Birds, Bird Studies, and Bird Conservation in Denali National Park and Preserve

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Mt. McKinley National Park was created in 1917, mainly because of its rich wildlife resources. With the passage of the Alaska National Interest Lands Conservation Act (commonly referred to as ANILCA) in 1980, nearly 4 million acres were added to the original park, and the new complex of park and preserve lands was designated as Denali National Park and Preserve. Denali is well known for its diversity of wildlife and scenery. Thirty-nine species of mammals, 165 species of birds, 10 species of fish, and one amphibian have been recorded in Denali. Of the bird species, 149 occur regularly and 119 are recorded as breeders (nesting in the park and preserve).

Naturalist Charles Sheldon and scientists Joseph Dixon, George Wright, Olaus Murie, and Adolph Murie, who worked in Denali from 1906 through the early 1930s, were the first scientists to study and understand the ecological significance of birds in Denali. These early studies were followed by more in-depth and long-term studies by Adolph Murie extending from the late 1930s until about 1970. The valuable contributions of these scientists are published in several books. The travels and field observations of Charles Sheldon were published in 1930 in *The Wilderness of Denali*. In 1938, Joseph Dixon published the findings of his field studies in the notable book *Birds and Mammals of Mount McKinley National Park, Alaska*. Adolph Murie made significant contributions to understanding many northern species with his landmark books *The Wolves of Mount McKinley* published in 1944, *The Mammals of Mount McKinley* published in 1962, *The Birds of Mount McKinley, Alaska* published in 1963, and *The Grizzlies of Mount McKinley* published in 1985. In *The Birds of Mount McKinley, Alaska*, Murie states…

> "In McKinley Park the visitor has the rare opportunity to enjoy northern landscapes, a variety of lichens and flowers, and grizzlies, caribou, Dall sheep, perhaps a wolf or a wolverine, and a number of birds in their northern breeding grounds. Of special interest among the birds are three species of ptarmigan, each with a specialized voice and an inclination to use it. There are shorebirds, two of which, the surfbird and the wandering tattler, are of special interest because most of the nesting data on them have been gathered in the park. The arctic warbler and the wheatear, visitors from Asia, are relatively common. The golden eagle, unmolested and free, may frequently be seen soaring in the blue sky over its mountain home. May this magnificent bird and other migrants, survive the many new hazards in the south and continue returning each spring in the future, to contribute beauty and spirit to this northern wilderness."

The foresight of Adolph Murie is evident in this passage from his book. Murie and others realized that Denali is not isolated from the environmental hazards created by humans and that its migratory birds face an increasing number of threats on their migratory journeys and wintering grounds. Murie, along with other naturalists and scientists including Charles Sheldon, Joseph Dixon, and George Wright, all realized the importance of preserving the ecosystems and wildlife of Denali in the rapidly changing world.

Denali's bird life is made up of migratory birds from all over the globe and a hardy group of birds that remain in the area year-round. The abundance of birds in Denali ebbs and flows across the seasons, increasing significantly as migrants return to Denali in spring and decreasing when they depart in autumn. Summer birding in Denali rewards visitors with opportunities to view many species in this spectacular northern environment. Birding in winter is slim by numbers but great in rewards, as observations of pine grosbeaks, mixed flocks of ptarmigan, or perhaps a northern goshawk or gyrfalcon await the hardy winter birder.

Visitors are drawn to Denali to search for many northern species of birds. The beauty and the unique lifestyles of these northern breeders rouse the curiosity of many naturalists, scientists, and visitors. While we revere the beauty of Denali's

Opportunities to see the strikingly handsome northern hawk owl lure many birdwatchers to Denali.

birds, we must also acknowledge the threats to their existence. Denali's migratory birds face a multitude of hazards during their migratory journeys and on their wintering areas. Even in the seemingly pristine environments of Denali, year-round residents face changes in habitat, climate, and the presence of chemical contaminants. Broad-scale threats such as chemical pollutants that remain in our environment (known as persistent organic pollutants) and global climatic changes may have long-lasting and far-reaching effects on Denali's birds. On a local scale, increases in human activities may alter the habitats and habits of different species as more humans visit Denali.

The goal of this article is to introduce you to the birds of Denali, describe some of our historic and recent bird studies, and discuss some of the conservation issues facing Denali's birds. By learning more about Denali's birds and how they connect Denali to the world, we can better understand the role that Denali and its bird life play in global ecosystems. By understanding these ecological connections, perhaps we can more clearly see our role in preserving global ecosystems for birds—and for ourselves.

The Birds

Thirty-five species of water birds (loons, grebes, swans, and ducks) occur in Denali, and 23 species are recorded as nesting in Denali. Three species of loons—red-throated, Pacific, and common—and two species of grebes—horned and red-necked—nest in Denali. Geese are most often seen during migration and are not common breeders, except for white-fronted geese, including Tule's white-fronted geese, which nest in Denali. Over 400 pairs of trumpeter swans nest in the productive wetlands in the northwestern portion of Denali and along Denali's southern borders. Tundra swans do not nest in Denali but are commonly seen during spring and autumn migration. Twenty-three species of ducks, including 15 nesting species, occur in Denali. Nesting species include American wigeon, mallard, northern shoveler, northern pintail, green-winged teal, greater and lesser scaup, harlequin, surf scoter, white-winged scoter, black scoter, long-tailed duck, bufflehead, Barrow's goldeneye, and red-breasted merganser. Ducks seen during migration include gadwall, Eurasian wigeon, blue-winged teal, canvasback, redhead, ring-necked, common goldeneye, and common merganser. All of the water birds that occur in Denali are migratory. Some species, such as the long-tailed duck and surf scoter, spend their winters at sea. Other species, such as the white-fronted goose, may winter as far south as central Mexico.

Predatory birds (or raptors), including harriers, hawks, eagles, falcons, and owls, are well represented in Denali. Species nesting in Denali include osprey (rare), northern harrier, bald eagle, sharp-shinned hawk, northern goshawk, red-tailed hawk, golden eagle, gyrfalcon, peregrine falcon, merlin, American kestrel, great-horned owl, northern hawk owl, great gray owl (rare), short-eared owl, and boreal owl. Migrants and occasional visitors include rough-legged hawk and snowy owl. Most of the diurnal raptors—the harriers, hawks, eagles, and falcons—are migratory. Exceptions to this include gyrfalcons and northern goshawks. Gyrfalcons are the largest falcon in the world, and they nest only in Arctic regions. Adult gyrfalcons usually remain on or near their nesting grounds throughout the year unless they can't find food. Juvenile gyrfalcons are more likely to move away from the nesting grounds during the winter in search of food. Northern goshawks are usually year-round residents but will leave this area when food is scarce. Most of Denali's owls are year-round residents, with the exception of short-eared owls. These beautiful owls are migratory, but we haven't identified their wintering areas. Northern hawk owls and great gray owls are nomadic, and

they move long distances in search of food.

The wintering range of Denali's migratory raptors and owl spans a large area from central Alberta to South America. Within a species, individuals in a population may also be spread over a large geographic area in winter. For instance, golden eagles from Denali winter from central Alberta to north-central Mexico and merlins from Denali may winter from the southwestern United States (including southern California) to central South America.

Ruffed and spruce grouse and all three species of North American ptarmigan (willow, rock, and white-tailed) are year-round residents in Denali. Grouse are found in the forested regions of Denali. The smallest and least abundant white-tailed ptarmigan is usually found at higher elevations. The larger and more abundant rock ptarmigan is a bit easier to find and occurs in alpine tundra. The most common and largest of the three species, the willow ptarmigan, occurs in shrubby areas, usually at or below tree line. All three species flock together in winter.

The loud haunting calls of the American golden plover are commonly heard in alpine areas of Denali in the summer.

One of the greatest birdwatching experiences in Denali is the spring and autumn migrations of sandhill cranes. In late August the snowlines and temperatures creep down, the tundra turns crimson and gold, and large flocks of sandhill cranes whirl overhead on their way south. From late August through mid-September, the loud, resonating "garroo-garroo-garroo" of the adults and the higher-pitched shrill calls of the juveniles are common sounds near Wonder Lake. The return of sandhill cranes in May is a sure sign of spring.

Many visitors are surprised to learn that Denali is home to nesting shorebirds. At least 21 species of shorebirds nest in Denali, and six other species occur during migration. All the shorebirds are migratory, and most migrate long distances between their breeding and wintering grounds. Shorebirds nesting at higher elevations include American golden plover, upland sandpiper, surfbird, and Baird's sandpiper. Shorebirds nesting at lower elevations include semipalmated plover, greater and lesser yellowlegs, solitary sandpiper, wandering tattler, spotted sandpiper, whimbrel, least sandpiper, long-billed dowitcher, common snipe, and red-necked phalarope. These globetrotters are a delight to watch in Denali. Birds with intriguing names and habits, like the wandering tattler, attract birdwatchers by the score. The American golden plover has exquisite plumage, an evocative voice, and a globe-spanning reach (they winter in South America). Surfbirds, who spend most of their lives along coastal areas, nest in the mountainous regions of Denali.

Several species of birds that spend a portion of their lives at sea come inland to nest in Denali. Two elegant species—the long-tailed jaeger and the arctic tern—grace the summer skies of Denali. The beautiful long-tailed jaeger nests on the tundra, and these lithe, aerial hunters patrol the tundra in search of prey. As agile and elegant as jaegers, arctic terns nest near the numerous lakes and ponds in Denali. They hover seemingly effortlessly over ponds in search of prey. The wintering grounds of long-tailed jaegers are not well-described, and the wintering grounds of arctic terns include the oceanic regions of Antarctica.

Of all the animals on earth, arctic terns probably enjoy the highest percentage of daylight through the year. Many visitors remark about the presence of "seagulls" in Denali. The term "seagull" is deceptive; the two species that nest in Denali—the mew gull and Bonaparte's gull—are inland nesters. Most visitors quickly become familiar with mew gulls, as this species is often seen begging for food at areas where people congregate. Bonaparte's gulls, with their black heads, are often confused with arctic terns, with which they share similar habitat.

The habitat bordering the many streams in Denali (known as riparian habitat) supports many species of birds. The belted kingfisher, which is familiar to many Denali visitors, lives along streams in Denali. Like bank swallows, belted kingfishers dig into dirt or clay banks to form a nesting cavity. Streams are also home to colorful harlequin ducks, wandering tattlers, northern waterthrushes, and blackpoll warblers.

Denali's forested regions are home to five species of woodpeckers: the downy, hairy, three-toed,

The agile long-tailed jaeger graces Denali's skies and tundra in the summer.

and black-backed woodpeckers, and the northern flicker. All but the northern flicker are year-round residents. Black-backed woodpeckers are rather rare and usually occur in areas after a wildfire.

Flycatchers make a good showing in Denali, and all are migratory. The Hammond's flycatcher, with its characteristic raspy call, is the first flycatcher to arrive on the breeding grounds, usually in early May. Alder flycatchers only spend about 48 days a year in Alaska. They arrive just after the last freezing temperatures in spring, breed, raise young, and leave just before the first freezing temperatures in late summer. Olive-sided flycatchers, with their unique "quick-three-beers" song, and Say's phoebes, which build their nests in cracks of cliffs and rock outcrops, often near golden eagle nests, also occur in Denali.

The northern shrike is another bird that piques the curiosity of birdwatchers in Denali. The most northern and most widely distributed of all shrikes, it breeds throughout the Arctic. This species belongs to the group of birds known as passerines, or perching birds. Unlike most other passerines, shrikes have a unique predatory lifestyle, and their foods include everything from insects to small birds and small mammals. Often referred to as butcherbirds, northern shrikes impale prey that is too large to swallow on pointed objects. While northern shrikes live a predatory lifestyle, these strikingly beautiful and tenacious passerines lack many of the specialized adaptations of raptors, including large and powerful feet, talons, and a crop.

In winter, ravens, gray jays, and black-billed magpies are some of the most common birds in Denali. All three species are year-round residents, and all three are hardy survivors. Ravens and gray jays seem to magically appear no matter where you travel during winter. Gray jays are constant company at winter camps and campgrounds, and their behavior of begging and stealing food scraps from people and dogs has earned them the well-deserved name of "camp-robbers." Ravens are a bit more elusive around people, but they often follow wolves on their hunting trips during winter. Ravens are more predatory than either gray jays or magpies, and they will seek out and kill live prey when the opportunity arises. Ravens also occur at high elevations, and it is not unusual for mountain climbers to see ravens at altitudes exceeding 17,000 feet. Ravens swagger, strut, stroll, hop, and dash in and out of contact with humanity, exhibiting no dependence but a willingness to exploit. They treat people much like wolves or bears, always quick to pick up our scraps.

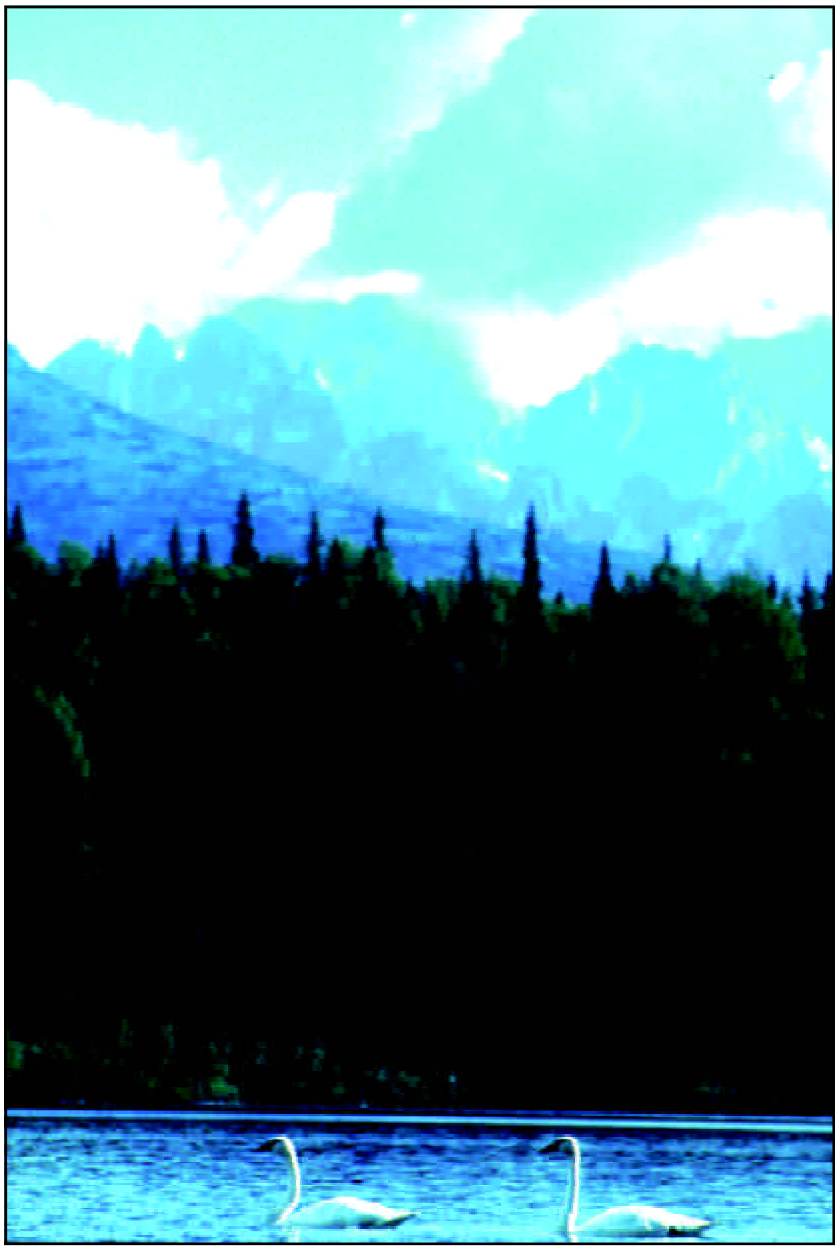
A variety of other passerines occur in Denali, ranging from swallows to sparrows to longspurs. Horned larks, American pipits, and Lapland longspurs are the characteristic passerines of the tundra. Each of these species has a highly specialized flight display or characteristic vocalizations. Lapland longspurs are one of the most common summer tundra inhabitants in Denali. The handsome males usually find a prominent perch to sing their sparkling jumble of notes throughout June.

Six species of warblers, including orange-crowned, yellow, yellow-rumped, blackpoll, and Wilson's warblers and northern waterthrush, nest

in Denali. Most of these species spend the winter in Central and South America. Sparrows, including savannah, fox, Lincoln's, white-crowned, and golden-crowned, are well represented in Denali and occur in a variety of habitats. Denali's sparrows usually winter at lower latitudes in North America. These species combine their voices each June to create glorious sunrise symphonies.

Gray-cheeked, Swainson's, and hermit thrushes nest in Denali, and their unique songs are characteristic sounds of summer. The familiar American robin also occurs regularly in Denali and is a common nester. The varied thrush, one of the earliest spring migrants, nests in the forested regions of Denali and has a unique extraterrestrial voice. An evening or early morning visit to shrubby or forested areas in Denali will leave you with mixed emotions and probably a stiff neck—while you'll enjoy listening to the calls of all these thrushes, you'll strain to get a good look at any of these species.

Over 400 pairs of trumpeters swans nest each year in Denali National Park and Preserve.



Several species of passerines are true globetrotters, attracting much interest from birdwatchers and scientists alike. Northern wheatears are summer visitors that nest in the tundra in Denali and spend their winters in sub-Sahara Africa. Arctic warblers are common nesters in willow thickets, and their harsh calls are difficult to ignore. This Old World warbler winters in southeastern Asia (China, Indonesia, the Philippines, and Borneo). Blackpoll warblers are tiny birds that breed across the boreal regions of North America. This tiny bird is a celebrity in the migration world. Their annual journeys between North America and South America are among the longest of passerine birds.

Perhaps some of the most interesting passerines in Denali are those that stay in the area yearround. In addition to ravens, gray jays, and black-billed magpies, the passerines of winter include American dipper, black-capped and boreal chickadees, pine grosbeak, white-winged crossbill, and common and hoary redpolls. These small birds are hardy. Black-capped chickadees weigh just a half-ounce (12 grams), yet they survive temperatures dropping to –40°F and lower. Chickadees living in northern areas are nearly 25% larger than those living in the temperate regions of North America. They store more fat in winter to provide greater insulation from the cold and store more fuel for keeping warm. They also cache food to ensure that they have an ample supply of food through the winter and can lower their body temperature to survive the long subarctic nights. Northern black-capped chickadees are extremely efficient at modifying an enzyme (lipoprotein lipase) to provide free fatty acids for metabolism by muscles and storage by fat. Redpolls are even smaller than chickadees. They store food in a pouch in their esophagus and can take on large amounts of high-caloric foods before nightfall and digest these seeds after they go to roost. American dippers are North America's only truly submersible songbirds. Even in the depth of winter, they forage in the few open leads along streams, feeding mostly on aquatic insect larvae. To survive in these harsh environments, American dippers have low metabolic rates, extra oxygen-carrying capacity in their blood, and a thick coat of feathers.

The Bird Studies

Bird studies in Denali are as diverse as the species themselves. Most historic studies focused on describing the birds occurring in the area and, in limited cases, describing the natural history of a species. In more recent years, studies were developed to determine population trends, identify nesting area, and describe nesting habitat in response to management needs and to understand how birds respond to changes in their environment. Over the years, many scientists have made significant contributions to our knowledge of northern nesting species by studying birds in Denali.

In 2001 the American Bird Conservancy, an organization dedicated to conserving wild birds and their habitats throughout the Western Hemisphere, recognized Denali for its significance in the ongoing effort to conserve wild birds and their habitats and designated Denali a Globally Important Bird Area. The American Bird Conservancy's Important Bird Areas Program was launched in 1995 and has concentrated on identifying and documenting the bird conservation sites throughout all 50 states—those of significance on a global level.

Historic Studies

The first scientific investigations of birds in Denali were those made by Charles Sheldon, Joseph Dixon, and George Wright. The field studies conducted by these men provided the first scientific information on the birds present in Denali. Adolph Murie probably made the first scientific study of a single species of bird in Denali in the late 1930s. Murie studied the food habits of golden eagles by collecting pellets that the eagles had regurgitated and by noting the remains of food in eagle nests, with special effort to find remains of Dall's sheep lambs.

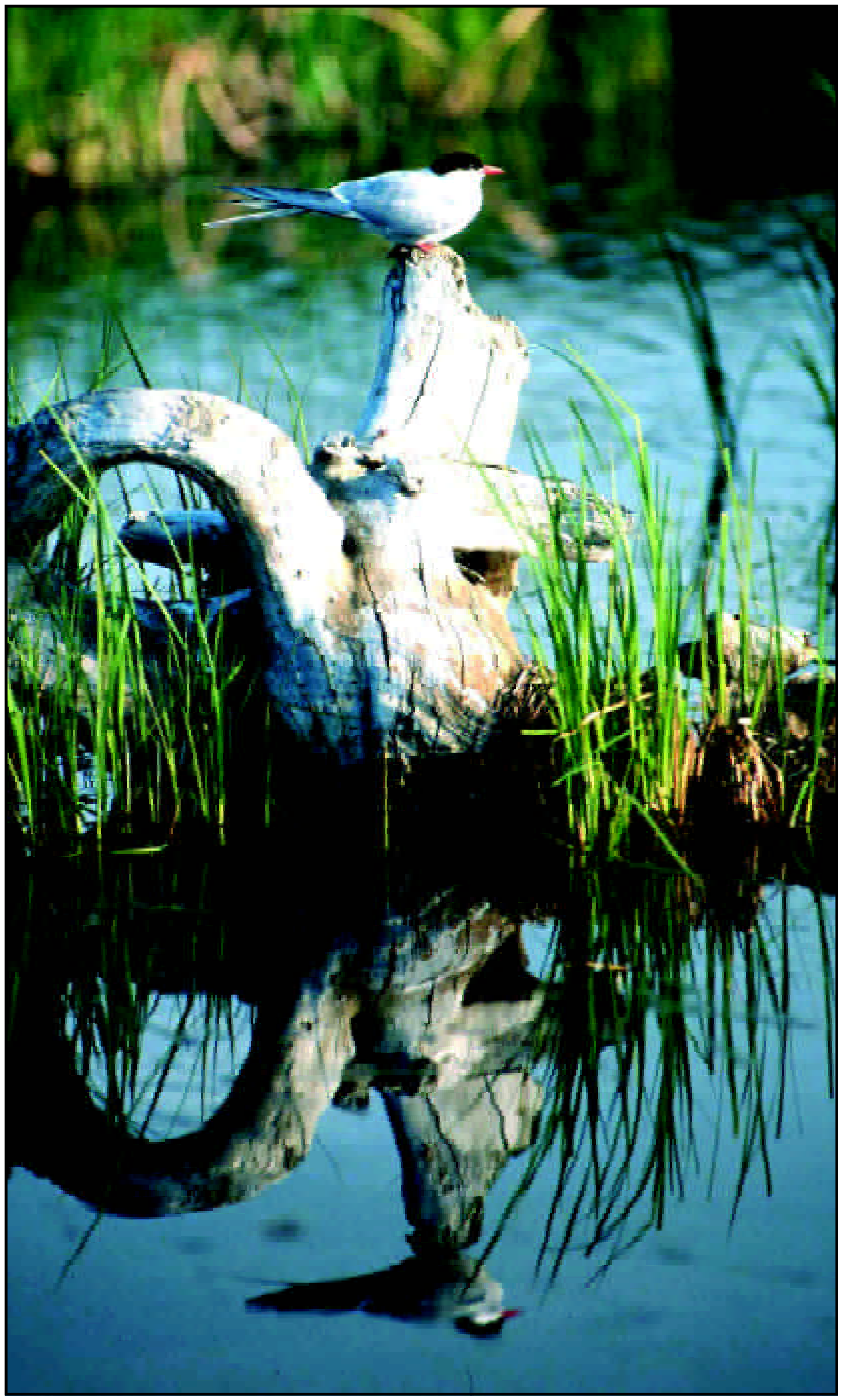
The period from 1940 through the late 1970s saw few bird studies in Denali. While many birders visited the area, only a few bird studies were conducted. These included cooperative studies, which continue today, with the U.S. Fish and Wildlife Service to determine population trends of waterfowl and trumpeter swans. In the early 1980s several studies on the nesting ecology of northern hawk owls (by Kenneth Kertell) and merlins (by Karen Laign) marked the beginning of more intensive studies on single species in Denali. Kertell also conducted several inventories of birds in the new additions to Denali in the early 1980s. From 1984 to 1994 the U.S. Fish and Wildlife Service and the National Park Service conducted field investigations of the nesting ecology of merlins in Denali. In 2000 and 2001 the National Park Service and Boise State University conducted field investigations of the nesting ecology of northern hawk owls in Denali.

In 1987 the National Park Service began to study the reproductive characteristics of golden eagles and gyrfalcons and conduct raptor surveys in many of the areas added to the original park in 1980. The study of the nesting ecology of golden eagles and monitoring of the reproductive success of gyrfalcons continue today. Our golden eagle study has spawned research into many aspects of golden eagle ecology, including migratory behavior, food habits, and survival of both breeding birds and juveniles. Using satellite telemetry, we recently identified the migration corridors, winter ranges, and summer ranges of juvenile golden eagles.

In 1991 the National Park Service published its Vail Agenda, a comprehensive strategy for serving America's noble trust into the 21st century. To meet our resource stewardship responsibilities, the Vail Agenda action plan calls for park managers and superintendents to have solid natural resource information at their disposal. Providing natural resource information in a comprehensive and timely manner is the Vail Agenda's mandate to the National Park Service's Natural Resource Inventory and Monitoring Program. The goal of this national program, launched in 1991, is to acquire the information and expertise needed by park managers in their efforts to maintain ecosystem integrity in the approximately 250 National Park System units that contain significant natural resources.

With the launch of the Inventory and Monitoring Program, Denali began several monitoring projects focused on birds other than raptors and waterfowl, with an emphasis on passerines. One project, run cooperatively with the Alaska Bird Observatory from 1993 to 2001, developed and implemented field techniques to assess population trends in selected species of songbirds in spruce forests along the Denali park road. The other project, run cooperatively with the Institute for Bird Populations, assesses productivity and survivorship of selected passerines. This program, known as Monitoring Avian Productivity and Survivorship, or MAPS, is a continent-wide monitoring program and continues today. In 1993 a local naturalist, Nan Eagleson, reinstated the Audubon

Arctic terns nest travel over 25,000 km each year between their breeding grounds in Denali and their winter grounds in Antarctic waters.



Christmas Bird Count on the very eastern edge of Denali. The Christmas Bird Count, a volunteer-based, continent-wide monitoring program, provides information on the broad trends of winter birds in the count area. In 1994 the National Park Service reinstated the two Breeding Bird Survey routes in Denali that were run opportunistically in the 1980s by various volunteers. The Breeding Bird Survey is another continent-wide monitoring program that is used to assess trends in bird populations across North America.

More recently, Denali's scientist were tasked with developing studies to better understand the distribution of birds in areas slated for development or increased human activities. In the late 1990s, Denali's scientists designed and implemented studies to identify the nesting habitat of trumpeter swans, other waterfowl, and raptors in areas slated for increased human activities in the southern portion of Denali. Few studies had been conducted in these areas, and the pressure to develop visitor services and the possibility of increased human activities in previously undisturbed areas prompted local citizens, state managers, and park managers to develop a strategy for protecting Denali's resources in this area.

Recent surveys show that many of the wetlands on the south side of the Alaska Range are used by nesting trumpeter swans and other waterfowl, including the Tule white-fronted goose. Nesting bald eagles are commonly observed along many of the waterways in the study area, and nesting golden eagles and gyrfalcons are common in the mountainous regions of this area. Park managers will use information from this study to plan the development of future visitor services without disturbing or destroying nesting habitat of these important park resources.

New Studies

Two new birds studies were designed and implemented in 2001 to monitor the long-term changes of park resources. The first study, conducted cooperatively with the molecular genetics lab of the Alaska Science Center, involves using a noninvasive monitoring technique to estimate the survival of adult golden eagles. One of the most important aspects of the population dynamics of long-lived species is adult survival rate. Determining the survival rates of animals usually requires capturing and marking the animal with a marker that can be identified remotely (such as a radio-transmitter) or when the animal is recaptured (such as a band). These marking techniques are commonly used on many animals in Denali, but capturing adult golden eagles is extremely difficult. Therefore, we are using molecular genetic techniques to identify individual golden eagles at selected nesting areas to determine if eagles use the same nesting areas in consecutive years and to estimate the probability of eagles living from one year to the next. By collecting shed feathers at nesting areas over a series of years and extracting

Gyrfalcons begin incubation in mid-March, often when mean daily temperatures hover around freezing.

DNA material from these feathers, we can determine whether the same eagles occupy the area in consecutive years. Using these data we can calculate the probability of an eagle surviving from one year to the next. After the DNA material has been extracted from the feather, all feathers are deposited in the National Eagle Repository near Denver, Colorado.

The second study focuses on describing and detecting changes in the distribution and abundance of passerines across Denali. Until the implementation of this study, passerine studies in Denali were focused on a narrow corridor along the Denali road, which runs approximately 90 miles through the north-central portion of Denali. While these studies provided data to track the population trends of a few passerines, they were not designed to provide information on a park-wide scale. In 2001, scientists working with the long-term monitoring program in Denali adopted a new strategy and initiated projects to better understand and assess changes in park resources across the entire park. Our new approach uses a sampling design that allows us to make inferences across the entire six million acres of Denali. The new study design also integrates several monitoring components, including passerines, vegetation, soils, and permafrost. This integration allows us to study changes in passerine populations and how they responsd to these other measurable environmental attributes. This study is conducted with assistance from the Alaska Bird Observatory.

The Future of Denali's Birds

At least 80% of the breeding species in Denali are migratory. Each spring the migratory birds, representing six continents, join the hardy year-round residents on this rich subarctic landscape to breed and raise young. The migratory behavior of so many of Denali's birds presents a complex conservation challenge to Denali's managers. The winter ranges of Denali's birds range from southern Alaska to the tip of South America, extends across Asia and into Africa, and includes much of the Pacific Ocean region. With so many birds spread over such a vast area, it is impossible to identify many of the forces that shape the long-term survival of Denali's birds. While most of these species are fully protected under the Migratory Bird Treaty Act of 1918, habitats along migration routes and on wintering areas of many of the species that breed in Denali are changing rapidly. Native habitats are being converted to more human-dominated landscapes through urbanization, agriculture, industry, forestry, and other activities. Other obstacles to survival, including communication towers, energy transmission lines, and mortality caused by domestic cats, are also increasing. One only needs to look around their own neighborhood to note the changes that are occurring around the world.

Most of the historic and ongoing bird studies in Denali occur on the breeding grounds. So far, only the golden eagle work has focused on identifying migratory routes, wintering areas, and areas used by non-breeding birds. We are working with scientists from the Alaska Bird Observatory, the Institute for Bird Populations, the U.S. Geological Survey's Alaska Science Center, the U.S. Geological Survey's Forest and Rangeland Ecosystem Science Center, the Department of Fisheries and Wildlife of the University of Alaska Fairbanks, Oregon State University, Boreal Partners in Flight, and the Alaska Department of Fish and Game on many projects developed to better understand and protect birds in Alaska.

We have only begun to scratch the surface in developing our understanding of the bird resources of Denali. Our task is to describe the ecology, identify the threats, and protect Denali's birds. These tasks are challenging, and our responsibility to protect park resources becomes more difficult as funding opportunities and park priorities change and threats to park resources increase. To meet this challenge, we are developing an Avian Conservation Plan for Denali. Its goal is to provide

Golden eagle productivity in Denali is influenced by spring prey resources. Triplet eaglets are common only in years when prey resources are abundant.

park managers, scientists, and the public with comprehensive information about the nature and condition of the bird resources placed under our stewardship. The plan will outline what we know about Denali's birds, describe our existing studies and conservation efforts, and identify the conservation and research needs of Denali. It will also include strategies for securing funding for projects and developing new partnerships with other scientists.

Education and Outreach

One of the best ways to protect birds and their habitats across the earth is through education. Denali's scientists actively engage in many forms of science education and public outreach to teach people about birds and Denali's science programs. Throughout the year we give many public presentations on the birds of Denali. We also work with local schools to help teachers, students, and local residents better understand the birds in their backyard. Our recently developed educational web site (www.nps.gov/dena/home/resources/wildlife/birdweb/ index/homebirdpage.htm) provides users with comprehensive information about Denali birds, our bird studies, and our many partnerships and cooperative efforts.

We also worked with staff at the National Park Service's Alaska Support Office to create a web-based science curriculum for the program ParkWise using data from our long-term golden eagle studies in Denali. ParkWise was developed by the Alaska region of the National Park Service to teach school children around the country about the National Park Service and the valuable cultural and natural resources of Alaskan parks. We also work closely with local non-profit groups, including the Denali Foundation with Elderhostel programs, ecology-centered community events, and other scientific presentations, and the Denali Institute with field seminars, workshops, and an autumn passerine migration banding station. Denali staff are active members of Boreal Partners in Flight, a coalition of individuals who are working together to help conserve bird populations throughout the boreal regions of North America. Boreal Partners in Flight is the official Alaska state working group of the international Partners in Flight program.

We also work with the Alaska Natural History Association (ANHA), a non-profit organization dedicated to enhancing the understanding and conservation of the natural, cultural, and historical resources of Alaska's public lands to provide educational materials for the public. ANHA has collaborated with Denali to publish the Denali National Park Bird Checklist and a recently released book, *Birds of Denali*. We also worked cooperatively with the American Birding Association on another new book, *A Birder's Guide to Alaska*. Denali's scientists also publish results of their research in peer-reviewed scientific journals and present results of their studies at meetings of scientific organizations.

The future of Denali's birds depends on all of us to be good stewards of the earth. Denali's avian conservation program hopes to lead the way in conserving these valuable park resources through scientific studies and science education for many generations to come.