



TOP 20

most threatened bird habitats in the U.S.

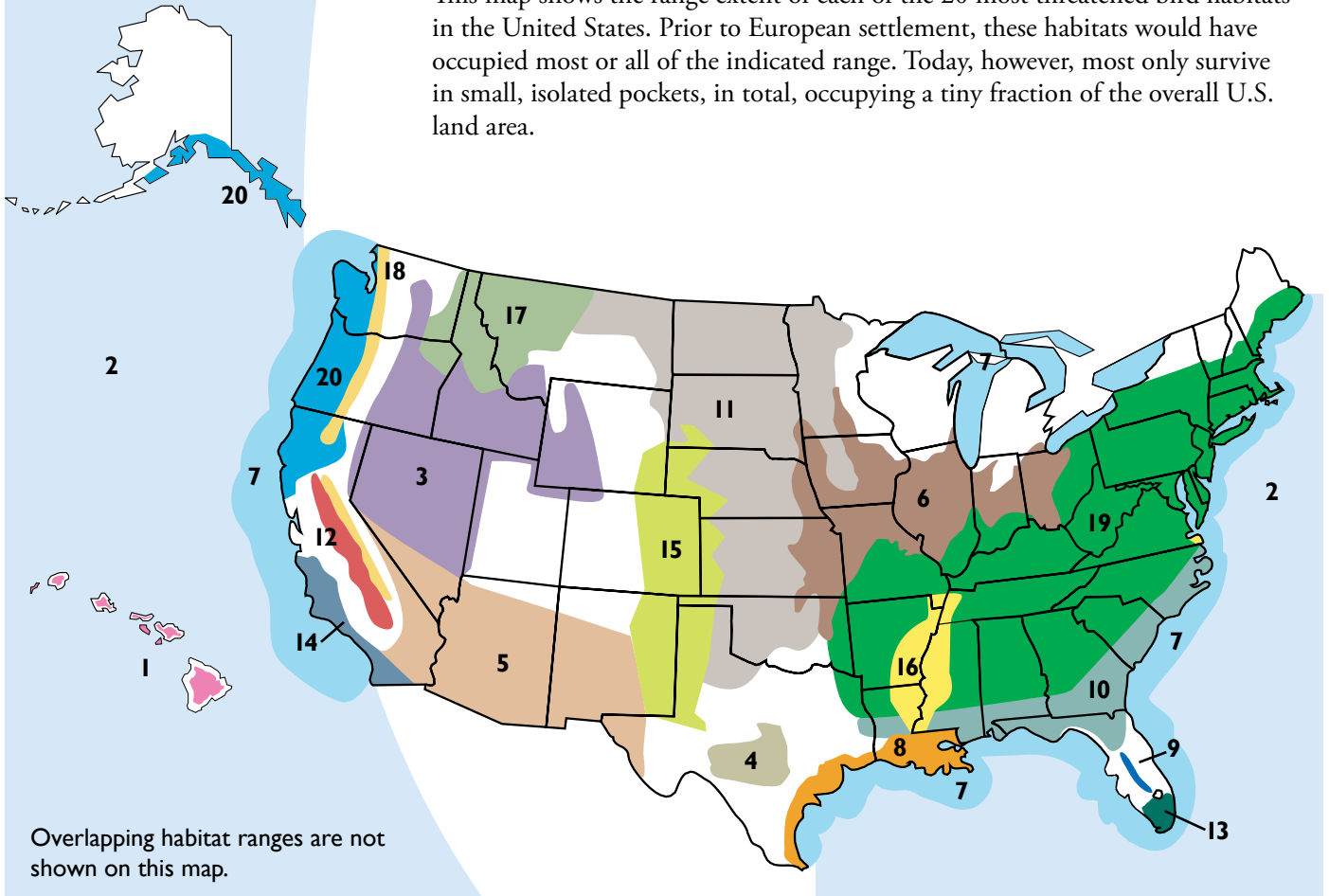






















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Top 20 Threatened Bird Habitats in the U.S.

This map shows the range extent of each of the 20 most threatened bird habitats in the United States. Prior to European settlement, these habitats would have occupied most or all of the indicated range. Today, however, most only survive in small, isolated pockets, in total, occupying a tiny fraction of the overall U.S. land area.

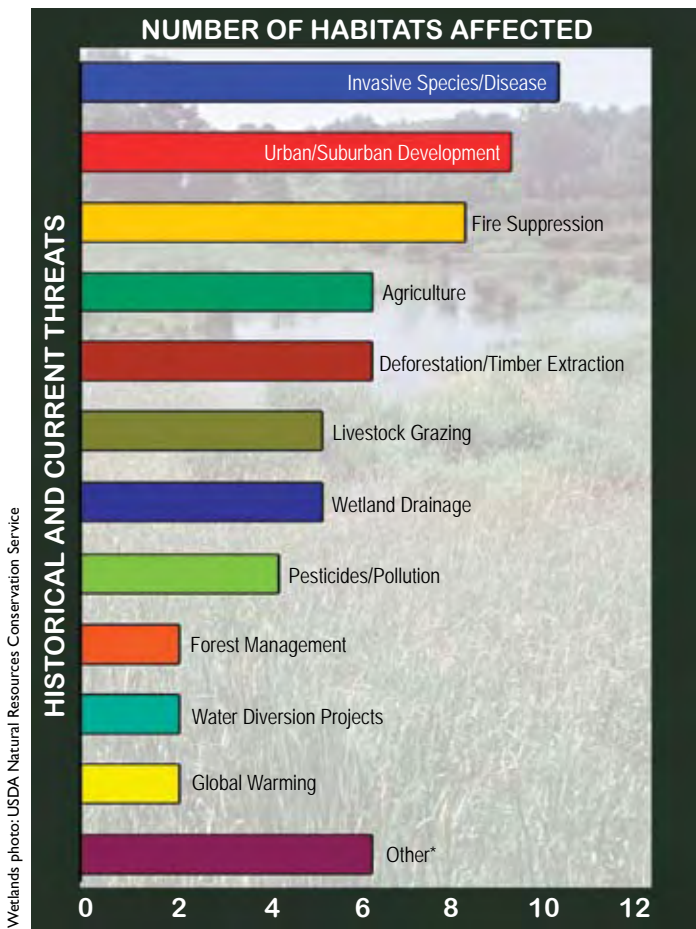


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|---|--|
|  20. Northwest Rainforest |  10. Mixed Longleaf Pine/Bottomland Hardwood Forest |
|  19. Early Successional /Eastern Deciduous Forests |  9. Lake Wales Oak Ridge Scrub |
|  18. Oak Savannah |  8. Gulf Coast Prairie |
|  17. Ponderosa Pine |  7. Coastal Beaches and Marsh |
|  16. Bottomland Hardwood Forest |  6. Tallgrass Prairie |
|  15. Shortgrass Prairie |  5. Southwest Riparian |
|  14. Chaparral |  4. Edwards Plateau Savannah |
|  13. Florida Wetlands |  3. Sagebrush |
|  12. California's Central Valley |  2. Open Ocean/Seabird Nesting Islands |
|  11. Great Plains Wetlands |  1. Hawaiian Forests |



Photos left to right: Laysan Albatrosses: Bill Hubick; Swallow-tailed Kites: Ken Meyer; Marbled Godwits: Glen Tepke

Threats to the Top 20 Bird Habitats



This graph shows the threats (historical and current) that have been the foremost causes for the loss of the 20 most threatened bird habitats, and the number of those habitats that they have affected. Those threats that have only affected one each of the twenty habitats were combined into a single “Other” category. While global warming is one of the most significant threats facing bird habitats today, its effects are only just becoming apparent. With the exception of sea level rise, it is difficult to quantify how global warming will ultimately reshape bird populations. Hence, it is only a named factor in two of the top 20 threatened habitats.

**Includes one each of: forest succession, coastal engineering, deer, fisheries issues, recreation, fire.*



Riparian habitat in Wyoming. FWS

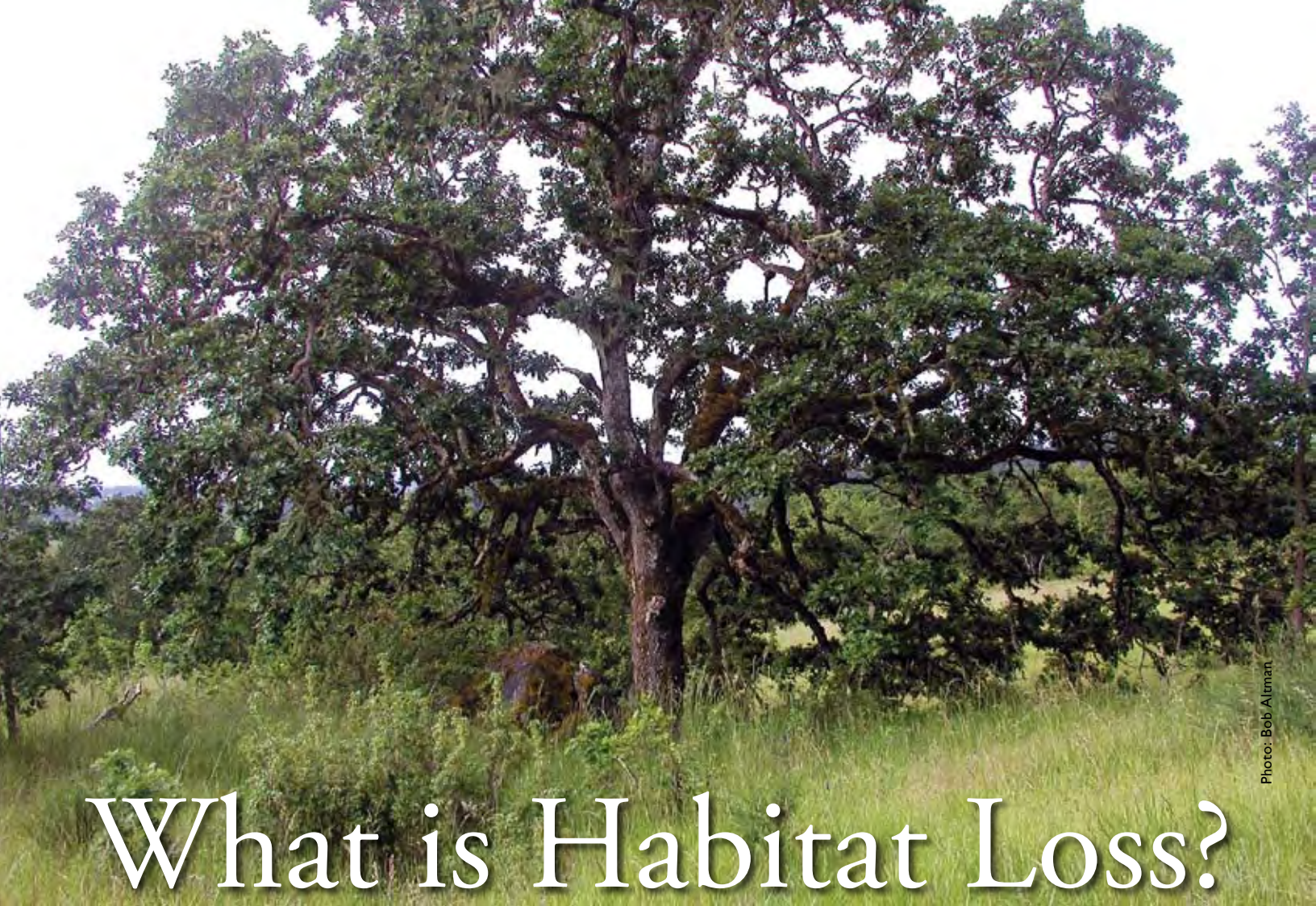


Photo: Bob Altman

What is Habitat Loss?

“Habitat” refers to the conditions in which an organism lives. In the broadest sense, habitat is never lost, but merely converted from one type to another, even if it is from solid land to open ocean, as water that was once locked up as ice is released with rising global temperatures. Changes in habitat conditions on Earth have been continuous throughout time, with mountain ranges rising and eroding away, various forest types marching north and south, periods of cooling and warming, and more recently, humans setting fires, moving plants and animals from one place to another, and building shopping malls and tract housing.

A wondrous result of continental drift, mountains building, and Ice Ages coming and going has been speciation—birds (and other life forms) diversifying

The kind of change that we call habitat loss is conversion of habitat conditions required by various bird species to conditions in which those birds cannot survive. This is the fundamental cause of population declines in birds.

into thousands of genetically distinct types, resulting in the fabric of living things that brings pleasure into our lives. Each species of bird evolved under particular habitat conditions. The continued survival and reproductive success of a species depends largely on an intricate set of relationships with those habitat conditions. Some birds have become adapted to habitat conditions that vary over time (including decade to decade, year to year, and season to season) and distance. The common birds we see in our backyards tend to fall at the extreme end of this category.

To a Common Grackle eating french fries outside a fast food restaurant, life has never been better. Other species are rigidly locked into habitat conditions that traditionally remained stable, and their specialized use of these conditions renders them ill-equipped to deal

with change. An antpitta deprived of humid forest conditions in the small swath of the Andes in which it evolved has little chance of survival.

So, as we humans continue to convert habitat to conditions that superficially seem to be of greater short-term benefit to us, we split the bird world into those that thrive with new opportunities and those that wither in the face of change. Bird conservation is simply an attempt to provide for the needs of that ever-increasing latter group.

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But not all change is bad. Fire, flood, extreme weather, disease, and urban sprawl may benefit some birds. Clear-cutting of forests and overgrazing of grasslands work nicely for others. The worst types of change are conversion to agriculture, which tends to be at least partially reversible, and conversion to urban conditions, which tends to be permanent.



Photo: FWS

To select the 20 most threatened bird habitats, we considered the severity of historic habitat loss, current threats to remaining habitat, past and ongoing restoration efforts, and the existence of protected areas such as parks, grasslands, wildlife refuges, and reserves. ABC's Green List (www.abcbirds.org/greenlist.htm) was used to gauge the value of habitat for conservation priority species. The number of Green List species (which includes birds listed under the Endangered Species Act) found in high concentrations weighted the importance of the habitat for birds.



Acorn Woodpeckers: Glen Tepke; TOP ROW: Lawrence's Goldfinch: Glen Tepke; Blue Grouse (recently split into Dusky Grouse and Sooty Grouse): USDA Forest Service; BOTTOM ROW: Burrowing Owl; Black Skimmers: Glen Tepke; Tricolored Heron: Bill Hubick; Western Bluebird: Ashok Khosla

The Economic Contribution of Birds

Millions of people love birds for their aesthetic value. They bring tremendous enjoyment to bird watchers and hunters, but are also valued by society in other important ways. Here is a brief summary of how birds benefit our economy and quality of life.

Irreplaceable Ecosystem Services

Birds play an important role in maintaining the ecosystems on which humans depend to maintain our quality of life and civilization. For example, birds eat billions of insects each year that left unchecked could decimate our crops. Birds also play an important role as pollinators, providing a fundamental service to agricultural production that simply cannot be replaced by other means.

According to the Smithsonian Migratory Bird Center, birds eat up to 98% of budworms and up to 40% of all non-outbreak insect species in eastern forests. The value of this insect control has been estimated to be as much as \$5,000 per year per square mile of forest. Another study found that in orchards, birds eat up to 98% of codling moth larvae, a major pest of apple trees.

Bird Watching

An estimated 46 million Americans participate in bird watching each year, according to the U.S. Fish and Wildlife Service.

The Outdoor Industry Foundation released a new report in 2006 that found all outdoor wildlife-related recreation activities generate \$730 billion annually for the U.S. economy. The report estimated that bird watching and other wildlife viewing

contributes \$43 billion annually to the economy. An estimated 66 million Americans participate in wildlife viewing, which supports 466,000 jobs. Retail sales of gear average \$8.8 billion, trip related expenditures total \$8.5 billion, and state and federal tax receipts amount to \$2.7 billion. The report is available at www.outdoorindustryfoundation.org.

In 2001, the U.S. Fish and Wildlife Service reported similar findings: a \$38 billion contribution to the economy from bird and other wildlife watching. One-third of outdoor enthusiasts take at least one bird or other wildlife watching trip per year, and nearly 70% visit forest land to do so. \$23.5 billion is spent on equipment such as cameras, binoculars, and clothing each year; \$8 billion on trip-related expenses; and \$6.7 billion on books, magazines, fees, and memberships. See http://library.fws.gov/nat_survey2001_economics.pdf for a copy of the “2001 National and State Economic Impacts of Wildlife Watching.”

Scientific Discoveries

From birds we have made important discoveries concerning aspects of flight, vision, and the mechanism of natural selection guiding evolution. Birds are also superb “canaries in the coal mine”, or indicators of environmental health and change. Rapid declines in bird numbers have alerted us to the harm being caused to humans and the environment by toxic chemicals. The knowledge we gain from birds directly affects our quality of life and our understanding of how economic development can be made more environmentally sustainable.



Photos left to right: Orchard Oriole: Bill Hubick; birders: Paul Salaman; bird banding: FWS.

Northwest Rainforest

AT A GLANCE:

PRIORITY SPECIES: Marbled Murrelet, Spotted Owl, Hermit Warbler, Band-tailed Pigeon

THREATS: Resource extraction, forest fragmentation

GEOGRAPHICAL AREA: British Columbia, Alaska, Washington, Oregon, California

Photo: stock xchng

The coastal temperate rainforests of the Pacific Northwest epitomize the dynamic interplay between the conservation of natural resources and the sustainability of timber harvest. From Kodiak Island, Alaska to the fog-enshrouded redwood forests of northwestern California, a mild, maritime climate with staggering amounts of rain supports rapid vegetation growth including highly productive conifer forests dominated by majestic trees such as Sitka spruce, redwood, Douglas fir, western and mountain hemlock, Pacific silver and noble fir, and western red cedar. These biologically diverse ecosystems support more biomass than any other forest type in the world. The high productivity that results in some of the biggest trees in the world has also resulted in a valuable commodity—lumber—

making these among the most intensively managed forests in the world.

The heart and soul of the Pacific Northwest is old-growth conifer forest. A walk through an old-growth rainforest is like a step back in time. Trees over 200 feet tall tower over multi-layered canopies and subcanopies, impenetrable shrubby understories, and forest floors carpeted with the remains of ancient fallen trees and mats of mosses and ferns. Perhaps the quintessential northwest rainforests occur on the Queen Charlotte Islands, known to their original inhabitants, the Haida, as “Haida Gwaii” which translates into “place of wonder,” an appropriate description for the lush forests of spruce, hemlock, and cedar, some of which are over 1,000 years old. Elsewhere, in the “panhandle” of southeast Alaska,

thousands of fjords cut deep into steep coastal mountains, and the forest mixes with cliffs, streams, and glaciers right down to the edge of the sea. In northwestern California, massive redwood trees reach into the low clouds and coastal fog to create an ethereal, cathedral-like setting, and the constant drips of moisture provide the sustenance on which the trees thrive.

Birds further the sense of awe that these forests inspire. Deep in the heart of an old-growth forest, time stands still when you hear the haunting and ventriloquial song of the Varied Thrush, the primordial blast of the Pileated Woodpecker’s call, or the long, echoing song of the Winter Wren from the forest floor. The dawn and dusk forays to the ocean and back by Marbled Murrelets add to the mystery.

However, the beauty and wonder of these forests are threatened by the value of trees as a commodity. After European arrival, these highly productive forests helped supply the lumber needs for the growing settlements of the Pacific Northwest. Once rail and boat transportation became established, this seemingly endless timber resource became an important export that provided not only for the growing population of the United States, but also the rest of the world. Decades of exploitation of the timber resource, especially in the early years when it seemed inexhaustible and there was little concern for reforestation, resulted in thriving local economies, especially in the small mountain communities throughout the region.

By the 1980s, there was growing recognition of the ecological and recreational values of these forests, along with an increasing awareness that



Band-tailed Pigeon: Ashok Khosla

timber extraction in old-growth forests was not sustainable at existing levels. The species that became emblematic of old-growth and eventually the center of controversy over the impacts of logging was a moderate-sized, unassuming owl. The Spotted Owl became the focus of an acrimonious debate that pitted the conservation community against the wood products industry, and more broadly, environmentalism

against economics. After 15 years of research, public rhetoric, accusations, and a series of lawsuits, the Northwest Forest Plan was completed in 1994 to guide future management of these forests.

Sadly, there is still debate over whether important areas of old-growth forest should be conserved. Even when there is agreement on this need, the complex issue of sustainable forest management continues to be a challenge amidst ever-increasing demands for timber. Efforts have been focusing on more selective harvesting and management to retain or accelerate old-growth characteristics in younger forests, especially on public lands. Some promising results are emerging, but we are still early in the process in an ecosystem that requires at least 200 years to reach old-growth status.

HABITAT CONSERVATION SPOTLIGHT

Bird conservation in the temperate rainforests of the Pacific Northwest is primarily about forest management, especially development and maintenance of old-growth forest, but some level of land protection and reserve creation is also needed. Large areas of government lands (both managed and unmanaged) and large tracts of single-owner private industrial forest land (intensively managed) dominate the landscape. Consequently, the best approach to bird conservation in this habitat type is to incorporate bird conservation objectives into the plans and policies of these larger ownerships. Some examples include retention or creation of varying amounts of large dead trees for Pileated Woodpecker and Vaux's Swift, and maintaining a mosaic of age classes of forest patches for Northern Goshawk and Band-tailed Pigeon.

Within the context of forest management, bird conservation is just one of many objectives that have to be considered. This balancing of objectives is not only between what is good for birds and the need for forest products and services, but also between specific bird conservation priorities. ABC Green List species such as the Willow Flycatcher prefer younger forests, but others such as the Hermit Warbler and Spotted Owl need older forests. One of the highest priority birds, the Olive-sided Flycatcher, actually finds the most suitable habitat at the juxtaposition of young and old forest. The Townsend's Warbler, Varied Thrush, and Winter Wren all display a strong affinity for older

forest, but each has unique needs within that forest type. So, the complexities of bird conservation, both among bird species and in relation to other forest management objectives, require considerable forethought and planning at both small and large scales.

To support the avian component of sustainable forest management, Partners in Flight bird conservation plans provide specifics on what birds need and how forest management affects their populations. ABC has been working with the Pacific Coast Joint Venture and several federal agencies to establish biological objectives for forest birds and to have those objectives incorporated into the plans, processes, policies, and projects of various partners. Further guidance for management, specifically of young forests, will be provided in a soon-to-be-completed ABC and U.S. Geological Survey publication on *Breeding Bird Habitat in Young Conifer Rainforests*. The implementation of the objectives found in the Partners in Flight plans and the recommendations in this guide will provide the best opportunities to ensure that bird populations are maintained and can thrive within the context of forest management.

—ABC's Bob Altman



Marbled Murrelet: G.Van Vliet/USGS

Early Successional Habitats in Eastern Deciduous Forests

AT A GLANCE:

PRIORITY SPECIES: Golden-winged, Kentucky, and Prairie Warblers, Henslow's Sparrow, Northern Bobwhite

THREATS: Poor management, forest succession

GEOGRAPHICAL AREA: East Coast of U.S., from Maine, south through Georgia

Photo: Mike Parr

The eastern portions of the United States are now covered by more forest habitat than they have been in two centuries. That forest is also older than it has been since American independence. It would be understandable to assume that this would please bird conservationists, and to a large extent it does. But further examination reveals just how complex the issue of reforestation is when it comes to birds.

Eastern forests were felled as European settlers moved from east to west in the 18th and early 19th Centuries. Most were cleared and kept clear for agricultural production to provide for local communities that had to be essentially self-sufficient. By the beginning of the 20th Century, however, the more fertile soil of the Great Plains were a

much more attractive prospect than the hardscrabble, depleted soils of the East. Industrialization and the associated improvements in transportation meant that fewer and fewer Easterners remained farmers. Farm abandonment was a common phenomenon throughout the first half of the 1900s. Abandoned farms went through normal phases of succession, gradually growing back into deciduous forests.

As the era of unregulated timber harvest drew to a close, virtually all remaining mature forest had been cut down. These vast clearings responded much as did abandoned farms, eventually growing back as forest.

Around 1900, the eastern half of the United States was as cleared of trees as it had been since the last Ice Age.

It has been growing back steadily ever since. Even though Americans seem to be paving over the country as fast as they can, the spread and growth of forested habitat has, until recently, outpaced the proliferation of parking lots, highways, and suburbs.

What this has meant for birds is a subject for speculation. At the height of farming in the East, forest birds likely became rare, and early successional birds became quite common relative to their abundance prior to European settlement. These early successional species include the Prairie Warbler, Yellow-breasted Chat, Brown Thrasher, and Blue Grosbeak. The quantity of habitat available for these birds declined steadily throughout the 20th Century as the forests re-grew. This gradual decline was well underway

when the Breeding Bird Survey began in 1966. Data from the Survey show that, by and large, early successional birds in the East continue on steady and significant downward trends.

Conservationists have had to consider what this habitat 'reversion' means and how we should respond. After all, what is occurring is merely a return to the conditions that existed in 1700. Most of the early successional species, albeit in decline, are still relatively common. Perhaps there is no need to maintain early successional habitat, instead allowing a return to more mature natural conditions.

Hooded Warbler: Barth Schorre



However, there are some early successional species that are clearly in trouble. Notable among them is the Golden-winged Warbler. This species may have relied on disturbances by beavers or other forces that are simply not as common today. This warbler is undergoing a steep decline in the eastern and southern part of its range; and is now listed on the ABC Green List as a species of *Highest Continental Concern*. Another example is the Northern Bobwhite. This popular game bird is not nearly as rare as the Golden-wing, but its decline has been precipitous. Much work is still required to build its population back up to desired levels.

Another issue facing eastern forests is that the habitat is still relatively young and the trees are of a relatively even age. Almost all of these trees started growing between 1900 and 1950, and as a result, the forests they comprise lack much of the spatial diversity of natural conditions. The gaps that are created when old trees die and fall are



Yellow-breasted Chat: Powdermill Research Station

not yet abundant in this young forest, and gap-loving birds such as Hooded and Kentucky Warblers suffer as a result. Selectively cutting down more trees within forests might improve conditions in this interim period.

Bird communities do best under the complex set of ecological conditions in which they evolved. Altering those conditions inevitably affects bird populations. When we attempt to restore habitat conditions to their former state, we must monitor the situation carefully and let the status of bird populations tell us if we have done the right thing.

HABITAT CONSERVATION SPOTLIGHT

Today, the deciduous forests of the Midwest eastward are almost all restricted to mountain and hillsides. This is because forests now remain only on terrain where steep slopes and thin soils cannot be farmed, grazed, or built upon. Even within a largely forested landscape, the flatter areas are mostly planted with non-native grasses or row crops, or have become suburban lawns.

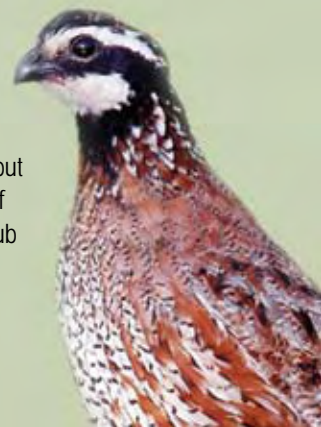
Before we tamed those flatter lands they consisted not of forests, but mostly of prairies, thickets and tangles, or grassy areas with scattered trees. This is probably because they were subjected to regular wild fires that prevented trees from growing. Prior to European settlement, fires were ignited both by lightning and Native Americans, and spread more easily across flatter expanses and onto south- and west-facing hillsides dried by exposure to sun and wind. Some of those grass and grass-shrub habitat types occurred in relatively small patches, but, in some landscapes, they spread over hundreds, sometimes thousands of acres.

Those fire-modified areas are now extremely rare, and the birds associated with them, such as the Henslow's Sparrow, Northern Bobwhite, and Prairie, Golden-winged, and Blue-winged Warblers, have declined as well. Most of these are not forest birds *per se*, but

judging from current and historical range maps, were and are still widely distributed across the Midwest and East. Habitats left from strip mining and modern silvicultural practices support these species today, though they lack the biological diversity that the native grass-shrub communities support.

In May and June this year, I visited three sites that are the subject of management efforts to restore native grassland and grass-shrub communities. Two of the sites are managed by the Missouri Department of Conservation and the third is at Fort Campbell, a military base on the Kentucky-Tennessee border in a region formerly known as the Kentucky Barrens. The greatest opportunities to bring back those habitat types at the scale needed to adequately support populations of some of our highest priority bird species are on public lands, but without widespread public support for the kinds of management needed to restore native grass-shrub habitats, those birds, and biodiversity in general, will flounder rather than flourish.

—ABC's Jane Fitzgerald



Northern Bobwhite: Bill Hubick

Oak Savannah

AT A GLANCE:

PRIORITY SPECIES: Oak Titmouse, Yellow-billed Magpie, Band-tailed Pigeon, Lewis's Woodpecker

THREATS: Residential development, introduced disease, fire suppression

GEOGRAPHICAL AREA: Washington, Oregon, California

Photo: Bob Altman

Rolling hills of waist-high grasses, interspersed with stately oaks, form the quintessential image of West Coast interior valley slopes. But this habitat is now much less common than it was a mere fifty years ago.

Given room to grow, savannah oaks develop stout trunks and massive, gnarly lateral branches beneath an umbrella of dense foliage. Many of the lower branches on bigger trees reach out until their own weight forces them downward so the tips of their lobed leaves touch the ground. Savannah oaks are also among the most aesthetically appealing trees, both in full foliage and in their more austere, leafless form.

Oak savannahs occurred historically as transitional habitat between native

prairies and denser woodlands. In California, small groves and isolated trees of valley oak, blue oak, or interior live oak are sporadically scattered across the landscape. Further north, the largest patches of oak savannah and the largest trees occur in Oregon, where Oregon white oak predominates. At the northern end of the range, in Washington and on Vancouver Island, British Columbia, Oregon white oak trees occur within a mosaic of prairie grasses and forbs in gravelly soils, forming a scrub-like habitat on rocky south and west facing slopes.

Oak habitats support some of the highest bird species richness in North America, in part because their acorns are a high quality food source. In peak years, acorn abundance can trigger increased reproduction, resulting in

increased survivorship among birds such as Acorn Woodpecker, Band-tailed Pigeon, Lewis's Woodpecker, Oak Titmouse, and Wild Turkey. Western Scrub-Jay and Yellow-billed Magpie cache thousands of acorns in the ground each year, thus facilitating regeneration of oak trees because most of these acorns will remain unretrieved and germinate.

Old, large oak savannah trees are prone to losing their limbs, resulting in trees that are a mosaic of living and dead branches with natural cavities. Over half of the bird species that have a strong association with oak trees are cavity nesters. Oak trees are also a common host for mistletoe, which is an important food source for Western Bluebirds and other species.

Historically, oak savannah was a fire-dependent system. Frequent, low-intensity fires, mostly ignited by Native Americans, served to thin out the understory of shrubs and small trees. As human populations grew, fire suppression became the norm, and other tree species, especially Douglas fir, began to establish themselves and out-compete the oaks, eventually dominating the landscape and converting it to a closed-canopy forest.

Oaks occur where people want to live. Early Europeans settled and grazed their livestock in and around oak savannah. As the human population expanded, the oaks were in the way. Now the only legacy of these oaks is in the names of the towns that replaced them—Oakland, Thousand Oaks, Oakville. Over one-third of the oak habitat that existed at the time of settlement has been lost, and oak savannah has taken a particularly hard hit in some places, with up to 90% gone in the Puget Lowlands of Washington.

Yet oak savannah is an imperiled habitat not only because of loss to development, but because of the lack of young oaks to replace the elder statesmen in the stands that remain. As people began to occupy these areas, they suppressed the fires that maintained the open herbaceous understory, and minimized the ability of other trees and shrubs to colonize the site. This, along with other factors such as overgrazing, and the often accompanying invasion of non-native grasses, contributes to the lack of regeneration of oak savannah.

The newest threat to oak habitats, particularly in California, is Sudden Oak Death Syndrome. The fungal-like pathogen that causes it, *Phytophthora*, introduced from Europe via the domestic plant trade, has now reached epidemic proportions, with no known means of prevention. Some of the white oaks such as valley, blue, and Oregon oak have yet to be infected, so the disease may yet prove to be limited in scope.

At the forefront of issues facing oak savannah habitats is the fact that approximately 90% of it is on private lands. This presents both a challenge and an opportunity. The challenge is the difficulty of large-scale conservation efforts in a patchy habitat within extensively fragmented land ownerships. On the opportunity side, the issue is “in the backyards” of a high percentage of the human population. The resulting visibility and concern can translate into a significant movement to educate and act upon the range of conservation needs, from protection to policy to management. The commitment and efforts of private landowners will ultimately determine the fate of oak savannah habitats and the birds associated with them.



Yellow-billed Magpie: Glen Tepke

HABITAT CONSERVATION SPOTLIGHT

Efforts to conserve oak savannah habitats have been a focus of numerous agencies and organizations over the past ten years. ABC is leading the effort through several Oaks and Birds (or *Quercus and Aves*) projects that have engaged more than 40 partners in Canada, the United States, Mexico, and Central America. With funding primarily through the Neotropical Migratory Bird Conservation Act and the Commission for Environmental Cooperation, these projects have generated over \$500,000 towards the primary conservation components of protection, research and monitoring, habitat management, and education and outreach. ABC has also assisted other partners in raising over \$1 million dollars for the conservation of oak savannah habitats through other funding sources, particularly the private lands programs of several federal and state agencies.

The scope of activities in the *Quercus and Aves* projects is extensive. Some examples include acquisitions of over 1,000 acres of oak

habitats in Washington and Guatemala; habitat management and restoration activities on hundreds of acres in British Columbia, Washington, and Oregon; bird monitoring and research in vineyards in California to assess species use and distribution; and development of landowner guides for management of oaks for birds in vineyards. An “Alliance” of 12 signatories, composed of agencies and NGOs from six countries, has been formed for the protection of Central American oak habitats and their associated birds.

Perhaps the most unique and exciting part of the program is in its formative stages—reintroducing extirpated species to parts of their former range. ABC, in cooperation with Ecostudies Institute and several other partners, is beginning to reintroduce the Western Bluebird to Vancouver Island, British Columbia and the San Juan Islands, Washington, and is looking at the feasibility of doing the same for the White-breasted Nuthatch in the lowlands of Washington between the Cascades and the coastal ranges.

—ABC’s Bob Altman



Oak Titmouse: Ashok Khosla

Ponderosa Pine

AT A GLANCE:

PRIORITY SPECIES: Flammulated Owl, Williamson's Sapsucker, Lewis's and White-headed Woodpeckers

THREATS: Fire suppression, timber harvesting

GEOGRAPHICAL AREA: British Columbia, Alberta, Alaska, Washington, Oregon, California, Montana, Idaho

Photo: Dan Casey

Historically, much of the lower elevation landscapes of the Rocky Mountain West were dominated by dry forests of ponderosa pine and Douglas fir, interspersed with extensive grassland and sagebrush in the valley bottoms. These habitats supported herds of elk and bird species such as Dusky Grouse and Red Crossbill. Native American tribes also made use of the habitat for their winter camps. Prior to European settlement, low-intensity fires occurred frequently in these habitat types. Some were due to natural causes, but native tribes also used fire to drive small game out into the open so they could be more easily hunted. These fires created stands of large trees with open understories; the occasional death of a large pine provided nesting snags for Lewis's Wood-

peckers (well before Meriweather Lewis first described them). Scientists estimate that as recently as 100 years ago, 70% of the acreage of ponderosa pine in the West existed as old-growth stands, with well-spaced, large trees, large snags, and patchy understory.

One of the most stately and picturesque tree species in western North America, the ponderosa pine can live hundreds of years, thanks in part to the fire-proofing effects of its thick bark. Beneath this armor lies a tender cambium layer that emanates a sweet vanilla-butterscotch odor on warm summer days. These trees were called "medicine trees" by some Native American tribes, who used the cambium and sap for food, flavoring, adhesive, as well as medicinal purposes. In many areas of the west where old-growth pine stands

persist, the scars from bark removal by tribes can still be seen.

Nowadays, old growth ponderosa pine is a rare commodity. As settlers moved across the West, pines were cleared for lumber and to make way for cattle and crops. More recently, changes in the patterns of fire, and active fire suppression, have had an additional influence on the condition and distribution of ponderosa pine habitat. Years of fire suppression are also a concern for the remaining stands of mature ponderosa pine. Douglas firs in the understory of these stands have thrived in the absence of fire, making a more continuous canopy and providing the "ladder fuels" that can draw the flames from ground fires up into the canopy of the larger trees. When fires enter these stands now, the big trees can no

longer survive. As little as 5% of the ponderosa pine forests in the West are currently in the open, mature condition so prevalent 100 years ago. What effect has this had on birds?

Species closely associated with older forests and snags such as the Lewis's Woodpecker, Flammulated Owl,

Williamson's Sapsucker: Peter LaTourrette



White-breasted Nuthatch, and Williamson's Sapsucker are all believed to have declined due to changes in habitat structure. Sooty and Dusky Grouse, dependent on the open, forb-dominated hillsides of mature pine, have declined dramatically.

In many areas, efforts are underway on both public and private lands to open up existing stands of ponderosa pine and Douglas fir by removing the dense understory of young trees and reintroducing low intensity fire to maintain stands with more widely-spaced mature trees. Incentives are being provided to landowners to reduce the risk of fire in populated areas by restoring stands to open conditions. While doing so, managers have the opportunity to provide habitat for declining bird species, but this will require incorporating some of the elements these species require (see below), such as pockets of thick shrubs and seedlings, and large snags for nesting. Landowner assistance



White-breasted Nuthatch: Bill Hubrick

programs and stewardship guidelines are available to landowners through ABC, the National Forest system, state forestry programs, and others. With a concerted effort, we may once again see the majesty and diversity of old growth ponderosa pine stands throughout the West.

HABITAT CONSERVATION SPOTLIGHT



Flammulated Owl: Brian E. Small/
www.briansmallphoto.com

The Flammulated Owl is one of a handful of birds identified as a primary focal species for ponderosa pine conservation and restoration efforts in the West. This tiny, elusive owl inhabits montane pine and aspen forests in western North America and Mexico. A true neotropical migrant, it feeds almost entirely on insects, especially moths and beetles. Flammulated Owls nest primarily in cavities excavated by woodpeckers, two species of which, Lewis's and White-headed, also rely heavily on mature ponderosa pine stands for nesting. All three species consistently select habitat that combines open forest stands with large trees for nesting and foraging, scattered clusters of thicker vegetation (shrubs and small trees) for cover, and adjacent openings (e.g., grasslands, sage, and burns) that provide optimum edge habitat for foraging.

ABC has been working with state and regional Partners in Flight groups and the Intermountain West Joint Venture to develop and refine habitat and population objectives for priority species on more than 26 million acres of this habitat in 11 western states. At the local and regional level, ABC and our partners are identifying specific stands in need of enhancement, providing outreach materials and detailed habitat prescription recommendations (e.g., snag densities and recruitment) to land trusts, and to those agencies, landowners, and loggers working in pine habitats, and are helping to implement more comprehensive monitoring for Flammulated Owls throughout their range. Together, we are hoping to return to conditions where fires are not "catastrophic", and where "medicine trees" once again dominate the landscape.

—ABC's Dan Casey

Bottomland Hardwood Forest

AT A GLANCE:

PRIORITY SPECIES: Swainson's Warbler, Swallow-tailed Kite, Cerulean Warbler, Ivory-billed Woodpecker (possible)

THREATS: Agriculture, resource extraction

GEOGRAPHICAL AREA: Southern states along the Gulf and Atlantic Coasts

Photo: FWS

Bottomland hardwood forest is the essence of the Deep South. Swollen rivers meandering across the gently sloping Atlantic Coastal and Gulf Coastal Plains carve broad valleys between pine-covered uplands. Melting snow far to the west and north results in spring floods across these valleys, leaving oxbows and swales across a topography in which inches of elevation spell the difference between flooded and merely damp. The same floods deposit rich topsoil, originally eroded from the Rockies and Appalachians. These are swamps, rich and productive. Great oaks of many species, elms, sweetgum, and that most emblematic species, bald cypress, are festooned with Spanish moss, creating a haunting environment. This is the Gothic architecture of the American wilderness.

Historically, the greatest expanse of bottomland hardwoods lay in the valley of the Mississippi River, but every river from the Neches in Texas to the Roanoke in North Carolina supported its share of these trees. This vast area sustained a diverse fauna: alligators, cottonmouths, snapping turtles, black bears, red wolves, and birds. Birds of legend occurred here, from the Bachman's Warbler to the Carolina Parakeet, to that great mystery bird, the Ivory-billed Woodpecker. There is no place on earth like the swamps of the South.

This habitat was daunting to humans, but the rich soil underlying it drew people intent on making a livelihood. The institution of slavery provided the labor to drain these swamps and to plant and harvest cotton on what

remained. The plantation system and the region's dispersed human population, and the resultant allocation of political power stemmed, at least in part, from the distribution of the soils of former bottomland hardwood forests. As everywhere else, the character of the ensuing civilization grew out of the nature of the land on which it evolved. The swamp is not just an image of the Deep South—it lies close to its soul.

The highest and driest of the bottoms were cleared first for cotton. This was the first great wave of habitat loss. The second came after the Civil War, when Northern timber companies systematically cleared the swamps of trees. The third came recently, after the middle of the 20th Century, when high soybean prices drove landowners to clear ever

lower and wetter ground for less and less reliable agricultural endeavors. By the 1980s, over 80% of the Mississippi Valley was cleared, and what forest remained tended to be in small fragments. Human poverty accompanied this ecological ruin, particularly for rural African-Americans. The pattern was repeated in many of the other river systems of the South. The historical aura of tragedy, emblematic of the region, reached its full essence in the ruins of bottomland hardwood forests.

The bottom had been reached, but fortunately, in the decades that have followed, there have been glimmers of a renaissance. Landowners have learned that a forest that can be leased for hunting and sustainably harvested for timber brings greater economic rewards than repeated failures to produce soybeans. Government agencies and conservation organiza-



Swainson's Warbler: Brian E. Small/
www.briansmallphoto.com

tions that formerly focused on other systems have come to recognize that the sheer magnitude and richness of these floodplain forests make them a truly unique American resource. The result has been hundreds of thousands of acres of reforestation.

Ever since planning for bird conservation began in this type of forest, the highest priority birds have been the Swallow-tailed Kite, Swainson's Warbler, and, where it occurs, the Cerulean Warbler. The possible rediscovery of the Ivory-billed Woodpecker in the winter of 2004-2005, albeit controversial, adds a new conceptual layer to conservation planning. Although it has long been known that disturbances, in the form of tornadoes, windstorms, ice storms, and occasionally fires, have an enormous impact on the nature of bottomland hardwoods, the apparent need for large, dead standing trees by the Ivory-bill suggests that, should it survive, more aggressive simulations of the impacts of these types of disturbances may be warranted for this species, as well as other birds, bats, and bears.

HABITAT CONSERVATION SPOTLIGHT

It is an early, damp Louisiana morning, and the sunlight flashes through the canopy of young oak and sweetgum trees, occasionally catching the wings of a Downy Woodpecker dancing its way up a skinny trunk, probing the tree for breakfast grubs. The hammerings of the woodpecker reverberate through the thin forest, soon disappearing into the heavy morning air.

Though large, this forest pales in comparison to the old, deep and dappled swamps of the Mississippi Valley's pristine bottomland hardwood forests. But then there are precious few of those left after the wholesale felling of the last 200 years that decimated so much of this habitat. Yet this emerging woodland is equally a world away from the soybean monoculture that, until recently, covered the same landscape. What is most exciting, though, is how and why this Louisiana forest came to be. Unlike the Appalachians, where abandoned farmland was simply left to revert to woodland, this forest was planted and will be managed in accordance with goals for priority birds established by the Lower Mississippi Joint Venture, a series of public-private partnerships extending throughout the region.

Biologists including ABC staff have formulated the needs of key bird species such as the Swainson's Warbler and Swallow-tailed Kite into what are perhaps the most sophisticated conservation objectives for any part of the country. The goals have captured the

imagination of managers, grant-makers, and donors, resulting in reforestation of several hundred thousand acres of low quality farm fields over the past fifteen years. Major donors include big energy corporations from around the country that buy land, plant trees, and fund public ownership and management of the land thereafter, all to obtain carbon credits that will become extremely valuable once public policy embraces the urgent need to address global warming. Much remains to be done, but the bottomland hardwood forests of the Mississippi Valley—the largest in the world—are now in better shape than they have been since their nadir as wildlife habitat in the 1980s. Reforestation projects emanating from the habitat plans only brighten the future further. If there really is an extant population of Ivory-billed Woodpeckers, the creative groundwork, organizational momentum, and habitat improvement that began many years before hope sprung anew in the Big Woods of Arkansas could give this most enigmatic of birds a new lease on life—a lesson that good conservation design can have positive, if sometimes unforeseen consequences.

—ABC's David Pashley



Swallow-tailed Kite: Jerry Bright

Shortgrass Prairie

AT A GLANCE:

PRIORITY SPECIES: McCown's Longspur, Lesser Prairie-Chicken, Sprague's Pipit, Baird's Sparrow, Upland Sandpiper

THREATS: Agriculture, residential development, fire suppression

GEOGRAPHICAL AREA: South Dakota, Nebraska, Wyoming, Colorado, Kansas, Oklahoma, New Mexico, Texas

Photo: Ron E. VanNimwegen/Bioimages

America's shortgrass prairie teeters on the brink of not being a prairie at all. Nestled in the eastern shadow of the Rockies, the area receives, on average, a mere 10-12 inches of rainfall annually, most of the moisture content of the frontal systems having been lost to the mountains before it. The maximum rainfall total for an area to be classified as a desert is 10 inches per year, and it is these few extra inches of rain that create one of the most delicately balanced habitats in North America.

Sometimes described as the "lost Serengeti of North America", the region was once a broad canvas painted with ankle-high blue grama and buffalo grass, interspersed with wheatgrass and occasional non-grass species such as yucca and prickly pear. The artists

behind this picture were the prairie dogs, bison, elk, and pronghorn that grazed incessantly on the open plains. Despite its size—some 70 million acres—the shortgrass prairie was home to a remarkably low diversity of bird species, with only 30 or so totally or mostly reliant on the habitat. As you travel to the eastern extreme of this region and rainfall increases, shortgrass gives way to mixed-grass then tallgrass prairie, and a higher accompanying diversity of birds.

With such a small percentage of America's avifauna present, it is easy to see why declines in bird populations were overlooked for a long time, as attention was diverted to the diversity of the eastern forests and other higher profile habitats where bird populations were also in trouble. Yet declines

were significant as grasslands were eaten up by the plough and bulldozer. Today, more than 50% of the former shortgrass prairie is used for cropland, with significant acreage also lost to suburban sprawl.

Before they were wiped out, the grazing effects of the bison were uneven as herds crisscrossed the plains, creating an ever changing patchwork of successional grassland habitat, ideal for the varying needs of Long-billed Curlew, Sprague's Pipit, Swainson's Hawk, Lark Bunting, Chestnut-collared Longspur, Upland Sandpiper, and Cassin's, Grasshopper, and Baird's Sparrows. Though the shortgrass prairie of today owes much of its continued existence to the broad-scale grazing of cattle and sheep, livestock grazing is far more static than that of the bison,



Grasshopper Sparrow: Bill Hubick

producing a paucity of those subtle habitat variations. Fire was also once an important part of the delicate habitat equation, and the intensive grazing of cattle now leaves little fuel for the fires to take hold. Where the potential remains, fires are suppressed, changing the ecology still further.

Suburban expansion around cities such as Denver continues to destroy thousands of acres of remaining prairie each year. Housing construction continues to threaten prairie dog colonies, which have declined by as much as 98% in the past century due to bulldozing, poisoning, and shooting. Prairie dogs create the shortest of

shortgrass habitat that is preferred by the Mountain Plover and McCown's Longspur. Burrowing Owls use vacant burrows for nesting, and Ferruginous Hawks prey on the prairie dogs themselves. Without this native mammal, these bird species continue to decline.

If focus was lacking before, there now exists an abundance of conservation initiatives working with local landowners towards clear population and habitat goals. Conservation easements pay farmers and ranchers to set aside land for wildlife rather than crops, and under the Endangered Species Act, Safe Harbor Agreements provide a voluntary incentive for landowners to protect the 55 vertebrate and plant species listed as Endangered or Threatened that inhabit the shortgrass prairie. Colorado's Shortgrass Prairie Initiative is a cooperative venture between The Nature Conservancy and federal and state agencies, working with local communities and landowners to preserve tens of thousands of acres of habitat in eastern Colorado to offset losses caused by impending

transportation improvements. The shortgrass prairie will likely never be restored to its pristine state, but conservation efforts are making a difference in the restoration of some of our Serengeti for bison, prairie dogs, and birds.



McCown's Longspur: Bill Schmoker

HABITAT CONSERVATION SPOTLIGHT

For the past seven years, *Prairie Partners*, a program of the Rocky Mountain Bird Observatory, with support from a broad base of federal, state, and non-governmental institutions, has developed long-term solutions for bird conservation by engaging private landowners in conservation activities, and by building partnerships between landowners and funding agencies. The program has been successful because it encourages voluntary, cooperative partnerships that are win-win solutions for landowners and wildlife. Levels of involvement in the program by landowners vary widely, but may include attending workshops, reading outreach materials to learn more about the wildlife on their lands, using stock tank ladders (designed to reduce wildlife drowning deaths), participating in the Mountain Plover Nest Conservation Program, or conducting habitat restoration projects.

The Mountain Plover project is a voluntary, non-regulatory effort to conserve the species in Colorado and Nebraska. In 2006 alone, landowners enrolled 267,000 acres in the program, permitting biolo-

gists to locate and mark over 200 plover nests to help landowners avoid them during cultivation activities. To date, more than 50 workshops have been held throughout the Great Plains, reaching 2,500 landowners and resource professionals. *Prairie Partners* has organized and implemented the fabrication of 1,000 stock tank ladders, free of charge to landowners.

From 2003–2006, *Prairie Partners* initiated 35 habitat enhancement projects in five states, affecting 60,000 acres of short grass and mixed grass prairie and associated wetlands. Projects implemented include playa lake restoration, riparian and upland grazing management, and the inter-seeding of Conservation Reserve Program lands with a variety of forbs for Lesser Prairie-Chickens.

—Tammy VerCauteren, *Prairie Partners*



Ferruginous Hawk: Ashok Khosla

Chaparral

AT A GLANCE:

PRIORITY SPECIES: Wrentit, Allen's Hummingbird, "Bell's" Sage Sparrow, California Gnatcatcher, Island Scrub-Jay, California Thrasher

THREATS: Development, invasive species, fragmentation

GEOGRAPHICAL AREA: Southern California, Mexico

Photo: Ron Reznick, www.digital-images.net

The giant HOLLYWOOD sign that overlooks Los Angeles is set in chaparral, and spells out part of the big problem for this habitat—it is being consumed by one of the largest metropolitan areas in the country.

Chaparral (referred to outside of the Americas as Mediterranean), is a habitat type that occurs on temperate western coasts of continents where there are winter rains, but little or no precipitation in spring, summer, and fall. Although the plant species vary greatly from place to place, the vegetative structure is always very similar. Whether in Spain, Chile, southwestern Australia, the northern

and southern tips of Africa, or the area with which we are currently concerned—southern California, extending into Baja California—the systems are dominated by woody shrubs with drought-resistant leaves and winter growing seasons that are adapted to relatively frequent fires. Much chaparral habitat lies atop unconsolidated steep slopes, resulting in a tendency for landslides to occur after combinations of fire and rain.

Birds characteristic of California's chaparral include the Wrentit, California Thrasher, Allen's Hummingbird, Sage Sparrow, and Golden-crowned Sparrow. Coastal sage scrub, a similar habitat that occurs along the southern-

most coast of California, supports the Coastal California Gnatcatcher, which is now listed under the Endangered Species Act. Riparian zones that cut through chaparral support oaks and sycamores, with additional bird species such as the Pacific-slope Flycatcher and Nuttall's Woodpecker.

Island Scrub-Jay: Glen Tepke



While the northernmost chaparral habitat, including the Big Sur area, is relatively intact and protected, the southern portions now support 56% of the human population of California, the most populous state in the nation. Direct and permanent loss of habitat to residential development has greatly reduced habitat available for birds, particularly from the Los Angeles area south through San Diego.

Many of the broken fragments of habitat that remain are too small to support high priority birds.

Chaparral is also dominant on California's Channel Islands, home to the Island Scrub-Jay (an endemic species found on Santa Cruz Island), and several endemic subspecies, including the Loggerhead Shrike and Sage Sparrow of San Clemente Island. These

islands have suffered the fate of islands everywhere—feral herbivores such as goats, sheep, and even bison, and a whole host of invasive, exotic plants. Aggressive invasive species removal programs over recent years have begun to turn the tide against these forces, though, and conditions for these rare birds are starting to improve.

Allen's Hummingbird: Glen Tepke



California Thrasher: Bill Hubick



Wrentit: Ashok Khosla



HABITAT CONSERVATION SPOTLIGHT

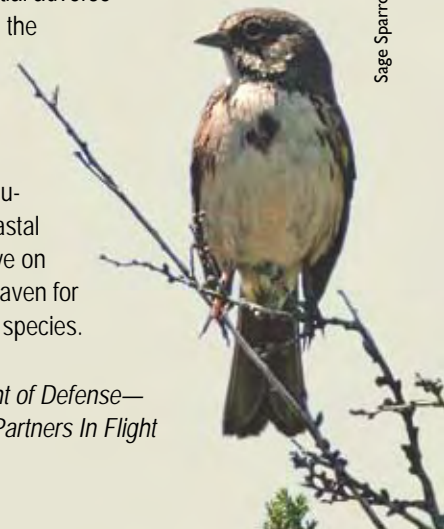
Marine Corps Base Camp Pendleton represents one of the largest contiguous blocks of coastal sage scrub in southern California. The federally-listed Coastal California Gnatcatcher is a common resident, such that approximately 18% of the species' population in San Diego County has been recorded on the base. A number of priority subspecies identified by Partners in Flight also thrive here: Bells' Sage Sparrow, Southern California Rufous-crowned Sparrow, and Coastal Cactus Wren, all found here, are defined by the state as being of "Special Concern."

Bird and habitat management on Camp Pendleton directly and indirectly benefits these species. A cowbird trapping program for the Least Bell's Vireo has also helped increase productivity for the gnatcatcher and other species that nest in shrubland

habitats near the vireo's riparian stronghold along the Santa Margarita River. But perhaps the biggest boost for this habitat is the base's comprehensive fire management plan. An annual controlled burn and an enhanced network of fire- and fuel-breaks help control the spread of wildfires and minimize their potential adverse impacts to people, while maximizing the benefit to birds. After a fire, either planned or unplanned, special efforts are made to reduce erosion and prevent invasive plants and weeds from taking hold in areas occupied by bird species of concern. Coastal sage shrub habitat continues to thrive on Camp Pendleton, providing a safe haven for some of the region's highest priority species.

—Chris Eberly, Department of Defense—
Partners In Flight

Sage Sparrow: Ashok Khosla



California Gnatcatcher: Scott Streit/www.bird-friends.com

Florida Wetlands

AT A GLANCE:

PRIORITY SPECIES: Mangrove Cuckoo, White-crowned Pigeon, Black-whiskered Vireo, Mottled Duck, Short-tailed Hawk, Snail Kite, Wood Stork

THREATS: Development, agriculture, drainage and channelization projects

GEOGRAPHICAL AREA: Florida

Photo: Maurice J. Kaurmann/Bioimages

Florida's landscape is the result of millions of years of accumulated fossils, shells, and sediments, deposited layer upon layer by the warm, shallow sea that once covered most of the state. The land that eventually emerged from these prehistoric waters was an extensive limestone plateau, thousands of feet thick in places. This limestone is extremely porous, allowing the area's abundant rainfall to penetrate deep down to extensive aquifers, underground rivers, springs, and caves.

Florida's geology combined with its low elevation has made it a state rich in wetland habitats. The mangrove thickets along the southern coasts, supported by tangles of specialized "prop" or "brace" roots that trap and hold sediment and soil, help stabilize

and build up the shoreline. These saltwater swamps create a network of life-sustaining nurseries for fish, shrimp, and other crustaceans. Mangroves host colonies of White Ibis and Brown Pelican, while Mangrove Cuckoos, White-crowned Pigeons, and Black-whiskered Vireos skulk through the thick foliage.

Florida wetlands also include salt marsh and sandy shores which host a multitude of resident and migratory bird species including Snowy, Piping, and Wilson's Plovers, and the endemic Florida subspecies of Mottled Duck. Many species of shorebirds, such as Snowy Plover, and ducks, such as Green-winged Teal, winter in Florida.

Freshwater prairies and sloughs are exemplified by the world-famous

Everglades, the "river of grass" flowing slowly south from Lake Okeechobee to Florida Bay. These watery sawgrass plains provide habitat for species such as the Snail Kite, Short-tailed Hawk, Limpkin, and the federally-listed Cape Sable Seaside Sparrow.

Shadowy, moss-draped swamps of cypress and tupelo, such as Big Cypress National Preserve and Corkscrew Swamp, shelter White Ibis, Wood Stork, and a wide variety of



Snowy Egret: Ashok Khosla

resident and migratory bird species, as well as Florida panther, river otter, black bear, and a unique diversity of orchids, bromeliads, and other plants.

European settlers considered Florida's wetlands breeding grounds for mosquitoes, alligators, and noxious diseases. These "worthless" lands have since been filled, bulldozed, drained, and deforested to create agricultural fields, golf courses, and land for residential development. Engineering projects such as roads and irrigation channels choked off the flow of fresh water from Lake Okeechobee through the Everglades, drying out many wetlands and, ironically, preventing the recharging of underground aquifers which supply so much of the state's fresh water.

By the time Florida was granted statehood in 1845, over half of its wetlands—over ten million acres, more than any other state in the country—had been destroyed. Populations of wading birds and other species reliant on wetland ecosystems plummeted.

Agricultural pesticides and fertilizers continue to degrade water quality throughout Florida, and the state's burgeoning human population demands ever-increasing amounts of water, putting wetlands under further strain. People continue to



Mangrove Cuckoo: Gerald Singer

migrate from other states to Florida at substantial rates, drawn by jobs, sunshine, and relatively affordable real estate. According to state demographic estimates, Florida's population has already exceeded 18 million, and will top 19 million by 2010.

Fortunately, people have begun to appreciate the value of Florida's natural lands, including its wetlands. In addition to sheltering many of Florida's threatened and endangered animals, wetlands contribute to higher water quality by filtering out agricultural and industrial pollutants, and help conserve fresh water by containing floodwater and diverting it to underground rivers and aquifers. In this state, where major hurricanes occur on an annual basis, wetlands act as important buffers, stabilizing shorelines and protecting land from storm surges and flooding. Wetlands have great economic value: birders, fishermen, hunters, campers, and boaters bring substantial tourism revenue to the state. The Everglades alone attract more than a million visitors each year.

Federal, state, and local governments, as well as private advocacy groups, have begun to take action to preserve and revitalize Florida's wetlands. Legislation such as Florida Forever, the world's largest conservation land purchase program, has helped the public and state to protect more

than 126,000 acres, many of them wetlands. Recent efforts at wetland restoration include the Comprehensive Everglades Restoration Plan, a collaboration between the U.S. Army Corps of Engineers and the South Florida Water Management District to restore and preserve south Florida's natural ecosystems, enhance water supplies, and ensure continuing flood



Wood Stork: Bill Hubick



Limpkin: Laura Erickson/Binoculars.com

control. Many other wetland restoration projects are ongoing throughout the state, all with common goals: restoration of this much-abused habitat and protection of the wetlands that still exist; continued acquisition of lands and/or conservation easements, and continued water resource development and supply.



Short-tailed Hawk: Ashok Khosla

Habitats of California's Central Valley

AT A GLANCE:

PRIORITY SPECIES: Tricolored Blackbird, Yellow-billed Magpie, Nuttall's Woodpecker, Swainson's Hawk

THREATS: Development, agriculture, pesticides

GEOGRAPHICAL AREA: California

Photo: stock.xchng

Forty-two million years ago, more than 100 million years after the formation of the Sierra Nevada Mountains, much of western California lay beneath the ocean's surface. Around that time, another series of massive seismic events rent the Earth's crust and created the California Coastal Range. Between the two sets of mountains, as the inland sea slowly retreated, a large, flat alluvial plain, some 430 miles long and 40 to 60 miles wide, was formed. The new topography, combined with a temperate climate, gave rise to a diverse array of ecosystems, including grasslands, riparian woodlands, and freshwater marshes, with vernal pools—seasonally flooded hollows—scattered like ephemeral oases throughout the landscape.

Before the wagon trains of the 1800s and the railroad trains of the Industrial Era brought millions of settlers westward, the region was one of the most ecologically diverse, rich, and bountiful in North America. Vast populations of waterfowl wintered in the abundant freshwater marshes; migratory songbirds converged on riparian woodlands of willow, western sycamore, box elder, cottonwood, and oak to breed; shorebirds made extensive use of the unique vernal pool ecology; and grassland birds abounded in perennial bunchgrass ecosystems that included desert grasslands, prairies, and oak-grass savannahs.

It was the very productivity of the region, however, that resulted in a rapid and devastating conversion of the landscape to become what is

today America's market garden—an agricultural Goliath that is responsible for growing one-quarter of all the food this country consumes.

To make way for the new frontier, wetlands were reduced from four million acres to fewer than 300,000. Many of those that remain are heavily degraded and often managed for water impoundments, or runoff and effluent storage. Nearly 90% of riparian habitats were decimated to make way for cows and combines. An estimated two-thirds (4,300 square miles or 2.8 million acres) of the vernal pools were destroyed, the remaining third restricted to higher terraces. Only 26% of the land ended up in federal ownership, compared with 49% in the rest of the state.

It is not simply habitat loss that has impacted birds and other wildlife of the region. Such intensive farming comes at a heavy cost that is not always reflected in the cheap price of the food it produces. One-third of all the pesticides applied in the United States are liberally spread over the Central Valley, leading to both lethal and sub-lethal effects that can impact entire bird populations. Water use is on such a scale that many aquifers have been “overdrafted”—used to the point that they have permanently lost much of their capacity. Introduced grasses now dominate grassland habitats, and giant reed (*Arundo*), brought in for erosion control, is now pervasive throughout riparian landscapes, along with other exotic invasives such as yellow starthistle, broom, and knapweed. More than nine and a half million people call the region home, with climbing real estate prices on the coast driving a new influx of people to the valley over the last decade.

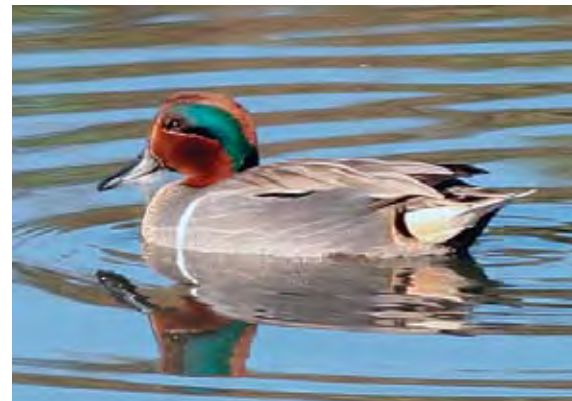
The remaining blocks of natural habitat are fragmented and isolated, with only small patches of relatively undisturbed native flora remaining, though the foothill areas are more intact than the valley floor. Yet the Central Valley is still vital for birds, particularly Pacific Flyway waterfowl

such as Northern Pintail and Green-winged Teal. Protected vernal pools, such as Merced and San Luis National Wildlife Refuges, harbor islands of native grasses for the Loggerhead Shrike, Savannah Sparrow, and the ABC Green Listed Tricolored Blackbird (which, along with the Yellow-billed Magpie, is largely endemic to the valley) amidst the sea of farmland. The Cosumnes River Preserve, owned by The Nature Conservancy, protects one of the best remaining examples of valley oak riparian woodlands, maintaining healthy populations of Swainson’s Hawk and Nuttall’s Woodpecker.

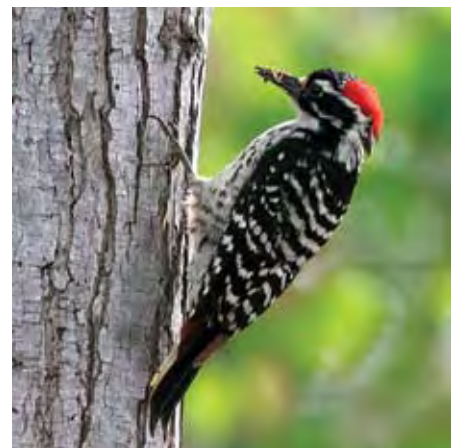
Many of the threats that have plagued the Central Valley for decades continue today. Deforestation is still stealing habitat corridors away from birds such as migratory warblers and Yellow-billed Cuckoos, which rely on contiguous riparian woodlands. Channelization and flood-control projects, salinization, toxic runoff, and erosion are ever-present threats to rivers and their associated habitats. Yet there are bright spots. New state standards for drinking water may help limit pesticide use in the region; the U.S. Fish and Wildlife Service has released a Recovery Plan for the myriad species dependent upon vernal pools in California and southern Oregon; and the Riparian Habitat Joint Venture, established in 1994, has produced the Riparian Bird Conservation Plan to guide conservation policy and action on behalf of riparian habitats and California’s landbirds. The Central Valley Joint Venture has protected more than 55,000 acres of wetlands through the purchase or donation of land title and conservation easements, and is enhancing more than 50,000 acres of wetland every year.



Loggerhead Shrike: Glen Tepke



Green-winged Teal: Ashok Khosla



Nuttall's Woodpecker: Ashok Khosla



Tricolored Blackbird: Ashok Khosla

Great Plains Wetlands

AT A GLANCE:

PRIORITY SPECIES: American Avocet, Long-billed Curlew, Marbled Godwit, Yellow Rail, Le Conte's Sparrow

THREATS: Sedimentation, agricultural development

GEOGRAPHICAL AREA: Montana, North Dakota, South Dakota, Minnesota, Iowa, Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas

Photo: FWS

The Great Plains Region is America's heartland—the "Breadbasket of the World." This status has come at the expense of wildlife. Populations of the great mammals are gone or badly depleted. Birds are still in decline.

Thousands upon thousands of depressional wetlands of the Great Plains—termed "potholes" in the northern Plains, and "playas" in the south—are among the most prolific breeding grounds for birds in the world. These small closed basins may be permanently inundated or underwater only periodically.

When dry, the landscape appears flat to the naked eye, but actually dips a mere (but critical) few inches to each wetland. Each central basin (the part

of the wetland that holds water) averages 1,300 feet across, after which the land slopes up over a quarter of a mile to a ridge that separates it from the neighboring basin. Millions of acres are covered this way.

Potholes occur in areas from which Pleistocene glaciers retreated 10-15,000 years ago. The current course of the Missouri River through Montana and the Dakotas marks the furthest extent of those glaciers, and potholes lie to the north and east of that line. Most remarkable are the Missouri and Prairie Coteaus, glacial moraines marking deposits of vast amounts of material pushed into place by the ice. The rolling topography of the coteaus results in an incredible abundance of potholes—and great habitat for birds.



Northern Pintail: FWS



LEFT: Horned Grebe: Donna Dewhurst/FWS
RIGHT: Le Conte's Sparrow: Laura Erickson, Binoculars.com

The Prairie Potholes are rightfully recognized as North America's "Duck Factory" and are also key for the reproductive success of many grebes, rails, gulls, terns, and shorebirds. Drier swales are also home to many of the world's Le Conte's Sparrows and Sedge Wrens.

Playas occur farther to the south, across the High Plains from Nebraska to the panhandle of Texas. The land here is flatter than in the Dakotas, and playas are flat central portions of closed basins that drain internally and flood periodically. Nearly 90% of these ephemeral wetlands are smaller

than 30 acres in size. Playas are important for many breeding birds, but they are of critical value for many ducks and shorebirds during migration and in winter.

Great Plains wetlands have been besieged by all manner of human assaults. The most common has been drainage, as land has been converted to agricultural production. Another prevalent threat to playas is sedimentation. The ridges between the playas are ploughed for agriculture, and over time, soil erodes and fills in the basins to the point that they can no longer hold water.

Fortunately, the system of Joint Ventures (JVs), public-private partnerships initially designed for waterfowl conservation, but now dedicated to the well-being of all birds, has been especially successful in the Great Plains. The Prairie Potholes JV has protected huge areas of wetland-grassland complexes. The Rainwater Basin JV in south-central Nebraska has restored many wetlands of enormous importance to migrating waterfowl, shorebirds, and cranes within a heavily converted agricultural landscape. The Playa Lakes JV is taking innovative approaches to wetland conservation.

HABITAT CONSERVATION SPOTLIGHT

If you are a farmer in the Southern High Plains, you may not care much about wildlife, but you certainly care about water. Working a landscape facing persistent drought, with little surface water or rainfall, farmers must eke out their existence from the one source of water big enough to quench their fields—the Ogallala Aquifer. The Ogallala is a 174,000 square mile groundwater formation that spans portions of eight states: Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. It is the main source of water for the region, sustaining the livelihood of industries, cities, and most notably, agriculture. But the Ogallala's water table has been steadily declining since the advent of modern irrigation in the 1940s.

The water crisis has captured the attention of farmers, ranchers, resource managers and politicians across the plains. But many of these groups do not understand the crucial role played by playas in maintaining the Ogallala's water quantity and quality. Playas are the primary, and possibly exclusive, source of recharge for the Ogallala. Playas filter surface water and runoff before it gets to the Ogallala, keeping groundwater contaminant-free.

The Playa Lakes Joint Venture (PLJV) focuses much of its outreach and conservation efforts on the link between playas and the Ogallala.

Water is simply a more compelling hook than wildlife when it comes to reaching the public, especially private landowners, who own more than 90% of the landscape. If more farmers and ranchers understood that

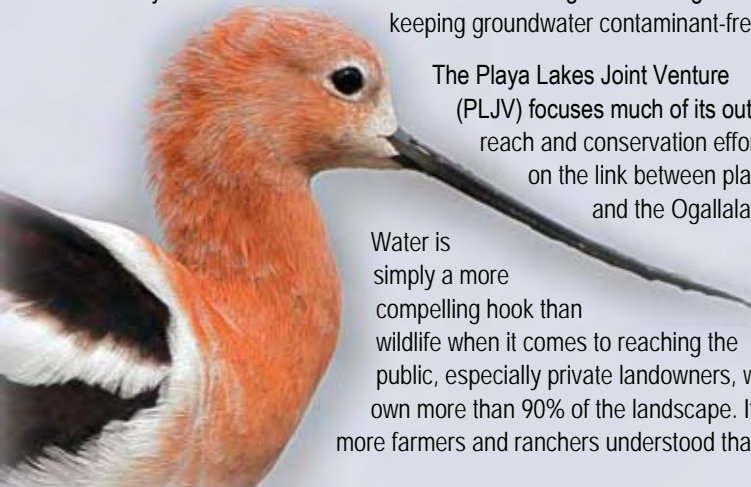
playas contributed to their bottom line, perhaps more would be willing to conserve them. And, if more playas are conserved, birds and other wildlife will ultimately benefit.

The connection to groundwater aside, simply making producers aware that playas exist is a key strategy. The JV is getting the word out on playas through its weekly radio program "Playa Country", which airs on High Plains Public Radio, and through a new film entitled "The Playas—Reflections of Life on the Plains." Under the 2004 USDA Farm Bill, the Wetlands Restoration Non Floodplain Initiative, largely brought about by PLJV partners, reimburses landowners for their efforts to restore playa hydrology and establish grass buffers around them. It also provides an annual rental payment from the federal government for 10-15 years.

Even the JV's research priorities are focused on how playa buffers filter soil and contaminants from surface water. Currently, the JV is facilitating the development of research projects to find the best possible buffer prescriptions for playas. Thus, when more landowners begin to realize the value of playas and start increasing their enrollment in the federal Conservation Reserve Program (and similar programs that set aside land to enhance wildlife habitat), the buffer prescriptions used will be backed by the best possible science.

In the PLJV region, and most everywhere, bird conservation cannot be achieved by only touting what we as birders think is important, but also by walking in the shoes of our constituents, understanding what is important to them, and tying it all together. In a landscape approach to conservation, elements such as wildlife and water (and economics, politics, and human dimensions) can't really be separated. Out here, what is good for the farmer comes first, and fortunately what is good for farmers is also good for birds.

—Debbie Slobe, PLJV Communications Team Leader



American Avocet: Ashok Khosla

Longleaf Pine

AT A GLANCE:

PRIORITY SPECIES: Red-cockaded Woodpecker, Bachman's Sparrow, Brown-headed Nuthatch, Northern Bobwhite

THREATS: Deforestation, fire suppression, conversion to other pine forest types

GEOGRAPHICAL AREA: Southern coastal plain, from Texas to Virginia

Photo: Lisa Kelly/Biolimages

Extending from Texas to Virginia, longleaf pine was once the dominant ecosystem of the uplands of the southern coastal plain. This environment thrived on disturbance. Floods in the valleys fostered bottomland hardwood forests, while frequent fire outside of the wet lowlands promoted the longleaf system. Longleaf pine evolved not only to withstand fire, but to encourage it, and so it became the prevailing tree species over a vast area.

Longleaf pine, at all but the briefest stage of its life cycle, tolerates low-intensity fires, whereas other pine and hardwood species are killed by fire when they are young. After a fire, pine needles build up on the ground, providing a new fuel source. Several



Red-cockaded Woodpeckers: Bill Hubick

years later, a lightning strike (or perhaps more commonly today, a human) starts yet another low-intensity fire that historically would spread for miles and miles between river valleys. This age old cycle produces a forest with an overstory comprised almost entirely of

pure longleaf pine with very little else, even in the mid-canopy. The ground cover is another story. Hundreds of low herbaceous plants and grasses co-evolved with longleaf pine, thriving in the fire system and coating the floor of this otherwise homogeneous forest with a mat of savannah-like undergrowth. What results is a vegetative ecosystem that is among the most diverse on the continent. Many species of orchids and insectivorous species, such as pitcher plants, are among the conspicuous members of this extraordinary flora.

The bird life of this system is equally tied to the ecology of longleaf pine. Ground nesters, such as the Bachman's Sparrow and canopy species, such as the Brown-headed Nuthatch will tolerate other pine species, but thrive

in longleaf. Likewise, many species now associated with early successional conditions, such as the Northern Bobwhite and the Prairie Warbler, prefer longleaf pine. The bird species most tied to longleaf, however, is the Red-cockaded Woodpecker, which lives in colonies among clusters of trees old enough (50 to 60 years) to develop a fungal rot into which the birds can excavate their cavities. This is the only North American woodpecker that creates nest and roost cavities in living trees, and there are few examples of this species using anything other than longleaf pine. An intriguing possibility is that the Ivory-billed Woodpecker, typically thought to be a bottomland species, once used longleaf just as frequently, tracking disturbances that killed trees and allowed the beetle larvae they feed to their young to thrive.

European settlement brought dramatic changes to the longleaf system. The tall, straight trunks of the pines were perfect for the masts of ships, and the great quantities of sap were used for naval products such as resin. The



Bachman's Sparrow: Berlin Heck

high quality wood also made excellent furniture, flooring, and other goods, and longleaf was harvested at rapid rates early in the 20th Century. The system was able to withstand this up to a point, but it could not endure the suppression of fire. Without fire, other species such as loblolly or slash pine took over, often encouraged by landowners and foresters who mistakenly thought that they grew more rapidly. By the end of the 20th Century, at least 95% of the original extent of longleaf habitat had been converted to other forest types.

Some birds, such as Pine Warblers, have fared well in the altered pine

systems, but others, most notably the Red-cockaded Woodpecker, have not, which is reflected in its endangered status today.

The worst for longleaf now seems to be over, however. Awareness of the special qualities of the tree, the undergrowth, and the associated birds has been gradually spreading. Knowledge of how to use fire in ways that simulate natural processes has grown too. The USDA Forest Service now manages many longleaf forests, and many more private landowners are converting their lands back to longleaf. Even the woodpecker is doing better under creative programs such as the Safe Harbor initiative inspired by Environmental Defense, in which the burden of supporting an endangered species is eased for private landowners. The longleaf pine forest has a very long way to go to get back to real health, but it is rebounding, and with continued conservation may one day no longer merit inclusion on this top ten list.

HABITAT CONSERVATION SPOTLIGHT

The majority of southern forestland is family owned – collectively, 4.3 million families in the South hold 127 million acres, or 59% of southern forestland. To be successful, landscape-level conservation efforts for the longleaf pine ecosystem need to engage family forest owners.

The American Forest Foundation, in partnership with ABC and others, has launched the habitat conservation program, *Forests for Watersheds and Wildlife*, which works with family foresters to create and conserve upland pine habitat for birds. Initiated with important seed funding from the National Fish and Wildlife Foundation, Home Depot Foundation, Southern Companies, and the Perkins Foundation, the program develops wildlife and stream habitat recommendations, organizes educational events and field tours, produces handbooks and other publications for family forest owners, and encourages the voluntary actions of landowners. The program's *Forested Flyways* initiative promotes multi-year collaborative efforts that encourage family forest owners to implement sustainable management practices that improve habitat for imperiled bird species.

Initiatives in Mississippi, Louisiana, Alabama, Georgia, and South Carolina have helped restore over 140,000 acres of upland pine habitat in the past three years. A total of 3.6 million longleaf pines have been planted on over 6,700 acres. Species that have benefited include the Northern Bobwhite, Red-cockaded Woodpecker, and Prairie Warbler, as well as the threatened gopher tortoise.

Upland pine conservation efforts do not end with the planting of trees. Significant effort is needed to create and maintain the open understory required by birds and other wildlife. Family forest owners are encouraged to use prescribed fire every two to three years to control hardwoods, and to thin trees periodically so that sunlight will continue to reach the forest floor. To learn more, visit www.conservationforestry.org.

—Drew DeBerry, American Forest Foundation



Brown-headed Nuthatch: Bill Hubick

Lakes Wales Ridge Oak Scrub

AT A GLANCE:

PRIORITY SPECIES: Florida Scrub-Jay, Red-cockaded Woodpecker

THREATS: Agriculture, development, fire suppression, invasive species

GEOGRAPHICAL AREA: Middle of the Florida Peninsula

Photo: Reed Bowman

Standing in the sandy scrub that lines the dry spine of Central Florida, it is hard to imagine that, at one time, you would have been able to dip your toes into the ocean from this very spot.

Two to three million years ago, most of peninsular Florida lay beneath a shallow sea. The only dry land in the state was an archipelago formed by the highest land ridges running down the center of the otherwise submerged landmass. Over time, the sea deposited sand onto the shores of this island chain, and beaches and sand dunes began to build. As the sea receded during the subsequent glacial period to form the Florida Peninsula, these beaches and dunes became isolated in the middle of the new mainland. Today they lie 60 miles from the nearest



Florida Scrub-Jay: Peter LaTourrette/birdphotography.com

ocean, forming a narrow, sandy ridge that rises 300 feet above sea level and stretches 150 miles down the center of the state. The largest of these ancient dune ecosystems, known as Lake Wales Ridge, extends south from Lake to Highlands counties.

Sometimes referred to as the “roof of Florida,” Lake Wales Ridge consists of a variety of habitats: sandhills topped by longleaf pine; scrublands of shrub oak, Florida rosemary, and lichen; sinkhole lakes that descend into the limestone substrate; and flatwoods of pine trees and saw palmetto. Infrequent but intense fires caused by lightning maintain the ridge scrublands’ open character. The sandy soil of the ridge drains quickly, forming important recharge areas for Florida’s aquifers.

Many endemic plants and animals evolved on the isolated islands that eventually became Lake Wales Ridge. The ridge contains one of the highest concentrations of threatened and endangered species in the United States—over 20 plant and six animal species.

Bird species of particular importance on Lake Wales Ridge are the endangered Florida Scrub-Jay and Red-cockaded Woodpecker. Florida Scrub-Jays in particular are highly dependent upon this habitat. They are territorial birds that live in family groups, and so are particularly vulnerable to fragmentation and other human disturbance. The ridge also provides habitat for ABC Green List species such as the Swallow-tailed Kite, as well as endangered reptiles such as the eastern indigo snake and gopher tortoise.

Some 80,000 acres of scrub habitat existed along Lake Wales Ridge before European settlers arrived. This sandy, sparsely vegetated landscape proved easy to farm and develop; over 85% of the scrub on the ridge has now vanished, cleared for citrus groves and housing developments. Fire suppression causes underbrush to grow too dense for species such as the scrub-jay, further degrading the ridge ecosystem. Invasive, exotic plants, such as Old World climbing fern, have invaded this habitat, growing and spreading rapidly, choking out already rare native plant species.



Indigo snake: FWS

Lake Wales Ridge will be challenging to manage and restore. In addition to the threat of increased development, most of the scrub is overgrown, often meaning that fire management is needed to restore the habitat. This is made difficult by the fragmented nature of the landscape, particularly the number of roads that crisscross the countryside.

However, public and private organizations began to acquire conservation lands along the ridge in the 1990s. These lands form a jigsaw-like network of preserves, owned and managed by federal, state, and county governments, as well as private groups such as The Nature Conservancy. Members of these groups formed the Lake Wales Ridge Ecosystem Working Group in 1991 to ensure long-term protection of the region's remaining flora and fauna, promote research along the ridge, and generate public awareness and support.

The two most important publicly-funded acquisition programs are Conservation and Recreation Lands (CARL) and Florida Forever (FF), both managed by the Florida Department of Environmental Protection. Florida Forever is the world's largest conservation land acquisition program, having purchased more than one million acres in the last five years. The Lake Wales Ridge CARL-FF project has identified over 43,000 acres for state purchase, approximately half of which has so far been acquired. Also significant is the Lakes Wales Ridge National Wildlife Refuge which will ultimately total 19,630 acres. This is the first refuge created specifically for the recovery of threatened plants, including the Florida ziziphus and scrub blazing star.



Red-cockaded Woodpecker: Bill Hubick

Other initiatives are providing much needed habitat enhancements. The fire strike team, an inter-agency collaboration coordinated by The Nature Conservancy and funded in part by the Disney Wildlife Conservation Fund, conducts prescribed burns on the ridge. Together these programs are helping to ensure a brighter future for the Florida Scrub-jay, Red-cockaded Woodpecker, and the other birds of Lake Wales Ridge.



Swallow-tailed Kite: © M. Hyett/VIREO

Gulf Coast Prairie

AT A GLANCE:

PRIORITY SPECIES: "Attwater's" Greater Prairie-Chicken, Reddish Egret, Buff-breasted Sandpiper, Hudsonian Godwit, Whooping Crane

THREATS: Agriculture, fire suppression, development, levees, canal channelization, impoundment construction, dredging, invasive species

GEOGRAPHICAL AREA: Louisiana-Mississippi border to the mouth of the Rio Grande, 10-100 miles inland

Lacassine National Wildlife Refuge. Photo: FWS.

It seems as though every time we see an aerial photograph of the Gulf Coast these days, it is entirely covered by a giant mass of swirling cloud, the ominous eye of which stares out at us, exuding menace and destruction. The hurricanes of recent years, whose names are now nearly as familiar as celebrities—Katrina, Rita, Andrew—have altered the landscape and rewritten the way we view this part of the country. Yet these changes pale in comparison to the human impact on the coastal habitat of the Gulf, particularly the coastal prairies. From the Louisiana-Mississippi border to the mouth of the Rio Grande, there once existed a near-unbroken plain of grasses, extending from ten to 100 miles inland, and covering over nine million acres, dotted with occasional islands of trees and shrubs.



Reddish Egret: Gary Smyle

These tallgrass prairies rivaled those of Iowa and Minnesota for diversity, harboring a multitude of grassland birds, waterfowl, and other wildlife. Like most grassland communities, the coastal prairie was a fire adapted system, with frequent fires set by light-

ning and possibly Native American tribes. These fires prevented trees and woody shrubs from taking hold, but burned the grasses so quickly that their roots were unaffected. Little bluestem, Indiangrass, switchgrass, and big bluestem predominated, giving way to freshwater and saltmarsh vegetation of sedges, rushes, saltgrass, and cordgrass closer to the coast.

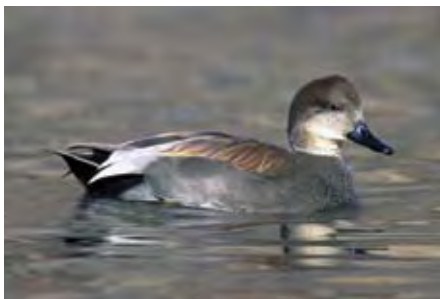
The coming of the railroad in the mid-1800s heralded a new wave of human settlement, and with it, the beginning of the wholesale destruction of prairie habitat. Today, only 1% of coastal tallgrass remains in Texas; perhaps as little as 0.1% in Louisiana. Agriculture was the main culprit, with fertile flats converted to pastureland for cattle, or dramatically altered to support vast rice fields and sugarcane plantations.

The large mammals, such as bison, antelope, elk, and red wolf, are now all gone, and birds such as the Henslow's Sparrow, White-tailed Hawk, and the endangered "Attwater's" Greater Prairie-Chicken just cling to scattered fragments of remnant habitat, mostly alongside railroad rights-of-way and highways.

Historically, coastal wetlands along the Gulf fared somewhat better than the inland prairies. The region still hosts one of the world's largest concentrations of colonial waterbirds, with large



Redhead: FWS



Gadwall: Michael Stubblefield

numbers of breeding Reddish Egrets, herons, ibis, Roseate Spoonbills, and Brown Pelicans. The region also provides critical stopover habitat for migrating shorebirds such as the Buff-breasted Sandpiper and Hudsonian Godwit, and over 14 million ducks also winter here. Significant proportions of the continent's Gadwall, Green-winged Teal, Redhead, and Lesser Scaup shelter in the marshes and bays, along with as many as two million Snow and Greater White-fronted Geese.

In recent decades, however, coastal marsh has been lost at an alarming



Buff-breasted Sandpiper: Gary Smyle

rate, particularly in Louisiana, where construction of levees on the Mississippi River has dramatically affected habitat. Canal channelization, impoundment construction, and dredging have all altered marsh salinity with resultant habitat impacts. The oil and gas industries, too, have taken their toll. The last traditional migrating population of Whooping Cranes winters at the Aransas National Wildlife Refuge in Texas, squeezed between a ring of natural gas wells and the Intra-coastal Waterway, which carries barges laden with petrochemical products and other potential contaminants.

Invasive Chinese tallow has added environmental insult to injury. Introduced to America during colonial times (allegedly by Benjamin Franklin) for its oil and wax-rich seeds and fruits, and its ornamental appeal, this

fast growing exotic soon spread. It is now prevalent in much of the remaining coastal habitat, and because it is largely fire resistant, has eluded control and continues to flourish.

Ongoing development along the Gulf Coast, and sea level rise associated with global warming are expected to reclaim hundreds of thousands of acres of coastal marsh over the next 50 years, and we can expect many more hurricanes to become household



Hudsonian Godwit: Dale and Marian Zimmerman

names in coming seasons. But bright spots exist. Agreements under the Endangered Species Act have helped restore several thousand acres of private lands for the "Attwater's" Greater Prairie-Chicken, and the Gulf Coast Joint Venture is working to restore and protect habitat for waterfowl throughout the region.



"Attwater's" Greater Prairie-Chicken: Philip D. Sudman

Coastal Beaches and Marsh

AT A GLANCE:

PRIORITY SPECIES: Snowy and Piping Plovers, Least and Roseate Terns, Clapper and Black Rails, Saltmarsh and Nelson's Sharp-tailed Sparrows, "Cape Sable" Seaside Sparrow, Wilson's Plover

THREATS: Development, recreation, pollution, global warming, coastal engineering projects, invasive species

GEOGRAPHICAL AREA: Atlantic, Pacific, and Gulf coasts; Great Lakes shorelines

Photo: FWS

There is something irresistible about shorelines – perhaps it is the sight of endless sky meeting seemingly boundless water, or the sharp smell of brine, or the rhythmic sound of the surf. Or it could be the expanses of marsh grasses that ripple like an ocean themselves, and harbor a wealth of shorebirds, waterfowl, fish, crabs, and other natural resources. Whatever the reason, our coasts exert a powerful draw, which has led to increasing strain on this habitat, as animal and human needs compete for a declining resource.

The Atlantic Coast is notable for its many barrier islands, such as North Carolina's Outer Banks, Chincoteague and Assateague Islands off Maryland and Virginia, and the Monomoy Islands off Cape Cod. These barrier



Black Rail: Ashok Khosla

islands contain a variety of habitats, such as sand dunes, intertidal flats, and salt and freshwater marshes, vital for nesting Piping Plovers and Least Terns. Most of the continental population of Roseate Terns nests on islands off the Atlantic Coast. Barrier islands are critical stopover points for migrating Sanderlings, Dunlin, and other shorebird species.

The Pacific Coast is known for its rocky coastline and steep bluffs,

punctuated by small "pocket" beaches and sandspits. The dunes of wider beaches shelter populations of endangered "Western" Snowy Plover and "California" Least Tern, while Black Oystercatcher, Common Murre, and Pelagic Cormorant breed along the rockier shores.

The warm, placid waters of the Gulf of Mexico shelter miles of sandy coastline and extensive sea grass and shellfish beds. The coastline is also known for its rookeries of wading birds, including ABC Green List species such as the Reddish Egret and Little Blue Heron.

The five Great Lakes, carved out more than a million years ago by the movement of huge glaciers, contain one-fifth of the Earth's fresh water. Sometimes referred to as "inland seas," the Lakes are bounded by thousands

of miles of varied shoreline, including sand dunes, rocky beaches, and extensive freshwater marshes. The sand dunes of the Great Lakes region form the largest freshwater coastal dune ecosystem in the world, sheltering Piping Plovers and other endangered species.

Some four million acres of rich salt-marsh and estuary systems occur along America's seacoasts, providing important habitat for ABC Green List species such as the Nelson's and Saltmarsh Sharp-tailed Sparrows, "Cape Sable" Seaside Sparrow (confined to Florida), Black Rail, and American Black Duck. Egrets, herons, ibis, and many species of shorebird and landbird also depend on marshes for food and a place to rest during migration. Saltmarshes also provide irreplaceable habitat for wintering ducks, geese, and swans.

Although these coasts and marshes vary widely in their physical characteristics, they face a similar barrage of man-made threats. More than half of the country's marshes have been lost or altered; areas such as the margins of San Francisco Bay have been particularly affected. Human development of coastal land removes vegetation and dunes that act as a natural barrier to



Least Tern: George Jett

erosion and flooding, often necessitating expensive beach "nourishment" projects, where dredged sand is pumped onto eroding shorelines, often resulting in loss of beach habitat and increased disturbance from beachgoers.

Mosquito control efforts including drainage, flooding, and pesticide spraying pose an additional threat to saltmarsh habitat and its bird species.

Climate change is leading to sea level rise at the current rate of approximately 0.1 inch per year. On average, a 1-foot rise in sea level will cause a retreat of shoreline of 100 feet or more. Under these conditions, habitats naturally "migrate" inland, but with increasing coastal development, are unable to do so. Warmer ocean temperatures have disrupted seasonal ocean currents, particularly along the

West Coast, upsetting the food chain and resulting in large-scale seabird die-offs. Agricultural runoff has created toxic food webs in some estuaries and massive algal blooms in others. Storms deposit garbage and agricultural waste, chemicals, and sewage along shorelines. Oil tanker traffic poses an ever-present threat of spills, as do pipelines and industrial plants.

Other threats include non-native plants such as common reed and purple loosestrife, and feral cats that prey on endangered Piping Plovers and other beach-nesting birds. Great Lakes sand dunes are threatened by mining operations that take the sand for glass and concrete products.

Despite the ongoing threats, there have been some successes, including conservation gains made by ABC and its partners for Red Knots in Delaware Bay. ABC also helped achieve a ban on the pesticide fenthion that was used to kill mosquitos in Florida—Piping Plovers and other shorebirds are no longer being killed by this hazardous chemical. Nevertheless, as global temperatures and demand for oceanside real estate rise, bird populations continue to be at risk along our coasts.

HABITAT CONSERVATION SPOTLIGHT

The U.S. Army Corps of Engineers is the federal agency responsible for maintaining the U.S. shoreline. It is also the primary agency charged with engineering the navigable waterways of the country. Both of these activities have dramatic effects on the distribution, quantity, and quality of the beaches, mudflats, and wetlands frequented by coastal birds. In highly-populated, economically important, and environmentally significant coastal

areas, the Corps must balance the practical tasks of shoreline protection and waterway maintenance with its environmental mission of managing lands for long-term natural resource productivity, while complying with a large array of local, state, and federal environmental regulations. ABC is now working

with the Corps and other natural resource agency partners to expand the potential of the Corps to contribute to bird conservation.

Many areas along the Atlantic and Gulf coastlines regularly receive shoreline protection in the form of beach nourishment, which can provide high-quality habitat for beach-nesting birds such as Piping and Snowy Plovers, Black Skimmers, and Least Terns. However, they can also result in foraging or nesting habitat degradation and increased disturbance to birds by beachgoers. ABC is advising the Corps on how to improve the way that beach nourishment projects are designed, so that bird habitat creation and disturbance reduction become more common outcomes of shoreline protection activities. ABC's strong working relationships with the Corps and the U.S. Fish and Wildlife Service ensures that birds have a voice when it comes to the maintenance of our beaches.

—Casey Lott, ABC



Snowy Plover: Glen Tepke

Tallgrass Prairie

AT A GLANCE:

PRIORITY SPECIES: Henslow's Sparrow, Dickcissel, Grasshopper Sparrow, Upland Sandpiper, Greater Prairie-Chicken

THREATS: Agriculture, fire suppression

GEOGRAPHICAL AREA: Ohio, Indiana, Illinois, Minnesota, Missouri, Nebraska, Kansas, Oklahoma

Purple Coneflower, a native tallgrass prairie species.
Photo: Kenneth R. Robertson

With careful route selection, it is probably possible to drive from Omaha, Nebraska, to Columbus, Ohio, without ever being out of sight of a corn field. This is what remains of one of America's greatest biomes—the tallgrass prairie. Frontiersmen marveled at this endless sea of grass that could reach as high as a horse's shoulder, and its bounty of wildlife. With determination, guns, and plows, however, they were able to exterminate the herds of bison and other wildlife, the Native American tribes, and eventually the native grass itself. It is ironic that America's heartland, its bedrock of rural values, exists where we have utterly destroyed the natural fabric of the land.

The almost complete conversion to agricultural use was perhaps inevitable,



Upland Sandpiper: Ted Steinke

for its soils and climate make this one of the most productive regions for crops in the world. The climate of the Great Plains is shaped in part by the Rocky Mountains, which strip westerly winds of their moisture, creating a rain shadow to their east. The High Plains, from Colorado to the Texas panhandle, receive very little rainfall, and an arid-adapted shortgrass system is all that clings to the parched earth as a result. Precipitation gradually increases

moving to the east, and the dominant species of grass changes from those that grow to your ankles to those that can grow higher than your head. Still farther east, in pre-European times, this tallgrass prairie ceded to savannah, and savannah to eastern hardwood forest.

In addition to precipitation, fire was a key factor, pushing the prairie eastward as it killed competing trees. The extension of tallgrass into Indiana and Ohio may have been entirely a result of fire, perhaps set intentionally by Native Americans to enhance the land's production of wildlife for hunting. The entire tallgrass prairie was devoid of trees because of fire, save perhaps for some protected patches near water. The alluvial soil, rich in nutrients and bathed in sufficient and dependable moisture, provided perfect

conditions for John Deere's newly invented plow that could cut through the thick sod for mass production of crops. Some say that the historical rise in prominence of the United States was due less to cultural values and industrial growth than to the reliable production of vast quantities of food from the former tallgrass prairie.

Bird populations have fluctuated with management changes in the tallgrass. While conversion to crop production made habitat unsuitable for most birds, land use for pasture or hay was reasonably compatible with the needs of many species. This deteriorated, however, when early-maturing strains of alfalfa were introduced. Mechanical harvesting while birds are still nesting has led to high mortality and reproductive failure, contributing to the oft-cited statistic that grassland bird populations have declined more than any other habitat-based group in the country. However, what negative management can take away, positive



Henslow's Sparrow: Laura Erickson, Binoculars.com

management can put back, and implementation of various Farm Bill programs over recent decades has helped many of these populations. Even the Henslow's Sparrow, with its need for tall, weedy, "rank" grass a few years after disturbance but prior to invasion by woody plants, is doing well in many areas, benefiting from the Farm Bill's Conservation Reserve Program.

The future of the tallgrass prairie as bird habitat is tied to international economics, energy use, and farm

policy. Intense production of biofuels, for example, could pull some of the land recently returned to bird habitat back into agricultural production. What becomes of land after short-term conservation contracts expire is probably going to be based on the best economic opportunity for the landowner. Heavy subsidies for crop production such as biofuels could prove enticing. The tallgrass prairie is on the list of the top ten threatened habitats in the United States not just because of the huge percentage that has already been lost, but also because its future as bird habitat remains so precarious.



Dickcissel: Gary Smyle

HABITAT CONSERVATION SPOTLIGHT

The Greater Prairie-Chicken, perhaps more than any other bird species, is the "canary in the coalmine" of tallgrass prairie landscapes. Once abundant from central Canada to southeastern Texas and east to Ohio, the species has declined dramatically with the demise of the tallgrass landscapes on which it depends. While birds still occur in relatively large numbers from the Dakotas through eastern Oklahoma, populations to the east and south are dangerously small and isolated. For example, in Missouri and Iowa, it is estimated that the current population may be as small as 500 individuals.

Fearing the complete loss of prairie-chickens from these two states, professional biologists and concerned citizens joined forces in 1999 to form the Grassland Coalition, with the goal of re-establishing healthy populations in ten areas where remnant populations were known to exist. The Coalition has embraced

the grassland bird habitat recommendations outlined in Partners in Flight bird conservation plans, and have designated "core areas," each in excess of a thousand acres, centered upon Greater Prairie-Chicken leks. Acquisition and prairie restoration efforts in these areas are considered the top priority, as these are the places where mating occurs and hens subsequently prefer to nest.

Most of the acreage in the core areas consists of public lands, on which the potential to manage and restore native prairie (including the removal of woody vegetation that fragments the grasslands and provides cover for predators) is greatest. Similar kinds of habitat improvements, implemented by willing private landowners, and funded largely by state and federal incentive programs, are encouraged in areas encompassing thousands of acres around each core.

Following these conservation efforts, the Greater Prairie-Chicken population in one focus area appears to be rebounding, and another shows promise. Whether adequate effort can be implemented in time to save the other populations remains uncertain, but without the dedication of Coalition members, the forecast would be dire indeed.

—Jane Fitzgerald, ABC



Male Greater Prairie-Chickens sparring: Al Perry

Southwest Riparian

AT A GLANCE:

PRIORITY SPECIES: “Least” Bell’s Vireo, “Southwest” Willow Flycatcher, “Yuma” Clapper Rail, Elf Owl

THREATS: Deforestation, livestock grazing, invasive species, development, flood control and water diversion projects

GEOGRAPHICAL AREA: Southern California, Nevada, Arizona, New Mexico, Southern Utah and Colorado, West Texas

Photo: Al Perry

The desiccated landscape of the Southwest instills in us imagery of tumbleweed blowing along dusty ground, ancient petroglyphs carved on dark cave and canyon walls, cattle skulls blanching under the merciless sun, and sidewinders slithering between the cacti.

But running through this harsh and arid country are ribbons of lush green; narrow corridors where rivers and streams, some ephemeral, some continually flowing, have slaked the parched desert to give rise to riparian ecosystems rich with life. While only occupying a tiny fraction of the land area, these riparian habitats support both the largest concentrations of animal and plant life, and the majority of species diversity in the desert Southwest.



Elf Owl: © Greg Lasley/VIREO

The distinctive soundtrack to these narrow oases is provided by the “zheedle, zheedle, zheedle, zee” of the “Least” Bell’s Vireo, the “fitz-bews” and “brees” of the “Southwestern” Willow Flycatcher, and the sharp “keks” of the “Yuma” Clapper

Rail—all three are federally listed as Endangered. At various elevations, other birds as diverse as the Elf Owl, Yellow-billed Cuckoo, Wilson’s Warbler, Hooded Oriole, and Elegant Trogon are found among cottonwoods, willows, alders, box-elders, and locust trees, and in lower story vegetation of seepwillow, mesquite, arrowweed and saltbrush. Overhead, Common Black-Hawks soar on rising thermals of hot, dry air.

Today, more than 80% of the riparian habitat of the Southwest has vanished. There is no mystery surrounding this disappearance. The story begins, predictably enough, with the influx of European settlers in the early 19th Century. The first to go were the beavers, trapped for their pelts by early fur traders. These native rodents played a

significant role in maintaining riparian habitat through the construction of dams that both ensured a vital source of water during periods of low river flow, and stimulated new vegetation growth through the build up of alluvial sediments around their lodges. The eradication of the beaver was soon followed by human settlement, timber extraction, and broad-scale agricultural development, particularly livestock grazing.

Cattle gravitate to stream margins from surrounding rangeland and graze incessantly on native grasses. They trample riparian vegetation, resulting in severe bank erosion and water sedimentation. Cattle manure also leads to excessive nitrogen levels in both soil and water.

To combat erosion caused by the cattle, and also for the ornamentation of gardens, saltcedar (also known as tamarisk) was planted. This woody shrub is a native of North Africa, the Mediterranean, and the Middle East, and grows in dense thickets that are of limited value to wildlife because they

support few insects. Saltcedar spread quickly through the Southwest, where it choked out native vegetation. Today, it has invaded more than one million acres of wetlands in the region and continues to flourish at the expense of native plant, mammal, amphibian, and bird diversity. Saltcedar is difficult to eradicate because it regrows so readily after cutting, however, many programs are now in place to reduce its spread, and laws are being enacted to prevent its sale and importation.

Today, urbanization and agriculture continue to be the most severe threats to the limited and vulnerable plant life of southwest riparian systems. Cities such as Phoenix, Albuquerque, and Tucson continue to expand into surrounding habitat as their populations rise.

The scarcity of water in the Southwest makes rivers and streams particularly important for sustaining the region's communities. This dependence places a severe strain on natural ecosystems. Water diversion and pumping for irrigation and consumer demand,

combined with flood control projects, have all but eliminated the broader flood plains and associated swamps and marshes of many river systems, particularly along the Colorado and its tributaries. Habitat fragmentation continues to drive down bird populations. The Brown-headed Cowbird is thriving, however. Rates of nest parasitism among riparian species have reached as high as 50% in some areas.

Achieving riparian habitat conservation depends on public agency buy-in to broad-scale land management plans and the successful provision of incentives to private property owners to restore their degraded land. Riparian areas take time to fully recover, but some management options, particularly fencing out cattle, provide immediate rewards. Even in severely degraded systems, the speed and extent of recovery once habitat is protected from grazing and trampling can be remarkable. Currently, though, efforts to restore riparian areas are being considerably outpaced by the rate at which they are being lost, making these vibrant ecosystems an ever-rarer feature of the Southwest.

HABITAT CONSERVATION SPOTLIGHT

Few birds epitomize the dire predicament of riparian habitats in the Southwest like the "Least" Bell's Vireo. Once common throughout Southern California and the Central Valley, this riparian specialist was reduced to just 600 breeding birds when it was listed under the Endangered Species Act in 1986. But following two decades of management, including cowbird control and riparian restoration, populations have rebounded—in some areas, as much as tenfold.

Last year, a pair of birds was observed nesting in a young arroyo willow tree in the San Joaquin River National Wildlife Refuge, heralding the return of the vireo to California's Central Valley after an absence more than 50 years.

Just four years earlier, the site of the new vireo nest was open land that had long been seeded in row crops. Then, 164 acres along the San Joaquin River were intensively planted with native understory shrubs and grasses such as button bush, mugwort, and elderberry to attract riparian species such as the Yellow Warbler (also long absent from most of the Valley). Project leaders were delighted when Yellow

Warblers returned to the refuge in 2002 (they number 14 breeding pairs today), but that victory was soon trumped by the unexpected appearance of breeding "Least" Bell's Vireos.

At least nine partners have been involved in the program, including the U.S. Fish and Wildlife Service, PRBO Conservation Science, River Partners, and California State University, Stanislaus. A total of over 250,000 native trees, shrubs, and grasses have been planted on 1,000 acres of the refuge, resulting in one of the Valley's largest contiguous blocks of riparian woodland.

The return of the "Least" Bell's Vireo, perhaps the ultimate reward for these efforts, clearly **demonstrates the benefits** of riparian conservation, and what can be achieved with good science, dedicated partners, political will, and sufficient funds.

—Gavin Shire, ABC



"Least" Bell's Vireo: FWS

Edwards Plateau Savannah

AT A GLANCE:

PRIORITY SPECIES: Golden-cheeked Warbler, Black-capped Vireo, Scissor-tailed Flycatcher

THREATS: Livestock grazing, invasive species, development, fire suppression, deer

GEOGRAPHICAL AREA: West-Central Texas

Photo: Gil Eckrich

Rising out of the ground like a giant wall, the Balcones Escarpment abruptly marks the transition between the Texas Coastal Plain and the eastern edge of Edwards Plateau. Before the escarpment lies the wide expanse of low, fertile, but featureless farm and rangeland; behind it the steep, rolling topography of Texas Hill country.

Cool, clear rivers cutting through the plateau support riparian habitat that is a pleasant contrast to the predominantly dry scrub and grassland vegetation, where armadillos and Greater Roadrunners scurry beneath the hot sun. In spring the plateau is transformed into a glorious tableau of wildflowers, dominated by a sea of vibrant Texas bluebonnets.



Golden-cheeked Warbler: Al Perry

Eventually the hills flatten out as the plateau transitions into the Chihuahuan Desert to the west, the Tamaulipan Brushlands to the south, and the short- and mixed-grass prairies to the north. A nexus of all these habitats,

as well as the riparian corridors that are home to bird species more commonly found in eastern deciduous forests, Edwards Plateau is a mecca for birders keen to see species as diverse as the Green Kingfisher, Long-billed Thrasher, Zone-tailed Hawk, Varied Bunting, and Acadian Flycatcher.

If there is one thing that is certain about the climate of Edwards Plateau, it is that you never know when it is going to rain. There are no predictably rainy months, or predictably dry periods. On any given day, the region may have to withstand a torrential downpour or begin a two-month long period of drought.

Rainwater does not remain on the surface for long, however, instead seeping through the thick, porous

limestone bedrock that forms the plateau, leaving only a thin skin of nutrient-poor soil. The erratic rainfall, limestone geology, and thin soils, have conspired to produce a unique plant community inhabited by some equally unique animal life. Edwards Plateau encompasses almost all of the remaining breeding range of the endangered Golden-cheeked Warbler, and a significant portion of the range of the endangered Black-capped Vireo. The vireo inhabits early successional stage patchy wood-shrub habitat, while the Golden-cheeked Warbler relies on mature Ashe juniper-oak woodlands.

What comprised pristine vegetation on the plateau prior to European colonization is somewhat of a mystery. What we do know is that only 2% of the plateau has not succumbed to conversion to pastureland or urbanization.

Edwards Plateau is now home to one of the most significant livestock industries in the country. Cattle, sheep,

and goat overgrazing has fragmented habitat and all but eliminated native grasses, now replaced with the invasive King Ranch bluestem. Deer overbrowsing has prevented the spread of woody species, and suppression of natural fires, critical to maintaining juniper-oak habitat, has further negatively affected bird species.

In 1900, the population of Texas was 80% rural, 20% urban. By 1990, the demographics were reversed. The urban boom continues today. During the 1980s the population of Austin increased by 50%; San Antonio's population increased by 20% each decade from 1960 through 1990. Because a large portion of remaining habitat exists around these cities, continued urban and suburban sprawl pose a significant threat to bird populations. The increase in population has also taken its toll on the Edwards Aquifer, now straining to supply drinking water to more than 1.5 million people.

More than 95% of rangeland is privately owned; this makes implementing wildlife plans much harder than if it were under combined federal or state ownership. In the 1990s, when the state pushed for designation of Critical Habitat for the Golden-cheeked Warbler, private landowners responded by cutting down large stands of old-growth habitat, believing that they would otherwise fall victim to future habitat restrictions. Nevertheless, financial incentives for private landowners are one important way in which the long-term future of what remains of Edwards Plateau habitat can be sustained. Federally-administered programs such as Partners for Fish and Wildlife and the Landowner Incentive Program can financially reward ranchers for their conservation efforts. Unfortunately there has not been a rush to join these initiatives on the plateau, indicating that much more education is needed to show that it is possible for both landowners and threatened bird species to come out ahead.

HABITAT CONSERVATION SPOTLIGHT

The Brown-headed Cowbird presents a curious conservation challenge in many parts of the United States. It is both a native species and a nemesis of efforts to restore threatened and declining bird populations. Once existing in limited numbers, in balance with other native species, this brood parasite (a bird that lays its eggs in the nests of other birds who then raise the parasite's young at the expense of their own) has flourished over recent decades due to modern ranching practices. The destruction of native habitat for cattle pasture favors the cowbird over more habitat-restricted species that it often parasitizes. Cowbird parasitism has become a threat to several species across the country, including the Black-capped Vireo.

At Fort Hood, Texas, on the northeastern edge of the Edwards Plateau, ranchers graze their herds as part of an agreement struck when the Army took control of the land in the 1940s. In the late 1980s, cowbird parasitism rates of Black-capped Vireo nests reached an alarming 90%. With continued declines, the U.S. Fish and Wildlife Service, under the authority of the Endangered Species Act, could have potentially shut down military operations. Something had to be done—and quickly.

The recovery plan for the Black-capped Vireo created an opportunity for the Army to work creatively with The Nature Conservancy to reduce

the cowbird parasitism rate, and starting in 1988, cowbird trapping efforts began. After a few years of trying various techniques, the most effective regimen involving both trapping and shooting was established. Trapping success is highest when traps are placed near cattle concentrations, which usually coincide with primary cowbird feeding areas. In areas away from cattle concentrations, selective shooting of territorial females proved effective at keeping parasitism rates down. Parasitism of vireo nests on Fort Hood is now less than 10%, and vireo reproductive success has increased dramatically as a result, from a low of 5% in 1987 to a high of 55% today.

Alternate grazing rotations that keep cattle away from vireo habitat during the nesting season may also reduce parasitism. However, any cowbird control effort must also be coupled with effective land management to insure ample early-successional oak-juniper habitat.

—Chris Eberly, DoD Partners in Flight



Sagebrush

AT A GLANCE:

PRIORITY SPECIES: Greater and Gunnison Sage-Grouse, Brewer's Sparrow

THREATS: Livestock grazing, fire, invasive species

GEOGRAPHICAL AREA: Between the Rocky Mountain and the Sierra Nevada ranges, from New Mexico north to Washington

Photo: Dan Casey

The sagebrush region covers over 155 million acres of the Intermountain West. One would not think that a habitat type that covers such a huge expanse would be among our most threatened, but the continuing rate of degradation and poor chances of recovery make it a clear choice.

This ecosystem is dominated by several species of sage, mixed with other shrubs and varying amounts of grass. Sagebrush covers the semi-deserts of the American West, east of the Cascades and Sierra Nevada, north of the southwestern true deserts, west of the Great Plains, and intertwined with the Rocky Mountains. Northern portions are often called sagebrush steppe due to the high concentrations of bunchgrass growing with the sage and other shrubs, while southern portions



Greater Sage-Grouse: Carol Davis

form the drier Great Basin sagebrush, where little grass is mixed in. Scientists have speculated that sagebrush spread through former grassland due to heavy grazing pressure, but records show that sagebrush was dominant even before European settlers brought large herds of cattle to the area.

Sagebrush does not respond well to fire, and so its dominance over the

region is evidence that the frequency of wildfires was historically low. Habitats lacking grass, or with only widely spaced bunchgrasses, do not carry fire well, providing further suggestion that fire was not a critical component of this ecosystem.

Today, however, fire, livestock, and non-native plants have brought about the deterioration of sage systems everywhere, and their malevolent work continues. Many North American ecosystems have withstood cattle grazing quite well, and in many places it is a practice that is compatible with bird conservation. Not so in sagebrush, due at least in part to a lack of historical adaptation on the part of sage system plants to grazing. Cattle select and eventually eliminate grasses and palatable herbaceous plants, leaving nothing but an increasingly

dense layer of shrubs. Early ranchers responded to this by burning or mechanically removing the shrubs and introducing exotic grasses for their livestock. This was bad enough for the sagebrush system, but the worst was yet to come.

Cheatgrass, a species native to central Asia, was inadvertently introduced into the Intermountain West late in the 19th Century. Cheatgrass fundamentally changes fire and vegetation patterns. Unlike native bunchgrass, it creates a bed of continuous fuel that carries fire easily. It matures early in the growing season and dries quickly, increasing the risk of fire. Where cheatgrass dominates, it burns every three to five years, and while fire kills native sage, which can take years to recover, it stimulates reproduction of cheatgrass. So we have a self-perpetuating cycle. Grazing and range management remove native plants, allowing cheatgrass an opportunity to invade. Once established, cheatgrass creates a fire regime that further sets



Sage Thrasher: Larry Barnes

back native vegetation and optimizes conditions for its own success and expansion. It has spread over millions of acres of the Intermountain West, and shows few signs of decreasing the rate at which it becomes the single, dominant plant over ever more ground.

None of the birds that are completely tied to sagebrush—the Greater and Gunnison Sage-Grouse, Sage Thrasher, Sage Sparrow, and Brewer’s Sparrow—or virtually any of the other species that use sage and other systems can tolerate cheatgrass-

dominated habitat. Because cheatgrass dries so quickly, it is not even of value to domestic livestock. Where cheatgrass takes over, it is good for only one thing—further perpetuation of cheatgrass. Furthermore, once established, cheatgrass is extraordinarily difficult to remove. Burning or mechanical removal merely serve to further stimulate it at the expense of native plants. The only cure involves several years of herbicide treatment followed by direct seeding of more desirable plants. This is very labor-intensive and very expensive, and the cumulative area restored throughout the West each year pales in comparison to the additional acres of sage lost to cheatgrass invasion.

Populations of all of the key birds are in decline, and although some of them still exist in fairly large numbers, their prognosis is grim. This is why sagebrush ranks so highly in our top ten threatened habitats—there is no system as vast as this one in such free fall.

HABITAT CONSERVATION SPOTLIGHT

The Brewer’s Sparrow is the quintessential sagebrush bird—its varied song is as much a part of the “sagebrush sea” as the characteristic scent of sage itself. Partners in Flight currently estimates the continental breeding population of Brewer’s Sparrows to be 16 million birds, but much like the habitat on which it depends, abundance does not necessarily mean security. Indeed, the population of this species has been in decline since the 1960s, and these declines have accelerated since the 1980s.

Brewer’s Sparrows depend on large patches of dense, thriving, unburned sagebrush with native grass understory. This means that if we are to reverse the trend and achieve the continental objective of doubling the population over the next 30 years, there is much work to be done.

ABC has been working with partners at the local, regional, state, and continental scale to support much-needed research

and monitoring for the sparrow, and to protect and restore its sagebrush habitat. ABC played a key role in identifying 39 million acres of sagebrush in 11 states that are the highest priority for intensive conservation design, habitat protection, and restoration work. This is leading directly to successful on-the-ground habitat conservation projects, including the Blackfoot Challenge in western Montana. In this model community-based, multi-resource, conservation effort, private landowners and public agencies are collaborating to protect and enhance habitat for an estimated 2,300 pairs of Brewer’s Sparrows. On the Desert Ranch in northeast Utah, ranch managers and biologists are working together to test the effectiveness of various habitat enhancement techniques to benefit the Greater Sage-Grouse and Brewer’s Sparrow on actively grazed lands. Despite the continued loss of sagebrush throughout its range, ABC and its partners are demonstrating that good conservation can yield immediate gains for this threatened habitat and the birds that rely upon it.

—Dan Casey, ABC



Brewer’s Sparrow: Peter LaTourrette/birdphotography.com

Open Ocean/Seabird Nesting Islands

AT A GLANCE:

PRIORITY SPECIES: Laysan and Black-footed Albatrosses, Xantus's Murrelet, Hawaiian Petrel, Black Storm-Petrel, Ashy Storm-Petrel, Whiskered Auklet, Black-capped Petrel

THREATS: Invasive species, marine pollution, overfishing, global warming

GEOGRAPHICAL AREA: Atlantic and Pacific Oceans, Gulf of Mexico



Laysan Albatrosses. Photo: Breck Tyler

In conservation terms, the seabirds of the open ocean are caught between a rock and a wet place! Roving far and wide across the most isolated seas, these birds rarely touch land. When they do, it is to breed on oceanic islands that can be hundreds, if not thousands of miles from the mainland. Neither land animals nor true ocean denizens, these birds have often been overlooked by conservationists dealing with either mainland or ocean habitats, and so they slipped through the cracks. Today the problems facing alcid (such as murrelets and auklets), tubenoses (including albatrosses, shearwaters, and petrels), and other ocean wanderers, such as frigatebirds, are well understood—namely introduced species on their breeding islands, overfishing, fisheries bycatch, and pollution of the seas.

In the United States, the main breeding grounds for seabirds are the Hawaiian, Channel, Farallon, and Aleutian Islands, but other islands, such as the Dry Tortugas off the Florida Keys and Petit Manan off the coast of Maine also play an important role.

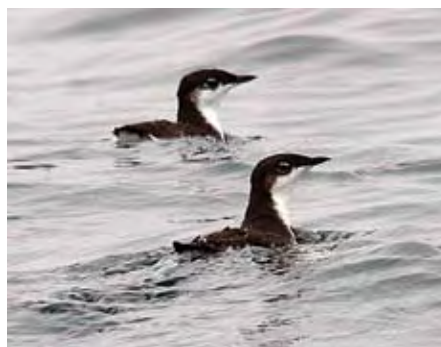
Although their remoteness has afforded these islands a high degree of protection against development, they have nevertheless felt the impact of human civilization. The threat of unregulated hunting and egg collecting has now passed thanks to the enactment of strict wildlife protection laws (though too late to save the Great Auk from extinction), but seabirds, including the Laysan, Black-footed, and Short-tailed Albatrosses, are still being killed inadvertently on longline fishing hooks in

U.S. and international waters. Conservation groups, including ABC, have pushed hard to have proven mitigation measures for limiting seabird bycatch mandated in all longline fisheries.

Like other island species, seabirds evolved in isolated environments, and over the millennia, became specialized and highly sensitive to change. The introduction by humans of alien predators, including cats, rats, mongooses, and foxes, has caused declines in the populations of a number of seabird species, such as the Hawaiian Petrel, Xantus's Murrelet, Black Storm-Petrel, and Whiskered Auklet. Guam has lost all three of its populations of breeding seabirds (Brown Noddy, White Tern, and White-tailed Tropicbird) due to the introduction of the brown tree snake.

Introduced ungulates can be as devastating as the predators. Left unchecked, introduced goats, sheep, cattle, and horses can wreak havoc on native habitat and trample ground nests. Even introduced plant species can compromise seabird nesting colonies, such as golden crown-beard on Midway Atoll (see below).

One advantage of islands is that they are, by definition, enclosed ecosystems, and are frequently relatively small. This can make removal of invasive species easier than on the mainland. The National Park Service successfully removed rats from Anacapa and other Californian Channel Islands to aid in the recovery of the Xantus's Murrelet and Ashy Storm-Petrel; and on Wake Island, between Hawaii and Guam, a coalition of groups removed feral cats to protect Wedge-tailed Shearwaters. Removal of the brown tree snake from Guam will be considerably harder, however, despite recent legislation that provided much needed federal funding. Conservationists are desperately



Xantus's Murrelets: Glen Tepke

guarding against the possible spread of this invasive predator to Hawaii, where it could devastate remaining native bird populations.

While at sea, ocean-going birds face a mounting barrage of threats. With the introduction of double-hulled tankers, oil spills are decreasing, but many operators still risk catastrophe by using old, single-skinned vessels. Tanker spills only account for 10-12% of marine oil pollution, however. An estimated 550,000 tons of oil is released into the oceans each year from pipeline ruptures and the continuous discharge emanating from ships and

land-based sources. An ever-growing accumulation of plastic trash drifts on ocean currents to the furthest reaches of the globe. Mistaking these items for small fish, albatrosses consume bottle caps, cigarette lighters, toothbrushes, and all manner of household objects, often with fatal consequences.

Ultimately, seabirds are reliant on ocean-based food chains for survival. Overfishing has changed the composition of ocean life almost beyond comprehension, with far reaching effects. Some U.S. fisheries are beginning to come under better management, but without significant changes to global fishing practices, seabirds will continue to feel the effects of declining food supplies. These effects are likely to be compounded by global climate change, the extent and impact of which is becoming ever more apparent. While we cannot predict how seabirds will fare with rising temperatures and sea levels, it is likely that their current population declines and sensitivity to habitat change will not dispose them favorably.

HABITAT CONSERVATION SPOTLIGHT

More than two million seabirds live on Midway Atoll in the Hawaiian chain, including the Black-footed Albatross and the world's largest populations of the Laysan Albatross. Introduced rats that once plagued the island have now been eradicated, but other invasives, most notably two species of plants, are now wreaking havoc.

Ironwood (a large tree that invades open areas) and golden crown-beard, have overrun parts of Midway. Golden crown-beard (a relative of the sunflower) out-competes native vegetation, growing well even in sand and in cracks in asphalt, and forms dense stands where albatrosses cannot nest. It also grows so rapidly that chicks can become enclosed by thick walls of vegetation while still in the nest. Unable to extricate themselves or be reached by their parents, some chicks starve.

Beginning in the late 1990s, the U.S. Fish and Wildlife Service initiated a golden crown-beard management program on Midway, which was intensified in 2003. The program has included control by hand-pulling, mowing, and herbicide application. In areas where golden crown-beard has been eradicated, native plants are propagated to prevent the invasive from recolonizing. In 2006, the National Fish

and Wildlife Foundation's Pulling Together initiative awarded a grant to the Friends of Midway Atoll National Wildlife Refuge to help with propagation of native plants and provide volunteers to help remove golden crown-beard. ABC and the Biological Conservation Assistance Program are also assisting in this effort.

Conservationists hope that the recent designation of the Northwest Hawaiian Islands as a National Monument will promote new sources of funding to help rid Midway of its most harmful invasive species, as well as financing the removal of lead-based paint from former Navy barracks on the island. Hundreds of curious young albatrosses have been poisoned after eating peeling paint that affects their nervous systems. With an estimated cost of \$6 million, the cleanup will require a substantial commitment from federal regulators, but ABC, with support from Lynn White and the Lannan Foundation, is pushing hard to ensure that the buildings are made safe for future generations of Laysan and Black-footed Albatrosses on Midway.

—Christy Finlayson, Friends of Midway and Jennifer Arnold, ABC



Laysan Albatross chick in golden crown-beard: Christy Finlayson

Native Forests of Hawaii

AT A GLANCE:

PRIORITY SPECIES: Akekee, Hawaii and Kauai Creepers, Akiapolaau, Maui Parrotbill, Ou, Nihoa finch, Omao, Oahu Elepaio, Nihoa Millerbird, Alala, Hawaiian Hawk

THREATS: Deforestation, invasive species, disease

GEOGRAPHICAL AREA: Hawaiian Islands

Photo: FWS

Few other places on Earth conjure up such vivid images of a lush, tropical paradise than Hawaii; certainly none in the United States. Palm tree-lined lagoons, mist-enshrouded waterfalls, and enticing beaches lapped by frothing, white surf beckon from the pages of travel magazines. But the notion of Hawaii as a pristine ecosystem is now confined to the history books. Overrun by people, and exotic animals and plants (even the famous Hawaiian macadamia nut is non-native), the Hawaiian Islands have suffered more bird extinctions in recent centuries than any area of comparable size on Earth. But even with many more species teetering on the brink, Hawaii remains a place of wonder.

The Hawaiian archipelago comprises eight major and 124 minor islands,



Amikihi: Bill Hubick

stretching some 1,500 miles across the east-central Pacific, and lying more than 2,000 miles west of the North American continent. The Islands were formed through volcanic action, concentrated around a “hot spot” on the floor of the Pacific Ocean. As the Pacific plate drifted northwest from the hot spot, the islands cooled and eroded, so that those in the extreme north-western reaches of the chain are now low lying atolls. The island of Hawaii

—or as it is known locally, the “Big Island”—is the youngest in the chain, and currently lies over the hotspot. As a result, it boasts two of the world’s most active volcanoes.

The descendants of the early finch-like birds that made it to this distant archipelago soon evolved and diversified to take advantage of the many vacant ecological niches they found. Birds particularly benefited from the lack of predatory mammals, which never naturally arrived from the mainland. Through the process of adaptive radiation, these early pioneers gave rise to many new taxa, and over the millennia, new species arrived, eventually forming the world’s most isolated and unique avifauna. By the time Captain Cook arrived in Hawaii in 1778, at least 71 endemic bird species and subspecies

remained. From the seed-eating Palila to the nectivorous Amakihi and Iiwi, the woodpecker-like adaptations of the insectivorous Akiapolaau, and the flower-probing Akepa, Hawaii's bird life forms an astounding array of vibrant diversity.

Some 10,000 species of native plants and animals are unique to Hawaii. Forty-eight different native forest types and more than 175 tree species have been identified on the islands, which include some of the wettest places on Earth. The major islands were once totally forested with impressive stands of native trees such as koa, manele, and sandalwood. Since human colonization, however, approximately half of the forest has been lost—primarily in the lowlands. The destruction began around 1,000 years ago with the arrival of Polynesian settlers. The process accelerated with the arrival of Europeans, who followed the logging with cattle grazing. Only 1.5 million acres of forest now remain, mostly on the upper slopes. Almost half of this is managed by the state, with the other half in private ownership; just 150,000 acres falls under federal jurisdiction.



Iiwi: Jack Jeffords

Twenty-four of Hawaii's birds are known to have gone extinct, including the Hawaiian Rail, Laysan Millerbird, and both the Lesser and Greater Koa-Finches. The most recent of these extinctions likely occurred just two years ago, when the last remaining Poo-uli (a small honeycreeper) died in captivity. Today, only a few native Hawaiian birds, such as the Apapane and Amakihi, are numerous. The U.S. Fish and Wildlife Service currently lists 30 Hawaiian birds as Endangered or Threatened; most are dependent on vigilant conservation measures to survive at all. The Hawaiian Crow or Alala now only exists in captivity, and

the Akikiki, internationally regarded as a critically endangered species, remains without the protection of the Endangered Species Act.

Although agriculture, logging, and development were responsible for most of the historical habitat conversion, today introduced mammals such as cats and pigs, and invasive plants, such as guava, present a more significant threat to remaining native ecosystems. Avian malaria and avian pox are now well established and pose another serious danger at ever-higher elevations.

Despite its unique flora and fauna and the high level of threats, Hawaii ranks close to the bottom of the list of states for spending on fisheries and wildlife. The future for Hawaii's birds is uncertain, and unless their ecosystems can be better protected, the list of extinct species could continue to grow. Some species appear to be developing a nascent resistance to avian malaria. This, along with conservation techniques such as captive-breeding and intensive site-based management programs that include invasive species removal and food supplementation, provide hope that Hawaii's remaining birds will survive into the future.

HABITAT CONSERVATION SPOTLIGHT

The Maui Parrotbill is currently restricted to high-elevation rain forests above the "mosquito zone" (approximately 5,000 feet) on the windward side of Haleakala volcano, in east Maui. It occupies most, perhaps all, of the currently available suitable habitat, but because this species has a highly specialized foraging behavior that requires each pair to defend a relatively large territory, the total population is small—approximately 500 birds.

In the early 1900s, naturalists reported that the parrotbill was most common in moist forests, dominated by koa trees, on the leeward side of Haleakala, but this part of the island has been severely damaged by introduced feral ungulates, particularly goats. Remnants of this habitat exist, but they are too small and degraded to support a parrotbill population.

However, habitat restoration efforts are underway by the Leeward Haleakala Watershed Restoration Partnership, which includes the Hawaii Division of Forestry and Wildlife, the Department of Hawaiian Homelands, Haleakala National Park, and several private landowners. Fencing of over 2,000 acres in the Kahikinui area has already begun, and long-term plans involve protection of over 20,000 acres. Subsequent removal of feral ungulates will allow natural recovery of koa and other plant species, and soil treatment and reintroduction of native plants may be used to speed recovery.

The Zoological Society of San Diego is developing a captive breeding program for the Maui Parrotbill, and it is hoped that sufficient forest recovery will have occurred by the time parrotbills are available for reintroduction. Re-establishment of parrotbills into moist koa forest on Haleakala would be an important step in the species' recovery by forming a second population to help reduce extinction risk.

—Eric VanderWerf, *Pacific Rim Conservation*





Photos left to right: Least Tern/George Jett; Buff-breasted Sandpiper/Gary Smyle; Cerulean Warbler/Robert Royse; Palila/Jack Jeffrey

About American Bird Conservancy

American Bird Conservancy (ABC) is the only 501(c)(3) organization that works solely to conserve native wild birds and their habitats throughout the Americas. ABC acts to safeguard the rarest bird species, restore habitats, and reduce threats, while building capacity in the conservation movement. ABC is the voice for birds, ensuring that they are adequately protected; that sufficient funding is available for bird conservation; and that land is protected and properly managed to maintain viable habitat.

ABC is a membership organization that is consistently awarded a top, four-star rating by the independent group Charity Navigator.



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