

Meeting the Challenge of Data Management for Bird Conservation

US-North American Bird Conservation Initiative Monitoring Subcommittee - January 2010

Background: In the *Opportunities for Improving Avian Monitoring* (2007) report, the fourth goal states the need to maintain bird population monitoring data in modern management systems and provide greater access to avian monitoring information for management and conservation decision making. The US-NABCI Committee asked the Monitoring Subcommittee to identify the highest priority data management needs for the four major bird conservation partnerships, while realizing that achievement of all four of the report's goals would be needed to make effective conservation and management decisions. The data management goal was addressed first because much data has already been collected but is inaccessible, poorly documented, incomplete, or under-utilized, all which hamper our ability to make informed decisions about bird conservation and management. Consistent database management assures data availability and makes it available to inform conservation and management decisions. Ineffective data management can be costly in terms of the: 1) inefficiency and redundancy of systems and staff, 2) inability to alter ineffective practices, 3) unavailability of information to make good decisions, and 4) failure to capture information from funded projects. Climate change has only reemphasized the need for relevant, high quality, accessible data. Strengthening the foundation of existing information will benefit new monitoring programs that include effective data management.

To address the request by the US-NABCI Committee, a workshop was held in the summer of 2009 to develop criteria that would realistically assess priority data management needs for the four major bird conservation partnerships. An assessment tool was built to determine their data management capabilities and is available for use by any organization. The four bird conservation partnerships used the tool to assess the costs of improving and maintaining the improvements for their highest priority data management systems. The identified priority databases are considered critical to inform management and conservation decisions at large geographic scales or populations levels.

General Recommendation: A total investment of \$5.5 million dollars is necessary to develop, enhance, and annually maintain priority data management systems. As management systems are built, efficiencies could reduce future costs. In general, the investment will be used to: 1) develop policies and procedures for data management, 2) secure information that is in danger of being lost, and 3) ensure the longevity and application of bird monitoring information. These tasks will be accomplished primarily through the development or enhancement of NGO and agency data centers. Although some efficiency can be gained through a coordinated effort among bird conservation partnerships, workload and equipment needs are often a direct function of the number of information records processed. Efficiencies can be achieved through the sharing of tools to capture, process, and maintain bird monitoring information and is being realized through approaches like the Avian Knowledge Network. Detailed assessments and justifications for the following recommendations are available. Realize that by narrowing the scope of this exercise to the highest priority databases and using a tool to hone in on the most critical needs within those databases this effort does not address the numerous data management needs that exist at local scales and within individual organizations.

Partners in Flight Needs: Partners in Flight (PIF) outlined three priorities associated with data management that are critical for the initiative. Two of the priorities focus on maintenance of existing databases — The Breeding Bird Survey database and the PIF Species Assessment database. The third, and equally important priority, is to gain support for efforts to develop and maintain regional data centers as nodes of the Avian Knowledge Network (AKN).

The AKN model of distributed datasets located at regional nodes (i.e. data centers) is gaining acceptance nationally but is relatively new. Data centers cooperate to make the most from each others' efforts, follow US-NABCI recommended data management practices, and make datasets widely available by passing them through the Bird Monitoring Data Exchange (BMDE) to the AKN distributed bird observation database. There are still many significant datasets that are in the process of being located, described using standard metadata practices, and uploaded into the BMDE. To ensure historical datasets are secured before they are lost, support is needed for existing and newly emerging data centers for developing capacity to enter and upload incidental and project-specific data. Sustained support is needed to maintain proper long-term management of data, create tools to summarize and analyze data, and integrate the schema of large existing and developing databases with the BMDE. Experience has shown that all these efforts are best coordinated regionally by full-time staff that can promote and facilitate the use of data centers, because few partners have the data management skills that are necessary to bridge the gap between biologists, decision makers, and machines. Applications of AKN information has been directly applied to forest management systems in California.

We recommend support for seven data centers, such as the California Avian Data Center, that are either regionally or protocol focused. The support will: 1) enhance the capabilities of existing AKN nodes and AKN compatible data centers through an increase in current funding for BMDE compatible acquisition of at risk databases, collection of new data, and their organization and use; and 2) establish and fully staff new AKN compatible data centers to fill gaps in the regional distribution of staffed AKN nodes. This investment would result in more than 10 million observation records, collected using standard protocols, being made available within two years of implementation.

To meet these objectives, the initial cost for seven data centers is \$3.15 million (\$450,000/data center).

Shorebird Needs: Enhancing the usefulness of data collected through the International Shorebird Survey (ISS) was identified as the highest priority data management need for shorebirds. ISS data are used principally for conservation and management initiatives during shorebird migration. During the last five years, ISS evaluations have helped formulate practices in federal agencies as varied as the U.S. Forest Service, the Department of Defense, and the U.S. Fish and Wildlife Service, as well as dozens of state agencies. ISS data are the only broad-scale information available on shorebird populations that are not temperate breeders. Building a reliable ISS data management system will be useful for conservationists and managers across the country by providing them with local, regional, and flyway information. Immediate enhancements to the ISS will cost \$180,000 for two years and maintaining the enhancements will need an annual investment of \$90,000. Improvements include eliminating data entry backlogs, building a more user-friendly interface, and capturing additional information; these

enhancements build on structures developed through the regional data centers of the Avian Knowledge Network. Support for shorebird surveys in the west would be accomplished through AKN regional data centers.

Beyond ISS, there is a need to enhance the longevity and use of information collected previously in several broad-scale surveys, including the range-wide Snowy Plover survey, Long-billed Curlew survey, and arctic breeding surveys. Ensuring this information is well documented and readily accessible will be useful to assess shorebird response to a changing climate. Immediate improvements to these datasets will cost \$100,000 for one year and will require a \$50,000 annual investment thereafter.

Lastly, developing an effective color-band reporting system is useful for both science and engaging the public in bird conservation. Systems have been developed for Red Knots and American Oystercatchers, but there is a need to expand beyond these two species. A \$50,000 annual investment is needed to gradually improve, maintain, and coordinate the color-marking reporting system for shorebirds.

Total needs for shorebirds are: \$330,000 for the first year, \$280,000 for the second year, and \$190,000 for long-term investment.

Waterbird Needs: Only a handful of waterbird data management systems exist that capture and process information at a population level or broad geographic scale — primarily four seabird databases, the Marsh Birds database (conjoined with the Point Count database) and a few colonial waterbird databases. These databases are a priority because they best inform management decisions relevant to the avian health of large portions of U.S. lands and waters.

Since the 1970s, agencies and NGOs on the Pacific coast have invested in the development and minimal maintenance of data management systems for seabirds (the Pacific Seabird Colony Catalog and Diet Database, North Pacific Pelagic Survey Database, and Pacific Seabird Monitoring Database). Additional resources are needed to enhance the latter two databases (\$180,000) and to provide effective, long-term maintenance of all three data management systems (3 FTEs \approx \$300,000). Atlantic coast partners are also developing the Northwest Atlantic Offshore Seabird Dataset Catalog, which could also incur similar maintenance costs in the future (1 FTE \approx 100,000). Because of past and ongoing investments in seabird data collection, the information that these data provide for important decisions regarding resource use and extraction, and the effects of climate change on marine birds, improving seabird data management systems is a high priority.

The 2002 North American Waterbird Conservation Plan recommended improved coordination and some standardization to improve comparability, fill gaps, and establish a centrally-managed repository for colonial waterbird data. Although resources were invested previously to establish and populate a database at USGS Patuxent, this monitoring initiative failed to develop further due to loss of dedicated staff. The emerging AKN model of distributed datasets may negate the need for one repository; however, the long-term management of existing and planned large-scale colonial waterbird datasets will require additional support in some form.

Over a decade of concerted effort to improve our understanding of inconspicuous marsh birds, many of which are priorities for management or conservation, has brought the community of stakeholders to the brink of being able to launch an integrated, coordinated operational survey. However, the commitment for ongoing management of the newly-developed Marsh Bird database has not been secured. Full development of a data center at Patuxent for landbirds, marsh birds, and colonial waterbirds would annually cost \$450,000, which would include FTEs to process, analyze, and maintain point count information.

Total needs for waterbirds are \$1.03 million for the first year and \$850,000 for the long-term.

Waterfowl Needs: The Waterfowl Breeding Population and Habitat Survey is the North American Waterfowl Management Plan's premier source of information for making continental-scale management decisions and is integral for achieving alignment of monitoring programs with clearly articulated management or conservation objectives. Although statisticians, quantitative biologists, and a data administrator are currently associated with management of this database, an additional, dedicated technician is needed to scrub the historical database and help edit and maintain incoming data on an annual basis. A number of critical changes to the database have been identified, and another formal review of the survey is being initiated that could lead to other critical improvements. It will be difficult to implement these important changes without dedicated data management support.

A second high priority need is to enhance the data management system for the Atlantic Flyway Breeding Waterfowl Survey. In 1989, the Atlantic Flyway Technical Section initiated this breeding waterfowl survey in 11 northeast states, ranging from New Hampshire to Virginia. This survey was designed primarily to estimate breeding population sizes of four species, although all observed waterfowl are recorded, and information collected during the survey supports effective management of eastern waterfowl breeding populations. U.S. Fish and Wildlife Service and U.S. Geological Survey scientists have proposed developing a hierarchical model framework to assess the consistency of results derived from breeding waterfowl population surveys in eastern North America. The framework would allow researchers to evaluate the effects of habitat, weather, and inter-specific interactions on short-term changes in Black Duck and eastern Mallard population sizes.

The Mid-Winter Waterfowl Survey (MWI) represents a third priority data management system need. It is conducted cooperatively by the states and the U.S. Fish and Wildlife Service and is thus a flagship coordinated bird survey effort to provide wintering population information at the continental scale. In combination with migration chronology information, the MWI provides critical information for setting population objectives and planning large-scale habitat management in wintering areas. This survey also provides a rare opportunity to assess population status and trend for otherwise poorly monitored waterfowl species to enable development of explicit, internationally recognized population objectives.

Total needs for waterfowl are \$1 million per year (Six FTE database managers and four spatial data managers).