



United States
Department of
Agriculture

Forest
Service



Working with Partners for Bird Conservation





Cover photo of canvasback duck courtesy of William Vingel, U.S. Fish and Wildlife Service

THE FOREST SERVICE IS A RECOGNIZED LEADER IN BIRD CONSERVATION.

Birds are important components of biological diversity, and their ecological, cultural, recreational, and economic benefits are recognized nationally and internationally.

Forest Service employees in the National Forest System, Research and Development, and State and Private Forestry Deputy Areas and International Programs are working together to play a pivotal role in bird conservation.

Forest Service ranger districts, supervisor offices, regional offices, and national office staffs are working together with public and private partners to implement programs and activities for the conservation and management of bird populations and their habitats. Scientists at Forest Service research stations are responding to the needs of public and private partners to advance bird conservation science and address management concerns. The agency's efforts are making the vision of integrated "all-bird" conservation a reality across the national forests and grasslands, the United States, and the rest of the Americas.

Many Forest Service accomplishments could not have been realized without the contributions, dedication, and passion of the Forest Service's many conservation partners. These partnerships are crucial to furthering "all-bird" conservation in the future.

The accomplishments displayed in this document illustrate the agency's commitment to integrated, "all-bird" conservation and to sustaining the health, diversity, and productivity of ecosystems to meet the needs of present and future generations.



DALE N. BOSWORTH
Chief



Photo courtesy of Art Weber, U.S. Fish and Wildlife Service

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EXECUTIVE SUMMARY

Birds Are Important!

The ecological, recreational, cultural, and economic benefits provided by a diversity of bird species are increasingly recognized both nationally and internationally. Healthy bird populations are an integral component of healthy ecosystems. More than 75 million Americans hunt, photograph, watch, study, or enjoy birds in other ways. Wildlife-watching activities, which include bird watching, generate over \$32 billion in annual retail sales. Moreover, birds are essential for sustaining many indigenous human cultures. Yet many bird species are declining as a result of habitat loss and fragmentation, pesticide use, and invasive exotic species.

USDA Forest Service Plays a Pivotal Role in Bird Conservation

The U.S. Department of Agriculture (USDA) Forest Service manages 8.5 percent of the total land area in the United States, which includes large blocks of habitat used by migrant and resident bird populations. The USDA Forest Service has a central role in bird conservation as a key partner in national and international bird conservation initiatives, studies, and programs—such as the North American Bird Conservation Initiative.

Integrated Bird Conservation Programs and Activities

The USDA Forest Service, through its diverse partnerships, is delivering a coherent, effective bird conservation program consistent with multiple and sustainable uses of forest and other grassland ecosystems. Bird



National Forest System.

conservation outcomes result from a variety of National Forest System (NFS), Research and Development (R&D), State and Private Forestry (S&PF), and International Programs (IP) activities, including research, integrated planning and assessment, population and habitat inventory, survey and monitoring, conservation education, and habitat restoration and protection.

Bird Accomplishments for Fiscal Years 2000–2002

The NFS, R&D, S&PF, and IP have worked collaboratively and independently to further bird conservation nationally and internationally. The appendix (FS-773A available at http://www.fs.fed.us/biology/resources/Pubs/wildlife/bird-report_appx) to this report displays USDA Forest Service bird conservation accomplishments. While the projects and activities identified in the appendix are not a complete list of USDA Forest Service bird conservation efforts, they do display a substantial portion of USDA Forest Service bird conservation accomplishments in fiscal years 2000–2002.

Future Opportunities and Challenges

In the next decade, the USDA Forest Service will have many opportunities to face the challenges in meeting bird conservation needs. These challenges include accelerating levels of habitat change associated with land conversion and habitat fragmentation, species invasions, hydrologic manipulations, environmental contaminants, global climate change, and other natural and anthropogenic disturbances. A sustained USDA Forest Service commitment to bird conservation, national and international cooperation, and formal partnerships with agencies and nongovernmental organizations is required to address these challenges. The diverse skills and experiences of the USDA Forest Service workforce will provide a strong foundation for bird conservation in the coming years. The agency's multiple use capabilities and know-how will be important not only within the United States, but throughout the migratory ranges of birds in other nations.



Photo courtesy of Gary Kramer, U.S. Fish and Wildlife Service

INTRODUCTION

Americans place a high value on the more than 850 species of birds that can be found in the United States. In fact, more than 75 million Americans hunt, photograph, watch, study, and enjoy birds in other ways.¹ Bird watching is the fastest growing wildlife-related outdoor activity in the United States!² Wildlife-viewing activities, which include bird watching, generate over \$32 billion in retail sales.³ For tens of thousands of communities and businesses, birds mean income and jobs. Moreover, birds are essential for sustaining many indigenous human cultures. Americans increasingly recognize that healthy bird populations are an integral component of healthy ecosystems. They are vital links in many food webs, and often serve as highly visible biological indicators of overall ecosystem health.

Increased competition for forest and grassland resources, coupled with increasing human pressures, are resulting in greater challenges for bird conservation. Many bird species are declining. Those in the greatest need of conservation, approximately 100 bird species, are protected under the Endangered Species Act, but hundreds of other species face mounting threats. Habitat loss and fragmentation, predation, pesticide use, invasive exotic species, and other factors are increasing the risks to species and to both national and international conservation investments.

Because birds use both public and private land, national forests and grasslands play a critical role in meeting the life-cycle needs of many species. Indeed, approximately 192 million acres of national forests and national grasslands provide essential habitat for many bird species. These lands comprise one of the largest areas of breeding bird habitat under single ownership in the U.S. Department of Agriculture Forest

Service legal mandates require protection of biodiversity, active management to improve forest health, and the continuation of other uses of these lands. The USDA Forest Service is called upon to maintain and enhance bird habitat and to provide information about the effects of management alternatives on avian populations.

State and Private Forestry (S&PF) programs developed in cooperation with State foresters and others make valuable contributions to conserving bird habitats. For many bird species, especially in the Eastern United States, private lands are essential to sustain them. Forests, wetlands, and conservation of other habitats on these private lands through S&PF programs are crucial.

The USDA Forest Service plays a pivotal role in conserving bird populations and their habitat by providing information and management alternatives to facilitate other land uses, while meeting public demands for bird-related recreational opportunities and protecting biodiversity. Toward that end, the USDA Forest Service has been engaged in activities such as research, inte-



Red-breasted nuthatch.

Photo courtesy of Great Basin Bird Observatory

¹ The 1999-2002 National Survey on Recreation and the Environment (NSRE), USDA Forest Service, and the University of Tennessee, Knoxville. The NSRE is the most recent of the National Recreation Survey series begun nationally in 1960. For more on this series, go to <http://www.srs.fs.fed.us/trends>.

² For a presentation of H. Ken Cordell's research that draws on the National Recreation Survey go to <http://www.srs.fs.fed.us/trends/birding.html>.

³ The 2001 National Survey of Fishing, Hunting, and Wildlife Associated Recreation is posted at <http://www.federalaid.fws.gov/>.

grated planning and assessments, population monitoring, and habitat enhancement and restoration for many years.

It is primarily the skills, training, and commitment of its employees that make the USDA Forest Service effective. USDA Forest Service employees analyze, plan, and deliver effective habitat management and research studies, not only in the United States on National Forest System (NFS) and private forest lands, but in other nations where birds from the United States migrate for part or most of the year. USDA Forest Service research scientists provide valuable information for bird conservation throughout the Americas. A foundation of sound science is essential.

Over the years, Federal and State agencies have established initiatives and programs to strengthen bird conservation. Since January 2000, the USDA Forest Service has been implementing the agency's Landbird Strategic Plan. The USDA Forest Service's *Taking Wing* (water-dependent migratory birds), *Answer the Call* (quail habitat management), *Dancers in the Forests* (grouse and woodcock habitat management), and *Making Tracks* (wild turkey habitat management) programs have advanced bird conservation on national forests and grasslands. USDA Forest Service International Programs has established the *People, Wings, and Forests* Program to help conserve migra-

tory bird habitats in Latin America, the Caribbean, and Canada. The USDA Forest Service's S&PF Deputy Area, through the Forest Legacy and other programs, has been protecting forest land from conversion to nonforest uses and in so doing has been helping to protect important bird habitat.

Recent developments in migratory bird conservation have compelled the USDA Forest Service to further strengthen its role in promoting bird conservation priorities established in the continental conservation plans and in national forest land management plans. Furthermore, a Presidential Executive order explicitly directs Federal agencies to work more cooperatively to meet their responsibilities for migratory bird conservation. These developments help the agencies fulfill their responsibilities in research and land and resource stewardship, but will require increased effort and collaboration.

Future bird conservation efforts will take into account new realities in bird conservation that require the USDA Forest Service to reach across organizational, State, and international boundaries. Furthermore, economically efficient strategies are necessary to conserve avian biodiversity while facilitating land uses. In fact, all of the USDA Forest Service bird conservation efforts emphasize conservation partnerships. Federal expertise and resources are leveraged through partnerships with conservation organizations, communities, State and Federal agencies, tribal governments, and international governments. Organizational boundaries are bridged through partnership-based bird conservation initiatives. These initiatives now include the North American Waterfowl Management Plan (NAWMP), the Waterbird Conservation for the Americas Plan, Partners in Flight Bird Conservation Plans, and Shorebird Conservation plans for the United States, Canada, and Mexico. Joint Ventures were formed in the mid-1980s as the implementation arm of the



Photo courtesy of Steve Farrell, U.S. Fish and Wildlife Service

Black-crowned night-heron.

NAWMP and delivery system for on-the-ground waterfowl conservation. These entities are independent, autonomous, self-directed, and regionally based in North America to deliver bird conservation. Recently, Joint Ventures have expanded their missions to include implementing all the other bird conservation initiative plans. All these plans, in which the USDA Forest Service has been an active participant, are the result of work by State, Federal, and tribal governments; nonprofit organizations; industry; and foundations.

Conservation strategies must act across the entire range of migratory birds. More than 35 percent (300+ species) of the 850 species in the United States leave the country each year and return in the spring. The North American Bird Conservation Initiative (NABCI) serves as a forum for enhancing bird conservation and dealing with the complex and often difficult challenges of inte-

grating bird conservation at regional, national, and international levels. The goal of NABCI is to deliver the full spectrum of bird conservation through regionally based, biologically driven, landscape-oriented partnerships.

Within the USDA Forest Service, NFS, Research and Development (R&D), S&PF, and International Programs (IP) have worked together to achieve major accomplishments in avian conservation. Given the agency's experience in habitat management over large scales, its research skills, and its strengthening connections with national and international cooperators, the USDA Forest Service will take an expanded leadership role. The USDA Forest Service is uniquely positioned to pull the varied avian interests together into a coherent, effective conservation effort that is compatible with sustainable uses of forest and grassland resources.



Photo courtesy of Craig Rudolph/Richard Conner, USDA Forest Service

BIRD ACCOMPLISHMENTS

Overview

USDA Forest Service success in incorporating bird conservation into management activities has increased significantly over the past decade. Accomplishments over the last 3 years exemplify progressive and innovative approaches to integrating species and habitat conservation including multiple-use management objectives. At the same time, efforts are increasing in cooperative partnerships, with many facilitated by the international framework provided by NABCI and its all-bird conservation approach.

The appendix to this report displays a diverse variety and remarkable number and quality of USDA Forest Service accomplishments on national forests and grasslands. In addition, the work of S&PF, and overseas work of IP, is increasing the number of bird conservation accomplishments. The following is a summary of findings generated by reviewing the many accomplishments identified in the appendix:

- Administrative studies, research, and inventory and monitoring efforts are improving the ability of the USDA Forest Service to measure the status of migratory birds and to predict the effects of habitat change on birds, whether resulting from natural or management disturbances.
- Research on the effects of habitat fragmentation, invasive plants, off-highway vehicles, fire, and forest harvest on avian populations and communities provides valuable input to management decisions.
- Integrating bird conservation and monitoring objectives into forest planning on national forests and grasslands has become a management emphasis. Scientists are developing and applying tools and scientific information necessary for integrating all-bird conservation into forest planning.

- A variety of habitat restoration and improvement activities benefiting birds are being implemented across NFS lands. Given the bird conservation assessments and plans being prepared across the United States, it is evident that many more opportunities exist.
- USDA Forest Service R&D scientists are in high demand, both here and abroad, for their technical expertise and knowledge of bird research methodologies, and the management implications of their work.
- The USDA Forest Service is actively supporting domestic and international partnerships, and these are playing a major role in USDA Forest Service bird conservation efforts and in conserving migratory birds of the Americas.
- The USDA Forest Service is actively involved in bird conservation outreach and education, including bird-related Web site development, community festivals, brochures, articles, field trips, school activities, and other efforts.
- The USDA Forest Service at all administrative levels is involved in bird conservation working groups and steering committees. The USDA Forest Service plays a leadership role in many of these bird conservation cooperative efforts including the NABCI.
- The NFS, S&PF, R&D, and IP are working to improve the conservation of all birds through their respective missions and programs of work.

Mission and Strategic/Emphasis Areas

International Programs

The IP advances sustainable forest management and biodiversity conservation worldwide and focuses on four major **goals**: (1) protecting forest health through fire and invasive species management; (2) conserving migratory species of concern that breed

in the United States and spend their nonbreeding season in other countries; (3) restoring and enhancing habitats for bird species most at risk; and (4) protecting the United States conservation interests abroad. The IP emphasizes conservation partnerships and fosters collaboration among USDA Forest Service field personnel and with national and international partners.

A major emphasis for IP is the conservation of migratory birds. The IP's—*People, Wings, and Forests*—program for migratory bird conservation is guided by the following **10 criteria**: (1) address species and habitats under serious direct threat; (2) help build conservation capacity in other nations; (3) address weakest links in species migration habitats; (4) connect and expand perspectives/skills of USDA Forest Service field personnel; (5) develop new partnerships and partners; (6) work in sites linked to the conservation of major United States ecosystems; (7) develop new bird conservation expertise in the USDA Forest Service; (8) increase/leverage funding with partners; (9) help protect United States conservation investments at home; and (10) strengthen the scientific and ecological basis for priority bird conservation work.

More than 300 species of birds migrate to the Caribbean and Latin America in the winter and return to the United States to breed. Unfortunately, many of these species are declining due to habitat losses in the United States or in the Caribbean and Latin America. Tropical forests, and other important bird habitats, are experiencing rapid declines as a result of human population growth, land development, deforestation, and other causes. Habitat losses overseas contribute to the listing of several species of migratory birds under the United States Endangered Species Act. IP works internationally to help recover listed species and prevent the need for new listings, both of which help maintain more U.S. land management options and protect bird conservation investments made in the United States.

The United States spends millions of dollars each year on domestic recovery efforts for species like the endangered Kirtland's warbler, which nests and breeds in Michigan but spends most of the year in the Bahamas, where very little is known about its habitat requirements. By investing dollars outside the United States, recovery for this species has improved and the USDA Forest Service's domestic financial investment in Kirtland's warbler recovery and management is more effective and is protected.

The United States urgently needs to take conservation actions for declining bird species populations—both at home and abroad. Examples of other species at high risk include Bicknell's thrush (northern boreal forest of Vermont, New York, and parts of Quebec—winters in the Dominican Republic); the golden-cheeked warbler (Texas—winters in Central American highlands); the cerulean and Swainson's warblers (Mississippi Valley—winters in the Andes in South America); numerous species of North American water birds that winter in Latin America and the Caribbean; and many species of short-grass prairie birds like the mountain plover and Baird's sparrow that winter in Mexico. The IP is addressing the threat to many of these species internationally.

The IP's work benefits migratory birds in two ways: directly through such activities as habitat improvement projects and studies, and indirectly through conservation training, technical assistance and partnership projects in fire management, reduced impact logging, watershed restoration and improvement, landscape-scale applied conservation biology, planning, ecological assessments, protected area management, and the control of invasive species. The IP works hard to provide technical assistance and effective U.S. natural resource policy assistance to help sustain migratory birds.

The IP is making lasting contributions to reversing declining population trends and sustaining species.

Additional background information about IP can be found at <http://www.fs.fed.us/global>.

National Forest System

The USDA Forest Service manages 192 million acres of national forests and national grasslands, known collectively as the NFS. Located in 44 States, Puerto Rico, and the Virgin Islands, the NFS is managed with a multiple-use approach, and under the principles articulated in the National Environmental Policy Act, National Forest Management Act, and Multiple-Use Sustained-Yield Act. The NFS strives to provide tangible benefits and products for people in a sustainable manner without impairing the ecosystem or damaging the environment.

National forests and grasslands comprise 8.5 percent of the total land area in the United States. The management of NFS lands has a profound effect on the quality and quantity of habitats available to bird species. Although many bird species are generally abundant and exhibit stable population trends, concerns about declines of some bird populations are growing. These declines are most apparent for some western and midwestern grassland and eastern forest-dwelling species.

The NFS Deputy Area is uniquely positioned to make lasting contributions to reversing declining population trends and maintaining stable and abundant bird populations. By enhancing, restoring, and protecting a variety of terrestrial and aquatic habitats necessary to sustain migratory and resident bird populations, the NFS provides for biological diversity, while meeting the public demand for bird-related recreation opportunities.

The NFS actively supports and participates in the NABCI, which coordinates and integrates the following proactive partnership-based, all-bird conservation initiatives: Partners in Flight, the NAWMP, the U.S. Shorebird Conservation Plan, and the Waterbird Conservation for the Americas Plan. Furthermore, the NFS implements bird-related

activities associated with programs such as *Taking Wing*, *NatureWatch*, *Dancers in the Forest*, *Answer the Call*, and *Making Tracks*.

The success of the NFS bird conservation program hinges on accomplishments in key focus areas, including the following:

- **Partnership Enhancement**—Partnerships are at the core of the program’s success to date, and are critical to future success. This strategic area emphasizes maintenance of existing partnerships and development of new ones at local, State, regional, national, and international levels.
- **Institutional Commitment**—Broad-based support for the bird conservation program within the USDA Forest Service is critically important. It is not enough for the “biologist community” within the USDA Forest Service to be program supporters; line officers, land management planners, and others must share in the understanding of, and desire for, this program’s success.
- **Organizational Effectiveness**—Program efforts must be closely aligned with those spelled out in watershed restoration plans, land management plans, and plans under the frame work of NABCI. Without such close coordination, well-intended efforts will not have the maximum possible impact.
- **Recreation and Economics**—Program success is closely tied to an increased understanding of the significance that birds have in our society today. When bird conservation efforts are described in terms of meeting recreational demand and enhancing economic activity, the program’s values to society are highlighted in a new way.
- **Inventory, Monitoring, and Studies**—Science plays an important role in successful bird conservation. This strategic area emphasizes successful incorporation of inventory, monitoring,

administrative studies, and research efforts into the program. A significant monitoring component is essential to understand the trends and conditions of birds and their habitats. It is necessary to ensure the quality of monitoring approaches and link them to monitoring conducted at different locations and scales.

Research and Development

USDA Forest Service R&D scientists conduct avian research to understand the effects of habitat, natural ecosystem disturbances, and management decisions on bird populations and the ecosystem processes that influence them. The goal is to provide solutions based on sound science that maximize the positive effects of forest and range management on birds. Research information is critical to the agency's capabilities to meet requirements of key environmental statutes, including the National Forest Management Act, Endangered Species Act, and Migratory Bird Treaty Act. Research provides the technical basis for developing conservation assessments or recovery plans for species at risk, including threatened, endangered, and sensitive birds. These assessments and plans contribute to the development of land management alternatives in forest planning.

Research contributes to species conservation in the United States and internationally through studies, inventories, and monitoring of bird populations and bird habitats. USDA Forest Service scientists work in partnership with other research and management entities and scientists on large-scale ecosystem research and ecological analyses.

Research is conducted at six research stations across the United States and at the International Institute of Tropical Forestry in Puerto Rico. Within these stations, approximately 25 research work units are working on more than 70 avian research projects. Researchers have provided information for forest planning and an array of associated management decisions in addition to numerous publica-

tions and technical papers. Recently, the agency's wildlife research program has focused on the following areas:

- **Forest Management**—Management activities can influence numbers and breeding success of birds by changing structural habitat configuration and nest site and food availability. Researchers are investigating effects of timber harvest in different habitat types on breeding birds. Natural disturbance of forests can also influence bird communities; this is particularly important in some tropical areas.
- **Fire**—Effects of natural and prescribed burns on cavity nesting and migratory birds depend on the nature of the burn and salvage or restoration activities that follow it. Understanding the nature of these effects provides a foundation for integrating forest management activities with bird conservation objectives.
- **Grazing**—Researchers are investigating how livestock grazing influences birds, with a special focus on songbirds of the Chihuahuan Desert grasslands, Southwestern willow flycatchers (a riparian species), and Mexican spotted owls.
- **Plant Invasives**—Riparian areas in the dry Southwest are being invaded by woody plants, such as saltcedar (*Tamarix chinensis*) and Russian olive (*Elaeagnus angustifolia*), that can radically change the habitat structure, hydrology, and fire regime. Researchers are studying the effects of woody invasions, as well as plant removal in response to invasion, on bird communities. They also are investigating how weedy invasive plants affect bird communities by changing habitat structure and food availability.
- **Animal Invasives**—Research shows how forest pests, such as hemlock woolly adelgid, that cause tree mortality can radically change bird habitat, and how larger animals such as Norway rats and European starlings interfere with nesting and survival.

• **Urbanization/Fragmentation**—Researchers are studying the effects of forest fragmentation on songbirds in western, midwestern, and eastern forests, and the effects of urbanization on songbird communities. Researchers have demonstrated that rates of nest predation are higher when a forest edge is nearby.

• **Wilderness**—If wilderness areas are to serve as a reservoir for native species and natural processes, their effectiveness in this role must be understood. Researchers have investigated how well the diversity of bird species is represented by birds in wilderness areas, the response of these birds to recreation, and the effects of urbanization near wilderness boundaries on birds.

• **Monitoring**—Effective monitoring is essential to determine the effects of management on avian communities. Researchers have been working to strengthen monitoring methods. Methods for improving the effectiveness of point count and mist nets for monitoring numbers of birds in different habitats have been investigated. Furthermore, scientists are developing applications of radar technology for the purpose of population monitoring and to document landscape-scale population responses to land management activities.

State and Private Forestry

The USDA Forest Service's S&PF program works closely with the 50 State foresters and other non-Federal forest landowners to advance forest and natural resource stewardship throughout the United States. More than 490 million acres of America's forests—more than 66 percent of the total United States—are in private hands. Of these acres, about 70 percent are owned by more than 9.9 million nonindustrial private landowners. The fate of wildlife in the United States is closely tied to the status, condition, trends, and management activities taking place on these non-Federal forest lands. America's private forests are declining due to fragmentation, parceling out of land, urban sprawl, and

impacts of forest insects and disease. S&PF plays an important role in addressing these threats—particularly in the Eastern United States. Unlike the West, where much of the land is publicly owned and managed, the East has significantly less public land, making the importance of private land for wildlife all the more important.

S&PF programs enhance conservation of bird habitats by encouraging sustainable forest management of more than 300 million acres of nonindustrial private forest lands. Furthermore, S&PF programs play a vital role in implementation of the forestry, wetland, and other provisions of the Farm Bill. Migratory birds and their habitats are directly and indirectly conserved through watershed and riparian restoration and improvement, sustainable forestry, maintenance of forests and open space in urban areas, and forest and wildlife conservation education in urban areas. S&PF works through voluntary and nonregulatory programs to protect forests from being converted to nonforest uses. These programs include the following:

- The *Forest Stewardship Program* works with landowners to develop and implement forest stewardship plans for private lands.
- The *Stewardship Incentive Program's* financial support helps private landowners implement forest stewardship plans. Forests, wetlands, and riparian areas are restored and enhanced.
- The *Forest Legacy Program* identifies and protects environmentally important private forest lands threatened with conversion to nonforest uses through easements and fee simple land purchase.
- The *Economic Action Program* helps rural communities and businesses dependent on forest-based resources become sustainable and self-sufficient.
- The *Urban and Community Forestry Program* provides technical assistance, education and training, public awareness assistance, and cost-share programs to conserve urban forests and open space.
- The *Forest Health Protection Program* provides technical and financial assistance to manage forest

pests on both Federal and non-Federal lands, including monitoring, risk assessment and management, and emergency pest suppression.

- The *Cooperative Fire Protection Program* assists States and volunteer fire management operations on non-Federal lands and complements the Wildland Fire Management Program that operates within the boundaries of the NFS.

Increasingly, S&PF programs are building partnerships to conserve migratory bird habitats through multilandowner landscape conservation planning and large-scale ecological assessments. In these types of projects, S&PF demonstrates the crucial role that forest management plays in migratory bird conservation. One such example of the expanding role of S&PF is described in the Lower Mississippi Alluvial Valley case study on page 24 of this report. S&PF sees these partnerships as promising opportunities to advance bird habitat conservation across the landscape. In addition to their domestic contribution to the USDA Forest Service mission, S&PF expertise is valuable internationally.

Bird Accomplishment Highlights

Western Boreal Forest Initiative

Covering two-thirds of Canada's landmass, the western boreal forest is home to numerous migratory birds, including 23 species of ducks. Isolated by its remoteness, the western boreal forest has long been an essential habitat for millions of North America's birds that leave and return during the breeding season to this northern landscape of forested wetlands composed of spruce, pine, aspen, and birch. With large expanses of water lying within its boundaries, the forest is a very productive breeding and resting ground for waterfowl, waterbirds, shorebirds, songbirds, and other wildlife.

Ducks Unlimited's Western Boreal Forest Initiative (WBFI) area holds a wealth of wetland complexes important to migratory birds. The boreal forest is choice habitat for millions of songbirds, shorebirds,

and other waterbirds, such as grebes, loons, white-crowned sparrows, cormorants, terns, and lesser scaup, as well as the Western Arctic snow goose, white-fronted goose, and Canada goose.

Currently, oil and gas development, logging, agriculture, and other activities are gradually altering this resource-rich area. Working in collaboration with the USDA Forest Service IP and other partners, the WBFI was established in 1997 and focuses on land cover inventory and mapping, change detection, management impacts, and waterbird and water quality inventories to monitor and protect important boreal wetlands. The data collected in this project will be useful for the Canadian partners, as well as the USDA Forest Service and its management of Alaska's boreal forests on the Chugach National Forest.

Through the WBFI, scientists hope to learn more about these ecosystems. Specifically, scientists would like to know what kind of wetlands exist in this area, where they are, how they function, and what bird species they support. Finally, scientists want to obtain a clearer sense of how human activity in the area is affecting the wetlands, especially the migratory birds they support, so more effective actions can be taken to sustain these habitats. The management goal is to determine how the biodiversity and productivity of the



Common loon.

Photo courtesy of Art Weber, U.S. Fish and Wildlife Service

region can be maintained and protected while land-use practices continue.

The IP is one of the primary funding partners in the WBFI, and has contributed to the WBFI for fiscal years 1999-2002. Other collaborating groups include the Government of the Northwest Territories; Ducks Unlimited Canada, Ducks Unlimited Inc.; Alberta-Pacific (Al-Pac) Forest Industries, Inc.; Syncrude Canada, Ltd.; British Columbia Hydropower; Gwich'in Renewable Resource Board; Inuvialuit Game Council; Pew Charitable Trusts; and the Sahtu First Nations. This coalition received a USDA Forest Service Taking Wing award in April 2002.

Kirtland's Warbler

Over the past quarter century, the Kirtland's warbler (*Dendroica kirtlandii*) has generated a lot of attention and concern. With only approximately 2,100 adults left in the world, this species is in serious decline, and is listed as endangered under the Endangered Species Act. As a result of collaboration between



Western Boreal Forest Wetlands.

the NFS and R&D Deputy Areas, the needs of the Kirtland's warbler's breeding habitat in the United States have been researched, documented, and integrated into the management of the Huron-Manistee National Forest. Millions of dollars have been spent to better manage the jack pine forests of northern and central Michigan, where Kirtland's warblers reside and breed in the summer season.



Researcher tagging red-legged thrush on Andros Island, Bahamas.

Photo courtesy of Joe Wunderle, USDA Forest Service

Despite all the conservation work focused on the Kirtland's warbler during the 3 months it spends in the United States, little else is known about this species during the other 9 months of the year. The Kirtland's warbler winters exclusively in the Bahamas and very little is known about its winter range and habitat requirements. The USDA Forest Service and The Nature Conservancy have formed a partnership that focuses attention on the Bahamas—the other side of the conservation equation. The USDA Forest Service contributors to this partnership are IP, the International Institute of Tropical Forestry, and the Huron-Manistee National Forest. This work complements the conservation investments made in the United States, and is vital in preparing and implementing conservation strategies necessary to save this species from extinction.

In March 2002, representatives from the Bahamas National Trust Ornithology Group and the USDA Forest Service International Institute of Tropical Forestry formed a team in the Bahamas to study the warbler. The team also included colleagues from The Nature Conservancy and the Bahamas Department of Agriculture. No one was expecting to spot one of these elusive warblers; however, the



Photo courtesy of USDA Forest Service

Kirtland's warbler.

group has now identified at least 30 individual Kirtland's warblers on the island of Eleuthera.

Initially surprised by the sightings, the researchers regained their focus and placed leg bands on six of the birds, a first for the species in the winter season. By studying the color-banded birds, the specialists were able to deduce that these particular birds reside at the Eleutheran site through most of the winter and leave for Michigan by early May. Over time, the researchers will learn more from these birds, especially what the birds need in the winter to survive and what researchers need to do to successfully recover this endangered species.

Winging Northward: A Shorebird's Journey

Shorebirds are true ambassadors for our world. Migrating to Alaska from many places, such as Mexico, Central and South America, Japan, Hawaii, and the West Coast of the United States, some shorebirds fly as many as 7,000 miles one way. Their numbers are declining, however, and scientists are concerned about their future.

To bring the excitement and understanding about shorebirds into classrooms, the educational program *Winging Northward: A Shorebird's Journey* was created. The program included a Web site and a culminating live, interactive television broadcast to teach students what they can do to protect shorebirds and their habitats.

Winging Northward combined distance learning with local classroom education, bringing over 500,000 students on a virtual field trip to a remote coastal community in Alaska. Aimed at fourth through eighth graders, this innovative program encompassed an entire curriculum that used shorebirds as a basis for a semester-long biology class. Students learned about migration, life history, and the importance of wetland conservation throughout the fly-way, from Alaska to South America.

Teachers from the United States, Canada, and Latin America signed up via the Internet (at <http://shorebirds.pwnet.org>) for the free service. The dynamic Web site contained a teacher resource center and exciting classroom activities that were correlated to national education standards. Part of the curriculum included Maya, a caricature of a western sandpiper (*Calidris mauri*) that traveled from Peru to Alaska. A poster contest had students drawing their way through shorebird migration. As the program progressed, students and teachers interacted by email with participants throughout the hemisphere. A total of more than 850 school districts registered, covering 30 States, Mexico, Puerto Rico, Brazil, and Canada. By the end of the broadcast, students were able to (1) describe how shorebirds are uniquely adapted to live in wetlands; (2) list the three habitat areas shorebirds need for a successful life cycle; (3) explain why shorebirds depend on wetlands in these three habitats areas for a successful life cycle; and (4) demonstrate that they can help wetlands by developing a class project that shares their new knowledge with others or helps protect a local wetland.



Photo courtesy of USDA Forest Service

Winging Northward Day on the Chugach National Forest.

This *Winging Northward* electronic adventure was a joint effort among the IP, Pacific Northwest Research Station, Ducks Unlimited, Chugach National Forest, U.S. Fish & Wildlife Service, Prince William Network, and Manomet Center for Conservation Sciences.

Inyo National Forest, Eastern Sierra Riparian Bird Study

The Eastern Sierra Riparian Songbird Conservation Project's principal goal is to develop baseline information on the riparian bird community and its habitats in eastern California. Songbirds are model organisms for monitoring the health of riparian systems and the effects of various land management practices on these systems.

This collaborative Partners in Flight effort includes Federal, State, and private organizations. Since 1998, the Inyo National Forest, in collaboration with the Bureau of Land Management (BLM) Bishop Field Office, California Department of Fish and Game, Point Reyes Bird Observatory, Eastern Sierra Audubon Society, Mono Lake Committee, Eastern Sierra Institute for Collaborative Education, Los Angeles Department of Water and Power, Sierra Nevada Aquatic Research Laboratory, Humboldt-Toiyabe National Forest, Cornell University, and the Mono Lake Tufa State Reserve, has gathered baseline songbird breeding and habitat data over a large portion of the eastern Sierra Nevada/western Great Basin regions. In 2000, the project expanded to more intensively investigate the riparian songbird breeding "hotspots" that the study identified in the Mono Basin, and the factors that influence bird abundance and productivity in these areas. Songbird habitat has gradually improved in the basin as a result of the rewatering of stream channels flowing into Mono Lake.

Project partners must continue to document and monitor these changes as part of the watershed restoration program. To investigate the potential impacts of pack-station operations and high-inten-



Western sandpipers on the Copper River Delta, Alaska.

Photo courtesy of USDA Forest Service

sity recreation sites—such as campgrounds and day-use sites—on songbird abundance, diversity, and productivity, the project expanded to include higher-elevation riparian habitats on the Inyo National Forest in 2001. Additionally, riparian study sites on BLM and Humboldt-Toiyabe lands within the East and West Walker River drainages were added. The study's long-term objectives are to monitor a subset of the vast array of existing monitoring plots to document bird population changes over time, provide outreach and education opportunities for biologists and the public, and continue to monitor riparian restoration projects in the eastern Sierra Nevada bioregion as recommended in the Sierra Nevada Partners in Flight Riparian Bird Conservation Plan.

The study has aided the Inyo National Forest in meeting its National Forest Management Act "management indicator species" monitoring obligations, which include monitoring riparian songbird populations and evaluating songbird species abundance, diversity, and productivity relative to habitat conditions and land management activities. Study results have improved scientific contributions to National Environmental Policy Act analyses and landscape analyses directed by the Sierra Nevada Forest Plan Amendment of 2001. In addition, the study is contributing to the forest plan revision process scheduled to begin in 2004. The process will include revising the forest plan management indicator species list to better reflect species that can indicate the effects of land management, as well as species that can be adequately monitored. This study is a landmark



Photo courtesy of Point Reyes Bird Observatory

Data collection in the field.

cooperative venture in the eastern Sierra that lives up to the vision of the Partners in Flight program and demonstrates how agencies and the public can pool their limited resources to accomplish regional, large landscape monitoring programs.

Northern Region Landbird Monitoring Program

The Northern Region of the USDA Forest Service has been using point count surveys to monitor landbirds every year since 1993. The program is operated in conjunction with the University of Montana and consists of two separate efforts conducted in alternating years: (1) monitoring more than 330 transects that are located in a geographically stratified random manner across all NFS lands in Montana and northern Idaho; and (2) monitoring the effects of specific USDA Forest Service management practices on birds across the region. The first



Photo courtesy of S. Maslowski, U.S. Fish and Wildlife Service

Bobolink.

component focuses on accumulating long-term bird population trends and habitat relationships data. The second component focuses on collecting short-term monitoring data to help answer specific questions posed by field personnel. These questions include describing differences in bird communities in relation to prescribed burning, sanitation timber harvest, and different grazing intensities in selected riparian habitats.

The landbird program is the first step in providing baseline information to assess trends in bird populations, gain a first approximation to bird habitat relationships, and suggest possible relationships between bird populations and USDA Forest Service management activities. Information obtained from these programs is being supplemented by more intensive investigations on demographics, habitat relationships, and the effects of management programs. The program has already resulted in a number of publications and has stimulated research projects by a number of investigators. Hutto and Young's review of the program is summarized in the Fall 2002 issue of *The Wildlife Society Bulletin*.

Over the years, this program has been very successful in recruiting new partners, including State wildlife agencies, private timber companies, tribal governments, and other Federal land management agencies such as the BLM, the National Park Service, and the National Wildlife Refuge System. Data from all cooperators are pooled, analyzed by the University of Montana, and made available to partners. Summary data are posted on the Web. Cooperation resulting from the USDA Forest Service landbird program has evolved into a statewide effort to monitor birds and their habitats across all of Montana. The Montana Department of Fish, Wildlife & Parks, Partners in Flight, and the other bird conservation initiatives coordinated this new and exciting effort called the Montana Bird Conservation Partnership. This partnership is well into its developmental stages and is envisioned to be a forum to implement comprehensive all-bird con-



Photo courtesy of Chris Page, USDA Forest Service

Landbird monitoring in Montana.

servation throughout the State. Idaho is now embarking on a similar program.

Hiawatha National Forest, Raco Plains Barrens Restoration Project

For a number of years, the Hiawatha National Forest has treated more than 400 acres annually to improve habitat for a host of wildlife species. The maintenance of openlands and pine barrens using management techniques that mimic the effects of historic, relatively frequent ground fires is a treatment emphasis. Several Regional Forester Sensitive Species and species of management interest, including the sharp-tailed grouse, prairie warbler, LeConte's sparrow, northern harrier, and upland sandpiper, have directly benefited from these habitat improvement efforts.

In fiscal year 2002, the Hiawatha National Forest and the Michigan Wildlife Conservancy (formerly the Michigan Wildlife Habitat Foundation) cooperated to maintain 150 acres of jack pine barrens on the Raco Plains in Michigan's eastern Upper Peninsula. Without intervention, the usefulness of this area as habitat for openland wildlife species was in jeopardy because of long-term fire exclusion and subsequent encroachment by woody vegetation. Intervention was also needed to perpetuate and stimulate a decade-old, 30-acre seeding of warm-season grasses. Fruit-bearing trees, such as sand cherry, hawthorn, and some jack pine, were retained to provide the structural diversity characteristic of a pine barren savanna.

The conservancy and Hiawatha National Forest shared the \$4,000 project costs. Implementation of

the project on the ground involved a two-step process spanning two seasons. In the fall of 2001, USDA Forest Service personnel began the preparatory work. Using a tractor and bush-hog, USDA Forest Service personnel mowed approximately 75 acres of outer perimeter which reduced woody vegetation, created a fuel break, and expanded the existing openland. During the spring of 2002, USDA Forest Service personnel established control lines and treated 75 interior acres with prescribed fire.

The Raco Plains Barrens Restoration project and other similar efforts have been very successful in maintaining and restoring openland wildlife habitat in the Hiawatha National Forest. Continued vigilance and active management will ensure that these important habitats remain a viable feature on the landscape.

"Citizen Science": A Partnership for Bird Conservation

In 1999, the Cornell Laboratory of Ornithology (Lab) entered into an agreement with the USDA Forest Service to develop and administer avian citizen science research opportunities on national forests and grasslands. The program encouraged partnerships by linking private citizens with USDA



Photo courtesy of Chris Page, USDA Forest Service

Field observations are critical.



Raco Plains Barrens, Hiawatha National Forest.

Photo courtesy of USDA Forest Service.

Forest Service personnel in avian research and monitoring. Two efforts resulted from the agreement, which continued from 1999 to 2002: *Birds in Forested Landscapes* and *Birds in Recreation Landscapes*.

In the first year, the partnership focused on the Lab's *Birds in Forested Landscapes* project, which investigated the effects of forest fragmentation on breeding thrushes and accipiter hawks throughout North America. A total of 110 citizen scientists contributed 2,300 hours to gather data at more than 300 study sites using a standardized protocol developed by the Lab and the USDA Forest Service. Accomplishments include the production of *A Land Manager's Guide to Improving Habitat for Scarlet Tanagers and Other Forest-interior Birds*, which was distributed to USDA Forest Service and other land managers. The partnership has produced additional guidelines for thrushes and hawks and used a new CD with songs of 50 high-priority forest bird species to study the habitat needs of these additional species throughout North America. Results of these studies are in several peer-reviewed scientific journals and are incorporated into Partners in Flight bird conservation plans.

The *Birds in Forested Landscapes* program was modified in 2000 to help the USDA Forest Service study the effects, if any, of recreation development on the presence and nesting success of forest-dwelling birds. In cooperation with the USDA Forest Service avian research community, the citizen science *Birds in Recreation Landscapes* program was developed. The project involved 100 campgrounds, with 90 citizens

contributing 3,000 hours. A final report showing the results of the project will be completed during 2004.

Humboldt-Toiyabe National Forest, Nevada Partners in Flight Bird Conservation Plans

The Great Basin Bird Observatory, Nevada Division of Wildlife, BLM, Lahontan Audubon Society, and USDA Forest Service joined together in 1993 as the Nevada working group of Partners in Flight.

The intent was to create a cooperative, multientity process to address management concerns for the birds of Nevada. Since that initial partnership was formed, the Nevada Partners in Flight published the Nevada Partners in Flight Bird Conservation Plan (Neel 1999). This citizen-based, habitat improvement plan is coordinated at the State level and is designed to (1) recruit and combine funding; (2) develop and implement long-term monitoring efforts that establish bird population trends and predict effects from land management activities; and (3) plan and implement conservation education that develops public support for implementing the plan.

The implementation of the plan is based on strong collaboration among agencies, nonprofit organizations, and individuals throughout the State. This collaborative process has resulted in several accomplishments to benefit birds in the State of Nevada. The Humboldt-Toiyabe National Forest has been a leader in completing several of these efforts. They include the following:



Citizen science volunteers.

Photo courtesy of Barb Kott, USDA Forest Service.



Western tanager.

Photo courtesy of Gary Kramer, U.S. Fish and Wildlife Service

- **The Nevada Breeding Bird Atlas.** Through a multiyear agreement with the Great Basin Bird Observatory, the forest was a major participant in completing the Nevada Breeding Bird Atlas in 2002. This volunteer-based, statewide effort has developed species lists for each county in Nevada, species accounts for each bird recorded, and interpretation of these data for land managers to predict species presence when completing land management analyses.
- **Nevada Breeding Bird Monitoring Project.** In 2002, the Humboldt-Toiyabe National Forest, in partnership with Nevada Partners in Flight, initiated the first year of the Breeding Bird Monitoring Plan. This plan includes (1) providing a continuous, long-term, extensive point-count sampling effort that will allow future population trend analyses for birds of Nevada's major habitat types; (2) addressing bird monitoring needs identified in the Nevada Partners in Flight Bird Conservation Plan as thoroughly as feasible, given funding limitations; and (3) providing resource managers with a database for tangible uses while also meeting the criteria of random statewide sampling. This is a volunteer-based monitoring project implemented through an agreement with the Nevada Division of Wildlife, BLM, and Great Basin Bird Observatory.

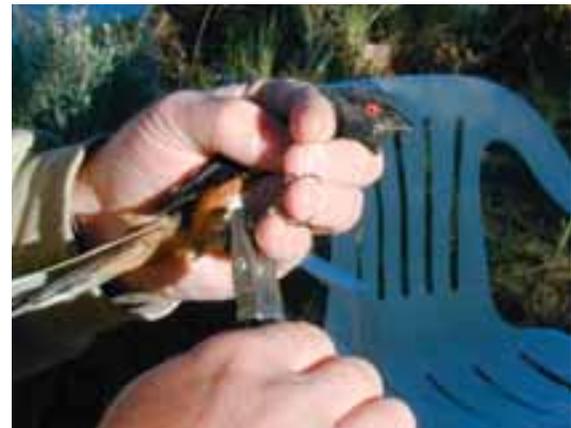
International Grassland Bird Conservation

Historically, grassland birds were found in vast numbers across the prairies of the western Great Plains. These species migrate annually between Canada, United States, Mexico, and countries farther south for the nonbreeding season. Today, these

grassland birds (for example Sprague's pipit, Baird's sparrow, horned lark, Cassin's sparrow, grasshopper sparrow, burrowing owl, lark sparrow, ferruginous hawk, bobolink, and mountain plover) are showing steeper, more consistent, and more geographically widespread population declines than any other group of North American migratory bird species. Leading threats and causes for these declines are grassland loss and fragmentation, livestock grazing, energy development, invasive species, and pesticide use, on both the breeding habitats in the United States and Canada and the wintering grounds south of the United States.

In 2002, a new partnership among the USDA Forest Service Northern Region, Rocky Mountain Research Station, IP, The Nature Conservancy's Prairie Wings initiative, and the Northern Great Plains Joint Venture (NGPJV) was formed to lead an international effort to reverse population declines and conserve grassland bird species. The USDA Forest Service Northern Region and The Nature Conservancy are leading the effort.

In the summer of 2001, the Dakota Prairie Grassland hosted several Mexican biologists and scientists, under the joint sponsorship of The Nature Conservancy's Prairie Wings initiative and the IP. In February 2002, personnel from the Dakota Prairie



Spotted towhee being banded.

Photo courtesy of Great Basin Bird Observatory



Black tailed prairie dog town in Janos, Northern Mexico.

Grassland, Thunder Basin National Grassland, and Nebraska National Forest participated in a northern Mexico grassland habitats tour with Mexican biologists and conservationists, and The Nature Conservancy. Subsequently, IP sponsored a partnership team meeting in Bismarck, ND, to advance the partnership action plan.

Through these exchanges, the partners have identified the need to use intensive and extensive grassland bird surveys in northern Mexico to determine focus species distributions. Also, IP is sponsoring development of management plans for bird habitats on the Janos and Saltillo grasslands in northern Mexico, both essential habitats for survival of grassland bird species that migrate from the United States and Canada. New partners and funding have been secured to track ferruginous hawks (*Buteo regalis*) through the application of satellite telemetry and feather stable isotope markers. In the winter of



The Nature Conservancy, USDA Forest Service, and Mexican grassland bird conservation partners.

Photo courtesy of John Sidle, USDA Forest Service

2002, two ferruginous hawks in Mexico were fitted with satellite transmitters. This research will make it possible to identify which Mexican grassland areas are key to ferruginous hawk and other grassland bird populations during the nonbreeding season as well as show where these birds spend the breeding season in the United States and Canada.

This partnership between the NFS, R&D, and IP demonstrates effective interdeputy collaboration. Working with The Nature Conservancy and others, this effort serves as an excellent example of the “integrated all-bird conservation” embodied in the vision of the North American Bird Conservation Initiative.

Lower Mississippi Valley Large-Scale Watershed Project

The Lower Mississippi Alluvial Valley covers more than 24 million acres in parts of seven States extending from southern Illinois to the Gulf of Mexico. Historically, the valley was largely bottomland hardwood forest. Flooding of the mighty Mississippi River and its tributaries shaped this land and the migratory bird habitats found there. Rich soils left by these floods produced a vast, forested wetland that sheltered a great diversity of wildlife. Unfortunately, by the 1980s, human intervention had reduced the original forest by more than 80 percent.

The USDA Forest Service’s Center for Bottomland Hardwood Research, in Stoneville, MS, provides an important source of knowledge and information about this bottomland hardwood ecosystem. Wildlife studies at the center document the effects of management activities in the bottomland hardwood ecosystem on the associated terrestrial animal communities. One of the primary focuses of the work is assessing management effects on, and determining silvicultural prescriptions for, neotropical migratory birds, whose populations in these fragmented habitats are limited. The center conducts research on the distribution and abundance of the

Photo courtesy of John Sidle, USDA Forest Service

Cerulean warbler (*Dendroica cerulean*), a neotropical migrant that winters in the Andes of South America. This species' population numbers have declined by more than 50 percent in the past three decades, and it has been petitioned for listing under the Endangered Species Act.

The USDA Forest Service is a member of the Restoring the Delta partnership with Ducks Unlimited, Inc., and many other partners. The goal of this partnership is to develop a strategic alliance to help landowners establish a watershed approach to sustaining the ecological integrity of the valley's bottomland hardwood ecosystem. More than 90 percent of the valley is privately owned, so developing economically viable options is critical to restoring and sustaining the valley's ecological values. To that end, the USDA Forest Service hired a valley watershed coordinator to guide restoration of bird habitats in the valley. To date, the Delta National Forest has completed some very important wetland conservation projects with partners. These project areas will serve as anchor points for conserving many migratory bird species.

Recently, the USDA Forest Service Forest Legacy Program acquired the 12,856-acre Anderson-Tully



Aerial photo with graphic overlay of the Anderson-Tully acquisition in Tennessee.

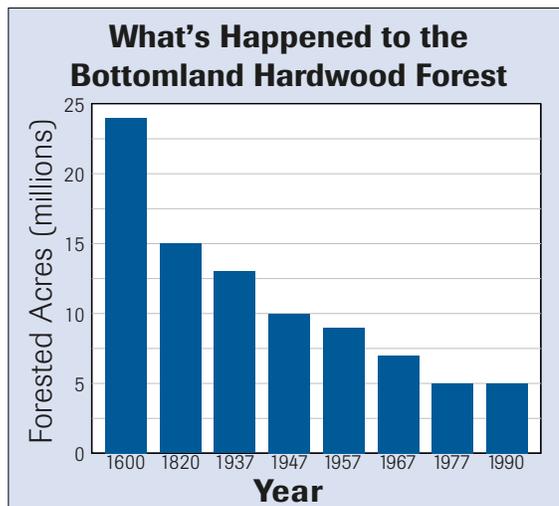
Photo courtesy of The Nature Conservancy

property, an important tract of privately owned bottomland hardwood forest on the Mississippi River in west Tennessee. This tract of land is located at the confluence of the Hatchie and Mississippi rivers and is connected to 24,000 acres of public lands that include Lower Hatchie National Wildlife Refuge, Cold Creek State Wildlife Management Area, Sunk National Wildlife Refuge, Fort Pillow State Park & Prison Farm, and the mid-Mississippi Alluvial Valley (MAV)-Fullen State Wildlife Management Area.

The restoration journey has begun. Numerous agencies and organizations including the U.S. Fish and Wildlife Service, Ducks Unlimited, State natural resource agencies, USDA Forest Service, Natural Resources Conservation Service, Corps of Engineers, Environmental Protection Agency, Business Council for Sustainable Development, Delta Council, and Lower Mississippi Valley Joint Venture, are playing a variety of roles in restoring this valuable bottomland hardwood ecosystem.

Vegetation Structure and Wildlife Distribution

Scientists at the Northeast Research Station are investigating the relationships between New England forest habitats and wildlife. Research efforts are directed at the distribution and ecology of vertebrates in relation to forest habitat and management practices. Projects include the distribution



Acreeage of bottomland hardwood forest in the Lower Mississippi Alluvial Valley.

of birds in relation to forest cover type, size-class, and habitat structure; the distribution of birds, small mammals, and amphibians to forest/clearcut borders; the predation rates of real and artificial nests in relationship to landscape characteristics, forest/clearcut borders and roads; the distribution and reproductive success of early successional shrubland birds in relation to patch size and plant succession; the identity of nest predators on real and artificial nests as indicated by still photography and videography; the habitat use and habitat-specific survival of fledgling neotropical migrants; and, most recently, the distribution and reproductive success of shrubland birds in powerline rights-of-way.

The research is designed to answer questions managers posed about the effects of their practices on wildlife. For this purpose, coarse-grained investigations of animal distribution in relation to habitat and management provide a valuable approximation of the effect of management on wildlife. Source-sink dynamics can, however, obscure the relationship between animal distribution and habitat quality because animals regularly reside in suboptimal habitats in which they are unable to reproduce successfully. Therefore, research emphasizes the effect of habitat and management practices on fitness, including nest success, net seasonal productivity, and fledgling survival, as well as the mechanisms

affecting bird distribution and fitness among habitats. This detailed level of study gives managers access to accurate and comprehensive information on the effect of their practices and policies on wildlife populations.

The process of identifying research questions, designing and conducting research projects, and ensuring that the information reaches the research community, resource managers, and the public involves a wide range of participants. Research questions are frequently identified through consultations with national forest biologists and personnel from State land management agencies and non-governmental organizations (NGOs). National forest managers' frustration regarding a paucity of data from extensively forested landscapes resulted in earlier investigations of bird distribution and fitness in relation to forest management. Researchers are initiating projects now on the management of early successional communities using wildlife habitat openings in response to requests by national forest and State management agencies. Through cooperation with the Massachusetts Audubon Society, research is underway on the management of powerline rights-of-way with a grant from Northeastern Utilities.

The products and outcomes include numerous publications in peer-reviewed journals and talks at



Photo courtesy of Dick DeGraaf, USDA Forest Service

Even-aged management of spruce-fir stands in the White Mountains of New Hampshire provides habitat for a diverse array of birds.

scientific conferences; however, researchers make an effort to ensure that the results reach managers and the public as well. For example, researchers are in close communication with biologists on the nearby White Mountain National Forest, and are regularly called upon to lend expertise to the national forest in meetings and on panels. Research results are incorporated in White Mountain National Forest policies, and are widely used by professional consultants and NGOs as well. Also, in cooperation with other scientists from the Northeastern Research Station, researchers have provided explicit guidelines for the management of wildlife habitats in “New England Wildlife: Management of Forested Habitats” (NE-144). This publication was recognized by a Chief’s Award for Technology Transfer in 1994. Finally, research results are available to the public in the form of popular articles in outlets such as the Woodland Steward, the publication of the Massachusetts Forestry Association.

Forest Management for the Red-cockaded Woodpecker

The red-cockaded woodpecker (*Picoides borealis*) received legal protection in 1973 under the Endangered Species Act. Adapted to live in old-growth pine forests of the Southeastern United States, this woodpecker has nearly disappeared as these forests have been cleared for and fragmented by agricultural, commercial, and residential uses over the last two centuries. Fire suppression has disrupted the natural frequent fire regime that normally removes the hardwood mid-story at 1- to 3-year intervals, maintaining an open park-like pine habitat the woodpecker prefers. In the altered forested landscape of the South today, active forest management is necessary to create and maintain conditions essential to the perpetuation of the species.

To understand the management needs of the red-cockaded woodpecker, many USDA Forest Service researchers have studied habitat relationships of the species. At the Southern Research Station in

Nacogdoches, TX, researchers have focused on the special characteristics of living pines as cavity trees for the red-cockaded woodpecker. Researchers have found that pines suitable for cavity excavation generally exceed 100 to 120 years in age, possessing heartwood of sufficient diameter to permit cavity placement well above the fires that naturally frequent these pine systems. Older pines also have a higher rate of occurrence of red heart fungus that decays the heartwood, allowing easier cavity excavation. Preferred cavity trees have relatively thin sapwood, further reducing excavation time. Still another characteristic of suitable cavity trees is their ability to produce resin in adequate quantity and with a particular chemical makeup. The woodpeckers excavate resin wells above and below cavity entrances that create effective barriers to predation by rat snakes.

The extended length of time required to excavate cavities and the complexity of factors that dictate cavity tree suitability result in a natural rarity of suitable cavity trees and, therefore, cavities in the ecosystem. With the substantial alteration of these ecosystems by human activity further eroding available suitable habitat, research to understand the



Red-cockaded woodpecker.

Photo courtesy Graig Rudolph/Richard Conner, USDA Forest Service



Photo courtesy of USDA Forest Service

Red-cockaded woodpecker nest box placement.

needs of the species and inform targeted management has become vital to the recovery of this unique species.

Northern Goshawks and Implications for Forest Management

Concern has arisen that northern goshawk populations may be declining across the country due to habitat loss associated, in part, with forest management practices. The Rocky Mountain Research Station, along with eight cooperating scientists, is leading a 13-year project on the Kaibab Plateau in Arizona to increase understanding of the relationship between goshawks (*Accipiter gentilis*) and forestry practices. An overarching, long-range goal of this research is the refinement of forest management recommendations from the southwestern region and their adaptation across the range of the goshawk.

A goal of this research is to understand what constitutes quality goshawk habitat, accomplished by

identifying the links between goshawk demography and the composition, structure, and landscape patterns of their habitats. Specific objectives of this research include (1) estimating age-specific survival and reproductive rates of the Kaibab goshawk population; (2) determining the relative importance of limiting factors such as habitat, food, predators, and competitors on goshawk survival and reproduction; and (3) identifying the vegetation attributes that help define habitat quality.

Researchers should understand juvenile population dynamics to determine how forest management practices influence goshawk populations and permit identification of post-fledging habitats. Findings are also contributing to an understanding of emigration and immigration patterns and their implications for gene flow among western goshawk populations, factors vitally important to the persistence of regional populations. This information will improve targeted management and conservation strategies at local and regional scales.



Photo courtesy of USDA Forest Service

Northern goshawk captured in Ponderosa pine forest, Kaibab Plateau.

Research is also targeting the vital role of, and factors related to, food abundance in the nesting success of goshawks. Results reveal that variation in goshawk reproduction closely tracks variations in prey abundance. To help understand the factors affecting prey abundance, researchers are investigating possible correlations with forest type, management prescription, and climatic variations associated with wet and dry cycles.

Goshawks placed competing with red-tailed hawks (*Buteo jamaicensis*) for food is another potential limiting factor under investigation. Results suggest that as forests are opened and fragmented, occupation



Northern goshawk.

Photo courtesy of USDA Forest Service

by red-tails increases, leading to direct dietary competition with goshawks and loss of quality nesting sites formerly available to goshawks.

Constraints placed on reproduction and population size by the availability of quality nesting habitat is another factor under investigation. Spatial habitat modeling shows that suitable nest habitat is abundant and randomly distributed, and, therefore, not limiting the breeding population. Instead, territoriality appears to set the population limit. Choice of nest location is, therefore, constrained by the availability of suitable habitat within spaces defined by neighboring territories.

Study results are validating existing management recommendations, and yielding more management tools. For instance, the habitat model discussed above may be used to simulate the effects of forest change through management and/or natural disturbance on goshawk populations. By modeling population dynamics within simulated landscapes, researchers can learn how many reproductive pairs are needed within a region to maintain viable populations.

Nicatous Lake Forest Legacy Project

Hancock County, ME, is home to 20,268 acres of land around Nicatous (pronounced Nic-a-TAO-is) and West Lakes. A conservation easement created April 24, 2000, protects the land from future development. The property contains 34 miles of shoreline, seven remote ponds, wildlife habitat, and a large

block of contiguous forest land. It offers hiking, boating, camping, hunting, and fishing opportunities.

The Trust for Public Land, the Forest Society of Maine, and Maine Coast Heritage Trust pooled their skills and resources to bring the project to fruition. They worked with the landowners, Robbins Lumber and Champion International, to shape a conservation easement on the property. This coalition of nonprofits brought the project before Maine's Forest Legacy committee, where its outstanding attributes made it a top priority for Forest Legacy funds. The USDA Forest Service also promoted the project nationally.

Maine's congressional delegation secured \$3 million from the Forest Legacy Program, and the Land for Maine's Future Program allocated \$750,000 toward the acquisition of the Nicatous and West Lakes conservation easement.

The Forest Legacy Program protects important forests from conversion to nonforest uses. These forests provide essential wildlife habitat, protect water quality, offer outstanding recreation opportunities, afford outstanding scenic views, are home to historic sites, and provide the opportunity to continue traditional forest uses. A Federal-State partnership allows landowners to keep their land private



Nicatous Lake Forest Legacy Project, Maine.

Photo courtesy of Neal Bungard, USDA Forest Service

while ensuring it remains forest forever through the use of conservation easements.

The Nictaus Lake Forest Legacy project won the Habitat Award, one of four Taking Wing awards for 2001. The mission of Taking Wing is to be a partner in managing wetland ecosystems for waterfowl

and wetland wildlife. Each year the Taking Wing program presents awards to USDA Forest Service units/employees and partners who enhance wildlife habitat. This is the first time a Taking Wing award has been awarded to a USDA Forest Service S&PF project.

USDA FOREST SERVICE COURSE TO THE FUTURE

The USDA Forest Service still has work to do in bird conservation. In the next decade, the agency, as a leader in bird conservation nationally and internationally, will strive to meet bird conservation challenges and address unmet opportunities in a proactive and cooperative manner. Bird conservation leadership will—

- Restore, enhance, and maintain habitat for native bird populations;
- Work nationally and internationally to protect the full life-cycle needs of birds;
- Strengthen bird research and monitoring and integrate results into programs and activities using an adaptive management approach;
- Actively participate in national and international bird initiatives and partnerships;
- Pursue opportunities to work outside of national forest and grassland boundaries, and across all land ownerships; and
- Enhance and exchange bird conservation knowledge with cooperators and the public.

To meet these goals, the USDA Forest Service bird conservation program's course to the future includes land managers, scientists, conservation partners, and the general public—

- Joining together to manage ecosystems in a manner that promotes bird conservation and the conservation of biological diversity due to an awareness and understanding of the importance of resident and migratory birds and their habitats.
- Integrating bird conservation objectives into land management planning and considering the impacts on bird populations and habitats in making land management decisions.

- Continuing to provide quality opportunities for the public to participate, learn, and share in “all-bird” conservation activities and educational events on national forests and grasslands.
- Continuing to recognize national forests and grasslands as providers of essential bird habitat and outstanding birding and hunting opportunities.
- Viewing the program as an integral part of the USDA Forest Service's major initiatives and strategies, such as the National Fire Plan and the Healthy Forests Initiative.
- Accepting the program as a model for how government agency conservation programs can be effective. Working with a wide array of partners, from conservation groups and other Federal, tribal, and State agencies to communities and individual citizens, the USDA Forest Service serves as a catalyst that brings disparate interests together to enhance bird conservation. Encouraging and supporting participation of partners to fuel the sustained vibrancy and quality of the program.

Further, these goals will be achieved by accomplishing the following:

- Strengthening the agency's work with other Federal, State, and local agencies, tribal governments, NGOs, and willing private landowners in assessing the state of our Nation's bird resources and identifying research and conservation priorities.
- Renewing the agency's commitment to high-quality research to understand the causes of

avian declines and to inform management decisions.

- Striving to protect, restore, and enhance habitat of all birds and prevent or minimize the loss or degradation of habitats on NFS lands.
- Emphasizing an interdisciplinary, collaborative approach to migratory bird conservation in cooperation with other governments, State and Federal agencies, and nongovernmental partners within the framework of the North American

Bird Conservation Initiative's Bird Conservation Regions.

- Working with domestic and international partners to promote migratory bird conservation internationally.

The USDA Forest Service looks forward to working with other agencies and conservation partners to deliver its bird conservation vision for the future.



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