



STUDIES OF MIGRATORY BIRDS

Northern Prairie Wildlife Research Center Jamestown, North Dakota

Since 1965, migratory birds have been a major focus of the research program at Northern Prairie Wildlife Research Center (NPWRC). Studies have emphasized population biology and habitat needs of waterfowl and other grassland and wetland birds. Past and current research contribute to conservation of avian populations and improved management of their habitats.

CURRENT RESEARCH

BREEDING DUCK RESPONSES TO WETLAND RESTORATION — Restoration of drained wetlands in the Prairie Pothole Region is increasingly important for land managers. Northern Prairie scientists are examining responses by breeding ducks to restored wetlands in relation to features of the wetland itself and of the surrounding landscape. The goal is to develop guidelines to allow managers to target restoration efforts in areas that will maximize benefits to breeding ducks. *Contact: robert_cox@usgs.gov*

HABITAT USE, MOVEMENTS, AND SURVIVAL OF FEMALE NORTHERN PINTAILS — Loss and degradation of wetland habitat, increasing populations of snow geese, and disease (avian cholera) are problems facing waterfowl managers in Nebraska's Rainwater Basin Area. This study is designed to estimate habitat use, movements, and survival rates of female northern pintails in Nebraska during spring migration. Ultimately, results from this study will be related to wetland management histories to guide wetland acquisition and management in the future. *Contact: robert_cox@usgs.gov*

SPRING-STAGING ECOLOGY OF GEESE AND PINTAILS — In recent years, numbers of mid-continent lesser snow geese using the Rainwater Basin and central Platte River Valley of Nebraska during spring have increased from isolated flocks to several million birds. This increase may lead to greater competition for food resources among several avian species. NPWRC is studying diets, nutrient-reserve dynamics, and time-activity budgets of lesser snow geese, greater white-fronted geese, and northern pintails during spring migration in Nebraska. Data from this study will be important for managing these waterfowl species during spring migration. *Contact: robert_cox@usgs.gov*

ACCURACY OF AGE DETERMINATION OF DUCKS — Age ratios are used to index recruitment of ducks and they are a critical input to Adaptive Harvest Management, which is used to set hunting regulations. Working in collaboration with researchers at the U.S. Fish and Wildlife Service and Louisiana State University, this study is using carcasses of banded ducks, many of which are known-aged, to estimate accuracy of sex and age determination of mallards, wood ducks, and blue-winged and cinnamon teal via wing plumage in the U.S. Fish and Wildlife Service Annual Parts Collection Survey and via internal examination. *Contact: robert_cox@usgs.gov*



WATERFOWL RESPONSES TO USDA-Conservation Reserve Program (CRP) – Several studies are evaluating factors influencing use of Conservation Reserve Program fields as breeding habitat by waterfowl. These studies focus on measuring changes in nesting effort and nest success of ducks according to features of CRP, including seeding mixes, spatial distribution of fields, and annual management programs such as emergency haying and grazing. Results of these studies illustrate the important benefits of CRP to prairie wildlife. *Contact: msherfy@usgs.gov*

LANDSCAPE FEATURES AND WATERFOWL DEMOGRAPHICS – This study focuses on estimating key reproductive parameters of upland-nesting ducks in relation to landscape characteristics. Research in the 1980s provided a foundation for demographic models currently in use to estimate recruitment rate of waterfowl. However, these models do not account for variation in landscape composition, including changing water conditions and availability of nesting cover. It is critical that uncertainties in models be addressed and that population demographic data are kept current with changes in landscape character. This study will contribute to these efforts by enhancing our understanding of how waterfowl reproductive parameters relate to habitat characteristics during a period of favorable landscape features (i.e., CRP), and will improve delivery of National Wildlife Refuge programs such as wetland and grassland easement acquisition. *Contact: msherfy@usgs.gov*

USE OF LANDSCAPE AND WEATHER INFORMATION TO PREDICT DUCKLING SURVIVAL — The ability to reliably predict survival rates of broods and ducklings is a critical need in waterfowl management. NPWRC is working to develop methods to predict brood and duckling survival in prairie pothole landscapes from information gathered using remote sensing techniques. Results of these studies are being incorporated as predictive equations into the mallard productivity model to increase precision of recruitment estimates. *Contact: gary_krapu@usgs.gov*

WETLANDS AND USE BY BREEDING WATERFOWL IN NATIONAL GRASSLANDS OF THE DAKOTAS — The U.S. Forest Service's national grasslands in North and South Dakota contain many palustrine wetlands that provide valuable habitat for waterfowl and other waterbirds as well as water sources for livestock. NPWRC is conducting a study to examine wetlands and waterfowl use in the Grand River National Grassland in north-central South Dakota and the McKenzie District of the Little Missouri National Grassland in northwestern North Dakota. This study will provide the U.S. Forest Service with scientific information for planning and management relating to wetland resources, their value to waterfowl breeding pairs and broods, and factors influencing their use by waterfowl. *Contact: jane_austin@usgs.gov*

MALLARD PRODUCTIVITY MODEL — Waterfowl managers face many challenges when deciding how to manage and maximize production of mallards and other upland nesting ducks. NPWRC has developed a system of models and data bases that can be used to predict the outcome of various management scenarios. Currently, work is underway to incorporate brood and duckling survival rates as stochastic variables that depend on biotic and abiotic factors. In addition, the model has been rewritten to run under Windows, and the user interface has been greatly enhanced. *Contact: robert_cox@usgs.gov*

WATERFOWL NEST FILE — Nest success rate is a critical determinant of duck production. NPWRC is host to the largest inventory and monitoring effort involving duck nesting in the Great Plains, with data on over 145,000 nests from the 1960s to present. Information on duck nests is collected annually by Center biologists and numerous cooperators in standardized format. Data are archived at the Center and periodically analyzed to assess status and trends in duck nest success and develop input for various population models. *Contact: terry_shaffer@usgs.gov*

EFFECTS OF CHANGES IN AGRICULTURE ON NUTRITION IN MIGRATORY BIRDS — Improved harvest efficiency, expansion of crops poorly suited for meeting wildlife needs, and the introduction of genetically modified crops that provide for exceptional weed control may pose a long-term threat to seed-eating migratory birds and resident wildlife populations. To date, NPWRC research has focused on monitoring changes in grain-harvest efficiency, suitability of soybeans for meeting birds' nutritional needs, and evaluating changes in condition of migratory birds. *Contact: robert_cox@usgs.gov, gary_krapu@usgs.gov*

DELINEATING SUBPOPULATIONS OF MIDCONTINENTAL SANDHILL CRANES — The midcontinental population of sandhill cranes is the largest crane population in the world. Inadequate knowledge of location and temporal patterns of use of breeding grounds, staging areas, and wintering grounds by the two subspecies, and the need to identify subpopulations of the mid-continental population, limits management abilities. This study uses satellite telemetry to identify breeding areas, wintering grounds, and migration routes of the midcontinental population of sandhill cranes, and to identify genetic relationships within the population. Knowledge of wintering and breeding ranges of the midcontinental population has been expanded and key spring and fall staging areas of various subpopulations have been identified. *Contact: gary_krapu@usgs.gov*

ANNUAL RECRUITMENT IN MIDCONTINENTAL SANDHILL CRANES — Sandhill cranes begin breeding at 3+ years of age, and successful breeders generally produce but 1 young. The midcontinental population of sandhill cranes is hunted in 9 states in the Central Flyway, in 2 provinces in Canada, and in Mexico. To insure that annual harvest from hunting does not exceed recruitment of young into the population, detailed information is being acquired on magnitude of



annual recruitment, and recruitment rates are being compared among subpopulations. Cooperators in this research include states of the Central Flyway and U.S. Fish and Wildlife Service. *Contact: gary_krapu@usgs.gov*

SPRING STAGING ECOLOGY OF SANDHILL CRANES IN THE PLATTE VALLEY, NEBRASKA — Concerns that deteriorating habitat conditions in the Platte River Valley of Nebraska may adversely affect the capacity of sandhill cranes to acquire fat reserves needed for migration and reproduction prompted research to compare current rate and magnitude of fat storage, standing crop of corn residues remaining in fields, and habitat use with data collected in 1978-79. Current data will be used to develop a mathematical model for predicting the number of cranes that can be supported in the Platte Valley under alternate management strategies. Cooperators in the study include the U.S. Fish and Wildlife Service, the Nebraska Game and Parks Commission, and the Platte River Whooping Crane Maintenance Trust. *Contact: gary_krapu@usgs.gov*

PELICAN POPULATION DYNAMICS AND IMPACTS OF WEST NILE VIRUS — Nearly half of all American white pelicans nest in three colonies in the northern plains, but very little is known about their population dynamics. In 2002, a study was initiated at the largest of these nesting colonies to measure survivorship and reproductive parameters. In 2003, about half of the pre-fledged pelicans died at the colony, and a sample of these birds tested positive for West Nile Virus. Because colonially nesting pelicans are particularly susceptible to catastrophic losses, NPWRC has begun a study to determine the impacts of West Nile Virus and other mortality factors at the colonies on Chase Lake National Wildlife Refuge in North Dakota, Medicine Lake NWR in Montana, and Bitter Lake (Waubay Wetland Management District) in South Dakota. *Contact: marsha_sovada@usgs.gov*

MARSH BIRD ABUNDANCE AND DISTRIBUTION — Many human-induced changes have dramatically altered the character of the prairie landscape, including extensive wetland drainage and conversion of wetlands and native prairies to cropland. Benefits of CRP and other grassland conservation efforts for waterfowl and grassland songbirds have been documented, but the extent to which these programs influence the distribution of marsh-breeding birds is largely unknown. Because several marsh species nest in upland sites, the demonstrated benefits of grassland conservation programs for waterfowl and songbirds should extend to these species as well. However, the relationship between grassland cover and marsh bird abundance is largely unknown and there is little information available on the distribution of marsh birds in North Dakota, particularly for secretive species such as yellow rails. This study will focus on distributional data of marsh birds in North Dakota and influences of landscape features on species of management concern. *Contact: msherfy@usgs.gov*

BREEDING BIRD COMMUNITIES OF WETLANDS — Surveys conducted on more than 1,000 wetlands in North Dakota and South Dakota will be used to examine breeding bird communities in wetlands of the northern Great Plains. NPWRC is developing models to relate the presence and abundance of various bird species in wetlands to habitat features, such as wetland size, class, and emergent vegetation, and landscape features. The models also will contrast natural and restored wetlands. Partial support for this study has been provided by the U.S. Fish and Wildlife Service and Environmental Protection Agency. *Contact: douglas_h_johnson@usgs.gov*

BREEDING BIRD POPULATIONS IN THE PLATTE RIVER VALLEY — Three topics involving breeding birds in the Platte River Valley are being address by Center staff. The first is how clearing of woody vegetation along the Platte River affects breeding bird populations. Such clearing is done to improve roost habitat conditions for migrating sandhill cranes and whooping cranes. The second is a comparison of breeding bird populations during 1979-80 versus 2001 on about 200 sites. A third study is evaluating bird use of restored wet meadows in the Platte River Valley. *Contact: douglas_h_johnson@usgs.gov*

EVALUATING THE BIRD CONSERVATION AREA CONCEPT — NPWRC is evaluating the concept that Bird Conservation Areas (BCAs) can maintain populations of breeding grassland birds in the northern tallgrass prairie. The hypothesis underlying BCAs is that large core areas of quality habitat (e.g., native prairie), surrounded by neutral habitats (e.g., small-grain fields), and isolated from hostile habitats (e.g., woody vegetation) will result in reproductive rates sufficient to at least maintain population levels of breeding birds. NPWRC is determining population density, productivity, and effects of predation and brood parasitism in grasslands of various size and landscape configurations. Collaborators include the U.S. Fish and Wildlife Service, U.S. Forest Service, Minnesota Department of Natural Resources, The Nature Conservancy, University of Minnesota-Crookston, and State University of New York, Syracuse. *Contact: douglas_h_johnson@usgs.gov*

GRASSLAND BIRD USE OF CRP — NPWRC continues to research benefits of Conservation Reserve Program (CRP) habitats for breeding birds. Studies covering nine counties in four northern Great Plains states are now in the 15th year, making this one of the longest evaluations of breeding bird use of CRP. Results have been instrumental in demonstrating wildlife benefits of the Program, which led to its renewal and to the designation of the Prairie Pothole Region as a priority conservation area for CRP. As part of this ongoing study, NPWRC also is examining how emergency haying of CRP grasslands affects use by breeding birds. Another study is examining the influence of proximate and landscape features on bird use of CRP grassland fields. *Contact: douglas_h_johnson@usgs.gov*

GRAZING EFFECTS ON GRASSLAND BIRDS — The loss and degradation of grassland habitat is considered a primary reason for declines observed in grassland-nesting birds in North America. The sandhills of Nebraska represent one of the largest areas of intact mixed-grass prairie left on the continent, but little information exists on densities of grassland songbirds there, or how they may be affected by cattle grazing. NPWRC will evaluate responses of birds to grazing management practices on Valentine National Wildlife Refuge, and also will compare bird use of refuge grasslands to adjacent private pastures. *Contact: pam_pietz@usgs.gov*



SONGBIRD NESTING SUCCESS RELATIVE TO GRASSLAND/WOODLAND EDGES — Expansion of woody vegetation has eliminated or fragmented large areas of habitat critical to grassland-nesting birds. Studies conducted on J. Clark Salyer National Wildlife Refuge and the Sheyenne National Grassland in North Dakota focus on effects of woodland encroachment on the reproductive success of grassland birds and include nest predation, cowbird parasitism, and nest. *Contact: pam_pietz@usgs.gov*

GLOBAL CLIMATE CHANGE AND RANGE SHIFTS OF GRASSLAND BIRDS — Earlier research has suggested that, under predicted global climate change scenarios, a number of grassland bird species will need to shift their breeding ranges if they are to maintain identified climatic tolerances. NPWRC is investigating potential effects of global climate change on grassland birds to determine where projected climatic regimes might be suitable for a variety of species, if suitable habitat for grassland birds exists there, to identify specific cues used by grassland birds where they settle to establish breeding territories. *Contact: douglas_h_johnson@usgs.gov*

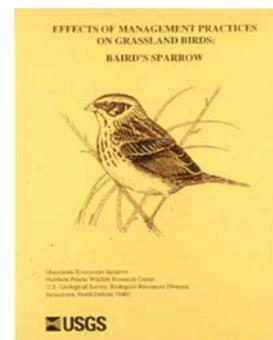
EFFECTS OF BURNING ON BREEDING BIRD POPULATIONS — Two studies initiated by NPWRC address the effects of burning on breeding bird populations. One study is a long-term evaluation of the responses of breeding birds to burning in the mixed-grass prairie where that practice is widely used by grassland managers. A second study examined how large (~30,000 acres) uncontrolled burns in the Little Missouri National Grassland in western North Dakota have affected use of the area by breeding birds. *Contact: douglas_h_johnson@usgs.gov*

INFLUENCE OF SEEDING MIXTURES ON BIRD USE OF CRP — Throughout the northern Great Plains, exotic grasses and forbs were planted in much of the cropland that was enrolled in the original Conservation Reserve Program. There are incentives to plant native species in the renewed Conservation Reserve Program, and the U.S. Fish and Wildlife Service is replanting many areas with native grassland species. Native species might provide either better or worse habitat for breeding grassland birds than those established with exotic species. NPWRC conducted a study of the influences of seeding mixtures on use by breeding birds of CRP fields and Waterfowl Production Areas from Montana to Iowa. *Contact: douglas_h_johnson@usgs.gov*

WIND TURBINE EFFECTS ON GRASSLAND BIRDS — NPWRC has initiated a study to determine if wind turbines constructed in mixed-grass prairie affect the density or species composition of breeding grassland birds. The study was requested by the U.S. Fish and Wildlife Service (USFWS) to help the agency decide if wind farms are compatible with the purposes of the USFWS Grassland Easement Program. NPWRC is working with Florida Power and Light and Dakota I Power Partners on their wind farms in South Dakota and North Dakota, respectively. *Contact: douglas_h_johnson@usgs.gov*

RELATED ACTIVITIES

EFFECTS OF MANAGEMENT PRACTICES ON GRASSLAND AND WETLAND BIRDS — With partial support from the Prairie Pothole Joint Venture, North American Waterfowl Management Plan, U.S. Forest Service, and The Nature Conservancy, Center scientists are involved in a cooperative effort to review and synthesize literature on the effects of management practices on grassland and wetland birds. This effort includes three kinds of products: a bibliography of pertinent literature, annotations and evaluations of that literature, and a synthesis of that literature for each pertinent species. More than 5000 articles have been incorporated, and syntheses have been completed or are near completion for 50 species. These products are available on the internet: www.npwrc.usgs.gov/resource/literatr/grasbird/grasbird.htm and www.npwrc.usgs.gov/resource/literatr/wetbird/wetbird.htm. *Contact: douglas_h_johnson@usgs.gov*



BIRD CHECKLISTS OF THE UNITED STATES — The Center cooperates with a number of federal, state, and private agencies to computerize bird checklists of the United States. Currently, the Center's Web site hosts nearly 500 bird checklists, covering management areas, nature preserves, and other areas of special interest in all 50 states, Puerto Rico, and the Virgin Islands. Among the major cooperators are the U.S. Fish and Wildlife Service, the National Park Service, the Bureau of Land Management, and the U.S. Army Corps of Engineers. In addition to checklists, this Web page includes guidelines for developing checklists. This Web page (www.npwrc.usgs.gov/resource/othrdata/chekbird/chekbird.htm) is among the top Web resources visited on the Center's Web site. *Contact: larry_igl@usgs.gov*

MIGRATORY BIRD INFORMATION ON THE INTERNET — NPWRC serves several kinds of information through its Web site (<http://www.npwrc.usgs.gov>). Over 200 resources related to migratory birds and their habitats are available. These include distributional information, species accounts, literature summaries, bibliographies, evaluations of management techniques, and research tools and software.

SYMPOSIA — NPWRC routinely organizes symposia when there is a need to bring scientists together to review the "state of the science." Symposia featuring migratory bird issues have included *Ecology and Management of Islands, Peninsulas, and Structures for Nesting Waterfowl* (1988), *Managing Predation to Increase Production of Wetland Birds* (1990), *Prairie Ecosystems: Wetland Ecology, Management, and Restoration* (1993), and the *Scaup Workshop* (1998). In addition, Center staff were central in organizing the international *Forum on Wildlife Telemetry* at Snowmass, Colorado (1997).

TECHNIQUES DEVELOPMENT — NPWRC staff have made many technical contributions to bird research and conservation. For example, they have designed and evaluated several types of predator exclosures used to protect nests of waterfowl and other upland-nesting birds; designed and evaluated video-camera systems for identifying nest predators and monitoring nest activities of songbirds; developed GIS applications, such as the integration of aerial videography with digital data from the National Wetland Inventory; evaluated several radio-transmitter designs and attachment techniques; and worked with engineers to develop state-of-the-art satellite transmitters suitable for use on migratory waterbirds. NPWRC staff also developed many field methods, including nest-searching techniques, methods for candling songbird eggs, and protocols for collecting and archiving data on nests and nest predation. Many of these advances are now used in state, federal, and international levels of research.

QUANTITATIVE METHODS DEVELOPMENT — Center statisticians have contributed greatly to the development of innovative methods for analyzing data from studies of migratory birds, particularly methods for analyzing nest success. Advances made in the late 1970s and early 1980s have been integral to the analysis of nest survival data from hundreds of studies conducted worldwide in the past two decades. Recently, Center statisticians developed a new analytical approach that greatly extends the capabilities of former methods, allowing for the modeling of categorical, continuous, and time-dependent explanatory variables, including random effects. These newest methods already are being used extensively and will likely revolutionize the way biologists analyze and think about nest survival data.

CONSULTATIONS — The Center's expertise in migratory bird research and statistical applications has led to a long and productive history of consultative projects with numerous partners. For example, Center staff, in cooperation with U.S. Fish and Wildlife Service biologists, developed and designed the Four-Square-Mile Waterfowl and Habitat Survey conducted annually by FWS in the U.S. Prairie Pothole Region. The Center continues to furnish statistical expertise necessary for making refinements and improvements. Center statisticians also analyzed data from the survey to develop models for breeding duck abundance and pond wetness values that are integral to planning tools (e.g., "Thunderstorm Maps") crucially important to the Fish and Wildlife Service. The Center also played a major role in a study with Prairie Pothole Joint Venture partners that documented an important relationship between duck nest success and the amount of perennial cover in the surrounding landscape. Center staff are routinely called on to provide advice on study design, field techniques and technologies, and data analysis.

COLLABORATORS — NPWRC staff work with an extensive network of partners throughout the field of avian ecology and, geographically, across the North American flyways and beyond. Staff conduct studies jointly with colleagues in other federal, state and provincial agencies, with universities, and with non-governmental organizations. NPWRC staff serve on the Central Flyway Council and Flyway Technical Committees, and are active in regional and national scientific societies, and other wildlife-related task groups, frequently holding leadership positions and serving as journal editors. Staff advise students at levels from high school to graduate school. Staff are frequently called upon to present the findings of studies at various forums. Other agencies contract with NPWRC for studies, taking advantage of the diverse and cumulative expertise at the Center.

FOR FURTHER INFORMATION:

Douglas H. Johnson, Ph.D.
Northern Prairie Wildlife Research Center
8711 37th Street SE
Jamestown, North Dakota 58401-7317
(701) 253-5539
douglas_h_johnson@usgs.gov

Pamela J. Pietz, Ph.D.
Northern Prairie Wildlife Research Center
8711 37th Street SE
Jamestown, North Dakota 58401-7317
(701) 253-5505
pam_pietz@usgs.gov