

Canyon Legacy

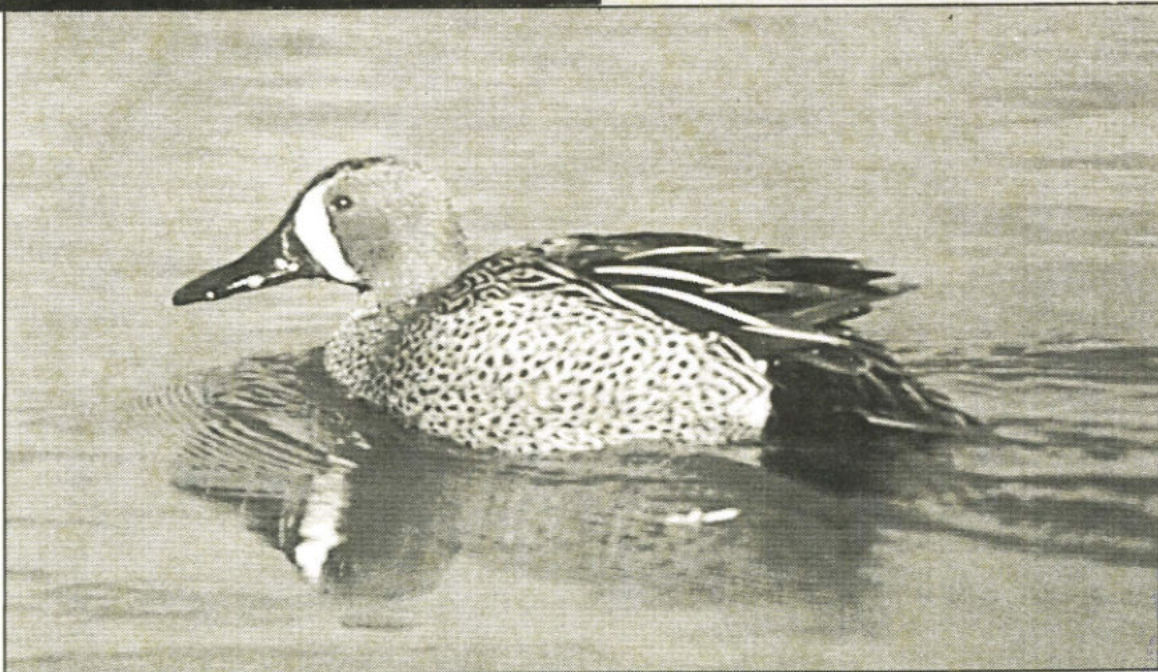
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Journal of the Dan O'Laurie Canyon Country Museum
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Birds of Canyon Country





**Journal of the Dan O'Laurie
Canyon Country Museum**

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Within...

Approximately 370 different species of birds have been recorded in the state of Utah and of these, close to 200 have been observed in Moab's surrounding areas including Arches and Canyonlands National Parks and the Nature Conservancy's Matheson Wetlands Preserve.

This issue is two part. It is an exploration of birds as expressed by the Pueblo peoples, descendents of the Anasazi. In southeast Utah one finds petroglyphs of beautifully rendered birds. Our museums house pottery in the shapes of ducks and doves; others are painted with abstract feather designs or turkey footprints. We look to the Pueblo peoples of today and the symbolism that birds hold in their culture to attempt to understand the art and artifacts of the past.

The greater part of this issue, however, is from the perspective of science and the research being done locally on threatened and endangered bird species— the monitoring of bald eagles and inventories of peregrine falcons along the Colorado River, the California condor that paid a visit to Arches, the southwestern willow flycatchers that migrated through last spring but did not find suitable nesting sites.

The peregrine falcon is a success story. Headed for extinction twenty years ago, the peregrine has been delisted. But the fate of the condor and many songbirds is tenuous. Of the 59 condors released, none have reproduced in the wild. Habitat loss on breeding grounds and wintering areas and along migration routes is devastating migrant songbird populations in Utah and throughout the nation.

But one cannot lose hope. Roger Tory Peterson, the father of modern ornithology, wrote that of all the higher forms of life on our planet "birds are the most beautiful, melodious, admired, studied and defended." For those who know little about birds, I hope that this issue inspires you to become interested in birds and their welfare.

After all, birds connect us with other places. They come to us from afar, announce our seasons, fill our world with color and song and amazement. Getting involved in helping our feathered friends can mean joining organizations that work for bird conservation both locally and nationally, planting vegetation in our yards that provides food and habitat, putting out bird feeders that are clean and disease free, and providing water for their thirst. I wish you all Happy Birding.

-Andrea Brand

Museum Membership

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The mission of the Dan O'Laurie Canyon Country Museum is to preserve and display artifacts and information, and to promote research and education which accurately reflect the natural and cultural history of the Moab area.

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This issue is dedicated to Linda Seibert

Linda loved birds. Caring for them, studying them, educating others about them — professionally and personally — excited Linda's thirst for hands-on involvement with the avian world. "A child of nature," her father recalls of Linda's early years; a love she maintained throughout her life. On May 31, 2000, Linda left this terrestrial-bound life, her spirit taking to the wing.

Front Cover: Anasazi black-on-white ceramic duck effigy. Photo by Mike Nelson, Director, Edge of the Cedars Museum, and courtesy of the Shumway Collection, UNTF/UNDC. Blue-winged teal photo by of Steve Kuhn.



Pueblo Birds

by Andrea Brand

some 220 different bird species and about 100 of these have an essential place in Pueblo ritual, ceremony, myth and folklore. Unlike the scientific taxonomy of birds which is organized in evolutionary order, Pueblo mythology organizes birds loosely by characteristics of their behavior, habitats they occupy, even the colors of their feathers.

The Pueblo culture is extremely complex, with each village, each clan and each religious order within the Pueblos expressing common themes in unique ways. In addition to this, Pueblo symbols represent many things at the same time. What follows is an attempt to show some of the most important birds in the Pueblo world, their use and meaning, as related to the elements of sun, sky, earth and

Throughout time, place and culture the magic and mystery of flight has connected birds with the gods. The ability of birds to leave this earthbound plane and travel to the sky and beyond sight makes them logical messengers between man and the heavens. In different cultures people raised birds to be set free or ritually killed so that they could communicate, in person or spirit form, prayers to the sky world.

The People

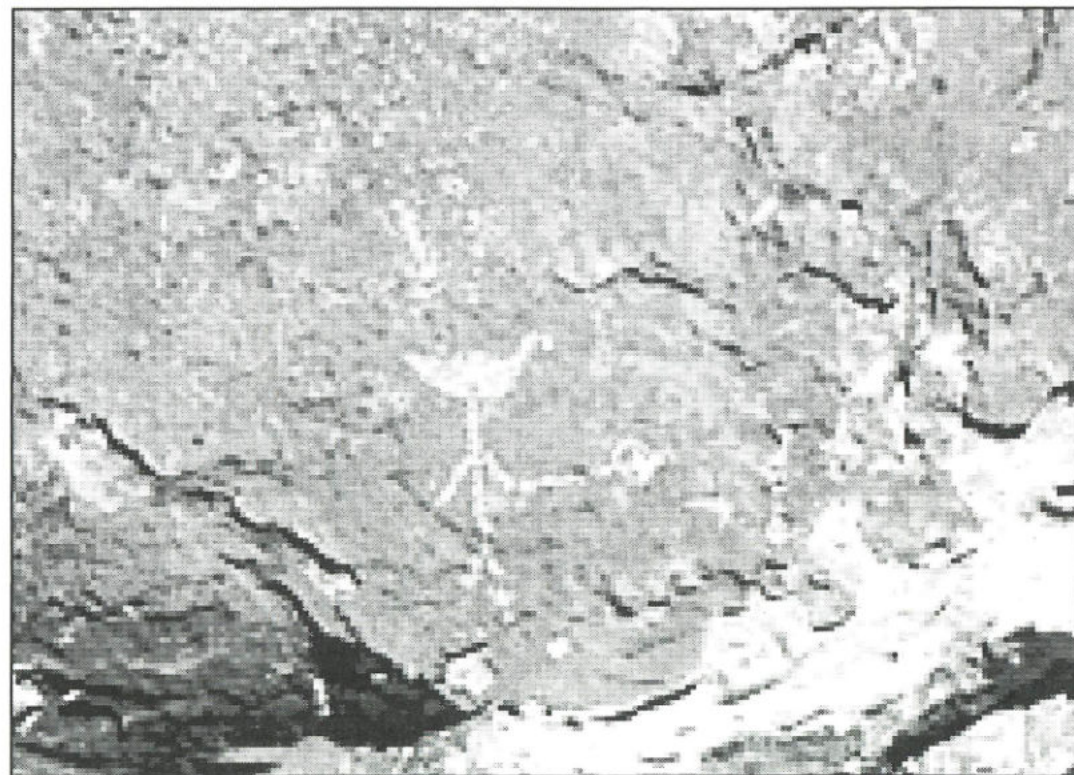
The Pueblo people, the Hopi, the Zuñi, the Keresan and the Taoans are descendants of the Anasazi. Today they live in more than 30 villages spanning a 350 mile crescent from the Hopi mesas of northeast Arizona, south to the Zuñi, on east to the Keresan of the Rio Grande Valley and north to the base of the Rocky Mountains and the Tanoan Pueblos. These native peoples live in stone and adobe towns, called "pueblos" by the Spanish, and farm nearby fields. They speak different languages but share a distinctive art and religion. The Pueblos live in 21st century America but have been able to keep their ancient traditions very much alive.

The Pueblos have been watching their birds for centuries. In their own languages they have named

water. But first, we must detour and learn a bit about feathers and magic.

Feathers

A prayer stick is mounted with feathers and planted in a field or elsewhere to carry a message. Loose feathers are offered, placed under stones or cast in streams and lakes. Fetishes, shrines, kiva altar arrangements, kachinas' masks and dress, all incorporate feathers as signs to gods and signals to men. Sympathetic magic holds that a physical part of a being can have the same spiritual powers of that being. So, in other words, the bird does not have to be present; feathers alone can be used in ceremonies and rituals to send prayers to the sky world. With so many feathers needed, pueblo men



Rock art with bird images, San Juan County, Utah

Photo courtesy of Mike Nelson, Director, Edge of the Cedars Museum

keep a supply of feathers on hand, some from birds hunted, others found and saved.¹

For Pueblos, the color of particular bird feathers relate to the six directions. For the Hopi's Soyal ceremony at Winter Solstice, north is represented by yellow warbler feathers, west the blue of the bluebird, south by a red parrot, east the white of the magpie, black from the hepatic tanager for the zenith and for the nadir multicolors from the blackbird's iridescent plumage. For the Zuñi, north is represented by the yellow-breasted chat, west by the blue of the Stellar's jay, south by the red of the macaw, east by the white of the spotted towhee, the zenith by multicolors of the purple martin plumage and nadir by black of the painted bunting. Two Pueblo peoples, Zuñi and Hopi, with a common theme of direction and color uniquely expressed.



Macaws and Parrots

In Pueblo mythology macaws and parrots represent the sun. They are colorful, exotic and come from the south, the sun's winter home. Macaw and parrot feathers are used on fetishes, on masks, on prayer-stick offerings; they are worn in the hair. Most pueblo peoples — Tewa, Keres, Zuñis, Hopis — all have names for the macaw and parrot in their own tongue. The Zuñi have Macaw Clans and Parrot Clans. The feathers of these birds have been highly valued for centuries.

Live parrots, macaws and loose feathers were traded to prehistoric peoples in the southwest from as far away as southern Mexico. At Casas Grandes, just south of the U.S./ Mexican border, and at Chaco Canyon in New Mexico, macaws and parrots were kept in enclosures in pueblo villages from at least 1100 A.D. In Chaco Canyon's Pueblo Bonito, a 12'x 30' room from the 12th century was

excavated. Archeologists discovered twelve macaws in a 10" layer of bird droppings and, carefully buried underneath, two more macaw skeletons. Remains of two types of macaws were found — the military macaw of arid Northern Mexico and the scarlet macaw from Mexico's humid south.



Macaws have long slender tails and their plumage includes brilliant reds, yellows, purplish blues and bluish greens. In prehistoric times feathers of the (then) local thick-billed parrot and various Mexican parrots were used. Parrots have shorter tails than macaws and predominantly green feathers. The distinctive curved bill of these birds can be seen on pottery and rock art and one can usually tell the differences between macaw and parrot designs by the length of the tail.

On exhibit at the Edge of the Cedars Museum in Blanding is a macaw feather sash that Curator Deborah Stevenson considers, "the most beautiful object on display in the entire southwest." Local resident, writer and explorer Kent Frost found the sash in a small cave in the Needles District of Canyonlands National Park. The sash is some 2' long and its coloring only slightly faded after almost 900 years. The orange-red of the scarlet macaw feathers complement a central design of turquoise feathers, probably of the mountain bluebird. The blue design is in the shape of a Thunderbird. For all Native Americans the Thunderbird, a spirit or monster based on the eagle, is the most powerful bird symbol. It is seen in both contemporary and old pottery and jewelry, ancient rock art, shields and teepees.

According to Stevenson, scarlet macaw feathers were brought up from the south and possibly traded for food, pottery, deer hides or other necessities. Chaco Canyon and Edge of Cedars could have been ceremonial sites where a priesthood or elite group lived and people brought in tribute or

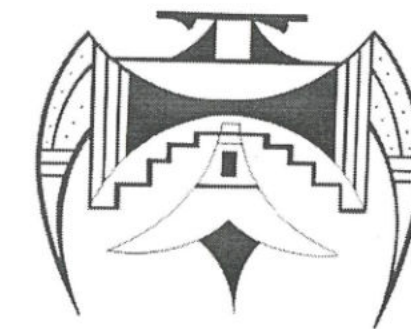
traded for prestige items that were distributed from these sites. It appears that the sash was fashioned locally because the top of the sash is made from the fur of an Abert's squirrel, a Utah native species. The sash would have been worn around the waist to hang down over a kilt. It would have been used in ceremonies by someone very important, such as a chief or priest.

Eagles

Eagles are of the sky. They can easily spiral upwards until lost to human eyesight. According to Pueblo mythology, they are said to go through a hole in the above, possibly to the home of the sun. The Pueblos consider principally the golden and bald eagles when they speak of eagles, but may also include other raptors like the red-tailed hawk and the osprey.

The eagle can stand for many things for the Pueblos- clouds, rain, snow and lightning, mature corn plants and the curative value of corn, hunting and war. The eagle is often identified with deities Knife Wing and Flint Bird, half-man, half-bird beings and a kin to the Thunderbird.

The wingspan of the golden eagle is an immense seven feet across. From head to tip of tail these eagles stand three feet high. Their hooked beak is as long as their head and they



have powerful locking talons. In the right light the golden feathers of the nape of the neck can be seen but otherwise it is a dark bird. The bald eagle is slightly larger and, because it is connected with waterways and eats fish, it has special attractiveness to the Pueblos. The tail feathers of

¹The Feather Bank, a repository of feathers from birds accidentally killed along roadways or by power lines and maintained by the Fish and Wildlife Service, is also a source of feathers for Native Americans.

Hopis, Eagles and National Parks

Currently there is a controversy regarding Native Americans and the taking of eagles for feathers and religious sacrifice. Since the 1960's Native Americans have been permitted by the Fish and Wildlife Service to take eagles from national forests but last summer the Hopi tribe requested to take eagles from Wupatki National Monument in Arizona. National parks have been regarded as wildlife sanctuaries since the founding of Yellowstone in 1872 and the NPS, in line with this mission, denied the request. Don Barry, Assistant Secretary of the Interior for Fish and Wildlife and Parks, however, overruled the NPS denial. By this time it was fall and too late in the season to collect eaglets.

The Hopi permit allows the taking of 40 eagles and an unlimited number of red-tailed hawks. Mike Britton, NPS biologist, says that the problem with this number is that it is political and not based on science. The golden eagle population of northeast Arizona has never been adequately surveyed. It is not known whether the population can handle a taking of 40 eaglets a year in addition to other human-caused mortality including roadkill, shooting, and collision with and electrocution from power lines.

As luck would have it, there were no eagles nesting in Wupatki National Monument this year and the Hopi did not renew their request. However, if they do request the taking of eagles in the future in another national park, such as the Grand Canyon, and it is granted, it could have far-reaching consequences for raptors and other wildlife populations in all national parks. Currently more than twenty Native American tribes are seeking to reestablish tribal hunting in national parks across the nation. -AB

References:

Audubon, January- February 2000
PEERreview- A Publication of Public Employees for Environmental Responsibility, Spring 2000.

immature golden eagles are white at the base and black at the tip. These feathers have important significance, the black and white relating to clouds and rain.

The Hopis have been collecting eagles for so long that the land stretching out from their mesas is divided into eagle allotments. Each large tract is allocated to a particular clan from a particular village, or for one of the various religious societies. Eaglets are collected from the nest when they are almost ready to fly, tethered to the roofs of pueblo homes for a time and then ritually sacrificed. Below is an account from Hamilton Tyler's book, *Pueblo Birds and Myths*, told by Hopi, Talayesva, when he was a boy and went on an eagle hunt. But because that year there were no eagles, his bird was a hawk.

"His father took him out one spring on a hunt that began by placing an offering in the Third Mesa Eagle burial plot. His father found the young hawk, and, because they were

in Bear clan eagle-hunting territory, they had to take the young bird to the sister of the Bear clan's chief. She already had five eagles and three hawks tethered to her roof, so she was willing to part with this one — after the proper rites. First she washed its head in white-clay suds, just like a newborn babe, and then gave it to the young man. This bird was then given the name Female Bear, because all eagles and hawks are thought of as mothers. Then,

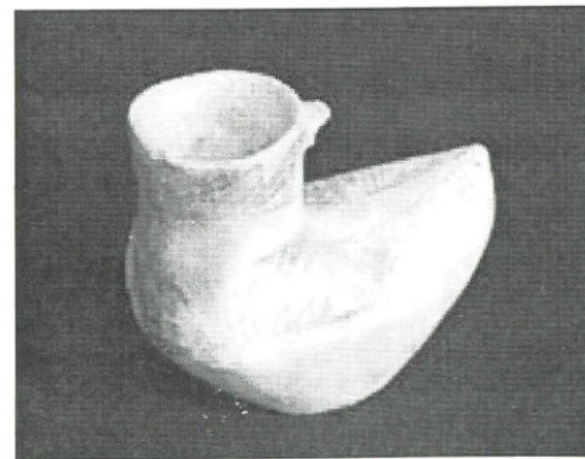
'My uncles and fathers told me that the eagles and hawks are spirit people who live in a special home in the sky. Sometimes in the winter and spring these sky people are

said to come to Oraibi as kachinas, with heads like eagles, and to dance in the plaza...I was told that at the right time of year the Eagle Chief above sent his people down through a special hole in the sky to build their nests, lay their eggs, and hatch their young among the cliffs of the mountains and high mesas.'

The young boy also knew that at the end of the Niman dance, when the quills of the bird would be hardened, and at the time the kachinas were also sent home, captive eagles and hawks would be 'sent home' to carry offerings and prayers to the cloud people for rain. For this offering miniature kachina "dolls" and bows and arrows were made for the bird.

'The next morning I climbed upon the housetop with my father and held the cotton leash while he threw a blanket over the hawk. Then he placed his thumb upon her windpipe and pressed hard. It seemed to take a long time for the hawk to 'go home.' When she became very still we plucked her feathers and sorted them. We stripped off the skin and tied our prayer feathers to the wings and feet and around the bird's neck, so that she would forgive us and be ready to return and hatch young hawks the next year. Then we took her out toward the place where we caught her, to the Hawk and Eagle cemetery of the Bear clan.'

They dug a hole about two feet deep. Their bird was placed on the bottom and his father uttered a prayer.



Anasazi black-on-white ceramic duck effigy. Photo by Mike Nelson, Director, Edge of the Cedars Museum and courtesy of the Shumway Collection, UNTF/UNDC.

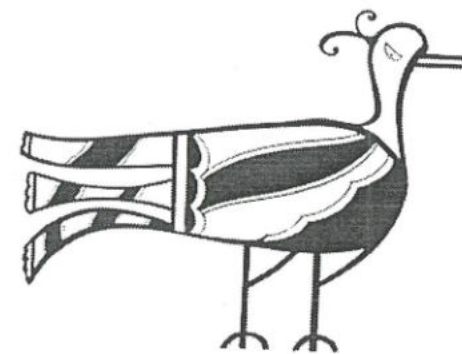
'Now we let you go free. Return to your people, for they are expecting you. Take these prayer feathers with our messages to the Cloud-People and tell them to send us rain.'"

Turkey

In general, macaws and parrots relate to the sun, eagles the sky and turkeys the earth. Wild turkeys represent the earth, springs, streams and mountains which are the homes of the cloud spirits. The turkey became man's companion in life but is also connected with death and sacrifice.

The wild turkey is a leaner and more muscular bird than our domesticated variety. Turkeys are strong fliers and can even soar but spend most of their time on the ground eating pinion nuts, acorns and scratching for insects. One hundred and fifty years ago wild turkeys traveled in flocks of as many as a thousand birds, living in the mountains in summer and migrating below snow line in winter led by wise old male gobblers.

By 700 A.D. the Anasazi had domesticated the turkey and maintained large flocks. Evidence of turkey pens have been found in many sites in San Juan and Grand Counties. In a site on White Mesa in San Juan



County archeologists found turkey remains in the vent shaft of an Anasazi pit house. The report reads, "Abnormal bone growth on the ulnae of all the turkeys indicates that wing feathers were removed from the birds over an extended period of time."² Of the 5 birds, 4 were male and 1 female, possibly reflecting a preference for male birds and their iridescent tail

² from "Archaeological Data Recovery at Four Anasazi Sites on White Mesa Along Highway 191 San Juan County, Utah" by James Firor, Rand A. Greubel, and Alan D. Reed, Alpine Archaeological Consultants, Inc.

feathers. The bones do not exhibit any cut marks implying that the birds were kept exclusively for their feathers. Another speculation is that they were cooked whole and pulled apart rather than butchered since the bones were found in a completely disarticulate condition.

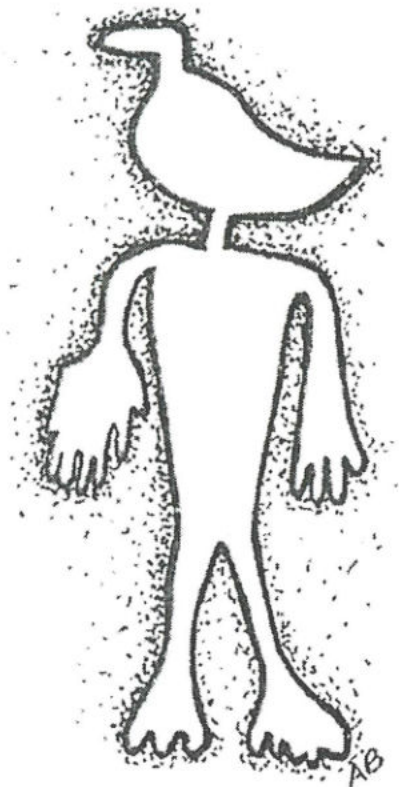
Most modern Pueblo cultures consider the turkey a ceremonial bird not to be eaten. Past archeological excavations supported this view but some recent excavations in Northern Arizona have yielded turkey bones with butcher marks. In accounts of Spanish explorers it appears that most Pueblo peoples did not consume their domesticated turkeys, but did take wild turkeys as game.

Pueblo people made cloaks of turkey feathers. These cloaks were used for warmth for sleeping and also to wrap the dead in for burial. In one burial a bunch of turkey feathers was placed in the deceased hands and underneath the head. It is believed that when a person dies he becomes a cloud person and a rainmaker. Headless turkeys are frequently excavated as mortuary offerings.

The principal value of turkeys in Pueblo culture is as a source of feathers for prayer sticks. Other bird feathers convey special messages to the spirit world but almost all prayer sticks have turkey feathers attached and are considered the 'clothes' of the offering. Feathers are tied on a string between horns of slain game such as a deer. If boughs are taken from a tree for a ceremony, feathers are placed in offerings to appease the tree for damage done. These offerings are an apology to the spirits for a disturbance in the natural order of the cosmos.

Birds of Rain and Water

For the Anasazi living and farming in this dry, dry desert, some of the most common symbols seen in their rock art and pottery are connected with rain and water. Along the San Juan River and in John and Slickhorn Canyons can be found petroglyphs of people with duck heads. In a tributary to the San Juan River is a beautifully rendered crane accompanied by what



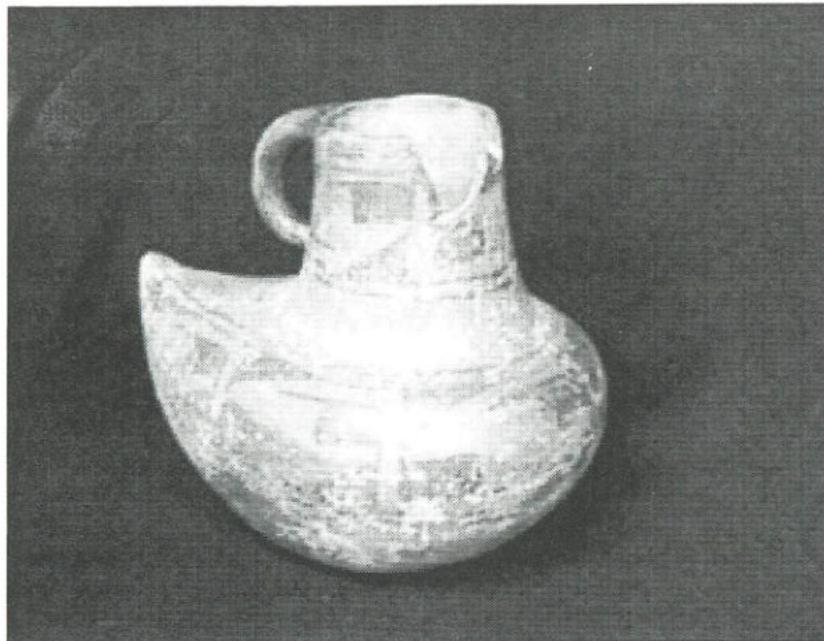
Duck-headed figure, San Juan River Pen & Ink drawing by Andrea Brand

appears to be an American coot. In Pueblo pottery birds are the most common symbol represented both in naturalistic and abstract designs. Both Anasazi and contemporary Pueblo pottery are formed into duck and dove body shapes.

When one finds a symbol represented again and again over the centuries in a culture's art, this image is very powerful. In general, in Pueblo mythology rain and water birds act as seed gatherers and bringers, guardians and messengers to the gods.

Some of the birds in Pueblo mythology connected with water might not be obvious to us at first glance—swallows, swifts, hummingbirds and doves.

Zuñi rain priests believe that certain birds must talk to them and they in turn ask these birds to call for rain. Four out of the eight bird feathers offered by rain priests come from swallows. Swallows' movements bring rain by dipping and



Anasazi black-on-red ceramic duck effigy. Photo by Mike Nelson, Director, Edge of the Cedars Museum and courtesy of the museum

circling above water courses. Swallows and swifts are usually seen near water courses or ponds flying low, catching insects a few inches above the water.

Beautiful iridescent feathers on the throat of hummingbirds relate them to the rainbow. Hummingbirds also suck moist nectar from flowers, particularly the tubular blossoms of the sacred tobacco plant. Rain priests at Acoma blow smoke in the six directions to induce rain. With their speed and endurance hummingbirds bring messages to spirits who send rain.

Doves, being seed eaters, need water and they search out pools and springs. The dove's song is thought of as a chant, an incantation to bring rain and also an indication of where water can be found. The Tewas associate the dove's voice with a rain song. Keresan pueblos of San Felipe and Santa Ana have Dove Clans. The seed-eating dove calls out for water and rain; rain does not always come so the bird sorrows.

Ducks, geese and cranes are water birds and naturally adapted to living in and around water. They fly along water courses when they migrate; they all will feed on domestic grains and are thought to bring seeds from distant points

where the spirits live. Ducks act as messengers and are connected with myth telling and listening. The Hopi have names for sixteen different duck species and the Zuni five.

Kiaklo is a Zuni Duck spirit. He is the keeper of myths; he not only tells stories but is also a great listener. Possibly several characteristics are combined here—ducks and geese call out in flight and they listen attentively while resting on ponds and lakes. There is a belief at Zuni that ducks are the form a spirit takes when traveling home.

In Hamilton Tyler's book, *Pueblo Birds and Myths*, he writes of kachinas Kiaklo and Chakewena.

"When Kiaklo appears for the tribal initiation he wears a mask decorated with a frog and tadpoles, a rainbow over the forehead of his mask and three lines beneath his eyes, which symbolize failing rain. The personator carries a duck skin filled with seed, with a string of shells around the neck, which he uses as a rattle. Shells are of the water, and they do whisper or talk outright when hung in clusters. Two other kachinas who dance at Zuni wear symbolic ducks on the top of masks; both seem to be borrowed.

The short-haired Chakewena

comes from the Keresan pueblo of Laguna and speaks in that language rather than in Zuni. This personage is a hunt figure. The mask has for eyes two new moons with the horns turned down, indicating that Mother Moon is pouring out water and then some yellow on the shoulders for sunshiny days. Also an incomplete rainbow. The rainbow stops the rain, but they want the rain to go on, so they do not finish the rainbow but break it with another design."

Each thing can stand for many things. Nothing is simple — an incomplete rainbow, a duck skin filled with seed, a turkey feather tied to the branches of a spruce tree, an eagle sacrificed and "sent home". Behind each ritual, each ceremony, each story, each art work, each design, is a complex symbolism related to the Pueblo world.

Ancient farmers and hunters lived lives interconnected. A unity of religion, art, spirituality, everyday life, planting, harvesting, having children; these were all linked to the cycles of the earth, sun, seasons, bird and animal migrations. A people aware of ancient patterns, water patterns and rain patterns. All of this comes out in their ceremonies and rituals, stories and art and it is this depth, this richness, this interconnection that makes it all so very powerful.

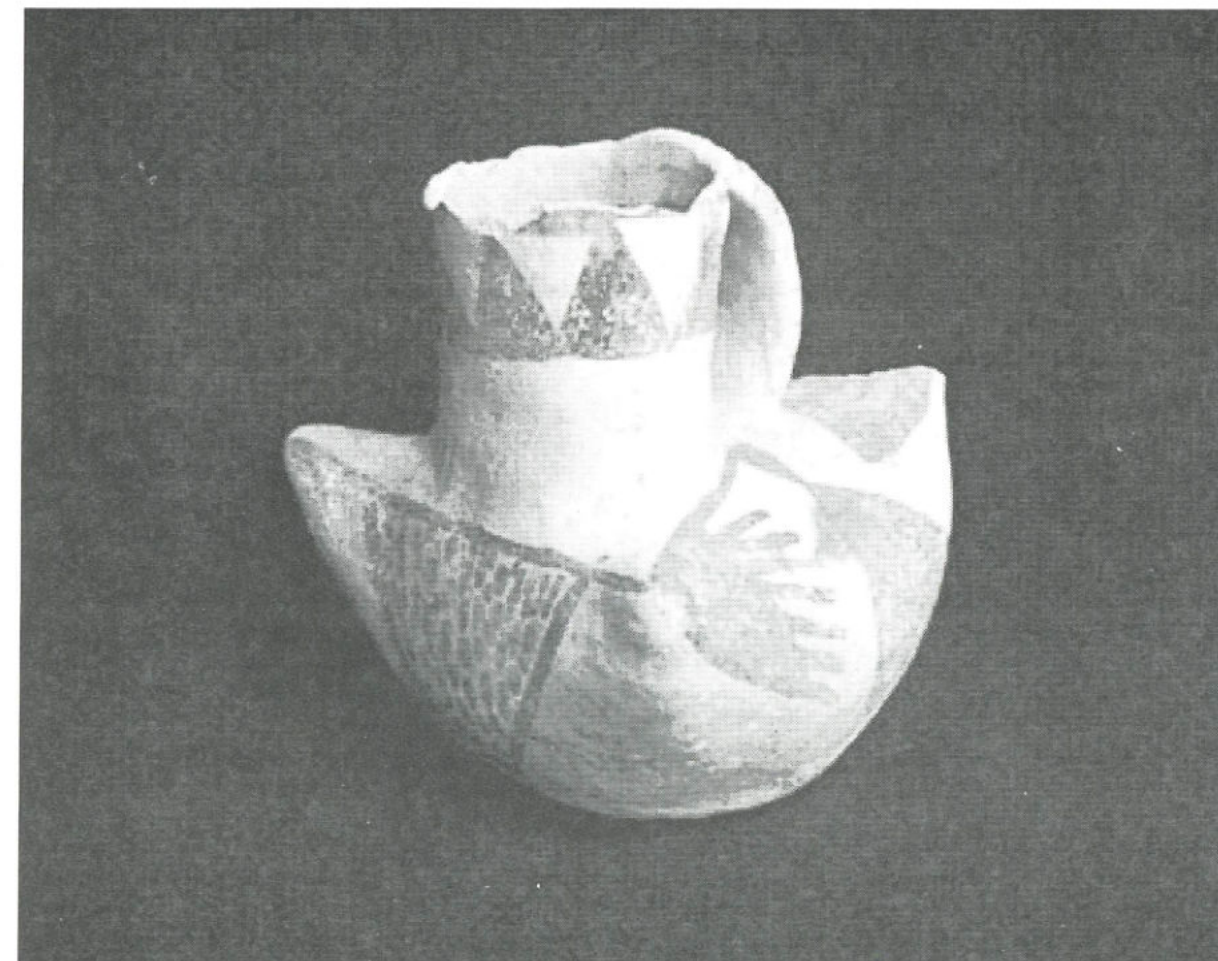


I would like to thank a number of folks who helped with research for this article; librarian Denise D'Agnese, Arches National Park, Director Mike Nelson and curators Deborah Stevenson and Debbie Westfall, Edge of Cedars Museum, archeologist Rand Gruebel, Alpine Archeology, and biologist Mike Britton of the National Park Service. -AB



Pueblo pottery designs used in this article and throughout the rest of this issue are from *Decorative Art of the Southwestern Indians* by Dorothy Smith, Dover Publications Inc., 1961

Andrea Brand has worked as a field biologist, field archeologist, and Park naturalist. As this issue's editor she has enjoyed the opportunity to combine her interests in ornithology, cultural history and writing. She makes her home in Moab.



Anasazi black-on-white duck effigy. Note feather design and dashed lines representing rain. Photo by Mike Nelson, Director, Edge of the Cedars Museum and courtesy of the Shumway Collection, UNTF/UNDC.

California Condors

By Gary Salamacha

On July 7, 1997, I was at Balanced Rock in Arches National Park when I received a radio call from the entrance station. A visitor had reported seeing a condor flying around the visitor center parking lot. I paused, knowing that there was an active golden eagle nest in the area and thought surely that was the bird being reported. I asked my co-worker to repeat the message. It just so happened that the visitor who saw the condor was research biologist Vickie Merrettsky, who had previously worked with condors in California. Upon arriving at the visitor center I talked with Merrettsky and we contacted The Peregrine Fund, the organization providing biologists to monitor the program. We got our first view of Condor #49 perched on the rock near the side of the park road. For the next six hours I watched as the condor attempted to fly, only to be forced to the ground by the nesting pair of golden eagles. It was incredible to watch this large bird take-off slowly and start to gain altitude, only to be forced back to the ground by the relentless eagles. In the four times that the condor attempted to fly it was immediately attacked. Even with its large body the condor was able to elude the eagles. I was amazed that such an enormous bird could fly so deftly. The last time that I saw Condor #49 it was flying east over Courthouse Wash. The Peregrine Fund dispatched biologist Shawn Ferry to Arches immediately, but he never located Condor #49. As it turned out, the wayward condor actually beat the biologist back to the release site in House Rock Valley, AZ, two days later. This was the



longest recorded flight (180 miles) since their release in December of 1996.

The California condor (*Gymnogyps californianus*) is one of the largest North American birds. The specifications are impressive--weight of 20 to 24 pounds, wingspan up to 9.8 feet (3 meters) and body length 46 to 55 inches. Condors usually nest in a cave or on a crevice among boulders on a steep slope. The female is sexually active at 5 to 6 years and usually lays one egg every other year in the wild. (In captivity, three eggs per year is possible.) The incubation period is approximately 56 days and the fledged young stay with the adult birds for up to two years. Condors feed exclusively on carrion of wild and domestic animals and can travel up to 150 miles in search of food. A Condor can live for 40 years or more.

Condors once roamed western North America, ranging from British Columbia to Baja California and other areas in the southwest. Their numbers fell as human settlements reduced food sources and habitat. Others were shot, poisoned or killed by power lines. By the 1970's there were only a few dozen left. The remaining birds were captured, not without controversy, and an intensive breeding program developed to

prevent certain extinction. The last wild condor was captured in April 1987 in California.

Before December 12, 1996, there were no known condors in the wild. At noon on that Saturday, six 2-year-old condors were released at the cliffs above House Rock Valley in northern Arizona before a crowd of cheering spectators. This was the first time in 70 years that condors graced the Arizona skies. In the fall of 1998, eight condors were released at a second site, south of St. George, Utah, in the Hurricane cliffs.

Twenty-eight birds of various ages now occupy two release sites in northern Arizona. The birds were initially fed stillborn calves provided by a local rancher. They stayed near the release site for the first couple of years although there were isolated flights from the site as far north as Flaming Gorge, south to the Grand Canyon, east to Colorado National Monument, and west to Bryce Canyon. It has taken them three years to find carrion on their own. Both groups spent most of the summer of 1999 at the Grand Canyon feeding on their own with a group of turkey vultures. Of the original six birds released, three were killed; one by a golden eagle, one by power lines and the third by unknown causes.

Condors evolved learning behavior called "flight distance." It is important for any animal to know who their predators are and the distance they need to make a quick escape. Since many factors which led to their decline were from human interactions (e.g. shooting, poisoning and lead contamination), it is vital to their survival that they see us as a threat. In captivity, the birds receive "aversion training"--loud noises and rough handling whenever a human must interact with them. When released birds become too friendly with humans, they have to be recaptured and returned to captivity so they do not teach the behavior to the other birds. If you see a condor, please do it a favor by scaring it away.

In the remote cliffs of central California's Sespe Condor Sanctuary, one of the last condors captured in 1987 was released into the wild after 14 years in captivity. This female

condor produced 12 offspring in captivity. Two 10-month-old condors were released with her with the hope she will be a mentor for the young birds. As of January 1, 2000, the current population of condors was 158 birds with the following distribution; captive population: 99, wild population: 59 (Southern California 16; Central California 15; Arizona 28).

The condors have made excellent progress in adapting to the wild in the last four years. What the future holds for them, however, is uncertain. The big question is whether or not the condors will breed in the wild. There was some evidence of mating activity and display by the male condors in the summer of 1999 which is encouraging. Hopefully they will survive, continue to propagate in the wild and become as common in their historic range as they were before their decline.



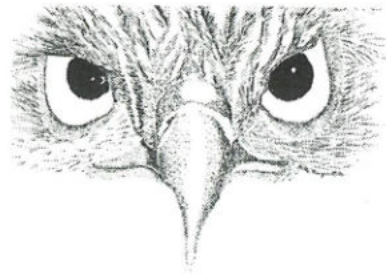
For more information, visit online peregrine.fund.org/notes/_condor.html

Gary Salamacha has worked as a Resource Management and Visitor Protection Ranger at Arches National Park since 1988. He has been involved in many resource management projects over the years including breeding bird surveys, raptor inventory and monitoring projects as well as monitoring burrowing owls.



Bald Eagles of Southeastern Utah

By Damian Fagan



Pen & ink drawing by Raven Tennyson

In the Beginning...

For an estimated 25 million years, the genus *Haliaeetus* has occurred throughout the world, except for South America and Antarctica. Meaning "sea eagle," there are five species in the genus and the best-known member, to us, is our national symbol - the bald eagle (*Haliaeetus leucocephalus*). When Europeans arrived in North America, the bald eagle was thought to have nested on both coasts and along every major river and large lake across the continent. The species bred in what is now every state in the U.S. and every Canadian province. Post Revolutionary War, after great debate, the bald eagle was selected on June 20, 1782, as the symbol of the United States of America. Little did those patriotic forefathers realize that in less than two hundred years this national symbol would be in dire straits.

Pressures from illegal hunting for feathers and trophies, decimation of prey species (mainly waterfowl), secondary poisoning from predator control programs, and bounties to protect the Alaskan salmon industry, all took their toll on the species.

In 1940, the U.S. federal government passed the Bald Eagle Protection Act, which officially recognized the need to protect the bald eagle from harassment and persecu-

tion. However, more serious declines were in store with the post-WWII use of pesticides to control mosquitoes. Widespread and indiscriminate use of DDT, which ended up in the fatty tissues of the adult bald eagles, resulted in the inhibition of calcium metabolism during egg formation. The resultant thin-shelled eggs broke under the weight of the incubating adult. Populations continued to plummet.

In 1966, Congress passed the Endangered Species Preservation Act. Designed to offer federal protection to wildlife and plants whose populations had dramatically declined in the 20th century, seventy-two species were listed as endangered in 1967. With amendments in 1969 and 1973, the finalized Endangered Species Act emerged. The bald eagle was listed below the 40th parallel (Alaskan populations were never threatened by pesticides) as endangered, except for Washington, Oregon, Minnesota, Wisconsin, and Michigan, where the species was listed as threatened. With bans on DDT use, populations slowly recovered. By 1995, the bald eagle was downlisted to threatened across most of its range.

In Utah, bald eagles are common winter residents. Historical records exist of active nesting territories, but not until 1983 were any recent nest sites active. State wildlife biologists located an active bald eagle nest territory along the Colorado River near the Cisco boat launch that year. Five years later, a second territory upstream of the Westwater ranger station became active, and an annual monitoring program started.

In 1999, I monitored two nest sites along the Colorado River (there are four nests in Utah). Though my field notes contain information regarding the nesting activities of the

eagles, they also included observations of other wildlife species. The following paragraphs are a synopsis of that season.

Courtship

From this elevated vantage point atop a small bluff along the Colorado River, I scan the riverway for signs of life. Several species of waterfowl - mallards, green-winged teal and northern pintails - feed where the river bumps over shallow cobblestones. Canada geese loaf on a downstream beach, their sinuous necks resting upon their backs. A flock of wild turkeys struts and pecks, struts and pecks for insects and seeds in the open patches of riparian woodlands that line the riverbanks. Though I note the number and composition of the species, they represent only the dessert. The main course on this February morning; however, is a pair of adult bald eagles in the late stages of their courtship.

Perched on a stout cottonwood limb, the pair sits close together overlooking a calm stretch of the river. The female, the larger of the two, throws back her head and emits a series of soft, whistled chirps. The male turns, then launches himself into flight. He flaps several times, gaining altitude, and briefly soars in a tight circle over the river. The male descends, lands on the female, and in a frenzy of flapping six-foot wingspans to maintain balance, he mates with her.

When the male dismounts, the female flies from the limb. She follows in the wingbeats of the male, except as she passes another nearby cottonwood she snaps off a two-foot branch and carries it over to her nest cradled in the upper crown of an old-growth cottonwood.

Her nest is large, some four feet across. The deep nest bowl is probably lined with grasses or soft, shredded bark, and days later, when the female settles in to incubate her eggs, I can only see her blazing white head above the nest rim. This white head gives rise to two names: from Old English *balde* meaning "white" and *leucocephalus* is Latin for "white headed."

Incubation

The days turn slowly into weeks as I check on the incubating adults twice-a-week. About every hour and a half, the adults switch incubating the eggs. The nest-sitting adult flies away as soon as the other one arrives. Often this bird flies to a nearby cottonwood snag to preen and stretch. During the six-week incubation period, great blue herons move into their nearby rookery, most of the waterfowl push through to their northern breeding grounds, and a pair of red-tailed hawks settles into their nest site about one hundred yards upstream from the eagles.

I don't know how many eggs the female laid, but two is average. I often see the incubating adults rolling the eggs over with their bills, ensuring the entire embryo will receive adequate heating.

Hatching

In mid-April, with a stiff north wind blasting through the area, I watch the attending adult tear apart some prey and offer it to a hatchling out of sight in the nest bowl. The adult feeds the young several times, then gulps down some food herself. I've come to know the two adults apart, mostly by their size.

In another week, I can see a small fluff of down moving about in the nest. As I watch the nest, several white-faced ibises feed in the muddy shallows along the edge of a small island just upstream from the nest. These migrating shorebirds have little to fear from either the eagles or the red-tails. The eagles dine on fish, rabbits, prairie dogs from the Cisco Desert, waterfowl and carrion. Shorebirds are rarely on the menu.

Nestling

During the next ten weeks, I check the nest on a weekly basis. From my perch, I observe the adults taking turns, carrying fresh prey into the nest and feeding the young. Now the young chick wolfs down the food, large chunks at a time. At times, when left alone, the young grabs a stick and proceeds to wrestle with it. The adults, reasonably, spend more time out of the nest than in it, using a nearby cottonwood snag for their baby-sitting monitoring.

In late May, the second eagle nest that I am monitoring fails. A huge thunderstorm pounds the area for several days and I suspect the high winds of blowing the young out of the nest. When I check the nest, the young eaglet is gone. I garner the Westwater rangers to ferry me over to the site. Beneath the nest tree lies the young casualty. Suddenly, the potential population increase in southeastern Utah has dropped by 50 percent.



Pen & ink drawing by Raven Tennyson

On my way back to the Cisco nest, I am detoured to the boat launch to help administer CPR to a Westwater Canyon drowning victim. It has not been a good day. At the Cisco nest, the young eaglet is fine. Built within the protective crown of a live tree, this nest is better sheltered from the storms than the Westwater one. I wish this eaglet luck.

Fledgling

In early July, the young bald eagle nestling makes its first flight. Tentative at first, the young launches itself from the nest and flies across the river. I can almost hear the bird shouting "I can fly!"

From this point on, the adults will instruct the young about surviving on its own. In about four months the young will be on its own, so it had better pay close attention. Mortality rates are high for first-year birds; in one case study by Brown and Amadon (1968) the estimated annual mortality was 78.5 percent. Other studies had lower mortality rates, averaging 30-50 percent. This mortality rate decreases with time as the birds perfect their hunting technique, avoid power lines, and distrust humans.

Over the years, from 1986 to 1999, 14 young have fledged from the two nests along the Colorado River. That is a little better than 0.5 fledglings per area or 0.25 fledglings per nest. Not a great average.

Current Status

On July 6, 1999, the U.S. Fish and Wildlife Service proposed to re-evaluate the threatened status of the bald eagle and de-list the species in the lower 48 states. The proposed action is a result of the combination of several factors: increased breeding pairs range-wide, increased knowledge to better manage the species and its habitats, reduced levels of persistent pesticides in the environment, and improved reproductive success in the growing population.

Whereas in 1982 there were 1,480 known nesting pairs in the lower 48, in 1997 that number reached 5,290. Captive rearing, reduction of pesticide use, public education and habitat management all have played a vital role in this successful program. Even though Utah has only four known nest sites (1999), and the state has not achieved its management goal of ten nesting pairs by the year 2000, the population range-wide has substantially increased. Fortunately, the species that caused the eagles' decline - *Homo sapiens* - also happened to be the species to save this bird. The bird's success can also be attributed to the existence of the Endangered Species Act, and act as an incentive for continued conservation and awareness about a magnificent creature.

Damian Fagan is a naturalist who lives and works in Moab.

Return of the Peregrine

By Rick Boretti

One of the finest wildlife sights to me, while rowing down Cataract Canyon, will always be that of a peregrine falcon with wings tucked stooping at around 200 mph towards a duck or passerine (song bird) along the river. There are few sites in nature that compare to watching a peregrine pop a meal or chase down prey. It is a sight that is fairly common to observe along the river corridor today, but was nearly a sight that we might have never had the privilege of witnessing again.

A Brief History

The peregrine falcon (*Falco peregrinus*) had a population crash first noticed in the 1950's. Organochlorine pesticides with DDT and DDE caused this decline.

Chemical sprays create a variety of problems for birds of prey as well as other life. These chemicals move upwards through the food chain, increasing in concentration. The peregrine is at the top of the food chain and suffers from poisons not initially intended for them. Among other problems, the pesticides caused eggshell thinning, causing eggs to break or not to hatch. Also adult birds affected by contaminants were not adequately caring for and were even killing their young. The decline was drastic enough by 1970 for the peregrine to be listed as endangered. At this point they were extirpated east of the Mississippi and populations had dropped an estimated 90 percent in the West. Peregrines had declined dramatically in other countries as well. The only other time of peregrine decline that I am aware of was in

England in World War II when a bounty was placed on the bird, as they were eating carrier pigeons used to carry coded messages in the effort to stop Nazi Germany.

Brief Behavior of the Peregrine

The peregrine falcon has a specialized diet consisting mainly of other birds. Bats will occasionally be taken and insects will be caught by young (An unusual observation was recorded of a fledgling stooping on a deer; however, the deer survived this attack.). This specialized diet is a reason for the peregrine's decline. Chemicals (DDT, DDE) sprayed on plants are eaten by insects that will carry a higher concentration of the toxins. Insectivorous birds eat the insects, making concentration levels even higher. The peregrine feeds on these plant- and insect-eating birds, with their high poisonous contents, receiving dangerous levels of the toxins. Even today, over two decades after being banned in the United States, traces of DDT are found in tissues of many organisms, including humans. Other raptors, such as the prairie falcon, with a more catholic diet eat birds as well as small mammals and were not receiving as high a dose of the toxins. Birds wintering in countries that still use harmful chemicals and marine pollution remain a problem.

Peregrines nest in the spring. This period is accompanied with fantastic courtship displays. Spectacular flight displays appear early in courtship. The birds can be observed doing incredible dives and loops, figure-eight flights, circles, undulated flights, talon-

grappling, and other displays. Cooperative hunting by male and female occurs at this time.

Watching a pair of falcons chasing down swifts is a common sighting. Later in the courtship period the male, called a tiercel or tercel (Latin for *une tierce* or 1/3), which is roughly 1/3 smaller than the female (female peregrines are on average 15% larger than males and juveniles are slightly larger than adults), starts bringing food to its mate. In-air transfers of a kill and ledge displays including head bowing, food exchange and beaking (like kissing) occur. During courtship the adult birds give a different call, a creaking type of call often called chipping or chupping.

During incubation the birds are quieter, with the female incubating the majority of the time and the male doing the hunting and some incubating. When the nestlings hatch, the male is kept busy bringing kills usually to the female who then feeds the young. Peregrines do not build nests but typically use a ledge on a cliff wall. They use what is called a scrape — often just a scratch in any dirt or depression on the ledge. Peregrines prefer sheer, inaccessible cliffs for nesting sites. As these sites become full, the birds may choose less desirable cliffs and perhaps even other birds' old nests in trees, and other so-called unusual spots as they have in the past and in other parts of the world. I have observed a nest (called an eyrie) in Tasmania, that had been carbon dated, which had an extended occupancy back 19,000 years. As the nestlings become more adult sized both adults will often drop off food to them, trying to stay away from the talons and beaks of their young. Fledgling time is also an exciting time to observe peregrines. The young fly quite clumsily at first and improve their flying skills daily. Kills are fed by the adults by food drops, aerial transfer (adults being careful not to get talons snagged with the food) and, as fledglings age, live birds caught by adults can be dropped to the young to try to make their own kill.

Peregrines in this country sometimes tolerate golden eagles nearby but will often chase them away from their territory. Golden will prey



Peregrine falcon

Pencil drawing by Anne Carter

on the young of the falcons. A study in Arizona found peregrines chasing off bald eagles. The peregrines were observed stooping the bald eagles and bopping the birds in the head. Some bald eagles that were hit were later observed dead of concussion. Great horned owls have also been observed to attack or eat peregrine chicks. Peregrines will also eat young of these species if the opportunity presents itself. I have observed adult golden eagles trying to attack fledgling peregrines. However, I have also observed golden eagles and peregrines nesting very close to each other with apparently little conflict.

Peregrine Nesting Chronology

On average, egg laying for peregrines around the canyon country is around mid to late April. Hatching for most peregrines is mid to late May and fledging late June and early July. Most birds will be in these ranges, but there will be the occasional birds that will not be in the average. One example would be if a pair has young that fail early on, they may recycle and fledge birds at a later date.

Peregrine Migration

Research on peregrine migration is still on going at the present time. The peregrine's Latin name means "to wander." Old and new reports of the birds resting on ships on the ocean exist. Birds that were radioed in Alaska and Glen Canyon migrated to Florida, Mexico, Central and South America. Among some unusual sightings was a peregrine that was banded below Glen Canyon dam that later turned up in Japan, as did a bird that was banded at Padre Island in Texas.

Search and Detection

Falcons, like all raptors, have incredible eyesight. Birds of prey need to pinpoint their prey to ensure capture. Like many animals, birds of prey have depressions in the rear of their eyes called fovea, made of densely arranged, light sensitive cells. Diurnal raptors have two fovea in each eye. One contains mostly rod cells, providing black and white, light and shade sensitivity, and is used for detection of movement. The other fovea contains mostly cone cells,



The author and biologist Mike Britton banding peregrine and checking the health of the bird. Photo by Chris Florian

which provide color vision for fine examination of an object and to break camouflage techniques. Peregrines can sometimes be observed head bobbing when hunting from a perch. When doing this, the birds are using the fovea used for detection with their binocular vision. To transfer the detected object from scan to fine, the bird may tilt the head, transferring the image to the inner fovea and giving the false impression of listening. Diurnal raptors have about eight times the density of cells in their eyes that we do. They also have a bony ring that can squeeze and elongate the eyeball. This allows them to have telephoto vision. Their eyes are large to provide detailed information. I once heard a comparison that if our eyes were the same proportion to our bodies they would be the size of basketballs.

Locating and Identifying the Peregrine

Falcons are built for speed and aerobic flight. Falcons wings are long, tapered, pointed wings that allow for sustained, fast, flapping flight. The peregrine has a hooked beak with a killing tooth used to crush or break the neck and head of its food. This is different from many raptors that only use their beak to eat and for preening. If you know the falcons, the only bird around here you may mistake a peregrine with is a prairie falcon. Prairie falcons are similar and also nest on the cliffs in Canyonlands. Some differences to look for are as follows; the prairie has a thinner mustache stripe compared to the thick hood of a peregrine, and the adult prairie has a lightly spotted belly compared to the heavily barred belly of the adult peregrine. The prairie also has a dark bar along the underwing. This dark triangle is a distinctive and diagnostic field mark to the prairie falcon. Fledglings of peregrines and prairies are more difficult to tell apart.

Peregrines will often perch near or on top of cliffs. When looking at a cliff there will be streaks of white wash from where the birds perch more often. The streaks of a falcon roost are long and thin lines compared to

the thick wash of other raptors. A golden eagle or red tail perch looks more like a bucket of paint thrown at the cliff. A kestrel falcon's wash is not as long as the peregrine's or prairie falcon's, which are similar. By observing different birds and their wash over time you will be able to decipher who is hanging out where. Many times I will hear the peregrines before I see them. The birds have various calls but the distinctive wailing is a good way to find them. The best way to learn this is to watch the birds and learn their calls or listen to bird tapes.



Biologist Mike Britton releasing peregrine

Outlook

Due to the halt of DDT and extensive reintroduction programs, the peregrine falcon has made an amazing comeback. In July 1995, the Fish and Wildlife Service gave notice of intent to de-list the peregrines from the endangered list. While the peregrine is still having problems in some parts of the country, the bird has recovered remarkably in many areas and on August 26, 1999, Fish and Wildlife Service de-listed the peregrine. This shows that the Endangered Species Act can work and may help save some animals from going extinct. Many animals and plants are still in vital

danger and need our protection. Habitat destruction, pollution, pesticides here and in other countries and many other factors still threaten birds such as the northern goshawk and willow flycatcher, to name a couple. An alarming decrease of some neotropical birds and species of frogs exists at the present time. Saving birds like the peregrine and other animals probably does more to protect man than a lot of folks realize and is an indication of the health of the environment. These animals show us that, like the canary in the coal mine, we can stop harmful chemicals, pollutants and save habitat, before

Photo by Chris Florian

these things start affecting us, and, just as important, stop man from destroying the amazing life with which we share the planet.

Rick Boretti is a wildlife biologist and sometimes river ranger. His home base is in Moab.



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Utah Partners in Flight Avian Conservation Strategy

By Jim Parrish*

The decline of avian populations, particularly Neotropical migratory birds (NTMBs), in North America and several areas of the Western Hemisphere is well documented. The reasons for declines are complex, and include loss of breeding habitat due to fragmentation, alteration, urban expansion, and natural disasters, loss or alteration of habitat in non-breeding areas and along migratory routes, and brood parasitism as the primary factors responsible.

Nationally, Partners in Flight (PIF) began in 1989 as a coordinated,

multi-faceted effort with the goal of documenting and reversing these apparent declines in NTMBs (e.g., those land birds that breed north of Mexico and then migrate to Mexico, Central and South America, and the Caribbean). These species were not included in initiatives directed towards waterfowl (North American Waterfowl Management Plan), shorebirds (Western Hemispheric Shorebird Reserve Network), or colonial waterbirds (Colonial Waterbird Group), or with initiatives addressing tropical biodiversity. Utah PIF was organized in 1993 for

the purpose of addressing the status of avian populations within the state and to provide data relevant to issues raised concerning the status of NTMBs in the Western Hemisphere.

Today, PIF has grown to become an international organization (PIF Canada and PIF Mexico have been established) with fulltime Eastern and Western Regional Coordinator positions in the United States, numerous working groups and organizational committees, as well as government and non-government employees dedicated either fulltime or part-time to the overall PIF



Black-necked stilt

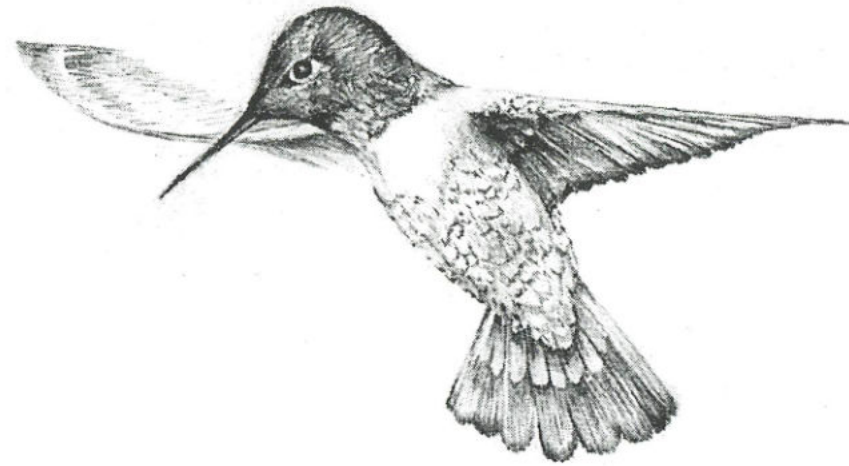
Photo by Damian Fagan

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conservation effort. In addition, the scope of PIF has now grown to include all birds except waterfowl. Each state in the Western Region of PIF has been established as a Conservation Planning Unit and is developing a Bird Conservation Plan to identify priority species in need of conservation action. The Utah Avian Conservation Strategy is the title given to the Bird Conservation Plan for Utah. The Strategy is currently being circulated for technical review and has resulted from coordinated and cooperative efforts by state and federal agency professionals, university faculty, non-governmental conservation organizations, and private individuals.

Effective and efficient ecological management involves determining which of Utah's avian species and their habitats are most in need of conservation. The primary purpose of the Strategy has been to prioritize avian species and their habitats and to set objectives designed to determine which are most in need of immediate and continuing conservation efforts. Attempts to reverse or at least curb declining trends will also require a coordinated and cooperative effort. Thus, the secondary purpose of the Strategy has been to recommend appropriate conservation actions required to accomplish stated objectives.

Portions of five physiographic regions (i.e., Utah Mountains, Colorado Plateau, Basin and Range, Wyoming Plateau, and Mojave Desert) and their associated avifaunas are located in Utah. Approximately 231 species of birds, excluding waterfowl, breed in Utah on a regular basis. Of these, 24 species have been prioritized for conservation efforts, as follows: Lewis' Woodpecker, Abert's Towhee, American Avocet, Mountain Plover (will likely be removed when and if the species becomes federally listed), Lucy's Warbler, Sage Grouse, American White Pelican, Bobolink, Virginia's Warbler, Gray Vireo, Bell's Vireo, Black Rosy-Finch, Long-billed Curlew, Sharp-tailed Grouse, Brewer's Sparrow, Black Swift, Black-necked Stilt, Broad-tailed Hummingbird, Ferruginous Hawk, Yellow-billed Cuckoo (likely to soon enter the revised federal Candidate system for consideration as a threatened or



Hummingbird

Pencil drawing by Anne Carter

endangered species), Black-throated Gray Warbler, Three-toed Woodpecker, Sage Sparrow, and Gambel's Quail. These 24 priority species utilize at least 18 priority habitats within Utah which are also identified and discussed in the document, as follows: Lowland Riparian, Mountain Riparian, Wetlands, Wet Meadow, Shrub-steppe, Mountain Shrub, High Desert Scrub, Low Desert Scrub, Northern Oak, Grassland, Alpine, Sub-Alpine Conifer, Ponderosa Pine, Lodgepole Pine, Pinyon-Juniper, Water, Playa, Cliff, and Agriculture. Additional species that may benefit from conservation actions recommended in the Strategy are also listed as part of the narratives describing each priority avian species. Narratives are composed in such a way as to provide as much information that is specific to the Utah portion of the species' range as possible.

The next priority task for Utah PIF is Implementation. Utah PIF is organized into five working committees made up of professionals from state and federal natural resources agencies, universities, and non-governmental organizations. A multi-agency Steering Committee has also been established with the objectives of coordinating and directing the overall Bird Conservation Plan process. A multi-agency Rankings Committee was established with the objective of evaluating available data on Utah's avian populations and ranking each species according to priority for possible conservation action. A multi-

agency Habitat Committee has functioned with the objective of assessing habitat requirements for avian populations and to provide recommendations for conservation efforts within high priority avian habitats. A GAP (Geographic Approach to Planning) Committee has provided statewide habitat data using the GAP models produced for Utah and has functioned to revise and update selected avian GAP models for Utah. Finally, an Information and Education Committee has been organized with the overall objective of identifying information needs relevant to the Utah PIF process and relevant issues regarding avian conservation in the state.

The Utah PIF strategy in meeting stated objectives has been to solicit and encourage participation from as many state and federal agencies as possible in evaluating Utah's avian resources for planning purposes. Utah PIF recognized early on that no single individual or agency has the resources necessary to effectively evaluate the state's avian resources for the purpose of producing a comprehensive plan that establishes priority species and identifies priority habitats. Thus, Utah PIF has sought to meet objectives through a cooperative approach involving Memorandums of Understanding/Agreement (MOU/MOAs) with state and federal agencies, universities, and non-governmental organizations and by expanding partnerships with other organizations and individuals seeking to enhance the state's avian resources.

The Strategy is considered part of a dynamic process that will be updated and revised periodically. Periodic review of progress towards the objectives and strategies identified in the Strategy is anticipated and will be carried out by the standing committees. Research and monitoring needs are listed that relate directly to the priority species identified and pertinent management questions, and we envision research and monitoring fulfilling a critical link in the adaptive nature of the Utah Plan.

Coordination and cooperation among existing and new partners will determine in no small part the overall success of the Utah Plan. In order to effectively implement the recommendations in the Plan into existing and future working plans (e.g., forest plans, district and statewide management plans, etc.), informational and educational briefings and additional networking will be pursued. On a broader scale, Utah PIF is now pursuing partnerships with other avian management organizations, including the North American Bird Conservation Initiative and the Joint Venture programs, for future cooperation and coordination. International coordination with PIF Canada and PIF Mexico is already underway as part of the overall implementation efforts for the Bird Conservation Plans and conservation strategies throughout North America and the Western Hemisphere.

The Utah Plan represents one of the most comprehensive compilations of Utah avian information ever attempted. It provides general information for hundreds of Utah's breeding birds and detailed information for the priority species. It also provides detailed descriptions and maps of Utah's bird habitats.

The INTRODUCTION provides background information on the national PIF effort and outlines the mission and principles of Utah Partners in Flight. The STATUS OF BIRDS IN UTAH provides general information on breeding and winter habitat use, distribution within the state, and migratory status of 231

breeding species. This section also illustrates the relative use of Utah's habitats by the state's bird species.

The ECOLOGICAL SUMMARY OF UTAH discusses which birds and habitats occur in each of the state's physiographic regions and looks at the influence of latitude and elevation on Utah's birds and bird habitats. This section also provides detailed information on nest characteristics, prey items, and foraging strategies for Utah's breeding birds and arranges birds into foraging guilds and nesting groups.

BIRDS IN UTAH MOST IN NEED OF CONSERVATION provides a description of the process used to evaluate and rank each of Utah's bird species (Appendices A and B). Detailed species accounts are given for 24 Priority Species, those that ranked highest for consideration for conservation actions. Each species account details distribution, ecology, and habitat requirements and lists associated species. These accounts also provide management issues and conservation recommendations and include suggestions for research and educational outreach.

HABITATS IN UTAH MOST IN NEED OF CONSERVATION gives detailed descriptions of Utah's bird habitats including dominant and associated vegetation, distribution, and bird use; habitats are mapped using products modified from Utah's GAP analysis. The section also discusses the selection of Priority Habitats for Utah.

Conservation topics important to the overall strategy of conserving birds in Utah are discussed in the OTHER CONSIDERATIONS section. While some of these issues may have been discussed in specific species or habitat accounts, they have broad implications for a wide variety of Utah birds and are thus emphasized in this section.

The CONSERVATION ACTIONS section provides a matrix of conservation issues and recommendations for each of the priority species grouped by habitat

and provides recommendations on broad conservation topics not covered elsewhere in the strategy.

The INFORMATION AND EDUCATION section lists the primary needs associated with bird conservation in Utah and gives suggestions for use of existing resources and development of new informational materials.

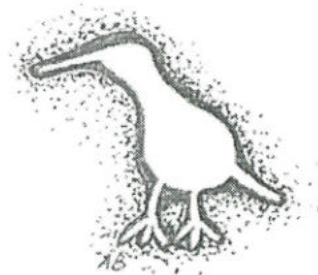
Finally, the IMPLEMENTATION section gives a framework for carrying out the suggestions provided in the Utah Plan. Continued partnerships and funding opportunities are discussed, as are development of new policies and initiatives. The use of flagship projects to demonstrate successful implementation strategies is also discussed.



(All birders are encouraged to become involved with Utah PIF and the Utah Avian Conservation Strategy. Updates on Utah PIF will appear in future issues of *Utah Birds*.)

Appendix A. Criteria for prioritizing Utah's breeding landbirds.

- I. IA - Importance of Utah to Each Species
 1 - Very Low. <1% of species' total breeding distribution.
 2 - Low. 1-10% of species' total breeding distribution.
 3 - Moderate. 11-25% of species' total breeding distribution.
 4 - High. 26-50% of species' total breeding distribution.
 5 - Very High. 51- 100 % of species' total breeding distribution.
- II. RA - Relative Abundance
 1 - Abundant. Species which can be observed in quantity in their habitat any day in the proper season without any special search.
 2 - Common. A species which several representatives should be noted daily in appropriate habitat.
 3 - Uncommon. An uncommon species might require searching in a specially favorable locality with resulting discovery of scattered pairs or isolated small colonies.
 4 - Rare. A rare species is not often encountered when looked for but is not considered unusual when it is found.
 5 - Very Rare. A very rare species is one that might not be encountered except by chance in several days of search.
- III. BD Breeding Distribution
 1 - Very Widespread. 76-100% of North America including Mexico.
 2 - Widespread. 51-75% of North America including Mexico.
 3 - Intermediate. 26-50% of North America including Mexico.
 4 - Local. 11-25% of North America including Mexico.
 5 - Very Local. <1-10% of North America including Mexico.
- IV. WD - Winter Distribution
 1 - Very Widespread.
 2 - Widespread.
 3 - Intermediate.
 4 - Local.
 5 - Very Local.
- V. TB - Threats in Breeding Range
 1 - No Known Threat. Habitat increasing or stable, or an ecological generalist.
 2 - Minor Threat. Habitat loss between 1% and 10%, or a moderate ecological generalist.
 3 - Moderate Threat. Habitat loss between 11% and 25%, or a moderate ecological specialist.
 4 - Extensive Threat. Habitat loss between 26% and 50%, or an ecological specialist.
 5 - Extirpation Likely. Habitat loss between 51 and 100%, or an extreme ecological specialist.
- VI. TN - Threats - Non-Breeding
 1 - No Known Threat.
 2 - Minor Threat.
 3 - Moderate Threat.
 4 - Extensive Threat.
 5 - Extirpation Likely.
- VII. PT - Population Trend
 1 - Large Increase. >5%
 2 - Increase. >1% annual increase.
 3 - Trend Unknown or Stable.
 4 - Decrease. >1% annual decrease.
 5 - Large Decrease. >5% annual decrease.



Snipe Pen & Ink drawing by Andrea Brand

VIII. UPIFSUM Total of Criteria Scores

Appendix B. Prioritized list of Utah's breeding terrestrial birds.

(excerpted in part)

SPECIES	IA ¹	RA	BD	WD	TB ¹	TN	PT ¹	UPIF SUM ²
Abert's Towhee	2	3	5	5	5	5	4	40
Lewis Woodpecker	3	4	4	4	4	4	5	40
Le Conte's Thrasher ³	2	5	5	5	4	4	3	37
American Avocet	5	2	3	4	4	4	3	37
Mountain Plover	2	5	5	4	4	4	3	36
Gray Vireo	4	4	4	5	3	3	3	36
Lucy's Warbler	2	2	5	5	5	4	3	36
Virginia's Warbler	4	4	4	5	3	3	3	36
American White Pelican	5	3	3	3	4	3	3	36
Bobolink	2	4	3	4	5	3	4	36
Sage Grouse	3	4	3	3	4	4	4	36
Black Rosy Finch	5	3	5	5	2	2	3	35
Bell's Vireo	2	4	3	4	5	4	3	35
Black Swift	2	5	5	4	3	4	3	34
Brewer's Sparrow	3	2	4	3	4	3	4	34
Sharp-tailed Grouse	2	4	3	3	4	4	4	34
Long-billed Curlew	2	3	4	4	4	3	4	34
Black-necked Stilt	3	3	4	3	4	4	3	34
Brown-crested Flycatcher ³	2	5	5	2	4	3	3	33
Bendire's Thrasher ³	2	4	5	5	3	3	3	33
Broad-tailed Hummingbird	3	2	4	4	3	3	4	33
Black-tailed Gnatcatcher ³	2	4	5	5	3	3	3	33
Ferruginous Hawk	3	4	3	3	4	3	3	33
Cordilleran Flycatcher ⁴	3	3	4	4	3	3	3	32
Spotted Owl ⁵	2	5	4	4	3	3	3	32
Gambel's Quail	3	3	4	4	3	3	3	32
Sage Sparrow	3	3	4	4	3	3	3	32
Three-toed Woodpecker	4	2	2	3	4	3	3	32
Black-throated Gray Warbler	3	3	4	4	3	3	3	32
Yellow-billed Cuckoo	3	3	2	3	4	4	3	32

¹ Area of Importance (IA), Threats to Breeding Habitat (TB), and Population Trend (PT) were considered to be more important ranking factors and were weighted more heavily than other factors in calculating final scores. The values of these three factors were therefore doubled in the revised final rankings (UPIF SUM).

² All species which had a ranking sum greater than 31 were considered for the final list. Not all species scoring 32 or higher were included in the final list for the reasons detailed below. In addition to these reasons, all species removed from the final list were at least partially represented by other species in the same habitat type.

³ Species removed from the final list because of limited distribution or low abundance in Utah combined with relatively wide distribution or high abundance in the portion of its range outside of Utah (i.e., Utah is not particularly important to species as a whole).

⁴ Species removed from the final list because it is common in Utah and other portions of its range and does not have a significant declining population trend.

⁵ Species removed from the final list because it is federally listed as Threatened and has a Recovery Plan which is currently being implemented in Utah and across its range.

Southwestern Willow Flycatcher Surveys in Canyonlands National Park

By Matthew Johnson and excerpted by Andrea Brand

Last spring I was hired by the USGS Colorado Plateau Research Station of Northern Arizona University to assist with a survey along the Colorado River of the endangered southwestern willow flycatcher. Another crew was hired to survey the Green River and meet up with us at the Confluence. About a month before the survey was to begin I was sent to St. George, Utah to be trained in willow flycatcher identification, habitat preferences and survey methods. The willow flycatcher is one of five empidonax flycatchers in the area and extremely difficult to identify by sight even when one has the bird in hand. All empidonax are dull in color, with pale eye rings and wing bars. So the secret to identification of flycatchers is their song and fortunately each is very distinct. For the willow flycatcher the song is a sneezy 'fitz-bew.'

About a week after returning to Moab I was hiking along the boardwalk in the Nature Conservancy's Matheson Preserve when I heard a bird sing 'fitz-bew.' I stopped. I held my breath. Could I really be hearing this? I had only previously heard this call from a tape recorder. The bird kept singing 'fitz-bew, fitz-bew', non melodious but undeniably distinctive, over and over. I tried to move slowly and quietly further up the boardwalk and soon the sound was very close. Within a few steps I found the songster not a meter off the trail perched eye level in a willow tree. It was flicking its tail slightly as it sang. In the late afternoon light I found the white wing bars more prominent than I had expected and its back a beautiful shade of green. The eye ring was slight, the beak dark above, paler below and its throat white. At this time I did not know that I would see only one more willow flycatcher up close during the entire survey and hear only a dozen total. The dozen willow flycatchers found on the Colorado River and some sixty on the Green River survey were all found to be migrants and no nesting sites were located.

Below is a selected portion of the discussion section from "Southwestern Willow Flycatcher Surveys In Canyonlands National Park Along the Colorado and Green Rivers," 1999 by Matthew Johnson, reprinted by permission of the National Park Service. -AB

Although formerly widespread and locally common, the southwestern willow flycatcher (*Empidonax traillii extimus*), is an endangered species currently known to breed at only about 75 sites in the southwest. This decline is mainly due to loss and modification of its breeding habitat which consists of riparian vegetation that are associated with streams, rivers, lakes and wetlands. In Utah, southwestern willow flycatchers were restricted to the southern part of the state and were noted breeding along the Virgin, Colorado and San Juan Rivers. Along the Colorado and Green Rivers significant amounts of potential southwestern willow flycatcher breeding habitat exist. However, surveys from Canyonlands boundary to Colorado/Green confluence in 1999 determined that flycatchers appear to use these portions of rivers as a migratory stopover rather than as a breeding area. These are the same results we found upstream of the Green River (Green River, UT -

Canyonlands park boundary) and the Colorado River (Dewey Bridge - Canyonlands park boundary). In other southwestern river systems (Colorado River in Grand Canyon National Park and San Juan River, Utah and New Mexico), migrant willow flycatchers also account for the majority of the detected flycatchers.

Migration is a period of exceptional energy demand, and small landbird migrants generally do not deposit enough fat to fly without stopping between breeding and wintering areas. Hence, availability of suitable habitats (i.e., riparian zones) where depleted fat stores can be safely and rapidly replenished becomes critical to a successful migration to most neotropical migrants including the willow flycatcher.

The riparian zone along the Colorado River between Canyonlands park boundary and the Green/Colorado Confluence includes many areas that appear, based on vegetation characteristics, to be potential willow

flycatcher breeding habitat. Most of these sites included dense stands of tamarisk spp., willow spp., cottonwood spp., and box elder spp. Several side channels meander adjacent to the main river and are bordered by stands of young, dense willows. Although many of the sites we surveyed in 1999 appear to be suitable southwestern willow flycatcher breeding habitat, willow flycatchers do not breed along these stretches of the Colorado and Green Rivers. The following are possible reasons why willow flycatchers may not be breeding along these sections:

1) Habitat/vegetation characteristics: The habitat along the Colorado and Green River is dominated by exotic tree species (i.e., tamarisk) in many areas. Many bird species will not breed in habitats dominated by exotic vegetation because these habitats offer little in the way of bird food resources. However, willow flycatchers currently breed in exotic vegetation in several areas of the



Willow flycatcher Photo by Bill Maynard, New Mexico Dept. of Game and Fish

southwest. At the San Juan Pueblo in New Mexico, willow flycatchers nest in habitat dominated by Russian olive, similar to what exists along the San Juan River. In Arizona, willow flycatchers sometimes breed in habitat dominated by tamarisk, which is also a prevalent exotic throughout the Colorado and Green River corridors. Therefore, presence and dominance of exotic vegetation does not likely preclude breeding.

2) Other unsuitable habitat components: Although discussions of habitat and habitat suitability typically focus on vegetation characteristics,

many other factors are important components of a species habitat. For example, geographic location, temperature, humidity, predators, food resources, and even adjacent land uses can influence whether a habitat is truly suitable and/or occupied. It is possible that one or more non-vegetative habitat components are not suitable for flycatcher breeding within our survey area.

3) Historic extirpation and slow recolonization: The recent low population level of southwestern willow flycatchers at most sites in the southwest makes local populations susceptible to extirpation. It is possible that as flycatcher populations along the Colorado and Green Rivers became reduced and more fragmented than in the past, local breeding groups may have produced insufficient young to

offset adult mortality. Similar local extirpation has recently been documented and can be driven by habitat loss and/or cowbird brood parasitism. As willow flycatchers became more rare in the region, the likelihood of recolonization of former breeding areas would have been greatly reduced. Therefore, suitable habitat may currently be unoccupied because the flycatcher is now so rare that there are not enough flycatchers to disperse into and settle in all available habitats. If so, effective management and recovery of current flycatcher populations and riparian habitats may lead to increasing

populations which could resettle in areas such as the Colorado and Green Rivers in the future.

When discussing potential reasons for the absence of breeding flycatchers, it must be remembered that we know very little of the history of the flycatcher in this region, or of the factors that may have affected its population. Therefore, all such discussions involve much speculation, with no guarantee that any of the speculation is correct. Furthermore, the absence of breeding flycatchers during a one year period (1999) does not mean that willow flycatchers have not bred there recently, or will not in the near future. Sogge et al. have documented several instances where flycatchers disappeared from former breeding locations along, the Colorado River, only to reappear after 3-5 year absences. Thus, several years of surveys may be necessary to provide high confidence that breeding willow flycatchers are absent from a river system.

The U.S. Fish and Wildlife Service has listed the southwestern willow flycatcher as an endangered species (USFWS 1995). Given the historical distribution of the species in this system, the sightings described in this report, and the fact that potential willow flycatcher habitat does exist, we recommend continued willow flycatcher monitoring along the Colorado and Green River corridors (Canyonlands Park Boundary Colorado/Green Confluence).

The ecological diversity of migratory species makes an assessment of habitat requirements and the development of management strategies for migrants particularly difficult. However, the preservation and conservation of southwestern riparian habitats such as the Colorado and Green River corridors should be of major concern. Even if future surveys determine that flycatchers are not currently breeding in these stretches of the rivers, the riparian habitat is clearly serving as an important migratory corridor and stopover area, and is deserving of protection and management.

The Joys of Birding

by Andrea Brand

It's summer but never too early to think about the holidays and Moab's Christmas Bird Count.

The Nation's first Christmas Bird Count took place just under 100 years ago on December 25, 1900. Frank Chapman, an ornithologist and member of the then fledgling Audubon Society, came up with the idea of counting birds instead of slaughtering them. His idea was in direct response to a holiday tradition known as the Christmas "Side Hunt". Participants of the "Side Hunt" would choose teams and go into the field with their guns; whoever brought in the biggest pile of "feathered quarry" won. Chapman and other observers were becoming

concerned about this indiscriminate slaughter of wildlife and parallel declines in bird populations.

Chapman set up 25 count sites from Canada to California and at the end of that Christmas day a total of 90 species and 18,500 individual birds were recorded. His idea took off. This year, 100 years later, close to 50,000 people participated in Audubon Society Christmas Bird Counts across Canada, the United States, Hawaii and the Pacific Islands, Central and South America and the Caribbean. With close to 1,800 count sites, over 650 species were seen in the United States and Canada and a phenomenal 1,650 species sighted in the tropics to total over 78 million individual birds!

Moab's first Christmas Bird Count took place in the winter of 1986. Jeff Connors was the head of Resource Management for Arches and Canyonlands National Parks and Natural Bridges National Monument. He had worked on breeding bird surveys previously in the East and had initiated a breeding bird census while working at Bryce Canyon National Park in the 1970s. He felt that it was a good idea to start a Christmas Bird Count in Moab. There were many residents interested in birding and the diversity of habitat created likewise a good diversity of bird species in the area.

Connors approached Nelson Boschen, a local biologist then working for Utah Division of Wildlife



Crane Pen & Ink drawing by Andrea Brand

Resources. Together they figured out the best location for the center of the count so that it would include the sloughs, now the Matheson Wetlands Preserve, Pack Creek, Castle Valley, Courthouse Wash, the Colorado River corridor, and some higher elevation areas. From this center, up on Sand Flats, a circle was drawn 15 miles in diameter. Connors filed the initial paperwork with the National Audubon Society, organized participants and compiled the findings for that first official Moab Christmas Bird Count.

Fifteen years later, thanks to the Moab Bird Club that also formed in 1986, Moab still holds annual Christmas Bird Counts. Each year from 30 to 40 participants spend a winter day hiking the count area recording every bird they see and hear, the species and number of individuals. Birders hike Courthouse Wash, Mill Creek and Negro Bill canyons, slog through mud and water of the Matheson Wetlands Preserve, scan open water in the sloughs or ponds in Castle and Spanish valleys, drive along the Colorado Riverway, and also

walk neighborhood streets in Moab peering into backyard bird feeders.

Observations of raptors are always welcomed. Majestic white-headed and white-tailed bald eagles, dynamic dark, speed-demon merlins and "butcher bird" northern shrikes remind us of the cold north country from which they have come. We feel blessed if we are fortunate to see one or two of these each Christmas Bird Count.

Seeing flocks of waterfowl with 50 to 100 individual ring-necked ducks, American wigeons, mallards, teals, and an occasional shoveler, their jeweled colored feathers -purples, blues and greens, and cinnamon, are truly a treasure to behold. When wood ducks appear one has found all the jewels in one setting.

Other sightings may include cheery bluebirds, tiny chattering chickadees and bushtits, shy woodpeckers and for those who brave the cold night the mysterious hoot of an owl. Birding in different habitats bears the gift of viewing many different bird species.

The data compiled from Moab's Christmas Bird Count is just one small piece of a large puzzle but nevertheless important. When information from some 1800 Christmas Bird Count sites is combined the result is a massive database vital to conservation. The database yields valuable information about shifting migration patterns and populations of different bird species during the early winter (mid-December to early January), when many birds are still traveling southward. When this data is further combined with other surveys, scientists have an understandable picture of how American bird populations have changed in time and space over the past 100 years.

All of this information has been compiled into what the Audubon Society considers the "longest running database in ornithology." Amazingly,

thanks to the efforts of the Audubon Society, the Cornell Lab of Ornithology and the USGS, the Christmas Bird Count database can be visited online at www.birdsource.org. Log on and one can view up to 100 years of Christmas Bird Count results from across the U.S., Canada, Central and South America, the Caribbean and in good ol' Moab, Utah.



Birders of all skill levels who are interested in joining the Moab Bird Club and/or participating in the Christmas Bird Count should contact the author and Christmas Bird Count compiler, Andrea Brand at 259-4050 or Donna Grah at 259-5864.



One of the best ways to spend a winter's day!

Photo courtesy of Lisa Church



Heron

Pencil drawing by Anne Carter

Results from Moab Christmas Bird Count, Winter 1999-2000

9090 Total birds reported count day
67 species reported count day
cw= Reported count week

Species	Number
Pied-billed Grebe	4
Great Blue Heron (Blue form)	1
Canada Goose	15
Wood Duck	7
American Green-winged teal	40
Mallard	374
Northern Shoveler	21
Gadwall	12
American Wigeon	43
duck sp.	12
Ring-necked Duck	62
Bufflehead	8
Common Merganser	4
Bald Eagle	2
Northern Harrier	4
Sharp-shinned Hawk	2
Cooper's Hawk	3
Accipiter sp.	2
Red-tailed Hawk	6
Rough-legged Hawk	cw
Golden Eagle	4
American Kestrel	21
Merlin	1
Peregrine Falcon	1
Ring-necked Pheasant	14
Gambel's Quail	60
Sora	cw
American Coot	20

Species	Number
Common Snipe	1
Rock Dove	13
Belted Kingfisher	2
Red-naped Sapsucker	2
Downy Woodpecker	5
Northern Flicker (form?)	90
Northern (Red-shafted) Flicker	9
Say's Phoebe	2
Horned Lark	30
Western Scrub Jay	16
Pinyon Jay	40
Black-billed Magpie	230
American Crow	216
Common Raven	66
Black-capped Chickadee	19
Juniper Titmouse	12
Bushtit	127
White-breasted Nuthatch	1
Rock Wren	12
Canyon Wren	25
Bewick's Wren	6
Marsh Wren	8
American Dipper	6
Ruby-crowned Kinglet	28
Western Bluebird	34

Species	Number
Mountain Bluebird	47
Townsend's Solitaire	4
American Robin	811
Cedar Waxwing	81
Northern Shrike	1
European Starling	4118
Yellow-rumped Warbler (form?)	32
Yellow-rumped (Audubon's) Warbler	23
Spotted Towhee	34
American Tree Sparrow	48
Song Sparrow	157
White-throated Sparrow	1
White-crowned Sparrow	705
Sparrow sp.	5
Dark-eyed Junco (form?)	399
Dark-eyed (Oregon) Junco	266
Dark-eyed (Slate colored) Junco	2
Red-winged Blackbird	51
Western Meadowlark	9
Great-tailed Grackle	cw
House Finch	162
Lesser Goldfinch	13
American Goldfinch	43
House Sparrow	335

Bird Stories

by Bruce Jager

Habitat

A friend of mine, a nurse, called me one day and asked if I would be willing to be a bird guide for a nice lady from New Jersey, whose husband had to stay in Allen Memorial Hospital for a few days. I said "Sure."

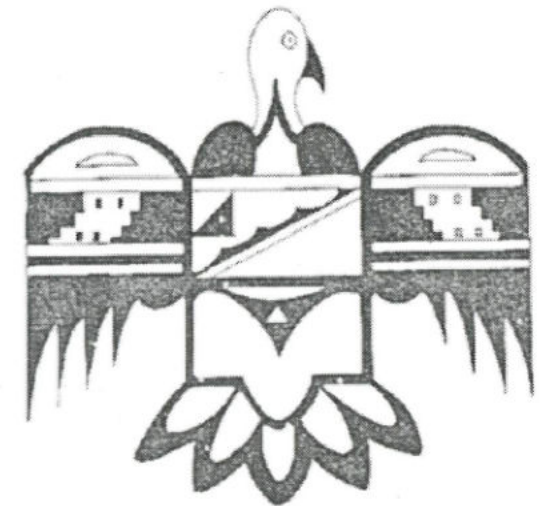
The New Jersey lady was the kind of person who records in her bird book the date and location of each new species she sights as though it were a trophy. The pressure was on. I asked my client if she had ever seen a great-tailed grackle. "No," she admitted, "but I'd like to."

I drove us to a commercial campground not far from the sloughs, where I had previously stayed while looking for a permanent place to "roost" in Moab. The 18-inch, large male - purple, glossy-feathered, yellow-eyed, and with a spectacular lengthy tail—strutted between the camp trailers as though he was lord of the manor. "With that bird alone," my client said, "You've earned both your fee and a tip."

I went on to find her a few other trophies, but in far more natural locations.

Eagle Fall

My friend, J.C. had been asked to take some pictures of a resort called Pack Creek Ranch, located on the west side of the LaSal Mountains in the foothills. He invited me along. We drove up a rocky, windy road in his jeep and hiked up to a cliff so that he could have a high-angle, long shot of the ranch. As we stood on the precipice, J.C. was adjusting his camera. Suddenly, a golden eagle with an 8-foot wingspan came gliding by, slightly below us, less than 10 feet away. I was so shocked and excited I could not verbalize to J.C. what was happening, so I slapped him on the back to get his attention, almost pushing him off the cliff. Fortunately, J.C. managed not to fall off the cliff, but I have been somewhat reticent about asking him to go raptor watching with me because he does not fly like an eagle.



outskirts of St. Louis, opened itself to the public for a day, so that they could see and photograph raptors from all over the world. Marlin Perkins was standing by a huge Andes condor, whose flying days were over, but who still made an awesome appearance.

As I began to ask Marlin questions about what DDT was still doing to raptor eggs, the condor stepped between us, moved his massive beak down towards my right

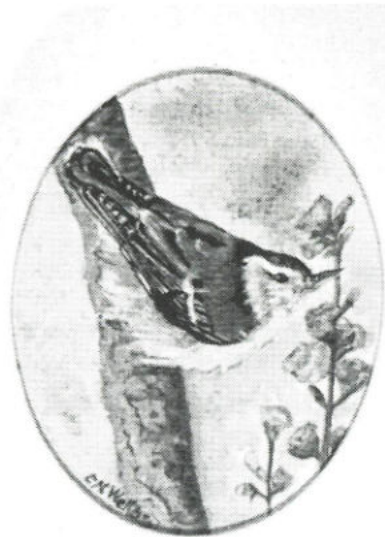
High Stepping with Marlin Perkins

Like many kids in the 1960s, I used to watch Mutual of Omaha's "Wild Kingdom," starring Marlin Perkins on TV. I would see him jump out of a small helicopter and wrestle a 30-foot anaconda or drive a jeep on the plains of the Serengeti, trying to clock a cheetah, fastest cat in the world. So, it was a thrill that some 20 years later, I would get to meet and talk with Marlin Perkins. It was just a year before his death.

Once a year, the Raptor Rehabilitation and Propagation Center, located on the western

hiking boot, grabbed my leather boot lace and jerked my foot up about as high as my waist. How I managed not to fall down was a wonder to me, but Marlin and I began to laugh and laugh. We speculated that the condor might have thought the bootlace was one of those long, juicy muscles that he had previously devoured high in the Andes Mountains. The experience was like a dream come true, meeting Marlin Perkins in the flesh and having an uplifting encounter with a creature from the wild kingdom.

Bruce Jager has lived in Moab for 5 years. He worked formerly as a teacher and photographer.



Nuthatch Watercolor by Carol Wells

Bird Homes

by Carol Wells

I never thought much about bird nests and their construction. Nor did I ever consider that there might be different types. A nest is a nest, and a fairly secretive thing. We see birds carry grasses, sticks and the like, taking for granted that the time of year has arrived for them to build a home. But I had only seen abandoned nests when trees are naked in winter. I had never watched a bird actually construct its nest, or seen one up close and personal, until one spring, when the wind blew someone's home onto my back doorstep. I looked around, toward the trees; as if it were possible to find some clue as to the ownership and the originating tree this nest had come from. If I could have put an ad in the classifieds, it would have read: Home found; approximately 5" long; hooded, woven together with

string, weeds, seeds, horse hair, and a bit of Christmas tinsel; unfinished; a great fixer-upper; willing to help re-hang. This would have been an ad to which any number of Northern Orioles might have replied. Not knowing then, that it was an oriole's nest, this feat of engineering from a creature with no hands, who constructs its home mid-flight, piqued my fascination for not only watching birds, but learning of their nesting capabilities as well.

A bird's nest reflects its behavior as well as its evolution. Many birds today still nest much as they did at each stage of evolutionary development. Some of the creative means of building and placement of nests has been driven by the survival instinct to escape predation. Because mammals were so successful, evolution forced birds to build their nests ever higher off the ground and so the exploration of trees and shrubs became viable nesting sites.

The primary purpose of this nest building is, of course, the eggs. Often in precarious situations high atop narrow cliff ledges, lying about on open ground, unaware that even trees are no guarantee against predation, defenseless eggs are at the mercy of their surroundings and their parents. Even the shapes of eggs give pause for reflection. Colors and speckles, pointed eggs, or almost round; are all clues as to what kind of environments these future fledglings will be born into. Auks and Murres who lay eggs on coastal cliffs, lay very pointed eggs, so that if an egg is accidentally nudged, it will roll in a circular fashion rather than right off the ledge. Conversely, woodpeckers, laying their eggs inside a tree cavity, are white and practically round. Since they are inside a tree, they have no need for camouflage, and can afford to be round since there is nowhere for them to roll. Eggs are the sustainers of life for each species.

It is the force of nature, the "natural selection" that explains the highly various forms of nests. Each type fills certain needs,

solves specific problems, and has particular adaptations that help each species survive this vulnerable egg-laying period. Though only a few species can be mentioned as examples in each of the categories of nests, most are species that have been observed in and around Moab at various times of the year. Hopefully, these examples will help give a greater understanding, if not deeper appreciation for the ingenious and surprising nesting behavior of birds.

The earliest birds laid their eggs right on the ground. Often as part of a ritualized courtship display, the female pivots on her breast, pushing with her feet resulting in a slight depression in the sand or soil into which she then lays her eggs. Most ground nesters lay eggs that are colored, and/or speckled so that they are camouflaged in the surrounding sand or ground. How does this particular type of nesting provide any protection for the eggs or the young? Birds that nest on the ground in colonies are highly synchronized. Terns, gulls, and many other coastal type birds that nest in colonies mate at approximately the same time and chicks hatch within days of each other. This allows the adults to protect both eggs and young collectively. As a mob, they can be much more intimidating than a single bird nesting alone on an open beach.

However, the killdeer that I have often spotted at Ken's Lake is not a colony nesting bird. It is the bird famous for its feigned broken wing approach. Pretending to be crippled, the killdeer hopes to lure predators away from the nest site by faking a promise of being easy prey. It is the male killdeer that makes test scrapes on the ground, waiting to see in which scrape the female will choose to lay her eggs. As with most ground nesters that use little or no vegetation for insulation, the clutch of four eggs are arranged with their pointed ends facing inward, so that they can be completely covered by the female's body.

Nightjars, nighthawks and whip-poor-wills, all in the family

of *Caprimulgidae*, are made to blend perfectly with the ground and do not make even the slightest of scrapings or dents in which to lay their eggs. Unlike other ground nesters whose eggs are speckled to match surroundings, these eggs are surprisingly conspicuous. It is the body of the bird itself that provides the camouflage, and so, only at the last moment of imminent danger will the female leave her eggs. This family of birds' reproductive cycle is closely timed with the lunar cycle. When the chicks hatch, the adults will fly through bright moonlight, catching insects that are normally only visible for them at dawn and dusk. The adults are monogamous and will return the next year to the same spot of ground even though no nest has been built.

One of the earliest alterations in the evolution of nesting was the introduction of extra vegetation to the ground nest. While pulling in vegetation towards the nest site with beaks was probably more of a chance activity, it was also a radical change since the mounding up of material provides increased safety from water and predators. The most common example of this type of nesting is waterfowl. Though we may often mention ducks and geese in one breath, in many ways they are quite different. Ducks and geese, like other waterfowl, do not have brood patches that are the bare patches of skin on other birds that allow the eggs to come in direct contact with body heat. Rather, female ducks and geese pluck down from their breasts to line the scraped together nest of reeds and cattails, and cover the eggs with the down while they are away from the nest. Unlike ducks, geese mate for life and it is the gander that is the vigilant sentinel guarding the goose while she incubates her eggs. Because drakes are the more colorful of the duck species, it is better that they wander off and join other drakes after mating since colorful feathers would bring more attention to the nest and its location rather than be of any camouflage.

Geese have their legs set at mid body rather than towards the rear,

making them far more agile on land than ducks. However, the female duck will return to the nest on foot through the brush so as to keep the nest location a secret. Females continually add material with their beaks from the surrounding vegetation during egg laying and incubation. Ducks compensate for the dangers of ground nesting by laying large clutches, averaging 6-18 eggs compared to a goose's 5-10. Both geese and ducks wait to incubate their eggs until the clutch is complete, so that the chicks will all hatch at once. Ducks and geese can handle these large numbers of chicks because they are born precocial, that is, hatched with all feathers, eyes open, and able to walk and leave the nest soon after hatching. Geese return to their natal breeding grounds and migrate in families that may include yearlings, middle-aged and older geese, which may still be breeding at the age of 40. Ducks form new pairs each spring, and normally live 15 to 20 years.

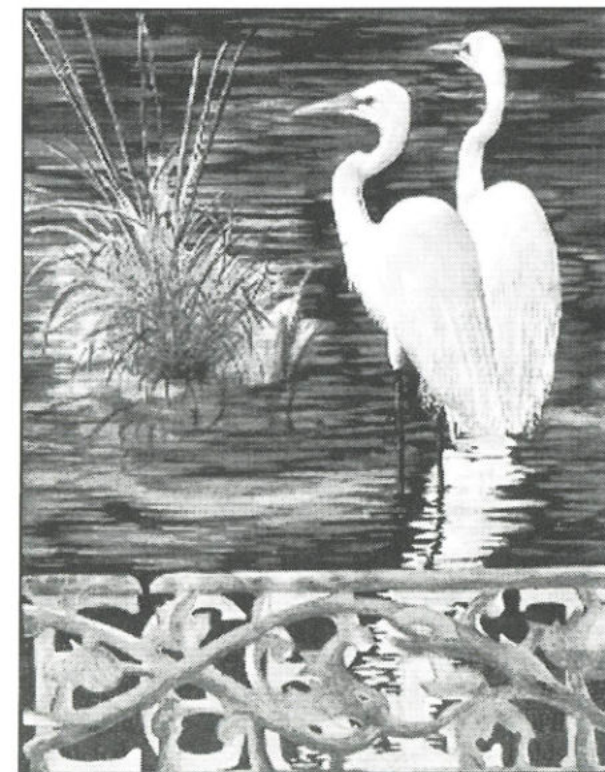
The next important evolutionary change was for birds to deliberately pick up material and carry it in their beaks to the nest. To choose a stick is a much more calculated act than the "pulling in" of vegetation. A loose pile of sticks and vegetation rather carelessly stacked together is what is known as a "platform nest." Often the fork of a tree is used for support. Platform nests can be lined with guano, cow manure, dead fish and even dead chicks.

Double-crested cormorants build platform nests of sticks always near the water and usually in colonies. A colony will either build nests entirely on the ground or entirely in trees, but not both.

American bitterns build their platform nests of reeds on the shores of marshes.

Pied-billed grebes offer a different approach to the platform nest. Since it is built of soggy vegetation and floats on the water like a raft, it is anchored to the plants below the water's surface. When danger approaches, a pied-billed grebe will cover the eggs with vegetation. Instead of diving into the water, leaving ripples and exposing the nest location, these grebes have the ability to force air from their feathers and body cavities, allowing them to slowly sink into the water with only their heads remaining above the surface. Once the danger has passed, the grebe is back on the 5-7 eggs as unnoticed as when it left.

Hérons and great egrets are also colony nesters that build their platform nests, lined with finer material, high in trees that are close to lakes, marshes, bays, estuaries and, in the case of herons, occasionally on cliffs. Both the parents of egrets and herons incubate 1-6 blue-green eggs in nests that are so flimsy, occasionally the eggs can be seen through the nest from below, and later a leg or foot may dangle through. Herons



Egrets Watercolor by Carol Wells

and egrets begin incubating as soon as the first egg is laid. The older chicks have a clear advantage over the younger chicks. In years when food is scarce, the older chicks will drive the younger ones out of the nest to their death.

A pair of life-long mated mourning doves also builds flimsy platform nests lined with finer material. The male provides the sticks while the female actually builds the nest. Incubation is done in shifts by both parents. When mourning doves nest in the spiny barbs of the cholla, it is the cholla that provides protection from fox or coyote. But mourning doves can also nest in pine trees at only 5 feet off the ground. Though camouflage is part of their protection, it is the mourning dove's reproductive cycle that ensures the continuance of the species. Each brood of two chicks requires only five weeks of care, from egg laying to fledging. If conditions are right, doves can nest year round, producing eight or nine broods per year.

Bald eagles carry 6-foot long branches to their nest site. In one case the nesting tree had eagles nesting in it for the past 23 years and contained a wood pile that rose 8 feet up the trunk. The nest of a bald eagle is more than 6 feet wide. Hollowed out in the middle, it is lined with moss and pine needles and holds 1-3 eggs. Both parents incubate the eggs and will feed the hatchlings fish from a nearby lake, river or even ocean that the nest overlooks.

Jays, crows, ravens, magpies, and nutcrackers all fall under the heading of Corvids. They are an intelligent, raucous bunch, and though the outside of their platform nests may look messy and unappealing, the inside usually is more cup-like and lined with feathers, grasses, bark fibers, hair, mud, and, in the case of magpies, sometimes cow dung. Magpies build nests of about 1500 sticks, complete with hoods having thorny branches. They enter from the sides of the nest and this spiny hood deters owls, crows and



Whooping Crane Watercolor by Carol Wells

other predators from getting a clean shot at the eggs and young. Corvids lay medium sized clutches of 3-6 eggs. Several Corvids, including American crows and a dozen species of New World jays, permit one to three, 1 or 2 year old birds from a previous clutch, to serve as helpers. They are apprentices to nest building and feeding the chicks. Additionally, these helpers defend the nest with great intensity.

The great horned owl takes over the abandoned nests of other large birds. It also nests on protected ledges, in cavities and caves, of forests, swamps, orchards and deserts; but always during the middle of winter. Hunting is much better to feed their 1-3 owlets before the dense summer foliage diminishes the visibility of rabbits, mice, voles and the like. By June, the young are ready to fledge and once grown, will likely remain within 10 to 20 miles of the tree in which they were hatched.

Burrow nests may have begun with ground nesters that used crevices as protection or lived where the soil was particularly soft. Using beaks and feet for digging purposes, may have actually started as a court-

ship display, and by chance, increasingly deep scrapes resulted in an improved concealment of the eggs. Some species, such as the kingfisher, became masterful tunnelers. Both male and female kingfisher will dig a 3-15 foot tunnel into a vertical bank near fresh or salt water. At the end of the tunnel lies a nest cavity lined with fish scales and bones, housing 5-7 white eggs. The entrance to this tunnel is 3 inches in diameter. Both male and female have brood patches. From dawn till dark, each parent fishes for the brood and makes its way back and forth down the tunnel. Approximately 23 days after hatching, the nestlings make their way down the tunnel for the first time. At the mouth of the tunnel near the top of a 30-foot cliff, the nestlings become fledglings, as their wings must work the first time they are tried.

The burrowing owl is the only North American owl to nest underground. It doesn't make its own burrow like the kingfisher, but uses the abandoned burrows of prairie dogs, foxes, and badgers to rear its clutch of 7-9 eggs. These owls enlarge the burrow by kicking dirt backwards, up the tunnel with their feet. No other owl so deliberately lines its nest with dung in order to disguise its own scent and keep its nest safe from the nose of the badger.

The chances of survival were much improved by tucking eggs into pre-existing cavities in trees. Some birds evolved adaptations that enabled them to excavate large cavities where none existed before. Once these cavities are abandoned, they provide homes for species that are not capable of excavating for them.

With their bills, downy and hairy woodpeckers drill holes in dead or dying branches of living trees. For downy woodpeckers both male and female excavate a cavity 8"-12" deep. For the male hairy woodpecker it is a solo enterprise and the excavating of his 10"-15" cavity can take 7 -21 days to complete. Male

and female of both species help incubate the white ball shaped eggs, the male usually taking the night shift.

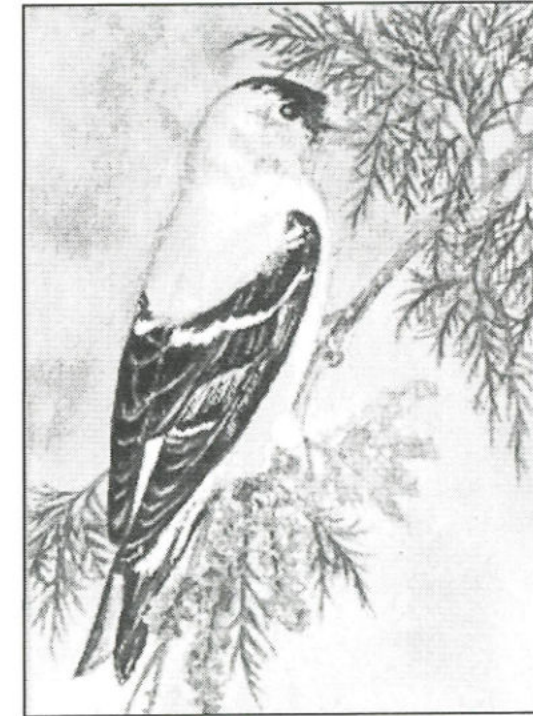
Barn owls rely heavily on humans to accommodate them. With large natural cavities in trees becoming a rarity, barn owls often find that barns, steeples and silos have been boarded up, making it difficult to find a home. Barn owls can "out-hunt" their cat counterparts by far. In the Netherlands, farmers construct special doors that allow owls access to barns and outbuildings. Barn owl nests are littered with fur and bones, and have been observed in such things as an old sink turned on its side that was left in the loft of a barn.

Most nuthatches use existing tree cavities and fill the cracks with fur or reduce the entrance size with mud, and smearing dead insects around the entrance, as is the case with the white-breasted nuthatch. On the other hand, the red-breasted nuthatch is one of the few that excavates its own cavity. This it does by lifting the bark off in sections rather than pecking out a hole like a woodpecker. It then lines the cavity with roots, bark, moss, feathers and grass as a soft bed for the 4-7 eggs it will lay.

House sparrows are not true sparrows. In reality, they are weaver finches. They, along with starlings and house wrens, have made it almost impossible for bluebirds to nest successfully without the help of humans. Bluebirds have declined by 90% during the 20th century. The felling of dead trees and the removal of dead limbs from live trees further reduces critical nesting habitat. But even bluebird houses supplied by humans will be attacked by house sparrows that will peck a bluebird to death and ruin the eggs, so that the sparrow can occupy the house. However, bluebirds do nest cooperatively and when one or both parents die, other unrelated adults and even juveniles from a previous brood, help feed the stranded chicks.

As nests become more complex, so too, does the work required to build them. The cup nest evolved from the need to make the platform nest stronger since they were being built further out on smaller limbs. Birds accomplished this by weaving twigs and vegetation along with hair or string and adding some kind of sticky binder. This resulted in strong, deeply cupped nests. The cup nest has also found its way into cavities and is also built on the ground.

Robins, for example, build statant nests, meaning a nest that is supported from below rather than the rim or sides like a pendulous nest. So the sides of a statant nest must be strong enough to hold the female and her eggs. Robins, members of



American Goldfinch Watercolor by Carol Wells

the thrush family, are site-specific — that is, they return to the same nesting spot each year. About one out of eight robins re-pair with the same mate as the previous year. Building the nest occurs roughly in three stages. Typically a pair of robins begins to assemble grass, straw, leaves, rootlets and string, which the female weaves into a foundation.

Every so often, she stands or squats in the center of this weaving and presses her breast and wings into it to shape the nest material to her body. Next, she brings pellets of mud to the nest and sticks these onto the nest's inner walls. She then gets into the nest and, pushing with her feet, rotates her breast around to pat the plastered walls into a smooth bowl. Then fine grasses are gathered which are pressed into the damp mud to cement a soft lining for her 3-5 eggs.

A flock of cliff swallows will build nests at the same time. Scooping up "beak-fuls" of mud and rolling them into balls, they are applied one by one, first in the hexagon that outlines the nest, and then, one on top of the other until a flask-like shape is complete. The bottleneck entrance is aimed slightly downward as an extra precaution against rain and predators. Often the flock will build in the morning, then take a break to swoop for insects while the mud dries. They periodically return to the nests to see how the mud is hardening, and then resume their work. Depending on the weather, the nests may take from three days to two weeks to complete, and are then lined with hair, grass and feathers for 3-6 eggs.

Though dippers are songbirds, they are equally at home in the water as in the air. They not only fly through waterfalls, but are able to walk underwater, upstream, then flap their wings beneath the surface as they rise to become airborne without skipping a beat. It makes sense that their nests would be built from pieces of moss gathered by the female and woven into a dome or oven-like structure. Usually the nests are built midstream or on a cliff ledge; sometimes they fly right through a waterfall to the nest that is concealed by this wall of water. In this way, the nests are kept fresh by a constant spray of water. The nest is lined with grasses and holds 3-6 eggs.

Juncos build their cup nests of grass, moss and twigs, usually on the ground, often with overhead protection from vegetation. While the junco generally leaves its nest when threatened, many birds such as Wilson's warbler and the Northern waterthrush stay put on the nest until they are practically stepped on.

Western meadowlarks also build cup shaped nests in a natural or scraped depression on the ground. The nest is lined with grass and hair, domed over by surrounding grasses and vegetation which are loosely interwoven, leaving an opening on the side for entry.

Hummingbirds are also cup nesters and use spider silk as a binder and to attach the nest to a tree branch. The outside of the nest is covered with lichens or bits of leaves, while the inside is lined with plant down and fibers. The nest will hold two hatchlings close together. Because the nest is flexible, it will expand as they grow, becoming almost flat by the time the young are ready to fledge.

As birds evolved into smaller, more agile species, nesting higher and higher in trees proved to be an effective way of avoiding predators. The pensile nest is actually a hammock suspended within the forks of small twigs that would not support a cup nest of the same size.

The female vireo gathers strips of birch bark and lays them over a fork of twigs. The ends hang loosely, until she returns to tie them into a sling with grapevine bark and bindweed, wrapping and winding the supporting fibers. She then thickens the walls and insulates them with grass and plant down. The female vireo then refines the shape of the nest by climbing into it and trampling the grassy floor. As she works, her mate feeds her insects. She adds a final coating of lichens to the outside and draws long threads of spider silk round and round, tucking in loose ends and polishing with her beak. The nest is now ready for her clutch of 4 eggs.

I'm not sure that parasitic birds, which have given up nest building, altogether, are a step up in evolution. Through human eyes, I see them as

Mother Nature's cheaters. Cowbirds time their cycles to that of other birds, waiting and watching. The cowbird lays its eggs in the nests when the unsuspecting birds are out looking for food. The choice of hosts is specific. The eggs must be approximately the same size as the cowbird's eggs. Their diet must match that of mainly insects; and the young must be fed for approximately 2 weeks beyond leaving the nest. Most birds, such as the robin and catbird, never notice the strange egg. Others invariably toss them out, or, in the case of the yellow warbler, build a new layer of nest on top of the old clutch and begin again. Yellow warblers nests have been observed to have as many as six or more layers deep of eggs in the attempt to escape the cowbird egg that was laid in each layer. For most birds, when the cowbird egg hatches, it is fed along with the rest of the brood and sometimes to the detriment of the brood. Cowbirds are usually larger and more demanding. The parents may end up feeding only the cowbird chick.

With the evolution of birds and nests continuing upward and outward, the pendulous nest is the quintessential representation of that movement. The pendulous nest is a hanging pouch suspended from the tiniest of twigs, making it an unlikely candidate for even airborne predators. Pendulous nests are most common in the tropics but the North American bird that immediately springs to mind is the Northern oriole. For almost a week, the female oriole flies pieces of string, grass, plant fiber, grapevine bark, and horsehair to the small branches of a tree averaging 40-50 feet off the ground. Even audiocassette tape, Christmas tinsel, and the crepe streamers from a cheerleader's pom-pom have been observed as useful nesting material. First the

female weaves one wall, and then a second; finally, she joins both sides into an elongated pouch. As she builds, the female oriole moves her head with a rapid shuttling motion, tangling nesting material with her beak and then pushing it into shape. On a bed of fine grasses, wool, hair, and cottony fibers, the 4-5 white and brown-blotched eggs are laid.

I have gained a new reverence for birds' task of raising young. With the nest that landed on my doorstep I felt privy to a secret world, allowed to gain new insights into the life of birds and the wonders of nature.

Carol Wells has lived in Moab for six years. She works as a graphic artist specializing in watercolors and illustration. She enjoys volunteering for the Nature Conservancy where she can indulge her other passion—birding.



Canyon Wren

Watercolor by Carol Wells

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