



The All-Bird Bulletin

Bird Conservation News and Information

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Landscape Conservation In Action

Roxanne Bogart, Wildlife Biologist, U.S. Fish and Wildlife Service

What does it take to conserve birds or any wildlife species for that matter? The array of activities being undertaken to halt the decline and loss of bird populations is impressive. From voluntary stewardship and species reintroduction to decision support tools and technical assistance capacity building.

Articles in this issue of *The All-Bird Bulletin* present the work of a diversity of conservation partners, from one private landowner dedicating his retirement to stewarding habitat for a severely declining grouse species, to partnerships of public and private organizations taking on strategic monitoring and management of waterbird species across three U.S. Fish and Wildlife Service regions.

Articles in this issue also present several of the U.S. NABCI Committee's priority themes: building on-the-ground biological capacity to carry out private land conservation, promoting coordinated monitoring, working internationally for Neotropical migrants within North America and beyond, and working effectively with federal agencies to promote responsible stewardship of lands under their ownership for species in need of conservation.

What ties these articles together is an approach that lies at the heart of what is needed to make a difference for wildlife in the 21st century: landscape conservation that is strategic, collaborative, and adaptive. It involves planning for the biological needs of species in the context of population and habitat dynamics and ecological processes occurring across the landscape. It involves determining how populations are limited to target conservation action where it can address underlying problems and do the most good. It involves working together toward common goals and pooling resources and capacity to make a lasting difference across the landscape. It requires us to be reflective and constructive, learning from and building on our efforts, and increasing our ability to adapt to changing conditions.

The article by Jorge Coppen on page 17 entitled, *Integrated Waterbird Monitoring and Management*, presents the full cycle of strategic habitat conservation, which entails biological planning, conservation design, conservation delivery, outcome-based monitoring and assumption-driven research. The other articles present the detailed workings of individual components of this approach, which may or may not be linked into a broader cycle.

Throughout this issue, partners are generating and using information and techniques to better understand and conserve bird species in specific landscapes, and learning from their efforts to improve them over time. Our challenge now is to use this science-driven, adaptive approach on an even greater scale by working together toward a shared vision of landscape conservation for birds.



Advancing integrated bird conservation in North America

Landowner Dedicates Retirement to Conserving Lesser Prairie-Chicken

Christopher Rustay, Conservation Delivery Leader, Playa Lakes Joint Venture

In the late 1980s, Jim Weaver retired from his work with the Peregrine Fund and moved to a ranch in southeastern New Mexico, an area where decades before he had hunted Lesser Prairie-Chicken with his falcons, hoping to do so again. Little did he realize how the plight of the prairie-chicken had continued to evolve and how immersed he would become in efforts to conserve this bird.

The Lesser Prairie-Chicken is a prairie grouse species that may be added to the Endangered Species List. One of very few birds endemic to the United States, it is only found in a five-state area of the Southern Great Plains. Its habitat is comprised of grasslands and shrublands, including shinnery, a climax plant community of shin-oak and grasses that grows on sandy plains, sand dunes, and sand hills and is endemic to the region. Whole-scale conver-

sion to agriculture, expansion of oil and gas exploration, and habitat degradation and fragmentation have had a tremendous negative impact on this bird. Once estimated to have a population of over five million, the Lesser Prairie-Chicken has now been reduced to approximately one percent of that figure.



Jim Weaver. © Weaver Ranch.

When Jim moved to his ranch near Lingo, New Mexico, he found himself in an area of Lesser Prairie-Chicken abundance and also at the center of a controversy about how to manage the land for this species. Within the state, movements were afoot to designate the Lesser Prairie-Chicken as threatened. Conservationists were concerned about eradication of shin-oak, the primary shrub in shinnery, and oil and gas exploration was booming, causing additional concern. In 2001, the Bureau of Land Man-

agement convened a working group of ranchers, environmentalists, oil and gas representatives, and federal and state agency representatives to develop plans to conserve the Lesser Prairie-Chicken and Sand Dune Lizard, which occupy much of the same habitat. The effort took significantly longer than expected but resulted in a workable plan (the "Conservation Strategies") that has been in the implementation stage ever since.

Some of the recommendations of this plan were to determine appropriate land management techniques, including how and where to manage shin-oak. The prevailing theory was that the prairie-chicken did best when there was a monoculture of this shrub across the landscape. Weaver, having seen what the landscape looked like over several decades and how shinnery and grass coexisted under differing conditions, didn't believe this theory and set out to prove otherwise. On his ranch, he worked to suppress shin-oak on areas between sand dunes but allowed the oak to maintain its presence on the dunes, where it kept the dunes stable.

In addition, through the Grasslands Charitable Foundation, which he helped to start, he funded a ten-year study on the effects of this type of land management on the Lesser Prairie-Chicken as well as on the rest of the ecosystem, including other grassland birds. He wanted to run a viable cattle ranch, so he worked with researchers to set stocking and rotation rates to allow for an appropriate experimental design. He also developed a working relationship with several researchers at Texas Tech University, across the border in Lubbock, Texas, and allowed students to conduct research on his ranch using the research design already in place.

Weaver's conservation efforts didn't stop at his property line. He supported a New Mexico Department of Game and Fish large-scale study of the Lesser Prairie-Chicken by providing a research base for biologists from the Sutton Avian Research Center out of Oklahoma. When he saw the researchers needed a local base, he bought a building in the town of Milnesand and loaned it to the researchers.

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Once a year, the yard of this facility is now converted to a camping area to house participants of the Milnesand Lesser Prairie-Chicken Festival, which Weaver helped start in conjunction with the New Mexico office of The Nature Conservancy. This festival, now in its eleventh year, allows visitors to watch and photograph—in a responsible way—Lesser Prairie-Chickens dancing on their leks. In addition, festival attendees are educated on Lesser Prairie-Chicken biology, conservation efforts, and history and ecology of the area, including birds, playas, plants, and reptiles.

Since then, Jim has been busy expanding his ranch to create large areas of unfragmented landscape for the Lesser Prairie-Chicken and now has about 25,000 acres under his management. To offset the increasing amount of sod-busting occurring in the region, he has placed most of those acres into the Natural Resources Conservation Service Grassland Reserve Program, which provides a permanent easement so that the lands will not be broken up. With this expansion, his ranch now abuts several New Mexico Department of Game and Fish Lesser Prairie-Chicken and Wildlife Management areas—amplifying benefits to the prairie-chicken.

The study on Weaver's ranch has now concluded and several research papers detailing the findings will be coming out in the near future. The first of these was presented at the Prairie-Grouse Technical Council meetings in Kansas this October. The study proved what Weaver had known all along: that low doses of chemical treatment on shin-oak and maintaining a mosaic of grass and shrubland will provide appropriate habitat for the Lesser Prairie-Chicken—habitat they can “hide in, see out of, and walk through.” The only treatment that did not provide appropriate habitat was in the pasture that was treated, but not grazed. The supposition is that the grasses that returned became too dense to allow for nesting.

Other results showed that three years after treatment all the components of a healthy prairie had returned in force, including a variety of prairie forbs, critical to young chicks as they mature during the summer. Nesting by the chickens was documented only several years after the treatments began, bolstering evidence obtained from Kansas that these birds take some time before re-occupying appropriate habitat.

In addition, the treatment provides for a much greater diversity of prairie birds than a monoculture of shin-oak. Loggerhead Shrike, Grasshopper Sparrow and both meadowlark species breed in this restored habitat, while hordes of Chestnut-collared Longspur and several grassland sparrows occupy the ranch in the winter. Lark Buntings migrate through in large numbers in both spring and fall, while Ferruginous Hawk and Prairie Falcon hunt over the prairie.

Weaver's plans for the future include reintroducing fire to the landscape and learning how the birds adapt. All these studies have and will continue to contribute to critical knowledge gaps in the ecology of this threatened bird.

For Weaver, what began as a love of hunting with falcons became an obsession with his intended prey. He has come to understand, appreciate, and love the bounty that managing appropriate habitat for Lesser Prairie-Chicken can provide.

For more information, contact Christopher Rustay, Playa Lakes Joint Venture, christopher.rustay@pljv.org.



Lesser Prairie-Chicken. / Noppadol Paothong

The San Juan Islands Western Bluebird Reintroduction Project: Success in the Pacific Northwest

Bob Altman, American Bird Conservancy, Northern Pacific Rainforest Bird Conservation Region Coordinator/Landbird Science Coordinator, Pacific Coast Joint Venture

The phrase “If you build it, they will come,” made popular by the movie *Field of Dreams*, is sometimes used in the bird conservation community. It suggests that if you restore or create the right habitat, target species that have abandoned an area will re-inhabit it. This works a lot of the time, but there are some instances when more help is needed to establish or enhance bird populations. One of America’s most charismatic birds – the Western Bluebird – provides a perfect example.



Recently fledged juvenile male Western Bluebird born on San Juan Island, Washington from adult birds translocated from Fort Lewis Military Installation. / Kathleen Ballard

Western Bluebirds were common in oak-prairie habitats on the San Juan Islands in northwestern Washington in the 1930s, but were extirpated as a breeding species in the early 1960s. By 1990 they had disappeared throughout their historic range in northwestern Washington and southwestern British Columbia. The cause of this extirpation was the loss and degradation of the bluebird’s preferred prairie-oak habitat, especially the routine removal of standing dead trees (snags) for safety or aesthetic reasons. This led to a reduction in tree cavities the birds use for nesting. Additionally, the arrival of non-native European Starlings in the 1950s, which aggressively compete for nesting cavities, likely accelerated bluebird declines and extirpations.

As late as 2007, the nearest Western Bluebird population to the San Juan Islands—the northernmost extent of their range on the West Coast—was approximately 100 miles south at the Fort Lewis Military Installation (subsequently renamed Joint Base Lewis McChord) near Olympia, Washington. This population has significantly expanded from four pairs in 1981 to well over 200 pairs thanks to groups of volunteers initiating a nest box program that provided additional cavities for nesting bluebirds that excluded starlings. Unfortunately, the likelihood of individuals from this expanding population recolonizing the San Juan Islands was low—the intervening 100 miles is mostly unsuitable habitat associated with the Seattle metropolitan area and waters of the Puget Sound.

Starting in 2007, American Bird Conservancy, along with numerous partners, cooperatively launched a hands-on effort to bring the Western Bluebird back to the San Juan Islands. Biologists employed the technique of translocation, whereby birds from established populations are captured, transported, and released into suitable but unoccupied habitat elsewhere. Birds were translocated from the expanding Fort Lewis population to San Juan Island using the successful reintroduction of Eastern Bluebirds to Everglades National Park as a model.

“Western bluebird recovery is important to Joint Base Lewis McChord because it supports the Installation Sustainability Program’s goal of recovery of all rare and listed species in the region,” said Jim Lynch, Fish and Wildlife Biologist for the Fort Lewis Fish and Wildlife Program. “By proactively seeking to recover the bluebird to its historic habitat, we help to eliminate the need for Endangered Species Act listing, and reduce future impacts to Fort Lewis and its military training requirements.”

Over the course of the five-year project, 42 translocations were conducted using a soft-release technique of aviary confinement and acclimatization prior to release. Overall, 80 adults and 26 dependent nestlings have now been released on San Juan Island. Successful breeding occurred in each year, and both translocated individuals and their offspring have returned from wintering grounds to reproduce successfully, producing 212 fledgling birds during the five years of the project.

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Intensive monitoring indicates that the population has grown in each year of the project, with annual increases in the number of territories, the number of nests, and the number of returning, non-translocated adults, which, in 2011, surpassed the number of translocated birds in the population—21 compared to 17. In 2011, there were 14 breeding pairs of Western Bluebirds that fledged 74 birds.

“These parameters indicate that progress is being made towards our goal of establishing a self-sustaining population,” notes Bob Altman, who is American Bird Conservancy’s Project Manager. “It is gratifying to have the hard work of so many people bear fruit, with the result that we now see these birds coming back to an area they had once called home. There is more to be done, but we are very optimistic about the future of this population.”

In tandem with the translocations, project partners also are working to conserve the prairie-oak ecosystem that the birds depend on, both through protection of habitat and education and outreach. Toward that end, the San Juan Preservation Trust made a key land acquisition—120 acres in the center of the San Juan Valley—which hosts two nesting pairs of bluebirds, and is a primary location for bluebird congregations during the post-breeding season. In addition, approximately 600 nest boxes have been put up on the islands to provide nesting opportunities for the returning birds. The nest boxes were made by children from the Friday Harbor Elementary School Winter Enrichment Program, inmates in the Washington Department of Corrections’ Sustainable Prisons Project, and many local volunteers.

“The project would not have been possible without the volunteer commitment of numerous people on the San Juan Islands, who hosted aviaries and nest boxes on their properties, helped construct nest boxes and move aviaries, provided materials and project equipment, transported birds from Fort Lewis to San Juan Island in private planes, and helped monitor nest boxes and look for released birds,” says Altman. “I don’t know of any other bird reintroduction project that relied completely on so many individual private landowners.”

Education and outreach has been a cornerstone of the project from the initial public meetings that kicked-off the project to the recent five-year “public party,” recognizing the efforts of the citizens of the San Juan Islands. Project partners staffed a booth at the local Farmers Market, conducted a bicycle tour of bluebird nesting sites, and taught a bluebird ecology class at the local elementary school, which culminated in nest box building by the kids (with adult supervision!). The project—and the message of prairie-oak conservation—have been featured numerous times on local television and in newspaper and magazine articles. A 12-minute video of the project can be seen on ABC’s Bird News Network (http://www.youtube.com/abcbirds#p/u/15/rA0awxtfa_k). One of the most rewarding outcomes of the education and outreach efforts was the 2010 Disney Conservation Hero Award given to Kathleen Foley of the San Juan Preservation Trust for her remarkable efforts on this project. There were only six awards that year, and she was the only North American recipient.

No birds will be translocated to San Juan Island in 2012; instead the program will be moving into a two-year monitoring phase to determine the stability and growth of the population, and the potential need for future population management. “We are very pleased to have achieved our goal of establishing a breeding population, however, 14 pairs is by no means a large enough population to be considered secure, so we are exploring ways to enhance it beyond the initial five-year period,” said Gary Slater, project Field Coordinator of Ecostudies Institute.



Shaun Hubbard with nestling bluebirds translocated along with their adult parents to San Juan Island, Washington from Fort Lewis Military Installation. / Lauren Ross

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Out of the Mists Comes Knowledge of Little-Known Endemics, as Researchers Band Together to Predict a No-analog Future

Pablo Elizondo, Instituto Nacional de Biodiversidad (INBio), Costa Rica, C. John Ralph, U.S. Forest Service, Pacific Southwest Research Station, Jared D. Wolfe, School of Renewable Natural Resources, Louisiana State University Agricultural Center and Louisiana State University, Costa Rica Bird Observatories

In the morning mist, high in the mountains at one of Central America's premier birding sites, three biologists clad in typical field garb chat quietly in Spanglish, as they squish along a muddy trail, stopping occasionally to carefully remove birds from mist nets. This scene is increasingly being played out across Costa Rica at the burgeoning bird monitoring stations of the Costa Rica Bird Observatories.

The concept of a bird observatory in Costa Rica began in 1994, as a bird monitoring project using seven bird banding sites around the picturesque coastal Caribbean village of Tortuguero, long considered a focal area for migrant birds. Banding sites in Tortuguero now encompass a variety of habitats, thereby providing insight into the natural history of a wide variety of migrant and resident birds. Linked by canals, the stations are accessed by field crews in the pre-dawn darkness during most months of the year.



One of the most colorful birds in Costa Rica, Golden-hooded Tanager (with fruit in its beak) is restricted to Central and Northern South America. / Pablo Elizondo

Mornings at Tortuguero banding sites are enthralling: Bicolored Antbirds announce their arrival at ant-swarms, while Western Slaty-Antshrikes solicit neighboring birds to join their foraging flock. Afternoons are spent counting migrating swallows, dipping toes in the Caribbean Sea, and eating coconut-infused rice at the spacious comedor of the field station. Field work around Tortuguero provides banders with an abundance of beauty and always a hint of real danger. Eyelash Pit Vipers are routinely encountered on palm leaves. Although small, this snake has highly toxic venom, so banders are taught to tie flagging near any vipers they see to prevent their comrades from stumbling into resting snakes during pre-dawn hours.

At Tortuguero, we have trained over 200 biologists in advanced bird monitoring techniques and have banded nearly 70,000 landbirds, operating in all months of the year. Our operation represents the longest constant-effort bird monitoring program in Latin America and has served as a model for other countries. A diverse array of organizations have supported the growth and development of the Tortuguero station, the first of several Costa Rica Bird Observatory (CRBO) stations. We gained critical support from the U.S. Forest Service's International Programs—Wings Across The Americas, Costa Rica National Parks, the Sea Turtle Conservancy (formerly Caribbean Conservation Corporation), Costa Rica Expeditions, and the Canadian Organization for Tropical Education and Rainforest Conservation. Given the many threats facing tropical bird populations, bird monitoring was a powerful incentive for broad collaboration.

Most people know that many bird populations are declining at alarming rates. Migrant birds must contend with a host of unknowns, including changing climate, invasive species, and habitat alterations on their temperate breeding, tropical wintering grounds, and migration areas. Because migrants routinely cross political boundaries, they make our global avian community a truly shared commodity. Establishing conservation and monitoring partnerships is thus a key strategy in the sometimes fractious battle between resource extraction and bird conservation.

Due to the number of species and their high rate of endemism, tropical resident species are severely impacted by rampant deforestation and an increasingly heterogeneous landscape. Compared to migrants, we know paltry amounts about the natural history of many resident tropical birds. Understanding more about resident ecology

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would help to identify factors that limit population growth and guide conservation action. The subtle interplay of climate cycles, such as the El Niño Southern Oscillation, as well as long-term climate change, perturbs temperature and rainfall regimes, which in turn can potentially negatively affect bird populations. We believe it is necessary to study how species cope with a changing world as we venture without control into a non-analog future: communities of birds and environments that are compositionally unlike any found today.

Given the acute threats of climate change and habitat loss, biologists from North, Central, and South America must transcend political and cultural barriers to promote sustainable bird populations for future generations. To further our shared interests in protecting global bird communities, we have established an interactive cooperative of ground-breaking initiatives that include the Costa Rica Bird Observatories, the Costa Rica Bird Banding Network, the Landbird Monitoring Network of the Americas (LaMNA), and the Western Hemisphere Bird Banding Network. These efforts have partnered to generate an impressive ground swell of data, plus the management and analytical tools necessary for scientists and managers to delve into the mysteries and subtleties of both migrant and resident bird ecology.



Jorge Leiton, a Costa Rica Bird Observatory intern, talking about bird conservation with children from the local school as part of the outreach program. / Pablo Elizonda

In 2008, the CRBO entered a new, ground-breaking phase when the National Institute of Biodiversity (INBio) agreed to host us. INBio is one of the leading non-governmental research organizations in the Americas—describing on average a new species to science every three days. Joining the U.S. Forest Service and the Klamath Bird Observatory as partners, CRBO opened its central office at INBio's headquarters in Santo Domingo de Heredia, adjacent to our newly established bird observatory field site on the outskirts of San José, the country's capitol. Given INBio's administrative expertise, logistic capacity, and international reputation, it has quickly become an important partner in bird science and management in Costa Rica and will ensure the long-term continuance of CRBO. Recently joining the Network are several stations such as those operated by the San Vito Bird Club, that conducts monitoring in and around the Organization for Tropical Studies (OTS) station at the Wilson Botanical Garden in the southern highlands of the country.

Enthusiastic and very moderately compensated bird banders are based out of our home office and bird observatory located at INBio's headquarters. The Observatories' bird banders hail from North, Central and South America, thereby creating an eclectic group of people united in their passion for studying and conserving birds. One or two of these crews travel among three or four sites, spending several days at each collecting information for a wide variety of species captured in nets and counted in censuses.

In a typical week, after collecting monitoring data from our urban forest bird observatory at INBio, banders travel to the misty highlands of Cerro de la Muerte to capture and count the birds at our "Madre Selva" station, recently established with support from the Elizondo family in a well-equipped four-bedroom house with bunks for a dozen or more. The gnarled limbs of trees at Madre Selva are laden with moss, creating a primordial landscape favored by a dizzying array of endemics and several bird species highly sought after by bird enthusiasts such as the Resplendent Quetzal. After acclimatizing to cold montane winds, the crew will go by bus to Tortuguero for a week's capturing in the humid lowlands. Traveling and working together for bird conservation creates strong bonds between banders, transcending cultural differences.

Motivated by the successful creation of bird observatories in the Caribbean, the Central Valley, and the Highlands, we began laying the foundation for a national partnership of bird banders in Costa Rica. In 2009, we

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Migratory Bird Habitat Restoration in the Sierra Zongolica, Veracruz

Diego Barrera, *Communications Specialist, Pronatura*

The warm waters of the Gulf of Mexico and the north-south orientation of the Eastern Sierra Madre favor the convergence of different migration routes from virtually the entire North American continent, making Veracruz one of the most important corridors for migratory birds worldwide. Pronatura Veracruz has worked since 1991 in the monitoring, education, and conservation of priority ecosystems for migratory birds. One of these landscapes is undoubtedly the Sierra Zongolica, an indigenous territory in

Southern Veracruz spanning three ecoregions—Petén-Veracruz moist forests, Oaxacan montane forests, Sierra Madre de Oaxaca pine-oak forests—in only 362 square miles.



Preparing site for nucleation in the Sierra Zongolica, Mexico. / Eric Zentmyer

Since 1997, the Sierra de Zongolica was demarcated as an Area of Importance for the Conservation of Birds (AICA in Spanish) by the National Commission for Knowledge and Use of Biodiversity (CONABIO). The national GAP analysis, conducted by the Autonomous University of Mexico (UNAM), The Nature Conservancy, Pronatura, and other agencies, identified the Sierra Zongolica as one of the most biologically important areas for conservation in Mexico due to its high levels of biodiversity and 'gaps' in conservation.

Migration in the Mountains. Until 2009, no formal study on resident or migratory birds had ever been conducted in the Sierra Zongolica. But thanks to funding

from the Neotropical Migratory Bird Conservation Act, Pronatura was able to conduct two years of monitoring, mapping, and habitat restoration in the region. We were able to identify the presence 316 species of birds, including 96 migrants and 220 residents. Some migratory species that stand out include Golden-cheeked Warbler, Wood Thrush, Bell's Vireo, Canada Warbler, Painted Bunting, Indigo Bunting, Worm-eating Warbler, Wilson's Warbler, Ruby-crowned Kinglet, MacGillivray's Warbler, Townsend's Warbler, Blue-winged Warbler, and Black-throated Gray Warbler.



Worm-eating Warbler—one of the many Neotropical migrants that overwinter in the Sierra Zongolica, Mexico. / Dan Sudia

Crops and Birds. The methodology, used in the above-mentioned study, was based on a network of points and transects representative of ecological diversity of the region. It was determined that the highest diversity, richness, and abundance of our focal species were found in the warm temperate zone of mesophilic cloud forests and shade-grown coffee plantations.

Moreover agricultural land accounts for 42 percent of the Sierra Zongolica territory. The landscape is full of slopes, which are exposed to variable amounts of solar radiation. On the "sunny slopes," annual crops are cultivated, and on the "shady slopes," coffee is produced.

Because of the low productivity of the hillslopes, annual crops are rotated, allowing land to "rest" for a period of three to eight years. These regeneration areas provide abundant

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resources for migratory and resident birds; however, regenerating hillslopes can often be colonized by invasive species such as bracken fern or other species that prevent pioneers from establishing themselves.

For these reasons, Pronatura has focused its efforts on the restoration of degraded ecosystems rather than the conservation of primary forests. We are focusing on supporting agro-ecological systems that maintain functional and dynamic vegetative assemblies, and thus provide biological connectivity and quality habitat for resident and migratory birds.

Nucleation: A Way Forward. Pronatura's restoration work is based on the principle of merging technical and academic practice with the simplicity of traditional knowledge. As such, we have been applying and adapting a technique in degraded landscapes called nucleation, which is based on research, conducted in the 1970s in Veracruz, on the natural succession of tropical ecosystems, and developed for ecological restoration in Brazil. . (To read more about nucleation, visit <http://www.scielo.br/pdf/sa/v67n2/a18v67n2.pdf>.)



Transplanting soil from mature forest to degraded site in the Sierra Zongolica, Mexico. / Eric Zentmyer

Pronatura began adapting these techniques in 2009 to mesophilic cloud forest in Mexico, incorporating knowledge local campesinos have accumulated through years of experience regarding the behavior of invasive species such as the very aggressive Bracken Fern. They had found through experience that the plants are pyrophilic and allelopathic; the only way to rid areas was through shading out the fern with certain adapted tree species, such as Sweet Gum and Clethra. These species were incorporated into the nuclei developed for these ecosystems.

A nucleus is a mound of soil measuring 1m² transplanted from mature forests and mixed with seeds of rapid-growing pioneer species that provide resources for migratory birds. These nuclei are transplanted in a diamond pattern across the degraded landscape. The nuclei are able to outcompete invasive species and seed quickly, contributing to the self-regeneration of the landscape, and aided by seed dispersal from migrants and residents. Nucleation has proven to be more cost-effective and efficient than traditional reforestation on steep hillsides.

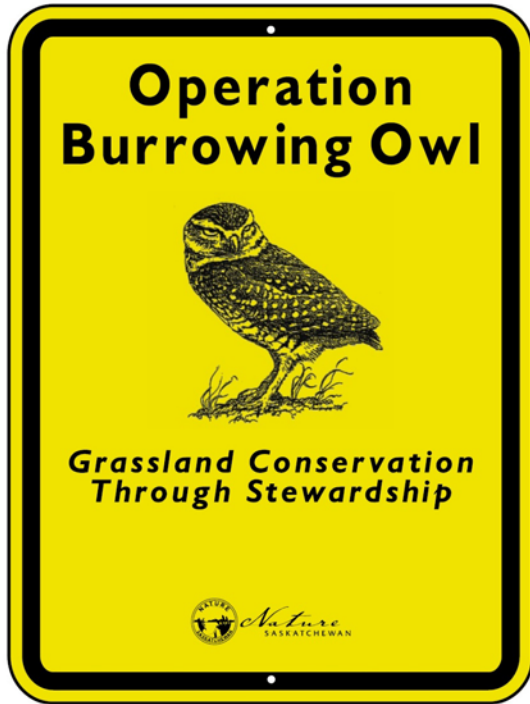
We will be evaluating areas restored using nucleation techniques for their long-term effectiveness in ecosystem recovery. There is still much to do, but we are confident that with local participation—transmitting and receiving knowledge and encouraging interest in the conservation, restoration, and recovery of ecosystems—we can generate results with long-term benefits for landscape and ecological sustainability.

For more information, contact Eric Zentmyer at ezentmyer@pronaturaveracruz.org.

Stewards of Saskatchewan: Landowners Conserving Habitat for Species at Risk

Katherine Brewster and Nicole Fergus, Habitat Stewardship Coordinators, Nature Saskatchewan

Nature Saskatchewan's suite of Stewards of Saskatchewan (SOS) programs have taken a unique approach to bird conservation in this Canadian province. By way of voluntary habitat stewardship agreements with landowners, the SOS programs have successfully conserved over 170,000 acres of habitat for prairie bird species at risk.



OBO gate sign. / Nature Saskatchewan

The first SOS program, Operation Burrowing Owl (OBO), was created following a 1986 survey that revealed a significant decrease in Burrowing Owl numbers, as well as a significant increase in habitat loss for this species. In response to that survey, Nature Saskatchewan and partners launched the OBO program in 1987, to raise awareness among landowners and the public about the Burrowing Owl and habitat loss. During the program's first two years, approximately 30,000 questionnaires asking for owl locations were distributed to landowners in south-central Saskatchewan, resulting in 350 initial participants.

From the beginning, the OBO program included four principle components: voluntary agreements, an annual owl census, gate signs, and an annual newsletter. First and foremost, voluntary agreements between landowners and Nature Saskatchewan were signed in order to ensure that remaining habitat would not be destroyed or degraded. The voluntary "hand-shake" aspect of these agreements was crucial to the initial success of the program because landowners often shy away from legally binding agreements.

In addition to agreeing to conserve habitat, landowners were asked to report on the presence and absence of Burrowing Owls on their land from year to year. This kept landowners engaged in the program and promoted active awareness of the Burrowing Owls using their land.

The gate signs given to participants were not only key in recognizing landowner commitment, but also in raising public awareness of Burrowing Owls in the area and about the program in general.

Finally, the annual newsletter allowed Nature Saskatchewan to keep in touch with participants, while making them aware of other related conservation work. These four components were vital to the program's success and remain key to achieving the SOS program goals—habitat stewardship, site identification and population monitoring, landowner education and awareness, and in later years, habitat enhancement.

The overwhelming success of OBO spawned the creation of similar programs for other bird species at risk. In 2003, Shrubs for Shrikes (SFS) was created to address concerns about the decline of the Loggerhead Shrike on the prairies. This was followed by Plovers on Shore (POS) in 2008, which promoted shoreline stewardship for the endangered Piping Plover. POS was timely in that its creation correlated with the federal designation of critical habitat for this species. Critical habitat, rather than the presence of the Piping Plover, was the focus of POS in its first three years. Since then, POS has moved toward targeting both critical habitat and shoreline with confirmed breeding pairs, as reported by staff and partnering organizations.

In 2008, program coordinators began creating site-specific Beneficial Management Practices Plans for participants of all three programs. These plans are based on the landowner's current operation and address practices they are already doing that benefit species at risk, as well as those to consider incorporating into their operation to further benefit the species. Plans have been well received and continue to be developed for more landowner participants. Finally in 2010, the SOS umbrella was extended to include all species at risk. Since then any landowner with a

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species at risk on their land can participate in Nature Saskatchewan's stewardship programming and enjoy the benefits of membership. For example, Sprague's Pipet is now included even though there is not a separate program and coordinator.

All of the SOS bird species at risk programs have been extremely successful. To date, OBO has 403 participants conserving more than 156,000 acres of Burrowing Owl habitat; SFS has 104 participants conserving more than 14,000 acres of Loggerhead Shrike habitat; and POS has 19 participants conserving more than 23 miles of shoreline.

Nature Saskatchewan has also evaluated the effectiveness of voluntary stewardship in preserving grassland. To determine grassland retention, 108 OBO grassland sites were compared to 98 randomly selected non-OBO grassland sites. Of the OBO sites, 66 percent remained as grassland after seven years, while only 49 percent of the non-OBO sites remained in grass. This evaluation lent support to the importance of voluntary stewardship in conserving habitat on private land.

Along the way, many lessons have been learned. Among them is the importance of the voluntary agreement, which instills a sense of responsibility among landowners to protect the birds. Further, having a conservation symbol (like the Burrowing Owl) seemed to effectively 'capture the heart' of landowners and focus their conservation actions. Recognition efforts, in the form of gate signs and gifts to mark milestones within the program (5-, 10-, 15- and 20-years), have been successful in encouraging ongoing commitment to the program. The annual newsletter has fostered a connection with and among landowners, promoted ongoing commitment, and has functioned as a conduit for feedback to shape our programs and better serve landowners in their conservation efforts.

Ultimately, having a win-win situation for both landowners (in the form of educational and financial support for habitat enhancement) and the conservation organization (in the form of habitat conservation and population monitoring results) allows programs like these to be a positive experience for everyone. Partnerships with other conservation organizations, including Nature Conservancy of Canada, Prairie Conservation Action Plan, Saskatchewan Watershed Authority, have allowed Nature Saskatchewan to provide landowners with needed resources to continue to improve education and awareness activities and habitat enhancement initiatives.

Needless to say, there have been challenges along the way. On several occasions, SOS staff have had to address some conservation myths of potential new participants. Nature Saskatchewan has found that the best approach in dealing with these misconceptions is to ensure that all staff are well informed, listen to the landowner's concerns, and calmly try to clear up false impressions through education. As with many non-profit organizations, it can also be a challenge to secure enough funds to maintain activity levels from year to year, let alone take on new project activities. As a result, the SOS program staff have always taken on heavy workloads and accepted some personal financial risk to be involved in projects they believe in. Despite the challenges, we will continue to remain dedicated to voluntary stewardship as an effective way to conserve habitat for species at risk and to monitor species occurrence to help evaluate the benefits of these actions.

In the future, we may consider taking a more ecosystem-based approach to be in line with evolving federal conservation priorities. This may involve including other species not currently targeted by our program to spread the benefits of voluntary stewardship to the many species in need of conservation in Saskatchewan. Funding support has come from Government of Canada, Saskatchewan Ministry of Environment Fish and Wildlife Development Fund, the EJLB Foundation, Saskatchewan Conservation Data Centre, SaskPower, SaskCulture, Neotropical Migratory Bird Conservation Act, and TD Friends of the Environment Foundation. For more information, visit <http://www.naturesask.ca/?s=stewardship>.



Piping Plover. / Melissa Ranalli

New Model Identifies Bird Habitat Use at Multiple Scales

David Hanni, Science Director, Rocky Mountain Bird Observatory

Birds are known to select habitats first by determining the amount of suitable vegetation at large scales and second by assessing food and cover at small scales. In human terms, investigating bird habitat at two scales is somewhat like deciding where to live, says Rocky Mountain Bird Observatory biometrician, David Pavlacky. “We might look at which region has the most agreeable climate and, within that region, which local community has the best schools and lifestyle.”

Pavlacky is using a new multi-scale occupancy model to analyze data that RMBO and its partners collect in 13 states in the Rocky Mountains, Great Plains, and Southwest as part of the Integrated Monitoring in Bird Conservation Regions (IMBCR) program. This new statistical model estimates bird occupancy at both a large scale, reflecting a species’ regional occurrence, and a small scale, reflecting its occurrence in local territories. “Most studies use one scale or the other,” Pavlacky said. “Our approach accounts for both simultaneously, which gives a more complete, and I think accurate, picture of a species’ habitat use.”

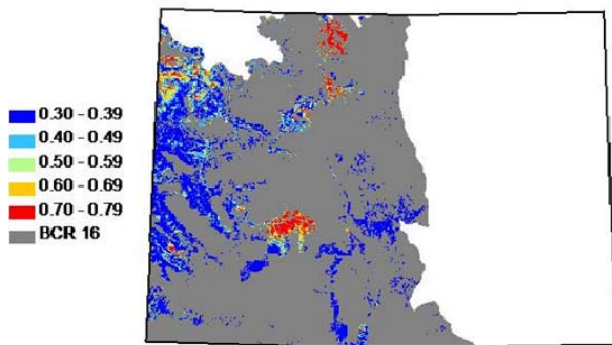


Figure 1. The predicted distribution of Brewer's Sparrows in BLM lands of BCR 16, Colorado. Occupancy rates were predicted using sagebrush area. The effect of patch size will be incorporated into future models.

The Brewer's Sparrow, a species of concern in the Southern Rockies/Colorado Plateau Bird Conservation Region (BCR 16), is the first bird to be analyzed using this model. This sparrow only occurs in sagebrush vegetation, and land-use practices that alter the amount and condition of sagebrush can affect the occurrence of the species.

At the large scale, Brewer's Sparrow occurrence increased with sagebrush cover and patch size (Figure 1). Therefore, these variables were useful for predicting the occurrence of Brewer's Sparrows at large spatial scales. At smaller scales, the occurrence of Brewer's Sparrow at point-count locations increased with sagebrush cover, then declined rapidly until reaching a lower threshold of 10 percent canopy cover of trees. This species also occurred at highest rates when grass height was about 12 cm tall and declined with increased shrub height.

RMBO has used the model to determine how Brewer's Sparrow responds to habitat conditions in BCR 16, including habitat loss and fragmentation at the regional scale and grazing and forestry practices at the local scale. These findings are useful for guiding land management practices and habitat conservation for Brewer's Sparrow.

Knowing what habitat features affect certain species at a variety of spatial scales allows landowners to manage effectively for target species, like the Brewer's Sparrow. In addition, because these birds respond quickly to changes in the distribution and availability of habitat features, their presence or absence will be useful information, allowing land managers to gauge the effectiveness of management practices.

In light of millions of dollars being directed toward Sage-Grouse conservation via the Natural Resources Conservation Service Sage Grouse Initiative (SGI), RMBO and partners is interested in using modeling tools to improve management of habitat enhancement projects for Sage-Grouse and make sure the needs of other sagebrush-associated bird species are met.

A wide assortment of conservation practices may be used under SGI, including prescribed grazing, conifer tree removal, protection of quality habitat, and weed control, each with varying effects depending on vegetative species present. This variety of possible practices reflects the diversity of habitat conditions used by Sage-Grouse throughout their life-cycle—open areas for lekking, mid-successional sagebrush interspersed with herbaceous cover for nesting, wet meadows and other areas with high quality forbs for brood-rearing, and late-successional sagebrush for wintering.

Continued next page

Many other bird species that breed in the sagebrush landscape will respond to conservation practices implemented to benefit Sage-Grouse. Among these other species, some are considered sagebrush obligates (breed only in sagebrush); others breed in a variety of shrublands, grasslands, riparian areas, or dry woodlands within the sagebrush environment. Considered collectively, this suite of bird species reflects the full spectrum of habitat conditions found at various scales within healthy sagebrush ecosystems.

RMBO plans to develop habitat-relationship models for several sagebrush-associated species to create a Decision Support Tool (DST) that will guide resource professionals, managers, and private landowners during SGI land-management planning and habitat-delivery efforts. Distribution maps and habitat models will be used in a structured decision-making process to determine the best management actions at the optimal locations and scales to maximize the occurrence of Sage-Grouse and other sagebrush birds for the minimum cost. Ultimately, better informed land management decisions will create seamless conservation at all scales across public and private lands. For more information, visit <http://www.rmbo.org>.

“Boots on the Ground” Expands Habitat Conservation

Seth Gallagher, Stewardship Director, Rocky Mountain Bird Observatory

The success and popularity of a partnership of Rocky Mountain Bird Observatory (RMBO), Natural Resources Conservation Service (NRCS), and Colorado Division of Parks and Wildlife (CPW) has spawned new wildlife biologist positions in Colorado and Wyoming. That partnership, based on the Colorado Wildlife Action Plan emphasizing species of greatest conservation need, placed four biologists around the state in 2008 to give landowners and NRCS staff technical assistance for wildlife habitat enhancement and restoration. Those four biologists—in Durango, Greeley, Pueblo and Steamboat Springs—have collectively contributed to enhancing 122,000 acres on 142 different projects using more than \$7 million in Farm Bill programs.

New positions include a biologist RMBO recently placed in Gunnison, Colorado, with support from the National Fish and Wildlife Foundation (NFWF) and NRCS, to work specifically on conservation efforts for the federally endangered Gunnison Sage-Grouse. Also with support from NFWF, RMBO now has a range ecologist in Lamar, Colorado, focusing on the Lesser Prairie-Chicken, a federal candidate species. Two positions are being hired in association with the NRCS Sage-Grouse Initiative (SGI)—one each in Kremmling, Colorado, and Saratoga, Wyoming. Other partners supporting the new positions include the U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program, Saratoga-Encampment-Rawlins Conservation District, Wyoming Game and Fish Department, and Audubon Society.

An additional biologist has been hired in Greeley, Colorado, to work on the delivery and management of existing Wetlands Reserve Program projects and other wetland conservation efforts in northern Colorado to benefit migrating waterfowl and shorebirds. This position also relies on many funding partners including NRCS, CPW, Intermountain West Joint Venture, and Playa Lakes Joint Venture.

RMBO has more than doubled its capacity for habitat enhancement efforts—progress made possible by the strong support of partners. Especially in the economic downturn, targeting conservation efforts and pooling resources to create technical jobs not only helps priority species but employment rates as well. For more information, visit <http://www.rmbo.org>.



RMBO biologist Brandon Miller (left) with Moffat County, Colorado, rancher Ken Adler and USFWS-PFW biologist Bob Timberman on a Sage Grouse Initiative project that included water development, fence marking and grazing management. / Seth Gallagher

Taking Outreach from the Land to the Classroom Builds Future Conservation Ethic

Kacie Ehrenberger, Director of Education and Outreach, Rocky Mountain Bird Observatory

Rocky Mountain Bird Observatory's biologists already work with landowners and resource professionals to implement stewardship projects on private lands. Now we are joining in a community-driven effort to prepare future landowners, decision makers, and resource professionals by creating a grasslands education module for fourth through eighth grades. The module will address the importance of grasslands for agriculture and wildlife; characteristics of the grasslands of the western Great Plains region, including unique plants and wildlife; challenges facing grasslands (e.g., urban expansion and exotic species); and effects of our actions and decisions on the environment.

To encourage use of the module, RMBO's education staff will conduct teacher workshops and lead activities with students whose teachers participated in a workshop. Our pilot site for testing this model is Hemphill Middle School in Strasburg, Colorado, a small rural school with an interest in offering students outdoor experiences tied to their curriculum.

The four short-term outcomes of this project are: (1) Teachers will increase and improve their skills in incorporating environmental education into their classroom; (2) Students and teachers will increase their knowledge of local grassland habitats, associated wildlife, and the benefits of grasslands to humans; (3) Students living on agricultural lands will share what they are learning with their families and think about how they would manage their land in the future; and (4) local landowners and resource managers will interact with students and teachers through field trips that showcase local examples of how to balance the needs of agricultural producers and bird populations.

Longer term, we expect that citizens of Colorado's eastern plains will care about and understand the cultural and natural systems of which their community is a part and will contribute to their conservation.

The module, to be available online, will ultimately reach hundreds of teachers and non-formal educators and thousands of students with messages, activities, and information related to the importance of our grasslands and steps we can all take in protecting this critical ecosystem. Visit <http://www.rmbo.org> for more information.

Critical Chihuahuan Desert Grasslands Rapidly Give Way to the Plow

Arvind Panjabi, International Program Director, Rocky Mountain Bird Observatory



Native desert grasslands, critical winter habitat for dozens of North American bird species, are being lost to the plow in Mexico's Valles Centrales.
/ Angel Montoya

Where do North America's grassland birds congregate in winter and what happens to them while they are there? Rocky Mountain Bird Observatory's International Program is supplying the answers to these questions, critical to the conservation of declining grassland species.

Native desert grasslands—a critical winter habitat for dozens of North America's most vulnerable bird species—are being relentlessly plowed under by farmers in central Chihuahua, Mexico. Sustainable grazing and better grassland management are the most effective and immediate ways to prevent grasslands from going under the plow. RMBO works with ranchers to improve the condition of their grasslands, both for birds and the ranchers' bottom line, and plans to secure funding for private lands biologists to offer landowners technical and financial assistance to implement sustainable ranching practices in Chihuahua.

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The Tarabillas Valley is within the 6.7-million-acre Valles Centrales Grassland Priority Conservation Area in Chihuahua, where RMBO estimates that plowed croplands increased by more than 600,000 acres from 2006 to 2010, resulting in a concomitant loss of grasslands. One of the largest grassland areas in northern Mexico, the region supports diverse species, including Chestnut-collared Longspur, Sprague's Pipit, Baird's Sparrow, and the only native breeding population of Aplomado Falcon, which formerly occupied the Tarabillas Valley but now hover on the brink of extinction there.

RMBO is collecting data on the abundance, distribution, survival, habitat trends, and habitat use of wintering grassland bird species across the Chihuahuan Desert in Mexico and the U.S. The information is needed to develop scientifically sound strategies for conserving grassland species and to justify bold and immediate action to prevent this continentally important ecosystem from disappearing. For instance, RMBO survey data indicate that recent habitat loss in the Valles Centrales has likely resulted in the loss of more than 500,000 wintering Chestnut-collared Longspurs, a species that has already declined by more than 84 percent since 1966, according to the North American Breeding Bird Survey.

RMBO's work in Mexico benefits at least 30 species of grassland birds that nest in the Great Plains. More than 90 percent of western North America's grassland birds depend heavily on the Chihuahuan Desert's limited grasslands during the non-breeding season. Continued loss and degradation of this habitat will only exacerbate ongoing population declines. For more information, visit <http://www.rmbo.org>.



Chestnut-collared Longspur (above) is one of a number of sharply declining species in the Chihuahuan Desert region. / Bill Schmoker

Integrated Monitoring in Bird Conservation Regions (IMBCR)

David Hanni, Science Director, Rocky Mountain Bird Observatory, Robert Skorkowsky, Region 2 Avian Program Coordinator, U.S. Forest Service, Jennifer Blakesley, Biometrician, Rocky Mountain Bird Observatory, Nicholas Van Lanen, Biologist, Rocky Mountain Bird Observatory

Monitoring is an essential component of wildlife management and conservation science. Effective monitoring programs can identify species that are at-risk due to small or declining populations, provide an understanding of how management actions affect populations, evaluate population responses to landscape alteration and climate change; and provide basic information on species distributions. Given the large-scale declines of avian populations and the loss, fragmentation, and degradation of native habitats, the need for extensive and rigorous landbird monitoring programs is greater than ever.

In 2007, the North American Bird Conservation Initiative developed the report, *Opportunities for Improving Avian Monitoring* (NABCI 2007). This report outlined goals and recommendations to further improve avian monitoring programs, including using more rigorous statistical methodology, integrating monitoring programs, and making data and results widely accessible to land managers and the public. With these recommendations in mind, bird conservation partners from across much of the western United States have collaborated to implement a new broad-scale all-lands monitoring

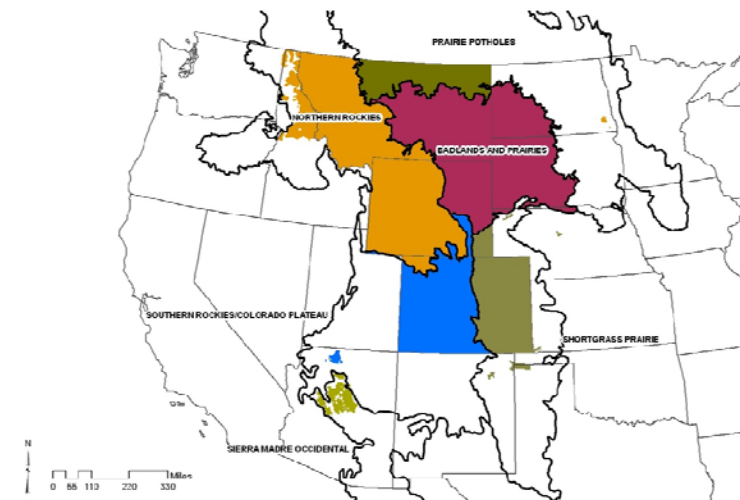


Seasonal technician, Matt Gracey, collects data for the Integrated Monitoring in Bird Conservation Regions program in Eastern Colorado. / Taylor Barnes

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program known as *Integrated Monitoring in Bird Conservation Regions* (IMBCR) (Skorkowsky et al., in prep.). The IMBCR design has since updated many long-term monitoring programs such as Monitoring Colorado Birds, Monitoring Wyoming Birds, and Northern Rockies Landbird Monitoring Program.

Objectives of the IMBCR program are to: (1) provide a framework to integrate bird monitoring efforts across bird conservation regions; (2) provide robust population density and occupancy estimates that account for incomplete detection and are comparable at different geographic extents; (3) use annual population estimates to monitor population trend and evaluate causes of population change; (4) provide basic habitat association data for most landbird species to address habitat management issues; (5) maintain a high-quality database that is accessible to all of our collaborators as well as to the public over the internet, in the form of raw and summarized data; and (6) generate decision support tools that help guide conservation efforts and provide a quantitative measure of conservation success.



Areas that are surveyed using the IMBCR program. Colored regions indicate areas surveyed under the IMBCR design. Black lines indicate Bird Conservation Region boundaries within the Rocky Mountain Region.

Region (BCR 17), the National Forests and Grasslands within the Shortgrass Prairie Bird Conservation Region (BCR 18), Coconino and Prescott National Forests in the Sierra Madre Occidental Bird Conservation Region (BCR 34), three National Forests in the Idaho portion of the Northern Rockies Bird Conservation Region (BCR 10), Kaibab National Forest in BCR 34, and the Southern Rockies/Colorado Plateau Bird Conservation Region (BCR 16).

The strength of the IMBCR monitoring program is based in its broad partnership support. Partners to this program currently include the U.S. Forest Service (Regions 1, 2 and portions of 3 & 4), U.S. Bureau of Land Management (SD, ND, CO, WY and MT), Colorado Division of Parks and Wildlife, Wyoming Game and Fish Department, Montana Fish, Wildlife and Parks, Great Plains and Great Northern Landscape Conservation Cooperatives, Northern Great Plains Joint Venture, Intermountain West Joint Venture, Rocky Mountain Bird Observatory, Avian Science Center, Idaho Bird Observatory, Wyoming Natural Diversity Database, Montana Natural Heritage Program, and Audubon Wyoming.

Information gathered under the IMBCR design is disseminated through annual reports (<http://www.rmbo.org/v3/InfoCenter/Publications/Reports/Science.aspx>), region-specific bird monitoring publications, species accounts and bird conservation information and scientific publications. In addition, information on bird-habitat associations, species distributions, and raw count data are made accessible to the general public through the Avian Data Center at <http://www.rmbo.org/public/monitoring>. Please visit the RMBO website (<http://www.rmbo.org>) or partner (i.e. <http://www.montanabirds.org>) websites if you would like additional information regarding IMBCR monitoring efforts.

We use survey data to estimate bird occurrence (“occupancy”) and density within particular areas of interest as defined by partners, for example, an individual National Forest. Using a randomized sampling design, we can directly compare density and occupancy estimates among geographic areas and across spatial scales. Birds are surveyed from a grid of points within each sample unit during a six minute period. Observers record distances to each bird and the one-minute interval during which each bird was detected. From these data, we can estimate occupancy rates at two spatial scales ([Pavlacky et al. 2011](#)) and density using distance sampling theory (Buckland et al. 2001).

The IMBCR program was first pilot tested in Colorado in 2008. This all-lands program has since expanded to include all of Wyoming and Montana, the entire Badlands and Prairies Bird Conservation

Integrated Waterbird Management and Monitoring Program: Strategic Habitat Conservation in Practice

Jorge L. Coppen, North American Waterfowl Management Plan National Coordinator, U.S. Fish and Wildlife Service

To maintain healthy waterbird populations (here defined as waterfowl, shorebirds and marsh birds) at the continental and flyway scales, conservation professionals need clear guidance on where, when, and how much habitat is needed to sustain them. Likewise regional land managers need guidance to efficiently direct financial resources to best meet waterbird habitat objectives within their conservation landscape. In addition, local wetland managers need information on how a management unit can best contribute to waterbird habitat objectives during migration and wintering periods.

Equipped with such spatially explicit guidance, managers can coordinate actions among sites, resulting in a combined landscape effect that adequately meets waterbird needs at the most appropriate times and places. By linking management decisions across scales, from the flyway scale down to local wetland management sites, waterbird conservation can be significantly improved—made both more effective and more efficient. These important management decisions depend on monitoring information, generated locally and at the flyway and regional scales. The Integrated Waterbird Management & Monitoring (IWMM) program was established to fill this vital need.

The IWMM Program. The Integrated Waterbird Management and Monitoring Program is generating and using monitoring information in an adaptive management framework applied across three spatial scales to inform and improve management decision-making. It combines cross-scale modeling and standardized monitoring, carried out at flyway, regional, and local scales, to assess the total area of conserved land and water within the flyway—the “conservation estate.” Information generated can then be used to guide decisions about where, when, and how to focus limited resources to best improve non-breeding habitats.

Currently the IWMM program is a collaboration among partners located along the Atlantic and Mississippi Flyways, including the U.S. Fish and Wildlife Service (FWS), state fish and wildlife agencies, Ducks Unlimited, and other non-governmental organizations. Partners from the FWS Migratory Bird Program and the National Wildlife Refuge System (NWRS), U.S. Geological Survey (USGS) and the Lincoln Park Zoo began the program in fall 2010. NWRS staff and seasonal waterbird technicians began conducting waterbird surveys under the guidance of an IWMM Program Coordinator at survey sites across the project area (Figure 1).

The IWMM program began as three separate structured decision making (SDM) workshops, held in 2007 and 2008. The SDM process is designed to explicitly deal with uncertainties and help decision-makers develop transparent and defensible decisions. Having completed these workshops, representatives from each SDM team merged efforts into an integrated program that reflects the interrelationships of management, habitat, and waterbird responses.

In addition to spatial integration efforts, the IWMM program includes several other elements of integration. Taxonomic integration addresses habitat quantity and quality needs of non-breeding waterfowl, shorebirds, and marsh birds that are often addressed separately. Population-habitat integration involves synthesizing information on the biology of waterbird species and habitat dynamics at multiple spatial scales to make predictions of population responses to management actions. Agency management efforts are integrated by working toward multiple land management objectives. And finally, adaptive management and monitoring evaluates progress toward management objectives, improves future management decisions, and more efficiently allocate limited resources.

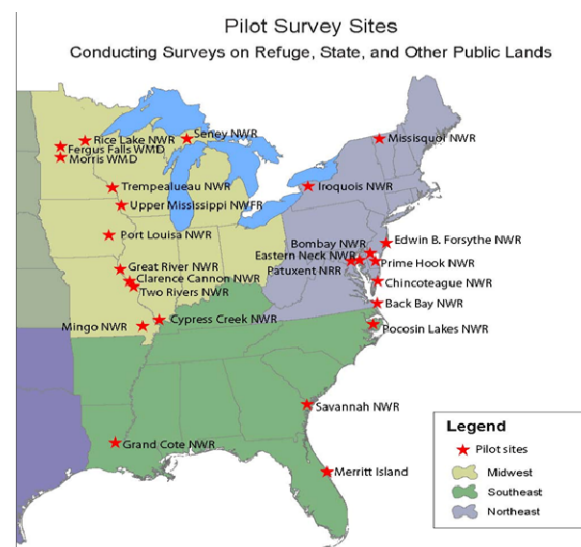


Figure 1: IWMM Program's pilot survey encompasses NWRS sites across three regions.

All across the nation, regional and state biologists, associated with flyway councils and migratory bird joint ventures, develop biological models and decision support tools to identify critical migration stop-over and wintering sites for each species guild. Here, it is critical to note the distinctions between regional models used by joint ventures versus those employed by the IWMM program. These modeling approaches represent two problem sets and answer different questions, though both are important steps in biological planning and conservation design for priority species.

Joint ventures in non-breeding areas set habitat objectives via population-habitat modeling exercises that predict spatial and temporal habitat needs based on the assumption that food is the primary limiting factor. More specifically, they set habitat quantity and quality objectives based on the outcome of bioenergetic models for non-breeding Joint Venture areas.

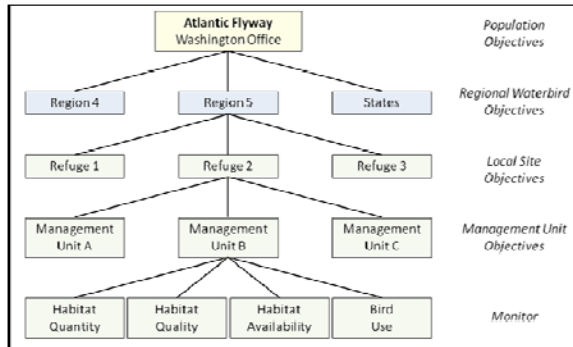


Figure 2. Waterbird objectives hierarchy, with fundamental flyway population objectives stepped down to management unit objectives at the local scale.

The IWMM program's regional-scale modeling exercise, on the other hand, attempts to allocate financial resources or effort most efficiently across landscapes to fill in habitat gaps observed in a flyway-scale habitat map. Given limited resources, a key challenge is to dovetail cross-scale monitoring and evaluation frameworks to serve both sets of objectives—biological and fiscal.

IWMM Model Objectives. The outputs of the IWMM model will help managers efficiently allocate resources by informing their decision-making at each scale and across scales. In this way, the IWMM program employs a hierarchical objective-driven framework across spatial and organizational scales (Figure 2).

At the flyway scale, the fundamental objective is to sustain waterbird populations as measured by long-term (e.g., 10-year running) averages of waterfowl, shorebird, and marsh bird numbers. The specific population and habitat goals are set by the North American Waterfowl Management Plan, U.S. Shorebird Conservation Plan, and Waterbird Conservation for the Americas, and reflect the ability of populations to support sustainable consumptive and non-consumptive uses. The IWMM model will address the condition, distribution, and availability of migration stop-over and wintering habitat to maximize body condition and daily survival rate while accommodating public use.

The fundamental objective at the regional/state scale is to maximize total bird-days across all local management sites, subject to regional budget constraints. Resource allocations are made to those management sites where the greatest waterbird return on investment can be realized. Regional/state decision makers will evaluate waterbird priorities and approve specific habitat objectives for individual local sites based on flyway information.

The regional model results in many possible spatial combinations for the distribution of available resources among management sites. For example, one alternative might be equal allocation to all sites; another might be allocation in proportion to wetland area. The result can be a continuum from equal allocation among all sites to all resources assigned to one site.

The fundamental objective for local-scale waterbird habitat management is to maximize an individual management site's contribution to ecoregional and flyway populations of waterbirds. This fundamental objective can be further refined for priority or representative regional or national species, resulting in similar objectives for each species or guild of species.

Local decision-makers identify appropriate local management objectives and strategies for key waterbird species within site management plans. The local scale model of management actions encompass all potential actions individual sites might undertake to manage the quantity, quality, and availability of wetlands habitat. Potential actions range from passive "allow nature to take its course" to acquisition of new lands and waters to wetland manipula-

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tions such as drawdowns, prescribed burns, disking, herbicide treatment, and predator control. Management alternatives may also include a combination of these actions and include a variety of scenarios.

This process improves upon status quo management, which provides annual operating funds to land managers who then make independent decisions on habitat manipulations and timing based on funds, staff, and infrastructure, and independently monitor how effective they have been at providing sufficient waterbird habitat quantity and quality.

Linkages Among IWMM Models. The models used in the IWMM program link monitoring data with cross-scale management decisions (Figure 3). By integrating waterbird movement models with structured decision-making, the IWMM models provide recommendations on how best to distribute financial resources at the regional level and which habitat management strategies are most effective and efficient to undertake at the local level. Remotely-sensed land use and land cover data layers and energetic information (kilocalories available) were used to create a flyway scale map depicting waterbird habitat quality.

The integrated model set can guide habitat management and allocation of resources to achieve continental waterbird population goals at the flyway level. Monitoring protocols and models may be adjusted to enhance integration and make use of learning opportunities. For example, as new information is obtained through monitoring and evaluation, the IWMM models will be updated to provide revised recommendations reflecting the most current scientific understanding available (Figure 4).

Monitoring Components. Monitoring information is collected at flyway, regional and local scales, although the majority of monitoring is conducted locally. The information gained through monitoring and evaluation is used at each respective scale to inform models, and some monitoring information provides utility for decision-making at multiple scales. The application of consistent monitoring protocols that inform management decisions increases the collective contribution of locally managed lands to meet large-scale waterbird habitat quantity and quality requirements.

Bird and habitat monitoring is conducted at key wetland locations across the Mississippi and Atlantic flyways during fall migration, winter, and spring migration. Monitoring protocols are designed to be simple enough that volunteers can be trained to conduct monitoring efforts. Currently, we are exploring opportunities for aerial surveys paired with ground surveys in select locations to identify methods for cross-walking aerial and ground surveys. Additionally, the costs of management actions are also captured for purposes of informing regional scale resource allocation decisions.

In the IWMM program, existing waterbird conservation plans, that identify priority species and population objectives, are used in conjunction with the flyway model to assist with setting regional and local waterbird habitat priorities. This information is used to develop wetland-specific planning documents, such as National Wildlife Refuge System Habitat Management Plans. The regional model can be used to guide resource allocation, as described previously, which in turn results in management actions at a wetland. Monitoring of habitat conditions

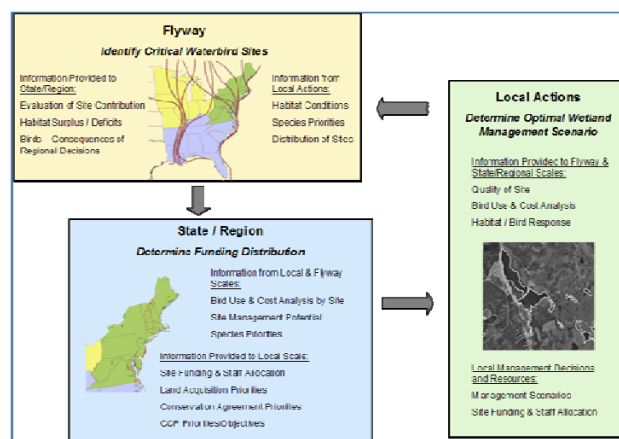


Figure 3. Diagram of information flow and model updating (arrows) at three spatial scales.

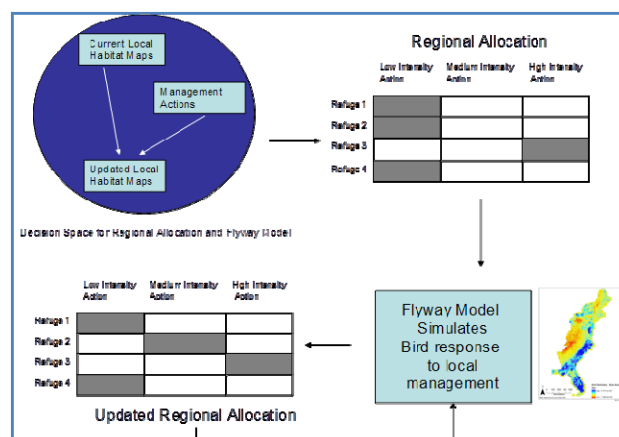


Figure 4. Diagram of decision making framework and model updating (arrows) at three spatial scales.

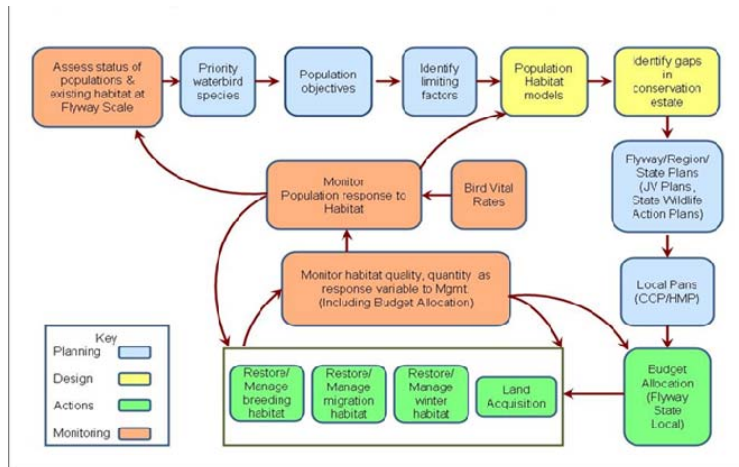


Figure 5. Conceptual model of the planning, design, management and monitoring steps of the IWMM Program.

and bird response are used in an adaptive management loop which feeds back to models, as well as, to local and regional decisions (Figure 5).

The IWMM program is an example of landscape scale strategic habitat conservation in practice (SHC, Figure 6). Habitat conservation becomes “strategic” because on-the-ground actions are based on planning and design and measured through monitoring and research. Through these cyclical planning, implementation, and evaluation strategies, we can measure the effects of, learn from, and adapt our management decisions and actions on bird populations.

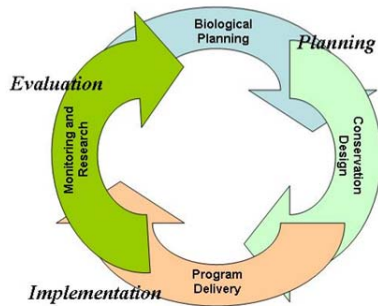


Figure 6. Strategic Habitat Conservation

Program Status and Administration. As mentioned earlier, the IWMM program is a collaboration among many people from different organizations. To effectively administer the IWMM program, thirteen sub-teams were developed to address specific aspects of the initiative along with an overarching Science Team which is comprised of leaders from each sub-team.

The IWMM program is entering the “set-up” phase prior to roll-out. We are currently validating monitoring protocols and checking linkages between model components and data needs.

To access the most relevant and current information about the IWMM program, visit our interactive website at <http://iwmmprogram.ning.com>. In addition to providing a repository for protocols and survey forms, the website serves as a forum for cooperators to ask relevant questions and discuss

fieldwork. The interactive website also features example habitat photos and metrics from vegetation surveys. The IWMM Science Coordinator can also provide regular feedback to all participants. If you wish to participate in discussions, organize groups, or take advantage of our interactive website’s features, please email Katie Koch (Katie_Koch@fws.gov).

Future efforts will include: (1) Building the Regional (North Atlantic, South Atlantic, Upper Mississippi and Lower Mississippi) and National Waterbird Teams; (2) Continuing to expand the geographic coverage and encourage increased participation in the program; (3) Validating and continuing to make improvements to the waterbird and vegetation monitoring protocols; (4) Completing assessments via model testing and refinement of the program’s ability to link management and funding decisions to waterbird population responses; and (5) Promoting an adaptive management approach at local, regional, and flyway spatial scales.

You can also call the IWMM regional contacts:

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Southeast Contact: John Stanton, U.S. Fish and Wildlife Service, John_Stanton@fws.gov

Northeast Contact: Jennifer Casey, U.S. Fish and Wildlife Service, Jennifer_Casey@fws.gov.

The IWMM Program Science Team wishes to express its gratitude to all the participants who have contributed to this fine example of strategic habitat conservation in practice.

Shorebird Enthusiasts Gather at Simon Fraser University, British Columbia

Brad Andres, U.S. Shorebird Conservation Plan National Coordinator, U.S. Fish and Wildlife Service

In February 2006, shorebird biologists decided to form the Western Hemisphere Shorebird Group (WHSG) during the first "Shorebird Science in the Western Hemisphere" meeting in Boulder, Colorado. The biologists who formed this group study shorebirds from their breeding grounds in the arctic to their wintering grounds in South America and at many sites in between. Over 100 professionals and 70 students from ten countries in the Western Hemisphere took part in the original meeting. Subsequent meetings were held in Venezuela in 2007 and in Mexico in 2009, and attracted shorebird biologists from Argentina, Canada, Chile, Colombia, Cuba, Ecuador, French Guiana, Guyana, Mexico, Panama, Paraguay, Suriname, the United States, Uruguay, and Venezuela. In 2011, the 4th WHSG meeting was convened at Simon Fraser University, Vancouver, British Columbia, Canada.

The purpose of a WHSG meeting is three-fold comprise and includes science, management, and outreach. The science agenda hopes to (1) bring together biologists studying breeding, staging and wintering shorebirds throughout the Western Hemisphere in one location; (2) promote information sharing on methods and study design among biologists working on different shorebird species; (3) promote range-wide studies of shorebirds by fostering collaborations among biologists interested in particular species; (4) integrate science into the implementation of various shorebird conservation plans; and (5) generate enthusiasm among the shorebird community to conduct additional studies of shorebirds in the future. Presentations also address management and conservation applications and social marketing and outreach.

The Fourth WHSG meeting featured eight symposia: Advances in Shorebird Monitoring; Evaluating the Re-distribution Hypothesis; Predators, Predation Danger, and the Ecology of Shorebirds; Shorebirds on Working Lands; Western Sandpipers; Black Oystercatchers; *roselaari* Red Knots; *rufa* Red Knots; Boreal Shorebirds; Ecological and Evolutionary Processes between Shorebirds and their Prey; and Plovers. Workshops also focused on Shorebird Hunting in the Caribbean, Shorebird Conservation, and Color-marking schemes.

Four plenary presentations were given by Erica Nol, Trent University (Life and Times of the Semipalmated Plover); Will Creswell, St. Andrews University, Scotland (Predation Risk Management in Shorebirds: a Case Study of Redshanks); Brett Sandercock, Kansas State University (Population Biology of a Terrestrial Shorebird: the Upland Sandpiper); and Patricia M. González, University of Buenos Aires, Argentina (Science and Conservation of Migratory Shorebirds: "First the Egg or the Bird?"). Summaries of the symposia will be published in a future issue of the Wader Study Group Bulletin.

For the 4th WHSG, 111 talks and 15 posters were presented, 31 percent of which were given by students. More than 145 people attended the meeting, and sponsors raised funds to support student and Latin American biologists' travel costs. Participants came from 16 countries, primarily from the Western Hemisphere but also from Europe and Oceania. The 5th meeting has been set for 2013 in Colombia. I hope you can join us!

For more information, visit <http://www.fws.gov/shorebirdplan/WesternHemisphereGroup.htm>.



Baird's Sandpiper on nest. / U.S. Fish and Wildlife Service

The North American Bird Conservation Initiative (NABCI) is a coalition of organizations and initiatives dedicated to advancing integrated bird conservation in North America.

The vision of NABCI is to see populations and habitats of North America's birds protected, restored, and enhanced through coordinated efforts at international, national, regional, state, and local levels, guided by sound science and effective management.

The goal of NABCI is to deliver the full spectrum of bird conservation through regionally based, biologically driven, landscape-oriented partnerships.

The All-Bird Bulletin is a news and information-sharing publication for participants of NABCI.

For subscription or submission inquiries, contact the Editor, Roxanne Bogart, U.S. Fish and Wildlife Service, 802-872-0629 ext. 25 or Roxanne_Bogart@fws.gov. To download back issues, visit <http://www.nabci-us.org/news.html>.

The All-Bird Bulletin publishes news updates and information on infrastructure, planning, science, funding, and other advancements in the field of integrated bird conservation and management. Include author's name, organization, address, telephone and fax numbers, and e-mail address. Pictures are welcome but not necessary.

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One likely enhancement is additional Western Bluebird translocations to Salt Springs Island, British Columbia in 2012. Only 30 miles as the bluebird flies from the established population on San Juan Island, continued translocations to Salt Spring Island should result in a larger regional population, with the potential for movement between islands, thereby increasing the sustainability of the San Juan Islands population into the future.

Primary project partners include American Bird Conservancy, the Department of Defense, Joint Base Lewis McCord, Ecostudies Institute, Washington Department of Fish and Wildlife, The Nature Conservancy of Washington, San Juan Preservation Trust, and the San Juan Audubon Society, with support from the Pacific Coast Joint Venture. Most uniquely, project funding has been entirely private, including Disney Wildlife Conservation Fund, Horizons Foundation, Norcliffe Foundation, Seebe Trust, Wildlife Forever Fund, Zoo Boise Conservation Fund, San Juan Preservation Trust, and numerous private individuals.

For more information on the San Juan Islands Western Bluebird Reintroduction Project contact Bob Altman, American Bird Conservancy at baltman@abcbirds.org.

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hosted a meeting attended by the majority of Costa Rican bird banders, resulting in the creation of the Costa Rica Bird Banding Network. The Network serves as the national banding program for Costa Rica that now receives support from the Costa Rican government, Ministerio de Ambiente Energía y Telecomunicaciones (MINAET), to assist in integrating the banding community with official governmental conservation initiatives. With support from the U.K.-based organization, Porzana, we can now offer free bird bands for resident birds as well as protocols, databases, and full integration with the Landbird Monitoring Network of the Americas.

Typical of bird observatories throughout the world, data goes much deeper than just the names of the species and the number of each bird detected on a census. It also includes critical assays of the health of both the Neotropical migrants and the little-known resident birds, each with their own suite of adaptations to our ever-changing environments. Such measurements of health include how well and often they are breeding and if they are getting sufficient food for migration and molting.

The information generated is fully accessible to government agencies, academics, and citizen organizations interested in the demography and status of bird populations in Costa Rica, and is available through the Costa Rica Bird Banding Network and LaMNA at a global level. We look forward to continuing our dedicated search for knowledge of avian communities through sustained monitoring in Central America—and using this knowledge to conserve these remarkable species. For more information regarding Costa Rica Bird Observatories, please visit us online at: <http://costaricabird.org/>