

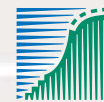
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# Waterbirds around the world

A global overview of the conservation,  
management and research of the  
world's waterbird flyways

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*Cover photography:* Whooper Swans *Cygnus cygnus* arriving at Martin Mere, England. Photo: Paul Marshall.  
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## Issues and challenges facing migratory bird conservation programs in North America

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### ABSTRACT

Many species of North American birds continue to experience population declines of a magnitude and duration that warrant concern. Although relatively few species are in immediate danger of being lost from the most northern areas, a large number require conservation efforts to ensure sustainability and reverse declines before expensive recovery actions are needed. The purpose of this paper is to examine, in general terms, the major conservation issues facing these bird species, and challenges that complicate the delivery of solutions. National wildlife agencies in Canada and the United States have recently developed national strategies for the conservation of migratory birds. These planning efforts help us to propose the general framework for a national bird conservation program that incorporates the following components: science (knowing the status of birds, what is affecting their populations, and how to mitigate adverse effects), legislation and policy (government tools for promoting and compelling protective actions for birds and their habitats), habitat (ensuring natural spaces are available where birds can carry out their lives), and international considerations (coordinate conservation efforts so that population sustainability is not threatened by failure in non-participating nations).

### INTRODUCTION

The purpose of this paper is to examine the major issues facing migratory bird conservation programs in North America and the challenges that complicate the delivery of conservation solutions. For definition purposes, North America includes Mexico, the United States and Canada only because these countries have recently developed mechanisms for cooperation on bird conservation; we recognize that the North American continent includes many other nations of importance to migratory birds whose bird conservation perspectives are not reported here.

Migratory bird programs have many important characteristics among nature programs that tend to keep them at the forefront of conservation:—

- Bird conservation is reflected in national or higher level legislation and jurisdiction. This is partly because birds are highly migratory, and so cannot be dealt with effectively by more local levels of government.
- Many international conservation fora have been established for birds because cooperation among the nations that share species through the annual migratory cycle is needed.
- Biological information on birds is relatively good. This fact owes much to the flying ability of birds which gives them some freedom from attack by mammals (such as people). As a consequence, birds can afford to advertise their presence through attractive plumages and vocalizations that not only

provide for ease of study but also create fondness for the species by people.

- Birds attract strong public interest for their beauty and cultural value, and also for their ecology and as food.

Birds have high vagility, and therefore high value as ecological indicators – in effect, birds reflect the current state of habitats better than most other organisms because they have freedom of movement.

Bird conservation faces powerful challenges. Before the sixteenth century, natural forces, combined with sometimes very significant land-use factors wielded by the indigenous people of North America, had operated on birds with positive and negative population effects that resulted in a particular distribution of birds across the continent. This situation is tempting to consider as a target for conservation because modern anthropogenic factors were absent.

Although birds face many new population pressures, it is not always easy to determine which are significant. Birds occur in every North American ecological region, and so they can be affected by almost every kind of economic activity. As favoured species for conservation, birds can be used in arguments against many societal undertakings, sometimes with little regard for evidence of effects on bird populations. Scientific studies of birds along with solid monitoring programs are needed to determine which factors must most urgently be addressed by bird conservation programs. However, what should conservation programs do in the absence of scientific certainty?

Factors that could be used to model population change in birds include natural processes, land use, water use, climate change, invasive species, environmental contaminants, and harvest (from Mac *et al.* 1998). An effective science-based program should attempt to quantify such factors in the context of their impact on birds. Without complete information, progress can still be made by assessing the potential scale of impact and developing habitat oriented approaches that have promise in softening anthropogenic effects for incompletely predicted benefit of birds and other natural resources. If very general habitat approaches are not at the outset sufficiently tied to research on birds, or, as is more often the case, if some scientific understanding is in place but it develops more slowly than habitat project work, bird conservation managers should be looking for improved scientific validation of work underway on an ongoing basis: the underlying philosophy of adaptive management.

North Americans are developing a framework for bird conservation, the North American Bird Conservation Initiative. More recently, both the U.S. Fish and Wildlife Service (2004) and the Canadian Wildlife Service (in prep.) have drafted strategic plans for migratory birds. These planning efforts help us

to propose the general framework for a national bird conservation program that incorporates the following: science (knowing the status of birds, what is affecting their populations, and how to mitigate adverse effects), legislation and policy (government tools for promoting and compelling protective actions for birds and their habitats), habitat (ensuring natural spaces are available where birds can carry out their lives), and international considerations (coordinate conservation efforts so that population sustainability is not threatened by failure in non-participating nations).

### SCIENCE ISSUES

To understand the issues that arise in science, it is useful to begin with a simple version of a bird conservation program designed to make appropriate use of science. Assuming a system that begins with the designation of conservation categories for species, there should be bird population monitoring sufficient to assign all species to the correct conservation categories, and make sure that category changes are detected within a reasonable timeframe. Research should be sufficient for understanding the requirements of priority species, and to allow development of conservation actions oriented to those species and their habitats. Although this is simply put, the research supporting conservation actions may require significant socio-economic components. Science is also required for evaluation, development of new models, structured learning, and revision of plans.

It is difficult to predict all the issues that will arise in bird conservation science. This is partly because of the wide range of scientific disciplines that may be applied to problems about birds, and partly because the natural environment poses such a wide range of questions. Nevertheless, a number can be described.

Population monitoring provides a basis for bird conservation. We know that there are currently monitoring failures, and this is an issue that reduces the quality of program delivery. For example, we have poor knowledge of the status of rails (Rallidae) and other, similar marsh species. The issue becomes the need to establish adequate monitoring systems. Nocturnal species, boreal species, and some tundra-nesting shorebirds are also outside the coverage of current bird monitoring programs.

Many issues arise in knowing what factors are reducing populations, and in getting knowledge to drive conservation. For example, what is limiting populations of the Loggerhead Shrike *Lanius ludovicianus* in Canada, and what can be done about it? What has been the population effect of West Nile virus on North American birds? What design factors are important to reduce bird collisions with buildings, wind turbines, and stationary towers? Are there important sub-lethal effects from a wide range of contaminants present in the environment of birds?

Among the science issues, it is important to know that there is currently a general lack of habitat monitoring in North America, and often only rudimentary knowledge of how habitat variables that we can measure relate to bird populations.

There is growing recognition of ongoing failures in communication of results and loss of scientific knowledge. Working against this are advances in technology and use of the Internet for sharing information. Sometimes it is possible to recover long-lost data from archives and bring them back into use, as the Arctic Goose Joint Venture intends to do with a number of century-old surveys of waterfowl that U.S. scientists carried out in Mexico.

As important as any other science issue is the need to use science to evaluate and improve conservation programs. This lies

at the heart of adaptive management. A current example is the planned biological evaluation of the conservation initiatives through the North American Waterfowl Management Plan.

### LEGISLATIVE AND POLICY ISSUES

When migratory bird legislation was introduced in North American countries, the immediate conservation issues were excessive hunting, especially market hunting, and collection of birds, feathers, nests, or eggs for personal use. Such practices had already led to the extinction of some species. Therefore, although habitat requirements for birds were recognized, the main thrust of regulatory tools dealt with hunting and prohibitions against possession of birds. The migratory bird treaties date from the first half of the twentieth century, but their overall intention, the preservation of migratory birds, remains valid.

Things have changed since the original treaties were developed. Additional legislative tools are available such as those that deal with endangered species and requirements for environmental assessments of new development and activities on the landscape. Governments are also increasingly committing themselves to conservation approaches through various international agreements for wildlife and habitat. An example of the latter is the Ramsar Convention on Wetlands. Unfortunately, human impacts on birds have accelerated, so that the indirect take of birds, as described below, now numbers in the many millions and is becoming an issue of high priority for North American governments.

Among the legislative issues facing us, we feel that three should be highlighted from the current perspective: forestry management systems need to support sustained populations of forest birds; agricultural programs need to encourage preservation of threatened bird habitats such as wetlands and native grasslands; and governments need effective tools to manage the incidental take of birds caused by economic or industrial activity. Examples of the latter include the occurrence of birds oiled at sea and the damage to bird populations as a result of fishing and forestry practices.

### HABITAT AND CONSERVATION ISSUES

When assessing conservation from a risk or assessment point of view, it is almost impossible to remove the role of habitat. Among the conservation issues affecting birds, there is such a wealth of possible risks, combined with a lack of information about how the risks could affect the sustainability of bird populations, that it is not possible to provide rankings. Wetlands continue to disappear, old growth forests and native prairies are shrinking. Habitat quality is under threat from overuse, pollution, and disturbance by exotic species. Increased contaminants including airborne global pollutants are finding their way into even those ecosystems quite recently thought to be pristine. At the risk of being unspecific, we note the following list of issues that are active concerns because of their potential impact on birds:

- Habitat loss and nest destruction
  - Expansion of farms, urban development; transportation and other linear development
  - Wetland drainage and modification
  - Unplanned consequences of fire management, livestock management, shrimp farming, tourism development, salt extraction, energy development, mining, aquaculture and many other human activities

- Contaminants
  - Oil at sea and oil tailings and production spills
  - Pesticides
  - Lead from fishing and hunting
  - Hazardous industrial wastes
- Introduced predators, competitors or diseases
- Environmentally triggered diseases (botulism)
- Physical threats - entanglement in fishing gear, collisions
- Hunting taking place outside conservation frameworks

Wetlands in all parts of the continent are of importance to a variety of species. Because the diversity of activities that occur near wetlands and wetland types are richer in Mexico, we have chosen to summarize the wetland issues in that country as an example of the diverse challenges for conservation in these habitats. The following issues were extracted from Inventory of Mexican Wetlands (Carrera & de la Fuente 2003): stream flow reduction by reservoirs, sedimentation, salt extraction industries, shrimp farming, tourism development, agricultural expansion, contamination, extraction of water for other uses, and drainage for reclamation.

One of the more quantitative recent works on conservation issues for birds was the review of the extent that birds may be affected by collisions and electrocutions associated with man-made objects in the United States (Manville 2005). Estimates were reported for vehicles strikes ( $10^7$  birds), building and window collisions ( $10^7$  -  $10^8$  birds), smoke stack casualties ( $10^4$  -  $10^5$  birds), power line electrocutions ( $10^4$  -  $10^5$  birds), power line impacts ( $10^5$  -  $10^7$  birds), communication tower accidents ( $10^6$  -  $10^7$  birds), and wind turbine impacts ( $10^5$  birds). This would amount to a total mortality of  $10^8$  to  $10^9$  birds annually. This information was adapted from the U.S. report; however, we state the results rounded to powers of 10, in recognition of the difficulty in coming up with precise estimates of these problems. The take-home message is that the cumulative impact of collisions is probably very significant.

The impact of climate change on birds is mostly predicted by models, rather than having much evidence from direct results. That is why we can hypothesize major impacts on the distribution and abundance of birds from climate model predictions, while, at a species level, climate change is not often identified as a current threat. Gross predictions of changes in moisture distribution can be applied to landscapes and the birds that occur there. That is not to say that the authors do not recognize the future threat of climate change on bird habitats, but that there is generally a lack of sufficient information to characterize it for particular bird species.

#### INTERNATIONAL COORDINATION ISSUES

The creation of national boundaries across landscapes used by wildlife can impose considerable challenges to wildlife that may encounter widely ranging differences in land use depending on the country they are in. Economic status, government structures and priorities, and differing cultural practices and values among other factors will vary among countries and influence the availability and quality of habitats for wildlife. Considerations for North American migratory birds include the countries of the Western Hemisphere as well as countries across the Atlantic and Pacific oceans that birds may access if originating at northern latitudes.

Communication and coordination are key elements of successful international conservation efforts. For example,

effective internationally coordinated monitoring efforts for migratory birds will ensure that all countries in a species' range have access to information on distribution, abundance and trends. In addition, international collaboration on monitoring will allow for discussion on how best to monitor species so that efforts are directed to the best locations and times of year. Other key elements include:

- Consistency among legal protection mechanisms
- Access to international conservation resources for birds
- Meeting the obligations for wetlands, and expansion of international focus beyond wetlands.

Conservation at a national level is often challenging in terms of capacity to coordinate a variety of interests and participants (e.g. government and non-governmental organizations); these challenges are multiplied when efforts move into the international arena. There is a need in the Americas to bring together governments and citizens to develop a framework for the conservation of migratory wildlife among nations. Environment Ministers at the 2001 Summit of the Americas in Quebec City recognized this and called for just such an effort.

#### CONCLUDING REMARKS

Considering the challenges presented by issues of science, habitat, legislation and international cooperation, the task at hand is not to be taken lightly. An increasing trend is towards the development of partnerships among governments, non-governmental organizations, academia and industries to come together to work towards common goals. By working together to identify conservation priorities and develop action plans that take advantage of each partner's strengths and capacities, the seemingly complicated task of effecting positive change becomes more tangible. To this end, the North American Bird Conservation Initiative (NABCI) is bringing people and organizations together on local, regional, national and international scales to meet common conservation goals in Mexico, the United States and Canada. NABCI's principles and achievements to date offer an example to other regions of a model that can be adopted or modified in other countries to address conservation using a partner-driven approach.

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