

# 8 | Conservation Actions



*A researcher surveys for collared pikas in Snowhawk Valley. A. Underwood, ADF&G.*

Conservation actions are activities conducted to improve the status and understanding of “species of greatest conservation need” (SGCN) in Alaska, reduce the need for future listings under the Endangered Species Act (ESA), and fulfill Alaska Department of Fish and Game’s (ADF&G’s) mission and mandate under the Alaska Constitution to manage fish and wildlife species according to the sustained yield principle (Alaska Constitution, Art. VIII, § 4). Conservation actions can take many forms, including filling critical information gaps on population status and trends; understanding habitat use during breeding, migration, and nonbreeding seasons; managing broad-scale threats to support species’ resilience; and monitoring population recovery. Priority conservation actions include identifying drivers of decline, promoting partnerships, and implementing effective and achievable projects to ensure sustained yield.

This chapter is organized by the conservation-action categories outlined by Salafsky et al. (2008) and updated in the Conservation Measures Partnership’s (CMP) Conservation Actions Classification, version 2.0 (CMP 2016). Some of these categories have been modified slightly to reflect conditions unique to Alaska, and within each category, examples of effective actions are provided. For many SGCN, especially long-distance migratory birds, their biogeographic ranges include migration stopover sites and nonbreeding areas outside Alaska and the United States. Because these species occur only seasonally in Alaska, partnerships outside the state in nonbreeding areas where populations are more vulnerable may be important for implementing conservation actions that benefit Alaska-breeding species. For these species and groups, potential conservation actions could be based within or outside of Alaska.

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## Research and Monitoring

Current and accurate data are essential for conservation. For many of Alaska's SGCN, only a limited understanding of population size, population trends, and seasonal movement patterns exists. Migratory pathways are just starting to be understood for some Alaska SGCN that travel as far as Antarctica, Argentina, and New Zealand. Information on population dynamics and movement ecology is often a prerequisite to making an informed assessment of a species' conservation status, to ensure use of other natural resources is compatible with conservation, and to identify what conservation actions, if any, are necessary.

Long-term monitoring and data collection efforts are often necessary to obtain population trend information. Alaska has and will continue to make essential research and monitoring activities a priority among its conservation actions. Important research and monitoring actions include the following:

- Determine distribution and habitat associations of SGCN within Alaska (Chapters 5 and 6).
- Determine population trends and abundance of SGCN.
- Estimate survivorship by age class and identify causes of mortality throughout the annual life cycle of SGCN (e.g., breeding, migration, nonbreeding).
- Map long-distance migratory movements, stopover sites, nonbreeding locations, and habitat use by SGCN.
- Assess the vulnerability of SGCN to climate change and other potential threats.
- Determine sustainable exploitation rates (sustained yield) for harvested SGCN.
- Identify important spawning and rearing habitats for aquatic SGCN.
- Predict if and how key habitats are likely to change in the future due to the changing climate and other potential threats, including which species may be resilient to habitat changes versus those that may require additional conservation actions to support their resilience (e.g., Marcot et al. 2015).
- Determine how habitat changes could affect SGCN and what conservation measures could slow or reverse population declines and support resilience.



*Sockeye salmon in Dry Bay, Glacier Bay National Preserve, Alaska. NPS, used with permission.*

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## Conservation Designation and Planning

Alaska has one of the most extensive networks of conservation lands and waters on the continent (see the “Conservation Lands” section in this chapter). Large expanses of remote and intact ecosystems create a unique and advantageous situation regarding conservation designation and planning. Conserving fragmented remains of habitats crucial to SGCN is a common need throughout the country. However, unlike much of the northern hemisphere, Alaska has experienced little anthropogenic habitat fragmentation outside urban centers due to its limited road network, existing regulations that help ensure conservation of high-quality fish and wildlife habitat, and restriction of development in Alaska’s national parks and wildlife refuges (a significant proportion of the state’s land). Therefore, the primary question in Alaska is how to understand and predict the potential impacts of broad-scale threats that have a high level of uncertainty (e.g., climate change, fish and wildlife diseases, harmful algal blooms, and introduction of invasive species) in order to support the resilience of SGCN.

### Conservation Lands

State and federal lands account for about 88% of all the land in Alaska. A substantial proportion of these lands—and, by extension, much of Alaska’s landscape—is already designated for conservation, whether as park land (managed and preserved unimpaired lands for public use), wildlife refuge



*Wetlands along the Kobuk River. N. Herbert, NPS, used with permission.*

(habitats managed for the conservation of wildlife and plant resources), or wilderness (preserved lands without human habitation or modification). Alaska holds 64% of all national park lands in the United States (NPS 2024), 80% of wildlife refuge acreage excluding U.S. territories (USFWS 2022), and 54% of designated wilderness in the nation (Norris 2007). The Alaska Department of Natural Resources (DNR) administers eight state parks comprising 3.4 million acres of state-owned land and 105 million acres of other recreation areas, historical sites, and marine parks (DNR 2019). In addition, ADF&G manages 3.2 million acres of special wildlife conservation areas (12 game refuges, 17 critical habitat areas, and three wildlife sanctuaries; ADF&G 2024a). Some of Alaska’s state- and federally-owned lands are designated for other uses, including energy development, recreation, and timber harvest.

### Management of Anadromous Waters

Under Alaska Statutes (AS 16.05.871–901), waters identified as important for the spawning, rearing, and migration of anadromous fish species are conserved and managed by ADF&G under a permitting system that attempts to ensure compatibility of conservation and any development or



Researchers use fyke nets to capture fish for identification purposes. ABR, used with permission.

resource extraction that occurs in such waters. Additional management is also accomplished by the National Marine Fisheries Service (NMFS), which designates essential fish habitat (EFH) under the Magnuson–Stevens Fishery Conservation and Management Act. ADF&G maintains and continually updates the *Catalog of Anadromous Waters* (ADF&G 2024b) that identifies where permitting of anadromous waters is required. These cataloged waters represent most of the state’s large rivers and streams and a growing number of smaller streams. As of October 2024, there were 19,247 streams, including mainstem reaches and tributaries, listed as supporting anadromous

fishes in Alaska. Considering this large number of anadromous streams alone, Alaska has taken a critical role in managing and maintaining high-quality freshwater habitats for anadromous fishes.

In addition to conserving and managing anadromous streams, ADF&G also maintains a program to secure instream flow reservations on waters identified as important to fish and wildlife to ensure adequate habitat. Both the *Catalog of Anadromous Waters* and the instream flow reservations program are essential aspects of anadromous waters conservation in the state. Funding from the State Wildlife Grants (SWG) program will continue to support these efforts.

### **Conservation in Marine Waters**

Over the past two decades, several important efforts have been undertaken to safeguard marine areas important to Alaska’s fish and wildlife. In 2002, ADF&G convened a task force that developed a public process by which marine waters can be legally designated for conservation by the Alaska Board of Fisheries (ADF&G 2002a). Because federal marine habitat areas are of particular concern, likely candidates for conservation and management have been identified by the North Pacific Fishery Management Council (NPFMC 2010).

Marine biodiversity is correlated with structural habitat diversity. Areas of the seafloor that are characterized by boulders, corals, and other living organisms are susceptible to damage from fishing gear, particularly bottom trawls. Regulations prohibiting groundfish bottom trawling and scallop dredging have been implemented to conserve and manage areas where this habitat type is known to occur. These locations comprise a relatively large portion of the continental shelf and, in many respects, serve as marine conservation areas.



Researchers evaluate stream water quality. ADF&G.

Audubon Alaska, a nongovernmental conservation organization (NGO), has identified a series of globally Important Bird Areas (IBAs) in the pelagic waters in the Beaufort/Chukchi Seas, Bering Sea, and Gulf of Alaska biogeographic regions. These areas are primarily associated with physical features that increase marine productivity. The IBAs encompass just 6% of the marine waters surrounding Alaska but support about 34% of Alaska's summer-season marine birds and 38% of Alaska's winter-season marine birds (estimated to be 24.6 and 5.9 million individuals, respectively; Smith et al. 2014). IBAs do not constitute legal designation as conservation areas; instead, they are a starting point for understanding seascape patterns of occurrence for seabirds in waters off Alaska and can be used to inform marine resource management decisions.

Voluntary conservation measures can reduce impacts to marine habitats used by fish and wildlife. The Aleutian Islands are home to many coastal and offshore habitats important to marine mammals and fish, but they also lie along the North Pacific Great Circle Route, which is heavily used by marine vessel traffic (see "Shipping Lanes," Chapter 7). To reduce maritime risks and enhance navigational safety, the International Marine Organization designated five Areas To Be Avoided (ATBA) along the route in 2016 (Sullender et al. 2021). These measures resulted in a significant decrease in marine traffic in these areas, from over 76% in 2014–2015 to under 12% in 2016–2017.

## Land and Water Management

The Land and Water Management category includes actions to conserve or restore sites, habitats, and the broader regional environment. These include management of areas for conservation, eradicating and controlling invasive species, enhancing degraded habitats, and restoring ecosystem function (CMP 2016).

In Alaska, climate change is altering habitat availability—sometimes rapidly—through reductions in sea ice and glacial extent, as well as changes in shrub cover and hydrology (Chapter 7). However, the high level of habitat connectivity in Alaska's large and relatively undisturbed terrestrial ecosystems will likely allow many SGCN to transition to other suitable habitats as they develop in a changing environment. Ongoing and future monitoring of SGCN and their habitats is important to determine which species and ecosystems will be resilient to environmental changes and which will require additional conservation actions to support their resilience.

## Stream Management and Restoration

ADF&G has statutory authority under Title 16 to maintain fish habitat and passage programs to conserve and improve the value of riverine and adjacent riparian ecosystems for fish. Alaska's fisheries enjoy strong public support due to their economic and recreational value, making stream restoration and management efforts a priority. Several restoration projects have been completed to reintroduce large woody debris, such as logs and root balls, into streams that were degraded by historical logging practices and other activities, and similar projects could be implemented in the future, where needed, to maintain high-quality riverine habitats in Alaska. These projects aim to increase structure and complexity in streams by creating pools, riffles, and runs while also providing cover for fish, stabilizing stream banks, restoring connectivity to off-channel habitats, and moderating stream flow. Such actions can have significant and long-lasting benefits for salmon, steelhead, and aquatic invertebrates, as well as the many wildlife species that depend directly or indirectly on salmon, including bears (Hilderbrand et al. 1999) and songbirds (Burnett et al. 2005).

Multiple efforts are underway to control and eradicate invasive species that negatively impact SGCN and their aquatic habitats. For example, the State of Alaska, federal agencies, and local Tribal organizations are continuing efforts to eradicate the invasive aquatic plant *Elodea* from several water bodies in the state (see “Species Management” below). ADF&G and partner organizations are also continuing to eradicate and suppress invasive populations of northern pike in the Southcentral biogeographic region. As of 2024, all known populations of invasive northern pike on the Kenai Peninsula have been eradicated.

In addition to agency work on stream management and restoration and invasive species removal, Alaska has six Fish Habitat Partnerships that share a mission of conserving, restoring, and enhancing Alaska’s fish and aquatic communities through fish habitat conservation. These voluntary, locally-driven, and nonregulatory partnerships help identify and fund local projects and leverage resources and expertise of member organizations to benefit Alaska’s native fishes and their habitats. Activities involve assessing, mapping, and prioritizing fish habitat needs in Alaska, as well as developing partnerships with agencies, NGOs, and individuals to accomplish important habitat restoration and conservation activities.

### ***Wetlands Management and Restoration***

The changing climate will cause gradual shifts in the types of wetland and aquatic habitats available to Alaska’s fish and wildlife (see the “Climate Change” section in Chapter 7). Understanding that local and regional conditions will be variable, increases in temperature and precipitation due to climate change are expected to have widespread ecosystem effects across some portions of Alaska. Higher temperatures have resulted in increased evapotranspiration (the atmosphere’s ability to draw water out of plants and off the land’s surface) and soil drying, which will continue to drive the alteration of wetlands and wetland functions in the future (Frost et al. 2020). This is expected to result in a gradual transition of wetlands to more well-drained upland habitats during the next 10-20 years, particularly in the Central, Southcentral, and Southwest biogeographic regions, which have discontinuous or no permafrost (Jorgenson et al. 2008). At the same time, glacial retreat in Alaska has and will continue to expose new land, which may result in the creation of new wetland habitats. The formation of new wetlands is a lengthy process, as it takes multiple decades for development of the complex vegetation structure that provides habitat for a diversity of wildlife species (Chapter 6).

The National Wetland Inventory mapping of Alaska is a valuable tool in management planning for lands and waters. The ongoing expansion and update by the United States Fish and Wildlife Service (USFWS) includes data on the location and type of palustrine (freshwater) wetlands and the extent of open water habitats for wildlife, both of which will increase the inventory’s value to managers. Used in conjunction with data on the importance of broad-scale land cover types for SGCN across the six terrestrial biogeographic regions in Alaska (Chapter 6), these updated wetland data will facilitate improved management, conservation, and restoration of important wetland habitats.

Much of the water provided to palustrine wetlands does not come from large waterbodies (e.g., streams, rivers, lakes) but from discharge slopes, sheet flow, small seeps, springs, and rivulets. Along with broad-scale wetland types, these small wetlands should also be identified, mapped, and acknowledged in management of Alaska’s water resources. Industry partners can play a role in this effort by providing fine-scale mapping of small wetlands and wetland functions near proposed developments. There will also be opportunities for these partners to promote the conservation or restoration of wetland habitats in Alaska during mitigation planning for development projects.

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## Forest Habitat Management and Restoration

Effective timber management practices and sustainable timber harvest are key to maintaining a diversity of important forest and scrub habitats that support SGCN populations. The Alaska Forest Resources Protection Act (AS 41.17) ensures that forestry practices are compatible with SGCN conservation, especially in sensitive riparian areas. The State of Alaska is working to maintain sustainable populations of SGCN while also benefitting the regeneration and resilience of managed forests and avoiding negative impacts on harvest opportunities.

### Impact of an invasive species on “species of greatest conservation need” (SGCN): Northern Pike (*Esox lucius*)

Northern pike have a circumpolar distribution but have been widely introduced around the world to establish recreational fisheries. In Alaska, their management is complicated because northern pike are native to Interior and western Alaska, where they naturally occupy an apex predator niche in aquatic ecosystems. The Alaska Range is a geologic barrier that restricts the natural distribution of northern pike in the state. In the late 1950s, a bush pilot illegally introduced northern pike from Minto Flats in the Interior to the Susitna river basin in Southcentral, and northern pike have been spreading ever since. Currently, over 150 water bodies in Southcentral Alaska have documented populations of northern pike, and it has become the most damaging aquatic invasive species in Alaska.

Northern pike have a generalist diet but prey heavily on other fish when available. They thrive in areas with dense aquatic vegetation, which is necessary for egg adhesion during spawning, camouflage as juveniles, and ambush predation as adults. Northern pike do not frequent deep littoral zones of lakes or turbid, high-velocity rivers. Habitat



Salmonids in northern pike stomach. J. Ching, UAF, used with permission.

plays a key role in the severity of ecological impacts where northern pike are introduced. In drainages where northern pike are introduced and have complete habitat overlap with native fish, the native fish populations are typically extirpated within a few years of northern pike invasion. This degree of impact is typically less severe in drainages that contain a mix of habitat types where prey species can seek refuge from northern pike predation. Historically, shallow, vegetated, and marshy drainages in Southcentral Alaska naturally functioned as important rearing habitats for coho salmon, Chinook salmon, rainbow trout, and other native fish; however, in many of these places, the native fish assemblages have been entirely replaced by northern pike. Alexander Creek in the Susitna River drainage is a prime example of the high degree of impact northern pike can have on local salmon stocks. This drainage is a homogenous network of wetlands, sloughs, and slow meandering rivers. At one time, Alexander Creek was the most popular Chinook salmon fishery in the Matanuska-Susitna Valley; today, Chinook salmon typically return here in numbers of less than 100 fish. State Wildlife Grants funding is used to suppress northern pike in Alexander Creek with the goal of reducing predation pressure on Chinook, coho, and sockeye salmon, increasing the abundance of their stocks in this system. These funds also support the early detection of northern pike in other watersheds, when eradicating their populations is most feasible.

ADF&G published principles and guidelines for state forest areas in Central Alaska that aimed to identify opportunities and actions mutually beneficial to both timber and wildlife management (Paragi et al. 2020). The recommendations were incorporated into the Alaska State Forest Action Plan developed by the DNR Division of Forestry and Fire Protection (DOF; DOF 2020: 67–68). The overriding goal of these guidelines is to assist wildlife and forest managers in collaboratively integrating their separate, but often compatible, responsibilities for managing resources. The report describes best management practices for SGCN that can enhance forest regeneration and make



*The transition zone where tree growth stops and alpine vegetation begins. F. Kovalchek, used with permission.*

mature tree stands more resilient. For example, managing coarse woody debris can occur in a manner that benefits small mammal SGCN. Small mammals consume, disperse, and inoculate soils with mycorrhizal fungi that are essential for tree regeneration and can also make mature trees more resilient to environmental change. Other benefits come from maintaining forest habitat features, such as cavity trees or snags that have little economic value

but provide important nesting, feeding, or roosting sites for a diversity of SGCN wildlife, including bats, small insectivorous birds, woodpeckers, and raptors. These SGCN can reduce the risk of tree damage by keeping irruptive populations of potentially damaging herbivores (insects and other vertebrates) in check. Wildlife managers have an opportunity to provide foresters with guidance that can minimize forest damage by maintaining or improving habitat for these predatory SGCN.

On a landscape scale, ADF&G's guidelines (Paragi et al. 2020) also suggest consultation with DOF on five-year timber sales to identify opportunities for maintaining wildlife habitat connectivity in managed forests. For example, wildland fire remains the dominant agent of landscape-level disturbance in Central Alaska. ADF&G's guidelines provide a framework for foresters and wildlife managers to work together to plan harvest in a way that mimics natural disturbance at a relatively large scale while maintaining a diversity of connected habitats and their structural features vital to SGCN. ADF&G is also working with DOF to identify and evaluate forest practices that can create early seral habitat beneficial to game species through tree harvest and prescribed burning. Examples of these habitat management activities include prescribed burns in the Alphabet Hills (Central Alaska) and mechanical habitat modifications on the Kenai Peninsula and near Tok (ADF&G 2024c).

In federally managed forests, restoration projects include silvicultural thinning to open up dense second-growth stands that develop 20 to 40 years after clearcutting (Hanley et al. 2013). Although this restoration activity has limited benefits for songbirds (Matsuoka et al. 2012), there is evidence it benefits small mammal populations and may benefit the Queen Charlotte Goshawk (USFS 2011).

Other forest management prescriptions designed to benefit old-growth-dependent species include retention of snags and mature trees within cutting units, establishment of natural old-growth buffers along shorelines and riparian areas, and maintenance of adequate old-growth stands to ensure the sustainability of wildlife populations (USFS 2008).

## Species Management

Species management refers to any activity implemented to improve the population status for an individual SGCN or groups of SGCN (CMP 2016). This can involve management of native species or invasive species. In Alaska, where the population status and migratory pathways for many SGCN are unknown or uncertain, effective species management activities can be guided by efforts to better understand population dynamics, migratory routes, and stopover sites, or a combination of these. Effective monitoring can identify SGCN that may require additional conservation actions to support their resilience, including reintroduction or assisted dispersal.

### Native Species

ADF&G prioritizes careful management of native species, and these efforts fall into two broad categories: indirect management and direct management. Indirect species management can include a range of actions to improve suitable habitats available for SGCN (e.g., predator reduction efforts to increase populations of prey species) and actions that may mitigate broad threats (e.g., improving water quality, removing invasive species). Direct species management can involve reintroducing species to areas where they formerly occurred (e.g., wood bison and muskoxen reintroductions), and assisting species with low dispersal capabilities in colonizing newly available suitable habitats

### Species of Conservation Need: Alaska Black-backed Woodpecker (*Picoides arcticus*)

The Black-backed Woodpecker is a seldom-seen bird of the North American boreal forests and montane forests in the western United States. Its core range in Alaska is largely within the range of white spruce in the Central and Southcentral bioregions, but it has been observed in most of the state's forested regions, and individuals have strayed as far as Kodiak and St. Paul islands. It feeds by excavating larval bark- and wood-boring beetles from dead or dying coniferous tree trunks, and it often nests in decaying trees in stands with high snag densities. Because of its reliance on dead and dying trees, it frequents recently burned areas and can colonize forests within weeks of a wildfire. Little is known about its population trends in Alaska. Fire suppression and postfire salvage logging can potentially affect these birds on a local scale. Spruce beetle outbreaks can provide additional feeding opportunities, and evidence from another species in this genus indicates that woodpecker predation on spruce beetles may have a stabilizing role on the dynamics of beetle outbreaks, which can cause widespread tree die-offs.



Alaska Black-backed Woodpecker. A. Bankert, used with permission.

that develop as a result of climate change. When there is incomplete information or uncertainty regarding the productivity of a population, proactive management actions are often taken to provide for sustainable population levels. Sometimes, however, declines occur that were not anticipated (e.g., Western Alaska chum salmon), and recovery of the stocks can be slow or incomplete (e.g., some king crab and herring stocks and Cook Inlet beluga whale). Three examples of SWG-funded conservation actions for SGCN in Alaska are discussed below.

There are concerns that Golden Eagles may be declining across North America, and this has resulted in management constraints on incidental eagle take under the federal Bald and Golden Eagle Protection Act. Biologists suspected that Alaska supports a large number of breeding Golden Eagles because of the vast availability of suitable open habitat; however, the number of Golden Eagles occurring in Alaska in the summer was unknown due to a lack of statewide systematic surveys. Estimating the statewide population size for this species is difficult because of the size and remoteness of Alaska. In partnership with HawkWatch International, USFWS, and the National Park Service, ADF&G's Threatened, Endangered, and Diversity (TED) Program developed a novel method to roughly estimate the number of Golden Eagles in Alaska by combining satellite tracking data of marked eagles with eagle migration counts. Results of this work indicate there are at least 12,000 Golden Eagles in Alaska each summer, an estimate that is more than four times larger than previous estimates (Booms et al. 2021). These modeling results emphasize that the Pacific Eagle Management Unit, which includes Alaska, supports more Golden Eagles than any of the other three Eagle Management Units in the United States.

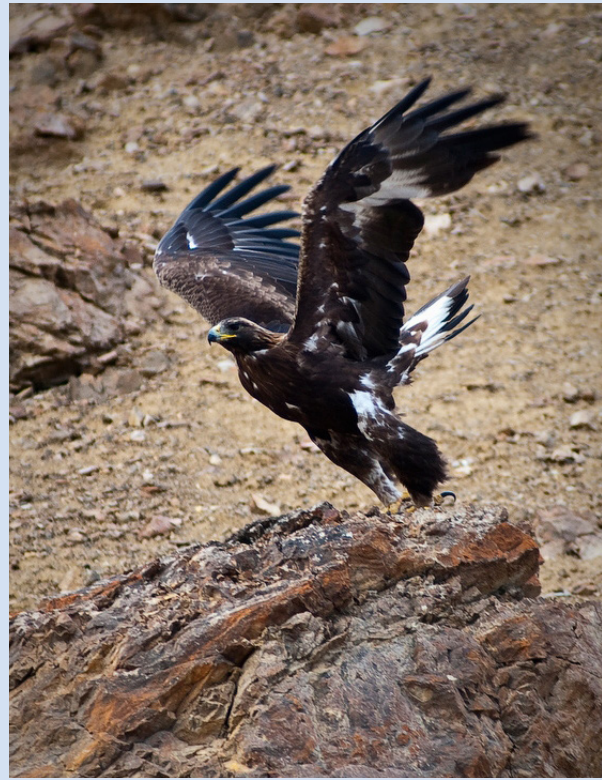


Understanding seasonal interactions during a species' full annual cycle can be crucial for effective management (Marra et al. 2015), even when part of that cycle occurs outside of Alaska. An emerging example is the Olive-sided Flycatcher, a migratory songbird that breeds in Alaska and is experiencing steep population declines across its range. SWG-funded research seeks to reduce the decline of the Olive-sided Flycatcher in Alaska and to identify potential management solutions for recovery. Adults that breed in Alaska undertake one of the longest migratory journeys of any North American songbird (12,000–17,000 miles annually), and as with many long-distance migratory birds, adult mortality during migration is high. Tagged individuals from Alaska revealed a series of important migratory stopovers throughout their annual journey (Hagelin et al. 2021).

*Travis Booms (ADF&G) banding a Golden Eagle. ADF&G.*

### Species of Conservation Need: Golden Eagle (*Aquila chrysaetos*)

Golden Eagles inhabit a wide range of latitudes and habitats around the world. In Alaska, Golden Eagles favor mountainous regions and Arctic tundra, where they primarily hunt snowshoe hares, Arctic ground squirrels, and other birds. However, they will also scavenge carcasses and prey on medium-sized mammals, such as marmots and young sheep and caribou. Most Golden Eagles in Alaska are migratory and winter in the western contiguous United States and southern Canada. Breeding pairs nest almost exclusively on cliffs, though they have been known to nest in trees. They build nests out of sticks and other vegetation, often maintaining several nests per territory and reuse them for many years. Therefore, their nests can grow to great size. Threats to this species include habitat loss, shooting, electrocution, wind turbine strikes, and lead poisoning from feeding on carcasses. These threats are greatest outside of Alaska while migrating or overwintering. Research led by ADF&G has helped document that the Alaska breeding population of Golden Eagles is robust and has helped spur conservation actions to reduce lead poisoning by encouraging hunters to switch to using nontoxic ammunition.



Golden Eagle. J. Frank, NPS, used with permission.

These data enable Alaska researchers to collaborate with managers in other states along the Pacific migratory flyway and internationally to identify important stopover sites along the migration route and, if habitat is a limiting factor, potential management options as well. The work aims to ensure breeding adults successfully return to Alaska, where they benefit from large expanses of intact habitat and experience high nest survival rates.

The Alaska hare, also known as the tundra hare, is a widely used recreational and subsistence food and fur resource for residents in western and southwestern Alaska. Historical accounts from the 1970s by local residents, area biologists, and published game bird reports describe groups of hares numbering 300–800 individuals; however, the current abundance of this species is believed to be well below those historical accounts. It is now rare to find groups of hares larger than 3–4 individuals, though it should be noted that the Alaska hare's population status, vital rates, and habitat use have been poorly understood until recent years. In 2018, the ADF&G Small Game and TED programs initiated a study with two goals in mind 1) develop a feasible, repeatable method to quantify the current population level, and 2) study hare movement patterns to determine home range sizes and habitat use. Population monitoring was conducted by identifying individuals using genetic information from winter fecal pellets collected at several study areas throughout the species' range in western and southwestern Alaska. To investigate movement patterns, 12 trapped hares were fitted with GPS necklace collars. The results of this research were used by the Board of Game and

### Species of Conservation Need: Olive-sided Flycatcher (*Contopus cooperi*)

The Olive-sided Flycatcher, a long-distance migratory songbird, is a distinctive inhabitant of Alaska's boreal forests. True to its name, this bird primarily feeds on aerial insects and aligns its peak nesting season with the abundance of insects in Alaska's moist and buggy boreal forests. It is estimated that the population of Olive-sided Flycatchers has declined by almost 80% across North America in the past 40 years. Much of this decline is attributed to adult mortality during their extensive migration—one of the longest of any North American songbird. Adults travel between 12,000 and 17,000 miles annually, migrating south through Mexico and Central America to winter in South America, reaching as far as Bolivia and the Andes Mountains. Satellite tracking studies done by ADF&G biologists have identified crucial stopover sites along their migration route, and these data are also being used by partners in efforts to help halt the decline of this species. One of the Olive-sided Flycatcher's identifying behaviors is "tree topping" or perching on the highest point of a coniferous tree or dead snag from which it flies to and fro, capturing insect foods in the air column. More often heard than seen, its distinctive call of "Quick! Three beers!" is a sound many Alaskans look forward to hearing during summer.



*Olive-sided Flycatcher.* S. Germain, USFWS, used with permission.

Federal Subsistence Board to make substantial changes to the regulatory structure for Alaska hares, including closing harvest in some areas for the 2025–2026 hunting season.

Future priority SWG-funded conservation actions include gaining a better understanding of SGCN population sizes, distributions within and outside Alaska, and habitat use; and identifying actions that can be implemented to mitigate and reverse population declines. These actions have been identified by ADF&G along with statewide and boreal working groups, such as the Alaska Shorebird Group (ASG 2019), Boreal Partners in Flight (Handel et al. 2021), the Alaska Small Mammal Group, and the Alaska Pollinator Coordination Group (ACCS 2024a). These working groups typically represent a range of species expertise and include members from state and federal agencies, universities, NGOs, Alaska Native organizations, and Canadian entities. Opportunities for potential SWG-funded projects on migratory birds also include national and international partnerships with groups interested in identifying migratory pathways and threats to migratory species throughout their full annual life cycle. The Association of Fish and Wildlife Agencies (AFWA) established the Southern Wings program specifically to facilitate state fish and wildlife agency participation in the conservation of migratory birds across their full life cycle (Southern Wings 2025). With funding from 41 state agencies, Southern Wings has helped facilitate the collection of important bird tracking data and habitat-use information at stopover sites and nonbreeding areas in Mexico, Central America, South America, and the Caribbean that are linked to breeding areas for migratory species in the United States. Because Alaska continues to provide high-quality, undisturbed breeding habitats for many migratory birds, this type of information collected outside the state will be especially important to understand where most mortality is likely to occur for neotropical migratory species that breed in Alaska.

Effective and timely management of individual species is necessary to maintain sustainable population levels of SGCN in Alaska. Within the broad scope of species management actions, including SWG-funded activities, ADF&G will continue the ongoing and careful management of Alaska SGCN, including harvested species managed under the sustained yield principle for the use and enjoyment of future generations.



Alaska hare. ABR, used with permission.

### **Invasive Species**

Conservation actions to minimize the risk of introducing invasive species, controlling their spread, and eradicating their populations where feasible, are a priority. These conservation actions typically involve efforts to control or eradicate infestations of aggressive invasive species. Invasive species are considered one of the top two threats to imperiled species in the United States (Wilcove et al. 1998); however, in Alaska the extent of their impacts may not be fully understood or documented (Duenas et al. 2018). Invasive species are considered the leading cause of historical extinctions worldwide (Groombridge 1992). Globally, 14% of critically endangered vertebrates, including 25% of critically endangered birds, are threatened by invasive species (Duenas et al. 2021).

To date, Alaska has relatively few invasive species compared to other states, but invasive plants and animals are recognized as a growing problem (see the “Invasive and Other Problematic Species, Genes, and Pathogens” section in Chapter 7). For example, as of 2024, the most comprehensive list of nonnative plants in Alaska includes 415 taxa (ACCS 2024b), an increase from the 283 species reported in 2007 (Carlson and Shepherd 2007). The Alaska Department of Transportation and Public Facilities now routinely prepares invasive plant surveys and removal plans for projects along the road system in Alaska, where invasive plants have gained a foothold in the state, including as far north as the Arctic Coastal Plain. Invasive freshwater aquatic plant species such as *Elodea* are of concern because they can alter habitats important for aquatic animal species.

Invasive fish and wildlife species can have devastating impacts on native aquatic and terrestrial species. The European green crab has recently become established in marine waters in Southeast Alaska (ADF&G 2024d), and this aggressive, invasive species has been known to prey heavily on commercially important marine invertebrates, as well as benthic organisms (Davis 2021), which are important food items for migratory shorebirds building fat reserves at stopover sites. The European Starling, an introduced bird species, has also become established in Alaska after expanding its range from the south; the species is now resident in the state, especially in areas of human habitation, and can displace native cavity-nesting birds.

Alaska’s extensive island archipelagos in the Southwest and Southeast biogeographic regions have harbored nonnative mammals at various times, which have either had large impacts, particularly on ground-nesting seabirds, or have the potential to do so in these insular ecosystems. Some of the invasive or nonnative introduced mammals on various islands in Alaska include Arctic and red fox,

mink, ground squirrel, Norway rat, house mouse, caribou, reindeer, cattle, and Arctic and European hare (Ebbert and Byrd 2002, USFWS 2024).

USFWS has eradicated invasive species and restored over one million acres on nearly 50 islands in the Aleutians, including the removal of introduced fox populations from 45 islands. On two Aleutian islands (Nizki and Alaid) that were studied before and after fox removal, the numbers of 12 waterbird and seabird species increased from 5,000 prior to fox removal to 14,000 after removal was complete (Byrd et al. 1994).

Although introduced foxes and large mammals may be hunted and trapped to eradication, small mammals occur at high densities, often underground, and are more difficult to eradicate. Rats are still present on at least 12 islands in the Alaska Maritime National Wildlife Refuge, and shipping mishaps could introduce them to others. Invasive rats have severe ecological impacts on islands, particularly for native wildlife. While rodent eradication from remote islands is possible, it is often prohibitively expensive and logistically challenging. The most common method, rodenticide application, poses risks to native birds, especially scavengers. During 2007–2009, rats were successfully removed from Hawadax (Rat) Island, a 7,100-acre island in the Aleutians, leading to ecosystem recovery (Buckelew et al. 2011, Croll et al. 2016). However, some nontarget bird mortality occurred, mostly consisting of Glaucous-winged Gulls and Bald Eagles that had scavenged rat carcasses (Ebbert and Burek-Huntington 2010, Buckelew et al. 2011). Invasive rodents continue to threaten seabird colonies on certain Aleutian Islands, where nesting birds are highly vulnerable to predation (Witmer et al. 2006). Removing introduced rats can mitigate these ecological threats and support the recovery of seabirds and other native species (Major et al. 2013). ADF&G’s Small Game Program also sees promise for rat removal improving endemic populations of Rock Ptarmigan.

In a comprehensive review by Nadol (1999), the level of state regulation of invasive species in the western United States (including Alaska) was deemed inadequate. Since then, the State of Alaska and federal agencies have released several management plans, including the *Alaska Aquatic Nuisance Species Management Plan* (ADF&G 2002b), the *Rapid Response Plan for Invasive Rodents in Alaska* (USFWS 2020), the *Early Detection and Rapid Response Plan for Invasive European Green Crab (Carcinus maenus) in Alaska, 2023–2028* (DeBruyckere et al. 2023), and the *Technical Guidance and Management Plan for Invasive Northern Pike in Southcentral Alaska: 2022–2030* (Dunker et al. 2022) to address invasive species within the state. In 2021, Alaska enacted restrictions and prohibitions on possessing some aquatic invasive species (ADF&G 2024e).

Currently, ADF&G partners with DNR, the Alaska Department of Environmental Conservation, the University of Alaska, U.S. Customs Agricultural and Plant Health Inspection Service, U.S. Forest Service (USFS), U.S. Geological Survey, USFWS, and local NGOs and Tribal organizations to implement an “Early Detection, Rapid Response” program to prevent the establishment of invasive plants and animals in the state. Harmful nonnative species in aquatic systems and on islands are of particularly high concern. Specific actions that reduce impacts from invasive species promise lasting benefits to Alaska’s native wildlife.

## **Awareness Raising**

Efforts to improve people’s understanding of SGCN and conservation actions and build their skills so that they can engage in conservation efforts are included in this category (CMP 2016). SWG projects are statutorily limited to funding education and outreach at no more than 10% of the project’s

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total cost. However, well-designed citizen science initiatives that enlist volunteer observers can yield useful scientific information and provide ancillary benefits for public education and scientific literacy (Bonney et al. 2009, Silvertown 2009). Alaska is a huge and remote state with relatively few scientists and limited funds available to study the state's many species of fish and wildlife that occur in it. With the help of local residents and biologists, land managers can expand survey efforts and do more with limited resources.

The Alaska Citizen Science Program (ADF&G 2024f) was developed by the TED Program at ADF&G to focus on two wildlife resources in road-accessible parts of Alaska: bats and wetland-associated breeding birds. As a partnership between members of the public and professional scientists, the program provides opportunities for interested individuals to assist wildlife biologists in collecting important data as part of ongoing research projects and conservation planning. The program provides opportunities for individuals, families, community organizations, and school groups to be outdoors and involved in collecting monitoring data on wildlife populations.

These citizen science projects have collected basic information on the occurrence and distribution of Alaska's wildlife species. Reports of bat sightings from citizen scientists greatly expanded the known range of the little brown bat in the Western and Central biogeographic regions and have

### Culture and place-based shorebird conservation outreach in schools and communities in the Yukon-Kuskokwim Delta

Shorebirds migrate across continents and oceans, relying on key areas to rest, eat, and refuel. Alaska hosts about one-third of all shorebirds on Earth. Within Alaska, the Yukon-Kuskokwim Delta provides important habitat for millions of shorebirds. This delta is also within the homeland of the Indigenous Yup'ik people, who rely on shorebirds for food and cultural resources. Shorebirds are harvested in relatively small numbers in Alaska, but this harvest now includes SGCN, such as the Bar-tailed Godwit (*tevatevaaq* and *teguteguaq* in the Yup'ik language). The objectives of the Yukon-Kuskokwim learning and outreach program are to support awareness of and stewardship about shorebird ecology and conservation, transmission of Indigenous knowledge and Yup'ik language, and interest in learning and nature. In collaboration with schools, communities, and other partners, the shorebird outreach program reached 18 communities, 88 local educators, and 3,179 students in 2022–2024. Community meetings, management meetings, and local presentations addressed other audiences. Shorebirds provide engaging contexts for learning about healthy habitats, food chains, geography, and the diverse peoples across shorebirds' migratory routes.



On the Yukon-Kuskokwim Delta, students and teachers in Hooper Bay sent this shorebird flock to the Pukorokoro Shorebird Centre in New Zealand. The Bar-tailed Godwit breeds on the Yukon-Kuskokwim Delta and North Slope in Alaska and winters in New Zealand and Australia. C. Ralls, Pukorokoro Shorebird Centre, used with permission.



*Pacific Loon. R. Askren, USGS, used with permission.*

provided insights into this bat's seasonal ecology and habitat use. In addition, most of the known bat maternity colonies in the state were first identified and reported by citizen scientists. Since the summer of 2014, citizen scientists have been helping conduct acoustic driving surveys for bats (ADF&G 2024f). These data will be contributed to the North American Bat Monitoring Program to help develop estimates of population trends at both regional and continental scales.

ADF&G's Birds 'n' Bogs Program (see the "Current Monitoring Efforts" section of Chapter 9) has also relied upon citizen scientists

to monitor populations of 12 boreal nesting bird species in Alaska's Southcentral and Central biogeographic regions. This program expanded from the Alaska Loon Watch, which started in 1985. In 2019, a scientific paper analyzing long-term population trends of Common and Pacific Loons in Southcentral Alaska utilized 30 years of data contributed by the program (McDuffie et al. 2019).

In addition to state-supported projects, several citizen science online platforms, including eBird and iNaturalist, have helped form a better understanding of the distribution of wildlife and plant species in road-accessible areas of Alaska (Chapter 9). For instance, the distributions and trends of many bird species have been modeled and mapped across remote areas of Alaska using eBird data and predictive models (Fink et al. 2022).

## Education and Training

Beyond citizen science, ADF&G engages in numerous education and outreach activities to raise awareness of wildlife concerns. For example, outreach concerning endangered Cook Inlet beluga whales has led to more signage aimed at increasing awareness for boaters that share the water with these animals. Funding support for school programs, such as in-class activities, public and scientific presentations, reach a broad audience to build awareness about wildlife SGCN, including the importance of population counts and the impacts of marine debris. ADF&G also partners with agencies, organizations, and community groups to provide presentations, run interactive activities, and engage with the public at annual events such as Belugas Count!, STEAM (Science, Technology, Engineering, Arts, and Mathematics) Events, and Sea Week.

## Legal and Policy Frameworks

Legal and policy frameworks aim to develop, change, influence, and implement formal legislation, regulations, and voluntary standards (CMP 2016). For example, in 2012, with support from ADF&G's Division of Sport Fish, the Alaska Board of Fisheries passed a regulation prohibiting the use of felt-soled waders in the freshwaters of Alaska to stop one common method by which fish diseases and invasive species can be moved between waterbodies (ADF&G 2012). In addition, DNR has quarantined five aquatic plant species to prevent the aquarium trade from importing invasive species (DNR 2024). In 2021, the state banned the possession of 33 species of amphibians, crustaceans, fishes, and mollusks (ADF&G 2024e). ADF&G does not generally propose legislation, but it does

### Species of Conservation Need: Pacific Red Knot (*Calidris canutus roselaari*)

The Pacific Red Knot is a sandpiper known for its beautiful, terracotta-orange breeding plumage and long-distance migration. The Pacific population is one of six recognized subspecies of Red Knots, which can be found on every continent except Antarctica. Pacific Red Knots are known to overwinter along the sandy coasts and wetlands of northwestern Mexico and breed in the tundra of northern and northwestern Alaska and on Wrangell Island, Russia, resulting in an annual migration of 6,000 miles or more. The Pacific subspecies is considered the least studied globally, and its population has declined over the last four decades for unknown reasons. Potential threats across the species' vast range that may be causing this decline include climate change, sea level rise, coastal development, anthropogenic disturbances, and invasive species such as smooth cordgrass. Smooth cordgrass can take over open mudflat habitat and alter sediment characteristics, causing reductions in available foraging habitat. Atlantic Red Knots are famous for eating horseshoe crab eggs in Delaware Bay; however, in general, the species is thought to specialize on bivalves. Current work by ADF&G includes determining important stopover habitat in Alaska during spring migration and determining their diet in Alaska and across the Pacific Flyway. Understanding what Red Knots eat in various locations can help researchers understand whether they have dietary plasticity and can adapt to changes in their prey base or are specialists with a limited ability to respond to large changes in prey.



Pacific Red Knot. B. Richard, ADF&G.

offer comments on pending proposals or legislation affecting wildlife in the state. For example, ADF&G engages with federal partners in multiple ways regarding ESA listing decisions involving Alaska's wildlife; data and information are provided to federal partners so that the best available science can inform decision making. The state also comments on proposed and existing ESA listings, which may include the designation of critical habitat or the delisting or downlisting of species.

In the future, information that identifies important wildlife habitats and management actions to mitigate or reverse SGCN population declines could inform the decisions of policy makers. In addition, information on the deleterious ecosystem effects of nonnative invasive species might help inform legislation and policy to further reduce imports of nonnative species, even if some stakeholders deem certain species desirable (e.g., introduced populations of northern pike, agricultural or aquaculture species, aquarium species, and exotic pets).

### Livelihood, Economic, and Moral Incentives

Livelihood, economic, and moral incentives can influence human behavior and assist in the conservation of SGCN (CMP 2016). These can range from the use of subsistence and natural resources to substitutes for environmentally damaging products and behaviors and may or may not be monetary in nature.

Some programs offer direct economic incentives to benefit the conservation of Alaska's fish and wildlife. In 2024, ADF&G and partner organizations initiated the Alaska Copper Ammo Challenge, a public education and incentive program to reduce the use of lead ammunition across the state

with the goal of minimizing accidental lead poisoning of wildlife. This program educates hunters about the benefits of lead-free ammunition and offers rebates to those who purchase copper ammunition (AK Copper Ammo Challenge, 2025).

Incentives do not have to be monetary. Participants in ADF&G wildlife observation programs, for example, may receive public recognition in a local newspaper, or certificates of achievement (e.g., based on the number of animals observed). Additionally, groups that “adopt” an important local habitat area for birds and other wildlife, and work to improve habitat, remove invasive plants, or promote responsible dog control can be publicly commended.

## Institutional Development

Institutional development refers to actions that build infrastructure and relationships to implement better conservation and management actions (CMP 2016). This includes developing working collaborations with other agencies, NGOs, private entities, or in-state and interstate consortiums. ADF&G has many potential partners including the Alaska Pollinator Coordination Group, Boreal Partners in Flight, Alaska Shorebird Group, Fish Habitat Partnerships, watershed conservation groups, Alaska Small Mammal Group, Pacific Birds Habitat Joint Venture, and the Western Bat Working Group. In some cases, ADF&G staff have provided expertise for formulating conservation and management strategies (e.g., bird conservation plans) or assisted with scientific meetings (e.g., American Fisheries Society, The Wildlife Society, Alaska Marine Science Symposium, and Alaska Bird Conference) that increase the effectiveness of conservation and management actions.

A specific priority for building capacity is engaging with species working groups, as noted above, and the Pacific Flyway Council Study and Nongame Technical Committees. These groups help support conservation and management actions for populations of Alaska’s wildlife at migratory staging and wintering areas across state and national boundaries, where threats to species that breed in Alaska are often high. Other priority areas for building capacity include collaborative activities to promote stream and wetland restoration efforts, as well as invasive species control and eradication.



*Oxbow lakes along the Kobuk River. N. Herbert, NPS, used with permission.*

For example, ADF&G’s TED Program has fostered more than 140 SWG-based partnerships over the past 10 years, thanks to collaborations with other state programs, government agencies, species working groups, universities, NGOs, Alaska Native organizations and environmental contractors. The work has built on collective strengths and expertise to leverage scientific outcomes that inform conservation and management actions for over 100 SGCN. The outcomes have recruited many new voices for collaborative conservation and management in the state. Nontraditional conservation partners (e.g., oil and gas, mining, and

timber industries) also stand to provide valuable opportunities for collaboration. For example, partnering with industry could help ADF&G develop and implement more effective wildlife mitigation measures, balancing development with the long-term viability of fish and wildlife populations. Encouraging and strengthening institutional development with external partners for conservation and management can be a powerful tool, and these efforts will continue.

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