A freshwater bivalve; larval stage is parasitic on fish. Reaches maturity at 4-5 years, life span to 15 years.	Past declines; current status poorly known	Columbia and Okanogan rivers; Curlew Lake, Ferry County; extirpated from much of historic range
Monitoring Activities ➔	No monitoring activities at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Hydro development	dams, fluctuating water levels, decline of native host fish	Population monitoring and research	Population monitoring and research
Environmental contamination	pollution, sedimentation	Control and monitor contaminants	reduce sedimentation and pollution
Limited distribution	may be reduced to isolated populations; status unknown	Determine and map current distribution; restore habitat.	survey historic and potential sites.
Lack of information	current distribution poorly known; taxonomic uncertainty; limited data on demographics and biology	Research life history, conservation, taxonomy	Support surveys, taxonomic and life history studies
Invasive animals	competition from *Corbicula*, an Asian clam, and other invaders	Control and monitor invasives	Enforcement and education

Western floater *Anodonta kennerlyi*	**Biology and Life History**	**Population**	**Distribution**
 from Nedeau, et al. 2005	Freshwater bivalve; larval stage is parasitic on fish. Muddy or sandy habitats in rivers and lakes, particularly mid- to high elevations.	unknown	Large rivers and lakes; known from Puget Trough, Yakima and Grays Harbor counties
Monitoring Activities ➔	No monitoring activities at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Hydro development	dams, fluctuating water levels, decline of native host fish	Population monitoring and research	Conduct surveys on population and research life history attributes, habitat elements
Environmental contamination	pollution, sedimentation	Control and monitor contaminants	reduce sedimentation and pollution
Limited distribution	may be reduced to isolated populations	Determine and map current distribution; restore habitat;	survey historic and potential sites.
Lack of information	current distribution poorly known; taxonomic uncertainty; limited data on demographics and biology	Research life history, conservation, taxonomy	Support surveys, taxonomic and life history studies,
Invasive animals	competition from *Corbicula*, an Asian clam, and other invaders	Control and monitor invasives	Enforcement and education

Winged floater Anodonta nuttalliana	**Biology and Life History**	**Population**	**Distribution**
 from Nedeau, et al. 2005	Freshwater bivalve; larval stage is parasitic on fish. Muddy or sandy rivers and lakes, especially in low gradient, low elevation areas of coastal watersheds. Long-term brooders.	unknown	Large rivers and reservoirs. Lower Columbia River.
Monitoring Activities ➔	No monitoring activities at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Hydro development	dams, fluctuating water levels, decline of native host fish	Population monitoring and research	Research mitigation alternatives
Environmental contamination	pollution, sedimentation	Control and monitor contaminants	reduce sedimentation and pollution
Lack of information	current distribution poorly known; taxonomic uncertainty; limited data on demographics and biology	Research life history, conservation, taxonomy	Support surveys, taxonomic and life history studies,
Limited distribution	may be reduced to isolated populations	Determine and map current distribution; Restore habitat;	survey historic and potential sites.

Invasive animals	competition from *Corbicula*, an Asian clam, and other invaders	Control and monitor invasives	Enforcement, education

Oregon floater *Anodonta oregonensis*	**Biology and Life History**	**Population**	**Distribution**
 from Nedeau, et al. 2005	Freshwater bivalve; larval stage is parasitic on fish. Shallow water, low gradient, low elevation lakes, rivers and reservoirs.	unknown	Columbia River and tributaries.
Monitoring Activities ➔	No monitoring activities at this time.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Hydro development	dams, fluctuating water levels, decline of native host fish	Population monitoring and research	Research mitigation alternatives
Environmental contamination	pollution, sedimentation	Control and monitor contaminants	reduce sedimentation and pollution
Lack of information	current distribution poorly known; taxonomic uncertainty; limited data on demographics and biology	Research life history, conservation, taxonomy	Support surveys, taxonomic and life history studies.

Limited distribution	may be reduced to isolated populations	Determine and map current distribution; Restore habitat;	survey historic and potential sites.
Invasive animals	competition from *Corbicula*, an Asian clam, and other invaders	Control and monitor invasives	Enforcement, education

Western ridged mussel *Gonidea angulata*	**Biology and Life History**	**Population**	**Distribution**
 from Nedeau, et al. 2005	Freshwater bivalve; larval stage is parasitic on fish. Found in all size streams; rarely found in lakes and reservoirs. Found mainly low to mid-elevation watersheds.	unknown	Found throughout the state; limited distribution west of the Cascades.
Monitoring Activities ➔	No monitoring activities at this time. Distribution survey conducted on the Similkameen in 2005.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental contamination	pollution, sedimentation	Control and monitor contaminants	reduce sedimentation and pollution
Limited distribution	may be reduced to isolated populations	Determine and map current distribution; Restore habitat;	survey historic and potential sites.

Lack of information	current distribution poorly known; taxonomic uncertainty; limited data on demographics and biology	Research life history, conservation, taxonomy	Support surveys, taxonomic and life history studies,

Western pearlshell *Margaritifera falcata*	**Biology and Life History**	**Population**	**Distribution**
 from Nedeau, et al. 2005	Freshwater bivalve; requires cold, well oxygenated, low gradient streams with gravel/sand bottom; larva are largely parasitic on salmonids. Sexually mature at 9-12 years, capable of living over 100 years.	Widespread declines; formerly very abundant.	Streams in western Washington, and scattered localities in eastern Washington.
Monitoring Activities ➔	No monitoring activities at this time. Distribution survey conducted on the Similkameen in 2005.		
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Environmental contamination	pollution, sedimentation	Control and monitor contaminants	reduce sedimentation and pollution
Limited distribution	may be reduced to isolated populations	Determine and map current distribution; Restore habitat;	survey historic and potential sites.
Lack of information	current distribution poorly known; taxonomic uncertainty; limited data on demographics and biology	Research life history, conservation, taxonomy	Support surveys, taxonomic and life history studies

Blue-gray taildropper *Prophysaon coeruleum*	**Biology and Life History**	**Population**	**Distribution**
 Kriistina Ovaska, CalPhotos	Associated with moist forest floor conditions; abundant coarse woody debris; bigleaf maple	A few isolated populations; a rare regional endemic	scattered sites in Puget Trough; extant populations in Lewis and Cowlitz counties
Monitoring Activities ➔			
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited distribution	isolated populations vulnerable	Increase distribution	Attempt experimental reintroduction?
Habitat loss	logging, development	Protect significant sites; Conserve suitable habitat	easements, agreements
Lack of information	life history, habitat needs, etc. poorly understood	Determine and map distribution; Population monitoring and research	survey potential sites; monitor known sites research life history, habitat needs

Crowned tightcoil *Pristiloma pilsbryi*	**Biology and Life History**	**Population**	**Distribution**
 William Leonard, CalPhotos	Terrestrial snail found in decaying leaf litter in salal	May be extinct	3 occurrences, 1 locality, Pacific County
Monitoring Activities ➔			
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited distribution	isolated populations vulnerable	Increase distribution; Protect significant sites; Conserve suitable habitat	Attempt experimental reintroduction?; easements, agreements
Lack of information	Taxonomic uncertainty, may be synonymous with more widespread species; life history, habitat needs, etc. unknown	Determine and map distribution; Population monitoring and research; research taxonomy	survey potential sites; research life history, habitat needs

Columbia oregonian *Cryptomastix hendersoni*	**Biology and Life History**	**Population**	**Distribution**
 Kriistina Ovaska, CalPhotos	An endemic land snail that inhabits margins of spring-fed streams and associated talus in otherwise arid landscape; likely eats algae and vegetation	Declining; currently known from only 4 isolated sites in Washington and several sites in Oregon	found at only 4 locations in Columbia River gorge in Klickitat County; Columbia Plateau ecoregion.
Monitoring Activities ➔			
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Lack of information	Almost nothing known about species ecology, life history, reproduction	Determine status and trend of population, limiting factors	Determine full extent of distribution; monitor populations; support studies of ecology, life history.
Habitat degradation	Blackberries degrading habitat; livestock pose trampling hazard and grazing has degraded vegetation; alteration of hydrology by diversions could eliminate population; pollution from roads and railroad deg	Monitor habitat status; permanent habitat protection; restore/enhance habitat; control invasive species	Monitor habitat condition; control blackberries.
Limited distribution	Only 4 isolated sites in an otherwise hostile environment	Protect known populations	Pursue possibility of permanent protection through easement, agreements, etc. Investigate the potential for reintroductions at other suitable sites.

Oregon megomphix *Megomphix hemphilli*	**Biology and Life History**	**Population**	**Distribution**
 William Leonard, CalPhotos	Terrestrial snail of moist hardwood/conifer forest; often associated with bigleaf maple and large woody debris	Few isolated populations; extinct at some historic sites	Regional endemic; Scattered localities from Olympia to Columbia River; Thurston, Lewis, Grays Harbor and Cowlitz counties
Monitoring Activities ➔			
General Problems	**Specific Problems**	**Conservation Strategies**	**Specific Conservation Actions**
Limited distribution	isolated populations vulnerable to logging, flooding, fires	Increase distribution	Attempt experimental reintroduction?
Habitat loss	logging, development	Protect significant sites; Conserve suitable habitat	easements, agreements
Lack of information	life history, habitat needs, etc. poorly understood	Determine and map distribution; Population monitoring and research	survey potential sites; monitor known sites; research life history, habitat needs