



United States Shorebird Conservation Plan

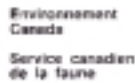
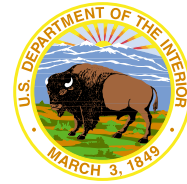
MANOMET CENTER FOR CONSERVATION SCIENCES
MANOMET, MASSACHUSETTS 02345

MAY 2001
SECOND EDITION

United States Shorebird Conservation Plan Council Organizations



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WESTERN
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RESERVE
NETWORK



United States Shorebird Conservation Plan

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MAY 2001

SECOND EDITION

BY STEPHEN BROWN, CATHERINE HICKEY,
BRIAN HARRINGTON, AND ROBERT GILL, EDITORS

The United States Shorebird Conservation Plan is a partnership effort of state and federal agencies, non-governmental conservation organizations, academic institutions, and individuals from across the country committed to restoring and maintaining stable and self-sustaining populations of shorebirds in the U.S. and throughout the Western Hemisphere.

Cover: Short-billed Dowitchers congregate before fall migration at Cook Inlet, Alaska. Photo by Robert Gill.



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Preface

The U.S. Shorebird Conservation Plan presents the major conclusions and recommendations of the technical and regional working groups that contributed to the development of a coordinated national initiative for shorebird conservation. Many of the details pertaining to the development of specific goals and objectives are presented in the accompanying technical reports, which are part of the Plan and are listed at the end of this document. These additional reports should be consulted whenever greater detail is required. This document is intended to provide an overview of the current status of shorebirds, the conservation challenges facing them, current opportunities for integrated conservation, broad goals for the conservation of shorebird species and subspecies, and specific programs necessary to meet the overall vision of restoring stable and self-sustaining populations of all shorebirds.

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*American Avocets in the United States nest principally in wetlands in the Great Basin region of the intermountain western states; during winter most of the population lives in saline lakes, lagoons, and estuaries of western Mexico.
Photo by David Twitchell.*

Executive Summary

The U.S. Shorebird Conservation Plan is a partnership involving organizations throughout the United States committed to the conservation of shorebirds. This document summarizes all of the major technical reports and recommendations produced by the various working groups that participated in developing the Plan. The organizations and individuals working on the Plan have developed conservation goals for each region of the country, identified critical habitat conservation needs and key research needs, and proposed education and outreach programs to increase awareness of shorebirds and the threats they face. The shorebird partnership created during the development of the Plan will remain active and will work to improve and implement the Plan's recommendations.

Natural landscapes in the United States have been altered significantly, and the wetlands, shoreline habitats, and grasslands used by shorebirds have been particularly disturbed. For many shorebird species, existing information is insufficient to determine how these alterations have affected populations. Many shorebird species face significant threats from habitat loss, human disturbance, and from different forms of habitat degradation such as pollution, prey resource depletion, and increasing threats from predators. Despite ongoing conservation efforts, many shorebird populations are declining, in some cases at alarming rates. Because development pressure will continue, critical conservation actions must be identified, integrated management practices must be developed, and ongoing changes in habitat configuration, quality, and availability must be controlled. Focused conservation action is needed now to protect and restore necessary habitats and address other threats to prevent additional shorebird species from becoming threatened or endangered.

The Plan has three major goals at different scales. At a regional scale, the goal of the Plan is to ensure that adequate quantity and quality of habitat is identified and maintained to support the different shorebirds that breed in, winter in, and migrate through each region. At a national scale, the goal is to stabilize populations of all shorebird species known or suspected of being in decline due to limiting factors occurring within the U.S., while ensuring that common species are also protected from future threats. At a hemispheric scale, the goal is to restore and maintain the populations of all shorebird species in the Western Hemisphere through cooperative international efforts.

The Plan was developed by a wide array of state and federal agencies, non-governmental conservation organizations, and individual researchers throughout the country. Major partners include all 50 States, the U.S. Fish and Wildlife Service, the North American Waterfowl and Wetlands Office, most of the Joint Ventures established through the North American Waterfowl Management Plan, the Bureau of Land Management, the U.S. Geological Survey, the USDA Forest Service, the International Association of Fish and Wildlife Agencies, The Nature Conservancy, National Audubon Society, Ducks Unlimited, the Canadian Wildlife Service, the Western Hemisphere Shorebird Reserve Network, Point Reyes Bird Observatory, and many other regional organizations. Manomet Center for Conservation Sciences initiated the project, obtained the funding to develop the Plan, and hired the coordinators who oversaw all aspects of the project to date as well as publication of these reports.

Three major working groups were formed at a national level. The research and monitoring group developed scientifically sound approaches for tracking populations of shorebirds, identified the critical research questions that must be answered to guide conservation efforts, and determined funding requirements to meet these needs. The habitat management group worked with the regional groups to assemble specific regional habitat management goals into a national program. The education and outreach group focused on development of materials for schools and public education programs to help build awareness of shorebirds and the risks facing them throughout the country, and identified areas where increased funding for education and outreach are needed.



Eleven regional groups were formed during the development of the Plan. The major focus of these groups was to determine what habitats need to be protected and managed to meet the requirements of the shorebirds in each region. Each group set its own regional goals and objectives, and collected information about ongoing management efforts and how they can be improved. In addition, the regional groups provided input to the development of the research and monitoring programs, and helped identify education and outreach needs.

The loss of wetland habitat in the U.S. has motivated federal, state, and private agencies to increase conservation and management of wetlands to preserve the public values of these critical habitats. Wetland management and restoration have developed rapidly in recent years, and the North American Waterfowl Management Plan has stimulated significant increases in funding for wetland conservation activities. There is growing recognition among land managers of the opportunity to integrate management practices beneficial to shorebirds and other waterbirds into current management practices focused predominantly on game species. This changing orientation reflects the rapidly growing number of people who engage in bird watching, wildlife photography, and eco-tourism in addition to traditional activities such as fishing and hunting. This growing constituency brings substantial economic benefits to wetlands and waterfowl areas, and has broadened public support for wetland conservation. We need management practices to focus on entire landscapes, but this requires an unprecedented level of coordination among multiple partners. No single conservation initiative can be effective alone. Wetland conservation for wildlife across entire landscapes requires the coordination of multiple efforts. The Shorebird Conservation Plan represents a significant contribution to the development of landscape-level wildlife conservation, and can contribute significantly to these larger goals as part of a broad partnership for wetland conservation.

The Shorebird Plan is designed to complement the existing landscape-scale conservation efforts of the North American Waterfowl Management Plan, Partners in Flight, and the North American Colonial Waterbird Conservation Plan. Each of these initiatives addresses different groups of birds, but all share many common conservation challenges. One major task is to integrate these efforts to ensure coordinated delivery of bird conservation on the ground in the form of specific habitat management, restoration, and protection programs. The newly developing North American Bird Conservation Initiative addresses conservation needs for all birds in North America, and the Shorebird Plan partnership will work closely with this initiative toward common goals.

Each partner organization involved in the Shorebird Plan will take on implementation roles suited to its focus and skills. The U.S. Shorebird Plan Council, which includes representatives of all partners in the Plan, will coordinate implementation. Major implementation partnerships are being set up with interested Joint Ventures organized under the North American Waterfowl Management Plan and with Partners in Flight. International coordination is also underway between the U.S. Shorebird Plan and the Canadian Shorebird Conservation Plan, which share responsibility for many of the same species at different points in their annual cycles. These partnerships will work to ensure that all of the recommendations provided in this document and the accompanying technical reports are addressed, and to ensure that stable and self-sustaining shorebird populations are maintained into the distant future.



Part 1: *The Wind Birds*

The restlessness of shorebirds, their kinship with the distance and swift seasons, the wistful signal of their voices down the long coastlines of the world make them, for me, the most affecting of wild creatures. I think of them as birds of wind, as “wind birds”.

— Peter Matthiessen, *The Wind Birds*

Introduction

Shorebirds are indeed among the most remarkable creatures on earth. Each year, most species of shorebirds undertake phenomenal migrations from their wintering grounds as far south as Tierra del Fuego, en route to their breeding grounds as far north as the Arctic Ocean. In the United States, we see many of these birds only twice a year when they mark the seasons for us with their awe-inspiring journeys. Even those species that breed or winter in the U.S. make impressive migratory journeys between their breeding and wintering ranges.

Imagine that it is early fall in the northern arctic, and the short frenzy of the arctic summer is coming to a close. Recently hatched young shorebirds are about to embark on one of nature’s most remarkable journeys. Without any help from their parents, who have already started on their own migration south, the young birds will set out on a journey of many thousands of miles, with no road map, to a distant destination they have never seen. Incredibly, shorebirds of each generation find their far-flung wintering grounds, which range from the southern coast of the United States to the most southern tip of South America. After spending the relatively mild winter season in the south, they repeat their journey back to their arctic breeding grounds to begin the cycle anew.

Along the way on these extraordinary journeys, shorebirds face increasing threats to their existence. Because they depend upon shorelines and wetlands, both coastal and along interior waterways, shorebirds are often competing with humanity for dwindling open space. Lack of habitat is compounded by increased threats from pollution of coastal and inland waters, high rates of predation, and other factors which make their journey more perilous every year.

Shorebirds occur in all 50 states, and they include the familiar sandpipers and plovers, as well as oystercatchers, avocets, and stilts. Their migrations include long-distance, non-stop flights, often exceeding a thousand miles per leg. To complete these extraordinary flights, shorebirds must lay on enormous fuel reserves. For many of the species common to North America, this is done at migration stopover areas, principally wetlands and associated habitats, which have high densities of food available at the critical times. In some cases up to 80 percent of the entire North American population of a species may visit a single site over a few weeks. The wetland habitats used by shorebirds also provide essential shelter and food for other species, including waterfowl, other avian migrants, commercial and recreationally valuable fish, and endangered and threatened species.

This Plan for the conservation of shorebirds has a simple goal: ensuring that all of our species of shorebirds are protected or restored, and that shorebirds continue to have stable populations that are capable of sustaining themselves into the long-term future. The Plan was developed by a diverse and committed group of people and organizations from across the U.S. who came together to volunteer their time and expertise to support this goal. Achieving this goal and the related objectives in this document will require ongoing and committed action on the part of all state and federal agencies that protect birds, the many non-profit organizations involved with shorebirds, as well as significantly increased understanding and involvement by the general public. Achieving these goals will ensure that future generations of people have the opportunity to marvel at these remarkable creatures as they perform one of nature’s most awesome migrations each year.



An Agenda for Shorebirds

Developing a Shorebird Conservation Plan for the United States was a daunting task for a variety of biological and political reasons. Each species has different geographic breeding and non-breeding distributions, population size, and dispersion patterns. Shorebirds occur in all 50 states, and use a wide variety of habitat types. In addition, the biology and ecology of most species are poorly understood. Comprehensive planning is made even more difficult by the fact that shorebirds are highly migratory. The Shorebird Plan must take into account all situations where lands of the U.S. play critical roles for populations of shorebirds. Some species breed or winter in the U.S., while others do neither but depend upon key habitats in the U.S. for completing their migrations. Clearly, understanding basic biological characteristics of shorebirds is essential to developing sound conservation plans for their protection. Part 1 of the Plan reviews some of the biological characteristics of shorebirds that play important roles in shaping a conservation plan. To successfully address these complex conservation issues the Plan must:

- include all shorebirds that occur in the United States during breeding, non-breeding, or migration seasons;
- identify those species and populations most in need of focused national conservation efforts;
- identify those species most in need of regional conservation efforts;
- prioritize conservation objectives;
- identify mechanisms for delivery of conservation programs;
- identify mechanisms for tracking success of conservation programs;
- propose programs that can be integrated into a larger, international framework because most of the shorebirds in the United States are international migrants; and
- work within the context of the existing, successful framework of other migratory bird conservation initiatives.



Black-bellied Plovers, shown here at a migration stopover site, readily use both marine and non-marine habitats. Photo by David Twitchell.

Shorebird Biology and Conservation Planning

This section provides background on the group of species known as shorebirds, including their distribution in the U.S., and the major conservation challenges that result from their unusual biology.

Shorebird Distribution in the United States

The term shorebird is applied in North America to a large group of birds commonly called sandpipers and plovers, but also including oystercatchers, avocets, and stilts. There are 214 kinds of shorebirds world-wide, 53 of which regularly occur in the U.S. Three of these species are relatively scarce in the U.S. and breed outside of North America (Curlew Sandpiper, Sharp-tailed Sandpiper, and Ruff), and one (Purple Sandpiper) winters but does not breed in the U.S. The Shorebird Plan primarily addresses the 50 species that regularly breed or occur in the U.S. A list of additional species recorded in the U.S. is included in Appendix 4.

Thirty-seven shorebird species breed in Alaska (29 of these breed only in Alaska and not in the lower 48 states); 25 of the 37 do not breed outside of North America (three of these breed only in Alaska, while the remainder also breed in Canada). Eight species (Whimbrel, Bar-tailed Godwit, Black-bellied Plover, Red Phalarope, Red-necked Phalarope, Red Knot, Sanderling, and Ruddy Turnstone) are circumpolar breeders (Holarctic) and six (Pectoral Sandpiper, Rock Sandpiper, Long-billed Dowitcher, Western Sandpiper, Baird's Sandpiper, and Pacific Golden-Plover) breed in Alaska and eastern Siberia. There are 12 species that breed in the lower 48 but not in Alaska; six of these (Piping Plover, American Avocet, Willet, Long-billed Curlew, American Woodcock, and Wilson's Phalarope) also

breed in Canada, four breed in the U.S. and Mexico (Wilson's Plover, Snowy Plover, American Oystercatcher, and Black-necked Stilt), and one (Mountain Plover) is essentially restricted to breeding only in the U.S. A single species breeds in Hawaii, the endangered Hawaiian Stilt, but a variety of species spend the non-breeding season there.

Shorebird Conservation Challenges

This section reviews the aspects of shorebird biology that result in conservation challenges which must be addressed successfully to protect this diverse group of birds.

Long Distance Migration

Because many shorebirds have extremely long migrations, protection efforts for critical sites must be coordinated over vast distances often involving many different countries. As a group, shorebirds undertake some of the longest-distance migrations of all animals. Pacific Golden-Plovers, Bar-tailed Godwits, and Ruddy Turnstones, for example, routinely travel more than 7,000 miles between Alaskan breeding and Australian non-breeding areas. A few species, including Snowy Plovers from Oklahoma or Rock Sandpipers from Alaska, may migrate just a few hundred miles between breeding and non-breeding habitats. However, many of the most highly migratory shorebirds use a 'long-hop' strategy, meaning that some sections of their journeys will be completed in long, non-stop flights. For example, Bar-tailed Godwits fly more than 7,000 miles across the Pacific to New Zealand without stopping for food, rest, or water. Other species may cover long migration journeys in a series of short flights. Some of the relatively short- and moderate-distance migrants also employ non-stop flights spanning from a few hundred to one or two thousand miles without stops, whereas others may have short-hop migrations.



Red knots, Ruddy Turnstones, Sanderlings, and Semipalmated Sandpipers "refueling" on horseshoe crab eggs, whose energy will be transformed to forward feathered motion to the Canadian Arctic. Photo by David Twitchell.

Shorebirds have a diversity of migration routes. Although each species is different, there are three general patterns in the United States, including: migrations between Alaska and Pacific islands and continents as distant as Australia; migrations along the Pacific coast and western mountain cordilleras of North and South America, some to as far as Tierra del Fuego; and migrations to the Caribbean Basin and northeastern South America, some of which pass through central regions of the lower 48 states, and others of which are more concentrated in Atlantic coastal regions. In general - but with exceptions - the more northern-breeding species of shorebirds have longer migrations, some extending to southernmost South America. Species that breed principally in the lower 48 states generally spend the non-breeding season in the southern U.S. and Mexico, but again, there are exceptions.

Low Reproductive Potential

Shorebirds generally have low rates of reproduction, so it is difficult to reverse past declines and recover populations rapidly. Clutch sizes of almost all species are four or fewer eggs, and very few species will re-nest after a successful first nesting attempt. Predation rates of young can also be high, especially in the Arctic when lemming populations are low and food for predators is scarce, or during years when there is late snow covering breeding habitats. Shorebird populations have proven unable to withstand an improperly regulated hunting harvest. Populations of many species crashed due to excessive market and sport hunting during the late 1800's and early 1900's; some species, such as American Golden-Plover, have never recovered their historic numbers, and Eskimo Curlews may already be extinct. Only two species, the Common Snipe and the American Woodcock are still legally hunted.

Concentration

Another element of shorebird biology that raises conservation challenges is the extraordinary degree to which some species depend upon one or a small number of strategic migration stopover sites; concentration makes them extraordinarily vulnerable to environmental disruption because much of the population is in the same place at the same time. Recognition of this special aspect of shorebird biology, and the need to devise novel conservation strategies, were the major factors driving the creation of the Western Hemisphere Shorebird Reserve Network. Documentation of concentration is costly to develop, but several examples are available. A case study of Red Knots shows that between 50 and 80 percent of the North American population stages at Delaware Bay during the spring. The population evidently depends on this stopover site for completion of northward migration into the Arctic. Survey data suggest that a number of other species also are highly dependent on small numbers of migration stopover sites. For example, during spring, most of the Buff-breasted Sandpipers recorded across the United States were at only 10 sites between the Appalachians and the Rocky Mountains. An example from the Pacific Flyway is the Western Sandpiper, where 2-4 million birds (60-80% of the population) may concentrate at the Copper River Delta in Alaska in any given year. National conservation priorities must consider the patterns of concentration at strategic migration areas in the U.S., identify which species are most at risk, and recommend appropriate regional priorities for protecting and managing strategic migration staging sites.

Dispersed and Ephemeral Habitat

Many shorebirds use habitat types, such as seasonal wetlands, that are widely dispersed across the landscape, and may be available in the same place only once every several years. Several regions within the United States where these habitat types are critical to shorebirds present special problems for efforts to monitor their numbers. The value of habitat for shorebirds in areas such as the Prairie Pothole region of the upper Midwest or the Playa Lakes region tends to be underestimated since wetlands are typically small, dispersed, and numbers of birds using any particular wetland may be small. However, when the complex of wetlands or the region is considered as a whole, numbers of birds using the area may be quite large. Additionally, these pothole wetlands, some managed wetlands, and larger alkali lakes, particularly in the Great Basin, may hold water one year and be dry the next. This causes great variance in the numbers of shorebirds using these wetlands in any particular year. Turnover rates of birds at these sites tend to be rapid. The overall effect on monitoring studies in these areas is that they need to be longer term and cover a wider area than some of the monitoring efforts at sites with predictable water resources (largely coastal) that attract large numbers of shorebirds.

Loss of Habitat

Shorebirds, like all other wildlife, need appropriate habitats to live in, including habitats for breeding, for the non-breeding season, and for migration. In many cases, strikingly different habitats are used in different seasons (e.g., many tundra-breeding species also depend on coastal habitats during migration and non-breeding seasons). Populations of almost all kinds of shorebirds have been affected by loss of essential habitat. For some species, losses of habitat have been severe in migration or non-breeding areas, whereas for others losses have been severe in breeding habitat. Some species have suffered severe habitat loss during two or more seasons.

In general, habitat loss has been very high for temperate-zone breeders, especially coastal-nesting species such as Snowy Plover and Piping Plover. Prairie-breeding shorebirds also have been affected substantially by breeding habitat loss, as prairie pothole habitat has been converted to agricultural uses. On the other hand, populations of some species such as Killdeer and Upland Sandpiper probably have increased due to human activities in some areas. In general, breeding habitat loss has been minimal in boreal- and arctic-breeding shorebirds, but there is growing concern that global warming may change this.

Loss of migration habitat also has been extensive. Coastal development and human activities in coastal zones of the U.S. have grown enormously since European settlement, reducing intertidal habitats and/or prey base used for foraging, and perhaps more importantly, usurping high tide resting areas used by shorebirds when feeding grounds



are inundated. For many kinds of shorebirds, migration stopover areas play a vital role in their ability to accumulate fat reserves, which are then spent to fuel the next leg of migration. Shorebirds unsuccessful in gaining necessary fat apparently have very low survival rates. Even where suitable habitats remain intact, they may be degraded by a wide variety of factors that limit their value for shorebirds, such as increased salinity, toxicants, or disturbance. Because the majority of shorebirds migrate southward throughout the United States during July and August, they frequently are competing with humans for coastal space during the peak of the human summer outdoor recreation season. In other situations, they are directly competing with humans for food and/or habitat resources (e.g., Red Knots and horseshoe crab harvest).

Population Change in Shorebirds

There have been no broad-scale projects designed to identify shorebird population sizes or to monitor changes in shorebird populations of North American species. Nevertheless, large habitat losses and existing data indicate that many shorebird species are likely to be experiencing significant declines. Evaluations of information from projects operated for other purposes are possible, but precision is low. Population changes need to exceed 50% before they are detectable using databases such as the International Shorebird Surveys. Nevertheless, evaluations of existing databases indicate declines in many of the species that have been examined, declines that in some cases have been large and rapid. A 1995 summary showed that more than half of the shorebird species evaluated were declining, while only one species was increasing nationally.

The U.S. Shorebird Conservation Plan provides population estimates based on a synthesis of existing information from the Western Hemisphere. While these numbers are sure to be revised, they provide a solid basis for beginning the shorebird conservation planning and monitoring processes. The Plan proposes monitoring protocols that will increase our ability to detect changes in shorebird populations. The protocols also should increase opportunities for identifying causes of population change, which heretofore have largely been elusive. Finally, improved monitoring will be essential for tracking effectiveness of the Plan itself.

Planning Across International Boundaries

Forty-nine species of shorebirds regularly breed in the United States. Table 1 summarizes their principal non-breeding distribution patterns and Figure 1 shows some of the major migratory pathways. The species that breed in the U.S. spend their non-breeding seasons or migrate through no less than 41 nations (13 in South America, 7 in Central America, 3 in North America, 11 in Oceania, and Australia, New Zealand, Japan, New Guinea, Philippines, China, and Russia). An additional four species from Russia and Canada do not breed in the U.S. but use U.S. lands during non-breeding seasons. Meeting the goals of the U.S. Plan will require cooperative conservation planning and implementation with similar efforts in many other nations. Clearly, what happens to shorebirds in one part of the world may dramatically affect their status in another part.



The Western Hemisphere Shorebird Reserve Network, Partners in Flight, and the North American Waterfowl Management Plan have pioneered the development of international networks for migratory bird conservation. Shorebird planning efforts have benefited from those successful models. The U.S. Shorebird Plan has been developed in close coordination with the Canadian Shorebird Conservation Plan, and also has included input from Mexico and Australia. In this process, we have formed new alliances and have provided impetus for our countries to reconfirm their commitment to migratory bird conservation.

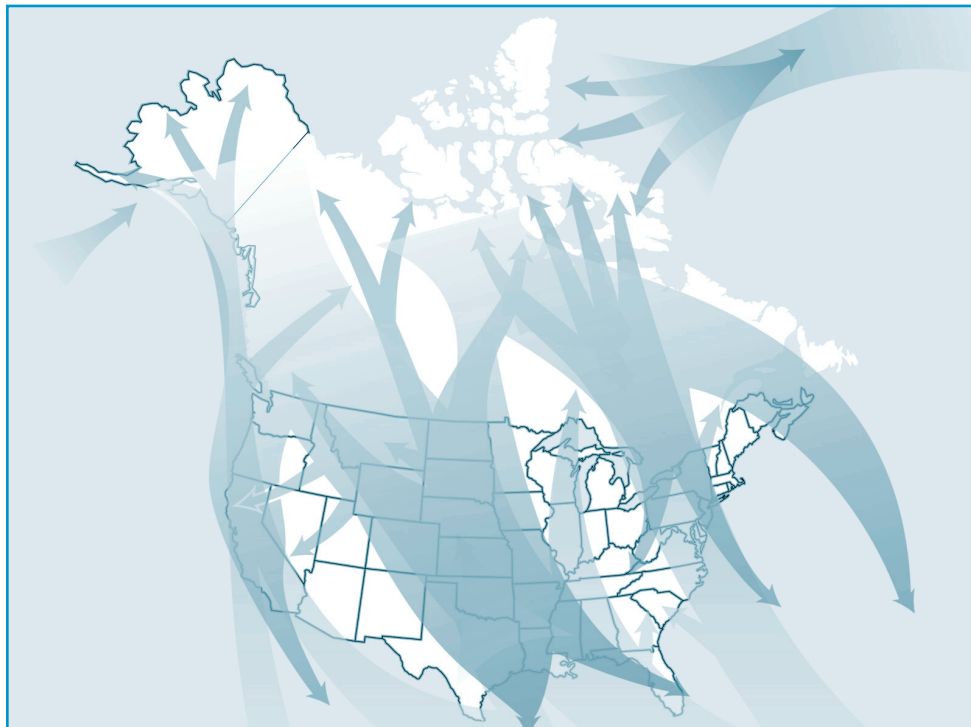
Young shorebirds like this Semipalmated Sandpiper often migrate south on later dates than their parents, and, like other young shorebirds, will frequently use different habitats from adults. Having adequate habitat available when young migrate is an important management and conservation consideration. Photo by Dennis Paulson.



Table 1. Number of United States-breeding shorebird species showing different non-breeding distribution patterns.

NUMBER	NON-BREEDING DISTRIBUTION	SPECIES
10	Widespread Species	Black-bellied Plover, Semipalmated Plover, Greater Yellowlegs, Willet, Spotted Sandpiper, Ruddy Turnstone, Red Knot, Least Sandpiper, Sanderling, Surf-bird.
8	Southern U.S. and Northern Mexico	Piping Plover, Snowy Plover, Mountain Plover, Black-necked Stilt, American Avocet, Long-billed Curlew, Black Turnstone, Marbled Godwit, Long-billed Dowitcher, Wilson's Plover.
8	Southern South America	American Golden-Plover, Upland Sandpiper, Hudsonian Godwit, White-rumped Sandpiper, Baird's Sandpiper, Pectoral Sandpiper, Wilson's Phalarope, Buff-breasted Sandpiper.
5	Oceania (including Australia and New Zealand)	Bar-tailed Godwit, Wandering Tattler, Sharp-tailed Sandpiper, Bristle-thighed Curlew, Pacific Golden-Plover.
10	Principally North America	Killdeer, American Oystercatcher, Black Oystercatcher, Purple Sandpiper, Rock Sandpiper, Dunlin, American Woodcock, Common Snipe.
7	Central America and Northern South America	Lesser Yellowlegs, Solitary Sandpiper, Whimbrel, Semipalmated Sandpiper, Western Sandpiper, Stilt Sandpiper, Short-billed Dowitcher.
2	Pelagic	Red-necked Phalarope, Red Phalarope.

Figure 1. Major routes of concentrated shorebird migration to and from the United States during spring and fall. In addition to these major pathways, shorebirds also cover much of the landscape in smaller numbers.



Part 2: A Vision for Shorebird Conservation

National Vision

The Vision of the U.S. Shorebird Conservation Plan is to ensure that stable and self-sustaining populations of all shorebirds are distributed throughout their range and diversity of habitats in the U.S. and across the Western Hemisphere, and that species which have declined in distribution or abundance are restored to their former status to the extent possible at costs acceptable to society.

Shorebird Conservation Goals

To effectively conserve the populations of North American shorebird species that occur in the United States, the U.S. Shorebird Conservation Plan must address conservation challenges at several different scales. The hemispheric goal below addresses the international cooperation necessary to conserve shorebirds throughout their range, and to ensure their survival. The national goal addresses the activities that must be undertaken within the United States to ensure that shorebird populations are not limited during their life history stages that occur here. Regional goals address the specific activities that must be undertaken to protect and manage habitats and the shorebirds that occur within each region of the country.



Roosting sites are important for shorebirds, such as these Surfbirds, because they provide an opportunity to rest while feeding areas are covered by the tides, allowing the birds to conserve the energy they will need during migration. Photo by Robert Gill.

Hemispheric Goal

Restore and maintain stable and self-sustaining populations of all species of shorebirds in the Western Hemisphere.

Appendix 1 lists current estimates of the sizes of North American shorebird populations, and target population sizes necessary to meet this goal.

- Strategy 1. Develop monitoring programs to determine whether shorebird populations are declining.
- Strategy 2. Focus research efforts on determining factors limiting populations of declining shorebird species, and focus international conservation efforts on reducing the effects of these limiting factors.
- Strategy 3. Develop coordinated shorebird conservation efforts with Canada, Mexico, the Caribbean, Central America, South America, and Oceania/East Asia.

National Goal

Stabilize populations of all shorebird species known or suspected of being in decline due to limiting factors occurring within the U.S., while ensuring that stable populations are secure.

- Strategy 1. Integrate shorebird conservation as part of a regionally-based, biologically driven, landscape-oriented, integrated migratory bird management program to deliver shorebird conservation in coordination with other migratory bird initiatives.

Strategy 2. Focus research to identify factors limiting populations of shorebirds in the U.S.

Strategy 3. Identify management actions that can ameliorate factors limiting shorebird populations in the U.S., and implement regional conservation programs to ensure that populations of shorebird species are not limited by any environmental factors within the U.S.

Common Regional Goals

Each Shorebird Planning Region (see Appendix 5) developed its own goals and objectives through the regional working group process. The specific goals and strategies developed by these groups are summarized in Part 5 of this document. In addition, the groups have collectively endorsed these common regional goals:

A. Provide sufficient high quality habitat to ensure that shorebirds in each region are not unduly limited by habitat availability or configuration.

Strategy 1. Identify and monitor key ecosystem and landscape variables that may affect shorebird use of the region (e.g., prey density, availability of roost sites, distance between high quality sites).

Strategy 2. Monitor shorebird use of available habitats to determine contributions of important sites to support of local populations of shorebirds.

Strategy 3. Coordinate management efforts for shorebirds among agencies and organizations within each region and flyway.

Strategy 4. Establish a specific habitat budget for the region, including amounts of specific habitat types that should be acquired, managed, or restored for shorebirds.

B. Ensure that efforts to provide habitat for shorebirds are integrated into multiple species habitat management initiatives where appropriate.

Strategy 1. Promote management of wetland habitats as dynamic natural systems to provide habitat for the entire range of wetland-dependent species, including shorebirds, at appropriate points in natural wetland cycles.

C. Increase understanding of how local habitat conditions affect shorebird abundance and use of a region and, in turn, how conditions affect hemispheric shorebird populations.

Strategy 1. Encourage management strategies and/or modeling exercises that will help clarify the most important determinants of shorebird use of particular habitat types.

Strategic Direction

Development of a conservation strategy for shorebirds in the U.S. has required close coordination with the other major bird conservation initiatives seeking to implement landscape-scale bird conservation, including the North American Waterfowl Management Plan, Partners in Flight, and the North American Colonial Waterbird Conservation Plan. The future of bird conservation clearly lies in the direction of implementing integrated programs that can address the needs of all birds. This section outlines the rationale for integration of shorebird conservation efforts with a broad partnership of organizations working to protect all birds.



The Role of Science in Shorebird Conservation

Effective shorebird conservation strategies must be based on sound science. The conservation goals outlined below cannot be achieved without the underlying foundation of scientific knowledge about shorebird species and the threats facing them. This scientific foundation forms the link between the broad goals laid out in this document, and the specific conservation projects that are necessary to protect bird species. Science provides both the information necessary to effectively identify critical conservation needs, and an understanding of what to do about them. Among the most important areas where information is lacking are the factors limiting the populations of each species, and the critical life history stages and geographic locations where these factors operate. For most shorebirds, this information is only partially complete, and in some cases, it is entirely lacking. In addition, we do not know whether the populations of many shorebirds are changing, and if so how quickly. We must strive to develop sound scientific information that will guide the refinement of shorebird conservation priorities, support the design and development of critical conservation projects, and help measure the effectiveness of our actions toward meeting our goals.

Bird Conservation Regions and Shorebird Planning Regions

Effective shorebird conservation requires a wide variety of habitat and species management efforts and the restoration of landscapes with suitable quantity, quality, and diversity of habitats. Programs aimed at providing for the needs of shorebirds will overlap with efforts to protect other bird species in almost every instance. Coordination of shorebird conservation efforts with those of other bird initiatives requires a common spatial language defining ecological regions where similar habitats and land uses result in similar conservation issues. The ecological framework of bird conservation regions developed jointly by all four major bird conservation initiatives in the U.S. (the North American Waterfowl Management Plan, Partners In Flight, the North American Colonial Waterbird Conservation Plan, and the U.S. Shorebird Conservation Plan) attempts to meet this goal (details are available at <http://www.manomet.org/USSCP.htm>).

The development of geographic regions that could reflect the wide range of shorebird populations and conservation issues within the United States was a major challenge. It was even more challenging given the goal of developing regions that could organize conservation issues for all birds as part of the North American Bird Conservation Initiative (NABCI) process. Each Shorebird Planning Region is made up of NABCI Bird Conservation Regions (BCR's), and includes large areas of the country where the ecological characteristics of the landscape result in common shorebird conservation needs and issues. Appendix 5 shows the Shorebird Planning Regions and the NABCI Bird Conservation Regions contained in each Planning Region. The regional groups that developed the specific conservation goals and objectives for shorebirds in each part of the country focused on these Shorebird Planning Regions.

Planning, Implementation, and Evaluation

Integrated Planning, Implementation, and Evaluation

Effective shorebird conservation requires a dynamic process of strategic planning, project implementation, and evaluation of success. This process allows managers and scientists to move forward with critical conservation projects that will support bird species, even though they do not have all the information they would like to have. Because many conservation challenges are clear and pressing, the conservation community needs a process that supports actions known to be of high priority, and that also supports ongoing refinements and assessment of effectiveness. This process is called adaptive management.

The three components of the adaptive management approach proposed here are: 1) planning; 2) implementation; and 3) evaluation.



Planning in this context means the development of goals and objectives for specific groups of shorebirds. It is most effectively completed by the experts familiar with each species or guild, and with the complex ecological information that is already available describing the life history needs and the factors limiting the populations of shorebirds. Effective planning also requires consideration of a wide range of non-biological factors, including existing management activities, land-ownership patterns, and many other factors. The plans developed by each Shorebird Planning Region are the heart of this process. Each plan prioritizes the most important conservation actions that must be undertaken for shorebirds within the region. While the regional plans will require ongoing additions and revisions, they set the stage for a coordinated effort to achieve significant shorebird conservation. In addition, the overall national programs needed to support the regions, and to address issues of national importance, are detailed in this document.

Implementation in this context means the process of carrying out the specific conservation projects necessary to effectively protect and conserve populations of shorebirds. In contrast to planning, implementation is most effectively carried out in an integrated (i.e., multiple species groups) fashion, where the overlapping habitat and management needs of shorebirds are combined as part of an overall strategy for conservation of all birds using similar habitats at the landscape scale. The integration of implementation activities for shorebirds with conservation programs for other birds is the central vision of this Plan. Successful implementation requires the participation of a wide range of partnerships, both public and private, as described below.



Arctic-nesting American Golden-Plovers are some of the longest distance migrants of all animals; conservation and management planning must be integrated on a comparable scale. Photo by Elizabeth P Mallory.

Evaluation is the process of determining how successful each specific conservation strategy has been at achieving its overall conservation goals. It requires sound scientific information and research on shorebirds and on their habitats as conditions change. Evaluation is not an end in itself, and should never become the primary focus of the overall strategy, but is nevertheless critical to ensuring that conservation goals are being achieved. Evaluation activities span a wide range, including scientific analysis of changes in populations of shorebirds, assessments of habitat quality and availability, targeted studies where critical information is lacking that will define future priorities, and overall assessments of individual conservation programs. A successful evaluation program eventually leads to a revision of the conservation strategies described in the planning stage, as science increases our ability to understand what limits bird populations and what should be done about it.

Integrated Bird Conservation

Shared conservation needs at the landscape level

Managing the conservation of the more than 700 bird species that occur in this country would be hopelessly complex on a species by species basis. Each species may use many different habitats during the year and each habitat type often has unique management issues. However, at the scale of landscapes, the needs of many different bird species are similar. Combining management needs for species that use the same types of habitat in the landscape increases the efficiency of management, reduces costs, and increases the effectiveness of specific projects by addressing the needs of a variety of birds simultaneously.

Integrating the needs of many bird species is not an easy task. Detailed plans are required for each group of species. Therefore, it is important that each initiative, based on a specific group of birds, continues to provide the best information possible about what is needed for those species. In addition, integration requires a focused effort

to look for overlapping opportunities for habitat conservation. In some cases, there will be conflicts among the needs of different bird species that share habitats; creative approaches to ensuring that all species are protected then will be critical. Overall, the challenge of integrating bird conservation for multiple species groups will yield significant benefits in terms of the efficiency of the conservation achieved on the ground, and the broad base of support that can be generated for bird conservation by working together.

Integrated Conservation Delivery

All conservation is ultimately local. The regional shorebird working groups formed as part of the Plan provide the expertise necessary to guide the successful delivery of shorebird conservation in their respective regions. The wide range of public and private organizations operating in each part of the country are the most knowledgeable about local conditions and needs and should work cooperatively with regional planning efforts for all groups of birds. The Shorebird Plan should be implemented in full cooperation with the North American Bird Conservation Initiative because it advances the vision of regionally-based partnerships that build on local knowledge and enthusiasm to deliver conservation activities for all groups of birds.

The most critical step in achieving integration is determining where the goals and objectives of initiatives for different bird groups overlap. The regional partnerships should be the focus for efforts to assemble the various plans for different groups of birds, and for determining how best to apply them. Integration will require different approaches in each part of the country, depending on the specific birds that occur, the threats to various habitat types, and the range of existing conservation activities already taking place. Allowing each regional partnership to determine its own course toward integration will ensure full and active participation by regional and local organizations.

Shorebird Plan Revision Schedule

The U.S. Shorebird Conservation Plan was developed with active participation from most of the organizations and individuals working to protect and learn more about shorebirds, and represents the best information available about priority education, research, monitoring, and management needs. However, many gaps in our knowledge of

these birds and their needs have been identified. Developing better approaches and increasing funding to obtain the missing information are the subjects of many of the recommendations presented here. As more information becomes available in upcoming years, there will be a need to systematically revisit the recommendations and goals laid out here. This will ensure that they are modified to represent the best available scientific information. For this reason, the Plan partnership recommends that the U.S. Shorebird Conservation Plan be revised every five years over the next 15 years, and thereafter as determined to be necessary.



American Oystercatchers have a relatively small population estimated at only 7,500, which makes them more vulnerable than species with similar threats but larger populations. Photo by Brad Winn.



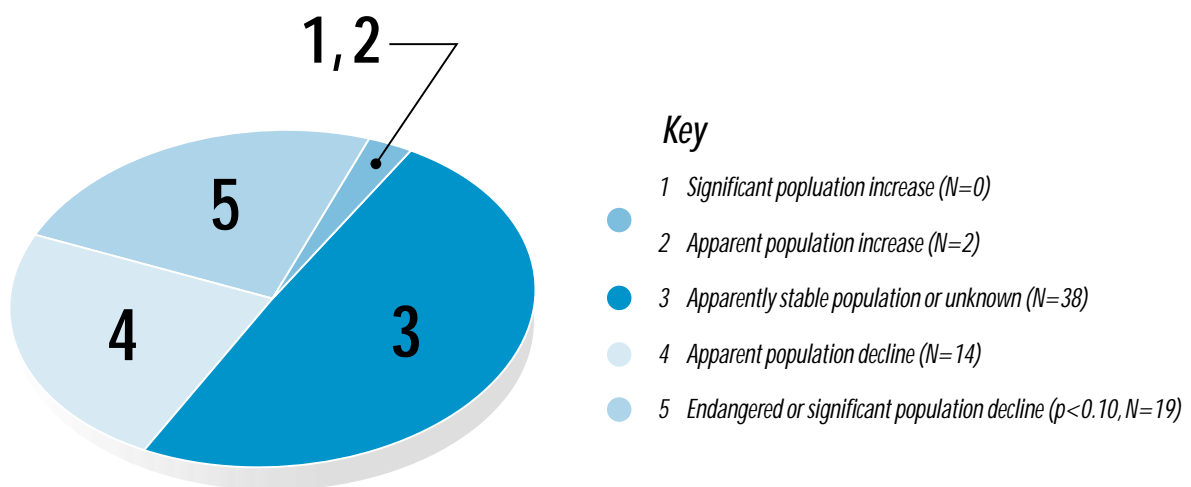
Part 3: Shorebird Conservation Status, Populations, and Priorities

Conservation Status of Shorebirds

As part of the U.S. Shorebird Conservation Plan and as a contribution to development of the Canadian National Plan, a technical working group focused on the difficult task of determining the conservation status of the shorebird species that regularly occur in northern North America (the U.S. and Canada). Their efforts were aimed at determining risks facing each species, and identifying factors needed to support populations of each species, so that the overall goals of the Plan can be met. An additional goal was to identify issues related to the maintenance of demographic and genetic stability for each species so that populations will persist far beyond the next century.

The baseline information from which these goals were determined was obtained through coordination and collection of species-specific information from 36 shorebird biologists from the U.S. and Canada. These results were summarized in a matrix containing over 150 pieces of information for each species. The full matrix, along with other supporting information, is presented in the accompanying technical report entitled the National Shorebird Conservation Assessment, which includes the following: 1) the assumptions on which all assessments were based; 2) some background information derived from data provided by the species experts as well as a review of the shorebird literature; and 3) conclusions and recommendations for shorebird conservation in the U.S.

The Conservation Assessment reported significant causes for concern related to many different aspects of shorebird biology and conservation. Only 10 of the 50 species considered (20%) have had a significant census undertaken. Most of these were censused during winter or migration and those censuses were not repeated regularly. Piping Plover is the only species for which annual, species-wide censusing takes place (with an in-depth winter and breeding census every five years). Thus, overall, we have very limited information on which to base population or trend estimates for most shorebirds. Twelve species (24%) have undergone a significant decline in breeding range, and there is insufficient information to evaluate 15 more. Significant threats were documented for 27 species (54%) during the breeding season, 36 species (72%) during migration, and 40 species (80%) on their wintering grounds. In addition, almost half of the shorebird species considered have significant or apparent population declines (Figure 2).



Population trends among US shorebirds based on 72 taxa (species and subspecies)

Figure 2. Population trends for shorebirds in the U.S. Compiled from the National Shorebird Conservation Assessment.

The Conservation Assessment reached the following major conclusions:

- There is not enough information available to thoroughly assess the status of most, if not all, North American shorebirds.
- The limited information that is available suggests that overall, northern North American breeding shorebird numbers need to increase substantially to meet the goals of the Plan.
- Adequate monitoring and research programs are among the highest priorities for the Shorebird Plan, so that the status and trends of each species can be properly addressed.

Estimates of Current Shorebird Populations

Rationale for Estimating Population Sizes

Knowledge of the number of animals in a population is not only of intrinsic biological interest, but for shorebirds and other waterbirds, has also assumed considerable practical application in conservation planning and action. Knowledge of population size is needed in assessing the viability of species with low numbers, and can provide a benchmark against which the success of management efforts may be measured. Population size is of particular importance for endangered or threatened species, but the development of population estimates has also been used in setting targets for a range of species, as in the North American Waterfowl Management Plan, and is being adopted as a broad-scale planning component of the Shorebird Conservation Plan. While the population estimates provided here are tentative and will require much additional work to support and refine, they nevertheless provide a broad overview of the status of current populations as currently understood. This information is of obvious value for setting broad policy goals for shorebird conservation.

In addition, several key initiatives relevant to the conservation of shorebirds and the wetlands upon which they depend are based on criteria involving the percentage of a flyway population using the site to determine that site's importance. For instance, the "Ramsar" Convention uses the criterion that a site should support 1% of a flyway population to be considered of international importance, and the Western Hemisphere Shorebird Reserve Network has adopted a scale of criteria (5%, 15%, 30%) to determine increasing levels of importance (from regional to hemispheric) of sites for shorebirds. Application of these criteria clearly requires a knowledge of the population sizes of the species being considered.

On a practical level, determination of the population sizes of shorebirds presents many difficulties, mainly related to the highly migratory nature of the birds. For instance, many species migrate from breeding grounds in the far north, where they are found dispersed at low densities over vast areas, through migration areas, where they occur in large but highly variable numbers, to wintering areas which may lie as far south as Tierra del Fuego at the southern tip of South America. Attempting to assess numbers at any of these stages brings with it a variety of problems relating to logistics, methodology, adequacy of geographic coverage, accuracy of estimates obtained, and the life history characteristics of the species being studied.

Methods for Estimating Numbers

Only recently has enough information been obtained over a wide enough geographical area to attempt to piece together estimates of the population sizes of shorebird species. The present estimates have been assembled from a variety of sources, involving different methods and different geographical areas as appropriate for the species concerned. Major sources of data have included: 1) count data accumulated from volunteer survey networks, such as the International Shorebird Survey, the Maritimes Shorebirds Survey, and the Pacific Flyway Project; 2) compilation of data from a variety of sources, including the major summary of data from the interior of North America, and regional inventories of wetlands in Latin America; 3) aerial survey data from various projects and areas,



including James Bay, Delaware Bay, Pacific northwest Mexico, and the Canadian Wildlife Service “atlas” projects to determine wintering numbers and distribution in South America, Panama and Mexico; 4) data from projects directed towards particular species, such as Piping Plover, Mountain Plover, Black Turnstone, and Bristle-thighed Curlew; 5) investigations from breeding areas in temperate North America; 6) investigations from Arctic breeding areas, including both historical studies and more recent work using remote sensing to assess habitats and populations over particular regions; and 7) estimates based on extrapolations from schemes such as the Breeding Bird Survey and Christmas Bird Counts. Data from all available sources were assembled separately for each of the following four seasons and within particular flyways or regions to avoid overlap or duplication of records of the same birds as much as possible: breeding, northward migration, southward migration, and wintering. Since detectability, geographic coverage, and “countability” varied for the different areas and species, the maximum number found across the four seasons served as the basis for the current population estimate.

For most species, this information must still be considered a first approximation, and subject to refinement and revision as more information becomes available. The quality of the estimates varies from an educated guess, through a number resulting from assembly of information for which an overall error estimate is rarely calculable, to fairly complete census data for a particular species. The probable accuracy of each of the estimates is indicated in Appendix 1 and in the National Shorebird Conservation Assessment and must be borne in mind when using the information for purposes such as setting population targets.

Because the information on which to base population estimates is poor for many species, a classification system was developed to indicate the relative degree of accuracy associated with each estimate. The estimates are ranked on a scale from 1 to 5, as follows:

Poor=1: A population estimate based on an educated guess. Score 1 also given to Eskimo Curlew which has not been reliably seen in recent years.

Low=2: A population estimate based on broad-scale surveys where estimated population size is likely to be in right order of magnitude.

Moderate=3: A population estimate based on a special survey or on broad-scale surveys of a narrowly distributed species whose populations tend to concentrate to a high degree either a) in a restricted habitat, or b) at a small number of favored sites. Estimate thought to be within 50% of the true number.

Good=4: A calculated estimate based on broad-scale mark:recapture ratios or other systematic estimating effort resulting in estimates on which confidence limits can be placed.

High=5: Number obtained from a dedicated census effort and thought to be accurate and precise.

Shorebird Population Estimates

The current estimates of shorebird populations in North America, listed in Appendix 1, should be considered tentative, particularly for the species where confidence in the estimate is moderate or lower.

Shorebird Species Prioritization

In any conservation plan there is a need to prioritize specific conservation activities. This Plan uses the approach of prioritizing species according to their relative conservation status and risks, so that the relative importance of various conservation activities can be assessed by considering the status of the species that will be most affected. The system for prioritizing shorebird species of concern was developed for the U.S. Shorebird Conservation Plan with input from many individuals participating in the Research and Monitoring working group, including representatives



from across the country and from Canada. The goal of the system is to provide a clearly organized method for categorizing the various risk factors that affect the conservation status of each species in a format that can be easily updated as additional information becomes available. The system was designed in collaboration with Partners In Flight to ensure that it was as compatible as possible while reflecting the unique conservation risks for shorebirds.

Variables Used to Prioritize Shorebirds

The variables used to prioritize shorebird species are the same ones used in the Partners In Flight prioritization system. However, the definitions of the variables, and the scoring system used to assign values from 1 to 5 for each variable, have been modified to better reflect the biology of shorebirds. Descriptions of the variables are provided here, and the details of the scoring system are provided in the National Shorebird Conservation Assessment.

1) Population Trend, PT

The population trend variable uses existing information on shorebird trends to estimate broad categories of population decline. Species with known declines in populations are likely to be at higher risk than species where ongoing study has detected no risk. However, many species may be declining even though trends have not been detected using current monitoring techniques. This is particularly true for species under-represented in ongoing monitoring programs. Only species with documented significant population declines ($p < 0.10$) are considered highly imperiled (see Shorebird Prioritization categories below).

2) Relative Abundance, RA

This variable uses population size estimates to classify each species into 5 categories based on breaks in the distribution of population sizes among shorebirds. Species with smaller absolute population sizes are likely to be more at risk, either as a result of historic declines or from catastrophic disturbances. Population estimates were developed by Morrison et al. (Waterbirds 2000, Vol.23 No.3, pages 337-552). With increasing data about current population sizes, these estimates will be revised.

3) Threats During Breeding Season, TB

This variable ranks the threats known to exist for each species, and the scoring reflects the limited knowledge available for determining threats to most shorebirds.

4) Threats During Non-breeding Season, TN

This score uses the same criteria as the breeding threats scores, with the additional factor of concentration risk during migration explicitly considered.

5) Breeding Distribution, BD

This variable ranks the size of the breeding range for species that breed in North America, and only applies during the actual breeding season. The assumption is that species with relatively more restricted ranges are more susceptible to breeding failure from natural or human-induced causes. Threats that occur from factors such as concentration during migration to or from the breeding grounds are addressed in TN above.

6) Non-breeding Distribution, ND

This variable refers to distribution during the non-breeding season, which includes migration to and from the breeding grounds. The score reflects the relative risks associated with having a smaller absolute range size during the non-breeding season. This variable includes criteria for both the area of the non-breeding range, and also for length of coastline for coastal species where measuring area is not as representative of distribution. Threats resulting from concentration at some point during migration are addressed in TN above.

Many of these variables, while widely agreed to affect conservation status, are very difficult to estimate. Nevertheless, prioritization is important to ensure that species more at risk are given the attention needed to avoid





Some North American shorebirds, such as the Wandering Tattler, winter on hundreds of oceanic islands, including dozens of different commonwealths and nations of the Pacific Ocean. Photo by Dennis Paulson.

significant declines. Because appropriate data is often lacking, the classifications produced by this system are considered estimates of the actual conservation status of each species. Further study is needed for most species with respect to most of these variables. The classifications presented here will be revised within one year of the completion of the Shorebird Plan, and at regular intervals as appropriate, and should not be considered final. The specific variables used in the system, and the rules for classifying species, are described in detail in the National Shorebird Conservation Assessment report.

To develop regional species priorities, an additional variable called Area Importance is used to reflect the relative importance of each Planning Region to each species.

Considering area importance at the regional scale ensures that conservation effort will be directed at species that are relatively important in each region. The relative importance of each Planning Region for each shorebird species during the breeding, migration, and wintering seasons is shown in Appendix 2. An additional table showing the relative importance of each NABCI Bird Conservation Region is included in the National Shorebird Conservation Assessment. Area Importance scores are based on knowledge of distributions, expert opinion, and data on distributions for species' where it is available. Because management decisions based on species priorities must often be conducted at appropriate seasons, the scores for these variables are reported using a system that reflects both the relative area importance and the season or seasons during which the area is important, including breeding, wintering, and migration.

Shorebird Prioritization Categories

The prioritization system classifies each species in one of the following categories:

5) Highly Imperiled

All species listed as threatened or endangered nationally, plus all species with significant population declines and either low populations or some other high risk factor.

4) Species of High Concern

Populations of these species are known or thought to be declining, and have some other known or potential threat as well.

3) Species of Moderate Concern

Populations of these species are either: a) declining with moderate threats or distributions; b) stable with known or potential threats and moderate to restricted distributions; c) relatively small; d) relatively restricted; or e) declining but with no other known threats.

2) Species of Low Concern

Populations of these species are either: a) stable with moderate threats and distributions; b) increasing but with known or potential threats and moderate to restricted distributions; or c) of moderate size.

1) Species Not at Risk

All other species where there is apparently no current risk of population decline.

The prioritization scores for each species and subspecies are provided in Appendix 3.



Some species, like this Whimbrel, survived an intense era of market gunning, while similar species like the Eskimo Curlew apparently did not, probably because of the Curlew's more limited distribution and more specific habitat needs. Photo by Elizabeth P. Mallory.

Shorebird Population Targets

Rationale for Setting Population Targets

The vision of the U.S. Shorebird Conservation Plan is to ensure that stable and self-sustaining populations of all shorebirds are distributed throughout their range and habitats in the U.S. and across the Western Hemisphere, and that species which have declined in distribution or abundance be restored to their former status to the extent possible at costs acceptable to society. Making this vision a reality will require halting the declines of many shorebird species, and increasing the populations of many species to the point where they are stable and self-sustaining.

The rationale for setting specific population targets is to provide an objective measure of when the overall vision of the Plan has been achieved. Achieving the vision will require an understanding of how populations have changed in the past as well as estimates of approximate population levels today. However, this information is known with certainty for only a few of the shorebirds that occur in the United States. Other parts of the Shorebird Plan lay out procedures for monitoring shorebirds sufficiently to provide information on their population trend, and research priorities necessary to determine the factors limiting populations of shorebirds. This information will make the process of setting population targets much more precise and scientifically sound. Nevertheless, there is a current need to set approximate population goals for shorebirds to guide the early stages of implementation of the Plan. The population targets provided here are only a first approximation attempt to provide these goals. Establishing population targets known to be sufficient for achieving the vision of protecting shorebirds in the United States will require significant funding for the monitoring and research needs outlined here, and will result in modified targets that will be revised as more detailed information becomes available. **Updated information on population estimates and targets will be posted on the U.S. Shorebird Conservation Plan website at <http://www.manomet.org/USSCP.htm>.**

Many of the shorebird species that occur in the United States have defined subspecies, i.e. groups which have been geographically isolated so long that they are distinct. Other geographically isolated groups exist that have not been recognized as subspecies, yet are in all likelihood genetically distinct, and possess unique characteristics that should be preserved. In some cases one subspecies within a species may be declining or facing specific threats where another is not. Because of these and other complexities, the process of setting population targets was applied to all groups of shorebirds recognized as being geographically distinct.

Methods for Establishing Population Targets

For most shorebird species, it is impossible to establish scientifically supported population targets that are known to meet the goal of achieving stable and self-sustaining populations. This is because current and past population sizes are unknown, and because insufficient information about conservation risks and factors limiting populations exists. Because information is lacking but the need for conservation action is clear, the working group established a simple approach to setting population targets based on the limited information available. This is not a scientific process, but a series of policy recommendations based on the simple set of assumptions and rationale outlined below. For the purposes of beginning conservation planning, tentative population targets were established based on the estimated population size, and the current assessment of whether the species has experienced recent population declines or not. In each case, both short-term and long-term goals are established.

1) Species known to be declining

Population Trend = 5. The species or population has been documented to be in decline, or is listed as threatened or endangered under the United States Endangered Species Act (the Act). Conservation actions aimed at increasing the populations of species should be prioritized according to the species priority, with restoration of the highest priority species addressed first.



Population goals.

Listed Species: In the case of endangered or threatened species, the short term goal is to achieve the level of recovery recommended in the species recovery plan prepared under the Act. Long-term goals are not provided for these species because planning and management under the Act should be sufficient to support their long-term persistence as viable populations.

Short-term Goal: For remaining category 5 species the recommended short-term goal is to halt the population decline.

Long-term Goal: The long-term goal is to restore the population to the level estimated to have existed in the year when population trend analysis began (for most species in the early 1970's). This level was calculated by using the known rate of decline, and back calculating the population size to the year when data were first collected, using the current population estimate as the starting point. For example, Black-bellied Plovers have a current population estimate of 150,000, with a 45% decline. The long-term target is to restore the population to 272,000, the level that would have existed before the decline took place ($272,000 - 45\% = 150,000$). For many species, these restoration targets are extremely conservative because historical declines are thought to have been large, but monitoring data are available only recently.

2) Species thought to be declining

Population Trend = 4. The species is thought by experts to have substantially declined, but lack of sufficient data has prevented statistical verification.

Population goals.

Short-term goal: The short-term goal for these species is to determine with certainty if declines are actually occurring, and to halt any declines that are occurring.

Long-term goal: The long-term target recommended for these species is restoration of the populations to the level likely held in the early 1970's, established by estimating the percentage of habitat loss the species has endured, and to increase from the currently estimated population size by a commensurate amount.

3) Species with no decline suspected, or known to be stable

These species have population trend scores of 3, 2, or 1.

Population Trend = 3. There is no information on population change, or insufficient information to assess past declines, but the species is thought to face future risks such as habitat loss.

Population goals.

Maintain population at current levels, with special attention to any declines that result from risks, or future information which indicates that the population status was actually declining when thought to be stable.

Population Trend = 2. The species' population is not declining, and is thought to be at historic levels. No population decline is expected, and the population is thought to be stable and self-sustaining.

Population goals.

Maintain population at current levels.

Population Trend = 1. The species' population size may be increasing above historic (i.e. pre-1800) levels. The National Shorebird Conservation Assessment indicated that no shorebird species are in this category. The specific population targets established for each species and population of shorebirds are shown in Appendix 1.



Part 4: National Shorebird Conservation Strategies

Priority Shorebird Monitoring Programs

Analyses of the North American Breeding Bird Survey (BBS) conducted since 1966 have demonstrated the conservation value of long-term population monitoring. Detection of population change is being used increasingly as a basis for setting bird conservation planning and management priorities, identifying research needs, and evaluating the effectiveness of bird management programs. For migratory species, data from monitoring programs are in demand not only at the state and national levels, but also in other countries that share the species. For the highly migratory shorebirds, virtually all countries in the Western Hemisphere have a stake in obtaining reliable population information.

Data from several shorebird inventory programs in North America in the past two decades strongly suggest that populations of the majority of species are declining, some at rates exceeding 5% per year. But, because these surveys were designed primarily for documenting distribution and patterns of relative abundance (rather than population size or population change), the statistical validity of the apparent population trends cannot be easily verified. Unfortunately the BBS method is not suited to habitats preferred by most shorebird species. Therefore, there is a compelling and urgent need for better shorebird monitoring methods and an institutional capacity for monitoring shorebirds. The level of funding presently allocated to migratory bird monitoring falls far short of what is needed to develop these programs.

During 1999 a group of distinguished experts on North American shorebirds convened on several occasions to review the current state of knowledge of shorebird populations and to recommend an approach to establishing a science-based, national shorebird monitoring program. They concluded that a comprehensive program with maximum conservation impact should have the following goals:

- Goal #1** Statistically valid monitoring of long-term, species-specific population trends.
- Goal #2** More precise estimates of the size of species' total populations.
- Goal #3** Monitoring shorebird use of major staging, migration, and wintering areas in the United States and Canada.
- Goal #4** Ensuring that shorebird population information is effectively integrated into the national bird conservation planning and implementation process.

Goals 1 and 2 address two approaches to assessing population change at the national or continental scale. Although it is often desirable to obtain actual estimates of total population (goal 2), indices to population size (goal 1) are usually easier to derive and serve the purpose of documenting direction and magnitude of long-term population change. Developing programs to meet goals 1 and 2 will help establish and periodically update strategic shorebird conservation priorities. Goal 3 addresses management needs at the local and regional scales and ensures that important habitats and habitat management actions are adequately monitored. Achieving goal 4 will require the establishment of a structure for effective communication between the academic and wildlife management communities. This will ensure that the national bird conservation dialogue (e.g., the North American Bird Conservation Initiative, NABCI) benefits by having the best available population information on shorebirds, and that monitoring scientists are apprised of the most critical monitoring needs faced by the wildlife management community. A practical mechanism is also necessary for assuring that wildlife managers are adequately informed on how to design and carry out shorebird monitoring programs as a means of evaluating effectiveness of habitat management projects.

Each of the over 70 species or distinctive populations of shorebirds in North America has a unique breeding and wintering distribution pattern and migration strategy. Breeding and wintering ranges of many species are not



easily accessible. The challenges presented by this diversity are evidenced by the absence of effective monitoring programs for all but one or two species. The North American Shorebird Monitoring Plan examines some underlying statistical issues related to survey design and counting methodology that become particularly relevant in the face of such complexity. Factors such as estimating numbers of birds in large flocks are common to most non-breeding surveys. Aerial surveys, while the only feasible method in certain situations, present special difficulties both for numbers estimation and species identification. Lack of information on turnover rates confounds interpretation of surveys of migrating birds. Because the particular mix of difficulties is different at different seasons, the relative merits of monitoring at different times of the year are explicitly identified in the full report. All of these problems need to be addressed during the course of survey development and many constitute fertile ground for research. A list of important research needs related to shorebird monitoring also is presented in the full Monitoring Plan.

The Shorebird Monitoring Plan presents prescriptions for 30 mostly new monitoring protocols. The Monitoring Working Group felt that a generalized methodology for monitoring a large number of species outside of the breeding season would severely compromise population trend estimation for most species and should only be considered for species that presented no realistic alternatives. Therefore many of the proposed protocols are species-specific or target a small number of species that can likely be monitored by a common method. The species and goals each would address are identified, a rationale for each method is described, and assumptions and primary issues requiring further study are identified. Particular attention is given to sources of bias and ways of reducing or eliminating them. A definition is provided for species that are "well-monitored". Under currently existing programs, only 2-3 species can be considered well-monitored, but if the protocols are developed and forged into a single, well-integrated monitoring program, then all, or nearly all, of the 72 species, subspecies, and distinct populations considered in the Plan will be well-monitored.

An implementation strategy for the program is proposed in the monitoring report. A competitive process is suggested through which grants to develop proposed new surveys will be awarded. Once designs are peer-reviewed and approved, funding will be redirected into implementation of operational surveys. The national avian data center at the USGS Patuxent Wildlife Research Center (Patuxent) is a logical repository for long-term databases generated by this program. It is proposed that Patuxent will: 1) develop software to allow web-entry and web-retrieval of data; 2) conduct regular analysis of population change; and 3) deliver relevant summary information to wildlife policymakers and managers. A Shorebird Monitoring Working Group established under the Plan will oversee continuity and effectiveness of the new surveys and broker technical assistance to wildlife managers. This group will communicate with the NABCI Monitoring Committee to elevate shorebird monitoring needs to the national and international levels and to receive information on local and regional bird conservation developments in need of monitoring guidance. The initial cost estimate for development and implementation of the proposed suite of surveys and for maintaining a centralized data management and analysis center is \$1.5 million per year.



Three subspecies of Dunlin breed in North America, with major wintering zones including a) the Atlantic and Gulf coasts of the US and Mexico, b) the Pacific coast of North America, and c) the coastlines of central east Asia. Photo by Tim Bowman.

Priority Shorebird Research Needs

Populations of many of North America's shorebird species are in steep decline. In order to reverse these declines, and to assure stable, self-sustaining populations, fundamental knowledge of shorebird biology is essential. However, vast gaps exist in our knowledge of North America's shorebirds. For example, for only a few of the rarest species is there a scientifically valid estimate of population size. In addition, the factors limiting the populations of most species are unknown. Maintenance of stable and self-sustaining shorebird populations is the central goal of the National Shorebird Research Program (NSRP) proposed as part of the U.S. Shorebird Plan. Shorebird conservation efforts cannot succeed in the absence of sound knowledge on various aspects of shorebird biology.



As information on shorebird biology unfolds, it is difficult to predict what topics will emerge as key issues for conservation. For example, population declines may turn out to have sources in breeding areas, along migration routes, or on the wintering grounds, or even a combination. Issues such as acid rain, pollution, global warming, or habitat loss might be involved, or other issues not presently recognized may be key. Alternatively, with improved information, we may discover that some declines that originally appeared to be alarming are actually the results of natural population fluctuations.

The National Shorebird Research Program

In order to provide the up-to-date, scientifically rigorous information essential for shorebird conservation, the U.S. Shorebird Conservation Plan recommends the institution of the National Shorebird Research Program, (NSRP). This program will support essential conservation-based research on shorebirds through establishment of a competitive grants program administered by the Biological Resources Division of the United States Geological Survey, acting upon the recommendation of a panel of experts. The program should include annual funding of \$2 million for national research priorities, and \$1.75 million per year for regional research priorities.

The NSRP should be administered at USGS Patuxent Wildlife Research Center, and should work with the Shorebird Plan Council to identify panel members, each with the highest scientific credentials and possessing skills representative of various research areas (e.g., breeding and non-breeding biology, coastal and inland areas). The function of the panel is to assure that funds are spent in a manner most likely to enhance the goal of assuring stable and self-sustaining shorebird populations. Proposals submitted to the NSRP must explain to the evaluation panel how the research will contribute knowledge important to the restoration or maintenance of stable shorebird populations. The panel will rank proposals on the basis of their likelihood to enhance shorebird conservation through restoration or maintenance of stable populations. The panel will have the national shorebird conservation priorities as a guide in prioritizing proposed research. Partnerships among federal, state, non-governmental organizations, and academic scientists will be encouraged where this is logical for achieving the goal of stable and self-sustaining shorebird populations. While the goal of this program is population based, this in no way infers that high priority research could not be funded at other levels, such as mechanistic research dealing with the behavior or physiology of shorebirds, their prey and predators, community, ecosystem or landscape-level ecology, etc. But, in the end, the goal is to maintain stable and self-sustaining populations. Therefore, mechanistic, community, ecosystem, or landscape proposals all have the obligation of demonstrating their relevance to conservation of shorebird populations.

In addition to the support necessary for the NSRP, significant additional funding is needed to support regional research. Just as the national shorebird community has established national conservation priorities, regional groups are ranking conservation priorities of species within regions. Sometimes these are concordant with national priorities, sometimes they are different. Regional support should be sought for research primarily of importance relative to regional conservation priorities, or for monitoring or management research primarily of regional application.

Example Priority Research Topics

The details of priority research topics are provided in the technical report on National Shorebird Research Needs. The following topics are among those considered by the technical group to be of high priority:

1) Essential research designed to facilitate stable and self-sustaining shorebird populations, especially those of high national conservation priority.

The most critical need is the identification of population limiting factors, so that we can understand which factors must be changed to increase shorebird populations. Other important topics include: understanding patterns of shorebird distribution and abundance, and factors controlling them; exploration of factors affecting space use and dispersal decisions, including the relationship of key habitat features such as foraging benefit, predator risk, and information acquisition to relative use of space; increasing our understanding of the dynamics of migration



patterns, including how populations move among sites, and why; understanding the timing of landscape-level habitat use, which is critical for monitoring studies, and understanding factors affecting turnover rates; analysis of dietary requirements, elucidation of dietary preferences, nutritional requirements, and metabolic needs, and identifying geographic population subdivision; and determining conservation issues below the species level, and identification of the role of subspecies in the overall population dynamics of a species.

2) Management research with application across regions.

Active management is necessary to enhance shorebird populations across multiple regions. Important areas of research to improve the effectiveness of management include: research to develop techniques for reducing specific population limiting factors, such as techniques for reducing nest predation; reducing risks from toxicants; improving or providing habitat; modeling potential impacts and development of management protocols to mitigate effects of global climate change; development of techniques to deter predators, such as aversive conditioning to reduce losses from both avian and mammalian predators; controlling disturbance effects on foraging and breeding; and techniques for increasing productivity, including captive breeding reintroduction and associated techniques.

3) Monitoring research and development of protocols for tracking population trends.

Research is needed to improve our ability to monitor species of national conservation concern, many of which are experiencing population declines of unknown magnitude.

Priority Education and Outreach Programs

In order to ensure the conservation of shorebirds and the habitat upon which they depend, it will be necessary to develop and implement programs that raise awareness of shorebirds among the general public. These programs, both local and regional in scope, should serve to educate targeted audiences (e.g., farmers, beach-goers, resource managers, etc.) as well as provide information on shorebirds for the general population.

It is essential that significant education and outreach efforts support the other activities undertaken as part of the U.S. Shorebird Plan.

The Education and Outreach Working Group developed a plan for effective and appropriate shorebird education tools and methods, entitled Shorebird Education and Outreach Needs in the United States. This plan delineates target audiences, develops key messages that can be used to reach these audiences, and makes recommendations as to how the messages can be imparted within relevant programs. The Working Group compiled existing materials and programs used for shorebird education, along with information on priority conservation needs and the messages wildlife professionals felt needed to be broadcast in order to address these needs. The Group then determined where gaps existed in the tools available, and therefore where the need to develop additional material and programs was the greatest. Finally, the Group made recommendations as to how the priority conservation needs can be reconciled with effective outreach and education programs and how these programs can be implemented.

Existing Resources

The Working Group developed an outreach survey to determine current national education and outreach efforts and programs for shorebirds and their habitats. Existing shorebird education materials varied greatly in their ability to reach targeted audiences. Most shorebird education materials have been developed for audiences in the U.S., although some are broader in scope and incorporate audiences within the Western Hemisphere. Many existing materials were either unavailable or not in compliance with National Science Standards, making their use difficult



Subspecies of Marbled Godwits have breeding populations separated by hundreds or thousands of miles; little is known about wintering locations of the different groups, making conservation planning challenging. Photo by Pablo A. Canevari.

for classroom teachers to justify. State and federal agencies, non-profit education organizations, and international organizations were asked about the type of materials used, the nature of their audience, the type of messages they feel are important, and the tools needed to assist in delivering these messages.

Most organizations surveyed are set up to deliver key messages and support future education efforts, but would benefit from some national coordination. In particular, they need increased community involvement, expanded partnerships, and better interactions with private landowners. Taking advantage of the World Wide Web and satellite distribution of educational programs could serve to broaden the scope of the national outreach efforts.

Priority Outreach and Education Issues

The Education and Outreach Working Group distributed a questionnaire to the regional working groups to help determine the priority shorebird conservation issues. Habitat loss emerged as the major category of concern at the national level. Other high priority issues included threats from agriculture, disturbance of shorebirds, and degradation of habitat from a variety of factors that differed among regions.

The most pressing gaps in resource information identified by the group included: 1) a lack of awareness of shorebirds among the general public; 2) absence of materials to convey the economic incentives for protection of shorebirds and their habitats, such as eco-tourism; and 3) a general lack of understanding of the threats to shorebirds. The Group found that much of the material in existence was not easily accessible or well-advertised, and developed a consolidated directory of materials to address this need.

Outreach Programs that Meet Identified Needs

Using the priority issues identified by the group, outreach plans were developed to address the national priorities among target audiences. These plans can either be adopted nationally or regionally. Full details regarding each program are included in the Education and Outreach Needs report, including plans for: 1) a national Shorebird Sister Schools and Sister Cities Program; 2) The Great Shorebird Trail; 3) Protecting Shorebirds and Coastal Habitat on the Massachusetts Coast; 4) Delaware Bay Shorebird Conservation; and 5) Training for Conservation Staff.

Habitat Management Philosophy

In addition to the specific programs for shorebirds described above, there is a national need to set broad goals for the integrated management of habitats used by shorebirds and other wetland-dependent wildlife. This section details some of the principles most important to achieving shorebird management goals in the context of multiple species management of wetlands and associated habitats. Management of shorebird habitats requires a wide range of specific techniques in many diverse habitats, and achieving regional priorities requires management for different species at different seasons. Detailed management regimes can only be designed at the scale of specific sites, but the specific habitat management issues in each region are detailed in the Regional Shorebird Plans. The general principles provided here apply to many situations where integrated wetland management for shorebirds and other wetland wildlife is the goal.

1) Wetland shorebird habitats should be managed as dynamic systems.

Wetland habitats are dynamic systems, and management regimes should reflect this basic characteristic of natural wetlands. Wetland management that includes maintenance of static water levels over long periods dramatically reduces shorebird habitat availability. However, persistent management of wetlands for the shallow-water environments used by many shorebirds would result in similar overall losses in habitat quality and diversity. Managed wetland systems should be designed to perpetuate the natural fluctuations in water level that drive dynamic processes, resulting in high quality habitat for a wide diversity of wetland species. Dynamic regimens also set back succession, keeping wetlands from becoming overgrown by persistent vegetation with consequent reductions to biodiversity. In addition, it is sometimes important to include upland habitats in management plans for breeding and migrating shorebirds.

It is essential that shorebird management consider regional as well as local habitat dynamics. Management objectives that are based only on local information may be inappropriate and incomplete. Many wetlands function as part of a complex of habitat types at multiple temporal and spatial scales. Habitat may be available at some sites only in certain years, but those sites can still play critical roles by providing habitat when it is limited in other areas due to water availability, vegetation cycles, or predator populations. Understanding that birds use multiple wetlands at different times according to natural cycles is critical to successful landscape-scale management.

2) Naturally self-maintaining systems should be preserved and are generally preferable to sites requiring ongoing management.

Active habitat management requires considerable inputs of time and money, and can be difficult to maintain over the long term. In some situations, active management is the only solution for providing appropriate wetland and shorebird habitat, and should be a priority. However, preference should be given when feasible to programs that attempt to maintain wetland complexes in natural states, so that habitat can be provided through natural cycles rather than through relatively expensive management. Nevertheless, activities such as control of exotic plants or animals, or dredging of areas degraded by sedimentation, may be necessary to maintain high wildlife diversity. Many of these natural sites provide good conditions for shorebirds. Protection from conversion to other land uses, and maintenance of natural dynamic cycles of water levels and disturbance regimes are critical. Acquisition and maintenance of high quality, natural shorebird habitats should be an ongoing priority whenever possible.

3) Management for diverse species groups is generally preferable to management for single species, except for species at high risk.

Whenever possible, managers should target flooding regimes to provide habitat for entire guilds of wetland wildlife, including shorebirds, rather than attempting to manage for single or specialized groups of species. Ecologically based, broad management goals should be set within the landscape context of the management area. Exceptions can be made in extreme circumstances, such as management for endangered species.

4) Management activities should be timed seasonally to have the maximum impact on critically limiting resources.

Shorebirds have specific habitat requirements at different points during the year, and management efforts focused on them should be timed to coincide with the periods when resources are limiting. For example, shallow-water habitats during the southern migration period of shorebirds are extremely limited in the Mississippi Alluvial Valley, and early fall habitat is generally more limited than is late fall habitat. Regional landscape management plans that attempt to provide habitat during critical periods in each region are needed. It is also important to understand the life cycles of the local invertebrate populations that are affected by water level manipulation. Invertebrate species consumed by shorebirds have a wide diversity of life strategies and may require varying types of flooding regimes to breed and survive.

5) Management of impoundments for shorebirds and wildlife diversity should be increased on publicly managed wildlife areas.

Many refuges have impoundment systems that use gravitational flow devices, tidal gates, and/or a system of pipes, ditches, culverts, and dikes. These systems have partial control over water management dependant on geographical conditions and weather. Such systems may be able to lower water levels in areas that historically receive higher rainfall, or snow melt in the spring. Many of these same areas experience little rainfall in the late summer and early fall months. Without the capacity to pump water from nearby sources, it is difficult to provide appropriate shorebird habitat for this migratory period. Management efforts should include developing a means of returning water to dry impoundments at strategically important wildlife areas by developing pumping capability.

Impoundments with water pumping capability can be more intensively managed for shorebirds. Provision of shorebird habitat can be achieved by coordinating drawdown of water levels with peak periods of shorebird migration. Appropriate timing can provide maximum habitat for the greatest number of birds. In some cases lowering water



levels for shorebirds must be tested on a small scale to ensure coordination with the water requirements of other species, with possible loss of vegetation or disease control, so as to provide appropriate habitat for shorebirds but not be detrimental to other management goals. In addition, water management should not be used to circumvent natural wetland cycles where drawdowns have important ecological effects, and the effects of pumping on downstream systems and salinity levels must be carefully managed.

6) Greater efforts are needed to support improved shorebird management activities on private lands.

Private lands provide important habitats for shorebirds. These include floodplains, farmed and tilled wetlands, and grazed fields. Some human activities can help to maintain shorebird habitat while others destroy or severely degrade it. For example, tillage agriculture can provide extensive areas of open habitat, as for example rice agriculture in the U.S. Gulf Coastal Plain or in the California Central Valley. Numerous opportunities exist for cooperative wildlife management efforts on landscape scales between private and governmental agencies. Management should include efforts to support compatible land uses that can coexist with sustainable shorebird habitats. Human recreational activity often encroaches on shorebird habitat, particularly in marine areas. Chronic disturbance can disrupt shorebird behavior, impair migration readiness, and reduce nesting activity. Shorebird management goals should take these activities into account, as well as include efforts to educate the public about the potential effects that chronic disturbance has on these birds.

7) Successful management for shorebirds requires a detailed understanding of historical conditions at each site and across entire landscapes.

Understanding the geomorphology as well as the geography of wetlands is critical for management to be effective at landscape scales. Formative processes determine the type, distribution, and size of wetlands. Substrates, in combination with climatic conditions and water, determine salinity and nutrient availability. In turn, these physical conditions control water quality as well as plant and animal communities and their distribution. Successful management over the long term requires a full understanding of the historical context of areas which historically provided shorebird species with the resources to survive. Managers need to understand how current and projected habitat conditions match or differ from historic conditions, and then evaluate management actions that can provide the missing resources.

8) Shorebird management should be coordinated among multiple agencies and programs.

Shorebird management plans should be developed at large geographic scales and should be linked with private, federal, state, or local agencies whose coordinated activities are essential to implementation of landscape planning. For example, water commissions often control the timing and amount of water released from reservoirs that affect water levels of refuges downstream. Shorebird managers may also find themselves competing with marine fisheries for the same resources, such as the horseshoe crab. Successful management for shorebird habitat will require cooperative and coordinated efforts among all agencies or groups whose activities influence shorebird management strategies. The Shorebird Planning Regions established for this Plan will serve as regions within which management agencies should strive to coordinate, but many issues will involve more than one region working cooperatively.

9) Multiple use management of natural areas requires careful balancing of public access with acceptable levels of human disturbance to shorebirds.

Many managed natural areas increasingly have multiple uses, and in particular, habitats used by shorebirds are often used for intensive recreational purposes. Disturbance of shorebirds on nesting, feeding, and roosting areas may significantly reduce survival and reproductive success. Increased research is needed to determine levels of disturbance that do not affect shorebird populations, so that managed areas can be used for educational and recreational purposes while contributing to overall shorebird recovery goals.



Part 5: Regional Shorebird Conservation Goals and Strategies

Overview

The eleven regional working groups formed in this planning process are the core of the U.S. Shorebird Conservation Plan. Other parts of this document assess the status of shorebird species in North America, set population targets, and propose methods for effectively monitoring changes in population size. These are extremely important endeavors, but the ultimate responsibility for ensuring that shorebirds breeding in, wintering in, or migrating through the U.S. have adequate quality, quantity, and distribution of habitat falls on the organizations working in each region of the country. This is no simple undertaking. But individuals and organizations from across the country have pooled their expertise and resources to collectively rise to the occasion. Individuals involved in the regional planning process range from lifetime shorebird conservation advocates and scientists to those with a newly growing interest and responsibility for shorebird habitat provision. Whatever the motivation, everyone involved brought an important perspective to the table.



Red Knots in the sunset. Photo by David Twitchell.

Each region is unique in its make-up of habitat types, management issues, and collection of individuals and agencies involved in wildlife research and management. These differences are reflected in the compositions of the regional groups, in the processes of regional goal development and in the strategies for shorebird conservation that they have generated. Below are executive summaries from the regional groups' efforts. Note that no regional plan was developed for the Appalachian region, where the mountainous terrain results in very small populations of shorebirds. The regional summaries each give a general description of pressing habitat management issues, list species of primary importance, and outline each group's broad goals and future direction. As with all of the

other documents associated with this Plan, specific reports should be consulted for more detail. The main components of each full regional report include: 1) a description of the region, including geographic boundaries, major habitat types and management issues of highest concern; 2) a summary of species occurrences and regional species priorities; 3) habitat goals, objectives, and management needs; 4) management coordination and monitoring needs; 5) critical research goals; and 6) education and outreach objectives. The reports vary in the level of detail included for each of the above components and some include additional information, such as specific funding needs and very specific habitat management recommendations.

Each regional group has identified important next steps and considered ways to formalize their group's structure, composition, and integration with other bird conservation initiatives. Most of the regions envision maintenance of a core shorebird working group with regular meetings and clear responsibilities for further planning and implementation of regional goals. Many groups feel strongly that coordination and effective implementation of report goals will be facilitated greatly by a designated position for these responsibilities. The organization responsible for the position will depend on resources and interest in each region. Also, most of the regional groups embrace the need to integrate achievement of their goals with those of other bird conservation initiatives. This makes sense from a very practical stand point and most groups recognize the clear advantages of working within existing frameworks established for on-the-ground habitat conservation. Different models have been proposed to formalize the

relationship between the regional shorebird working groups and Joint Ventures of the North American Waterfowl Management Plan. The relationships have begun to be established to date by the generous involvement of Joint Venture Coordinators in the shorebird planning process and by the more formal inclusion of shorebird representatives on many of the Joint Venture management boards and technical committees.

Pacific-Asiatic Flyway

Alaska

Because of its size and northerly position, Alaska provides breeding habitat for more shorebird species than any other state in the U.S. Seventy-one species of shorebirds have occurred in Alaska; 37 of them, including several unique Beringian species and Old World subspecies, regularly breed in the region. Most of these species migrate south of the U.S.-Mexico border and a third migrate to South America or Oceania. Concentrations of shorebirds at several coastal staging and migratory stopover sites exceed one million birds; on the Copper River Delta alone, five to eight million shorebirds stop to forage and rest each spring.

Using the species prioritization process developed for the U.S. Shorebird Plan, 14 taxa were identified as species of high concern in Alaska. All species of concern tend to have small global population sizes and/or limited breeding distributions. Seasonal occurrence of priority species was examined within the geographic context of Alaska's six Bird Conservation Regions, (BCRs). Most priority species, particularly breeding species, occur in the Western Alaska BCR. Southern regions (Cook Inlet and the Northern Pacific Rainforest BCRs) are primarily used by shorebirds during migration and winter. The Aleutian/Bering Sea Islands BCR is also an important wintering area for shorebirds.

Alaska's overall size and the size of its BCRs dictate that conservation considerations for shorebirds generally be framed within a landscape context. Except for the Arctic Plains/Mountains and Cook Inlet, where habitat for breeding shorebirds is being lost, most other shorebird habitats in Alaska remain relatively intact. The main threats to shorebirds in Alaska come from drilling, transport, and refining of oil and natural gas, especially in the Cook Inlet, Northern Pacific Rainforest, and Arctic Plains/Mountains BCRs.

It is unlikely that at anytime in the near future habitat will be deliberately manipulated to manage shorebirds in Alaska as it is elsewhere in the U.S. and Canada. Thus, an overall conservation goal for shorebirds in Alaska is to keep species and their habitats well distributed across not only the Alaska landscape, but also regions used by these same populations during other phases of their annual cycles. This will be achieved through a subset of goals and objectives specific to several major components of the Alaska Shorebird Conservation Plan that focus on population and habitat, research, and education/outreach. Specific actions for each component will be formulated during the first year following adoption of the plan. Biological elements of the plan will be based on well-designed, cost-effective, and well-coordinated efforts.

Northern Pacific

The purpose of the Northern Pacific Region (NPR) management Plan is to address shorebird management needs on a regional basis while considering Pacific Flyway and national levels of need. Within the NPR, the important shorebird habitats are coastal estuaries and beaches, rocky shorelines, open ocean/bay areas, and freshwater systems (natural and managed wetlands, flooded agricultural areas, and riverine systems). The group identified numerous sites across these habitat types within the region that supported at least 1,000 birds at a time. Many of the coastal estuaries within the region, such as Grays Harbor, Willapa Bay, and the Columbia River estuary, support large numbers of shorebirds during migration (i.e., >100,000 birds). Other locations, such as the Willamette Valley, are a mixture of wetlands and agricultural lands that, overall, support a wide diversity of species and large numbers of individuals.

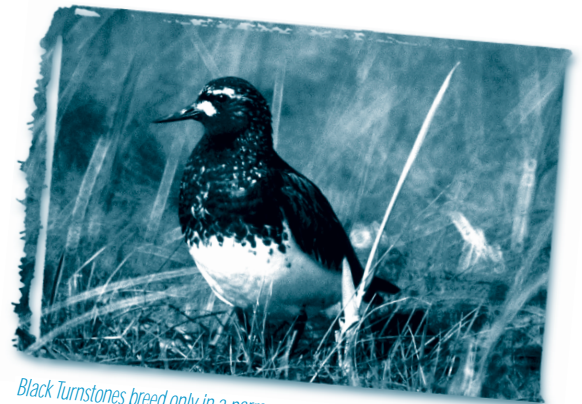


Of the 50 shorebird species breeding within the United States, 40 occur regularly within the NPR, although several species occur in very low abundance. All species were given regional prioritization scores based on abundance in the region, potential threats and several other important variables. Only one species, the Snowy Plover, was considered to be highly imperiled at the regional scale. Nineteen species were identified regionally as species of high concern (e.g., Black Oystercatcher, Common Snipe, Dunlin, Greater Yellowlegs, and Sanderling) and the remaining species were considered as moderate concern, low concern, or no risk.

The primary NPR goals are to: 1) stabilize and maintain current levels of breeding, wintering, and migrating populations of shorebirds within the region/flyway; and 2) measurably increase populations, over the next 10 years, of species affected by current or recent declines at population or flyway levels. In support of these broad population goals, specific goals were also developed for monitoring, management, habitat protection, research, and outreach. Specific strategies to meet each of these goals were developed.

Key features of the monitoring strategy include development and implementation of a flyway-wide survey to monitor shorebird species across four primary habitat strata (estuarine, rocky shoreline, pelagic, and freshwater). Research and monitoring recommendations cover a broad spectrum and include: 1) examination of shorebird response to introduced species and their control; 2) effects on shorebirds of various contaminants; 3) assessment of spatial and temporal aspects of shorebird habitat use; 4) in-depth studies of the life history of species of concern; and 5) evaluation of shorebird response to integrated waterbird management efforts and other enhancement or restoration efforts. Outreach strategies were developed to improve communication among public and private land managers regarding shorebird needs, to facilitate effective Plan implementation at the regional scale, and to support public enjoyment of shorebirds.

The loss of wetland habitat is a primary concern for shorebird conservation in the region. To meet critical habitat goals, the regional group focused on protection, restoration, and enhancement activities, recognizing the importance of the Pacific Coast Joint Venture (PCJV). The PCJV has identified and facilitated acquisition of many sites known to be important for shorebirds. The NPR Working Group will continue to work with the PCJV to implement habitat strategies, including identification and protection of additional important sites and implementation of restoration/enhancement activities. Restoration and protection would focus on three of the broad habitat types: rocky shoreline, estuarine, and freshwater. Restoration and protection activities include the protection of nesting areas for Black Oystercatchers on rocky shorelines, restoration of tidal regimes to diked wetlands in estuaries, water level and moist soil management in freshwater environments lost to agriculture and development, and removing exotic species and planting native vegetation in both estuarine and freshwater areas. Numerous sites from throughout the region were identified for implementation of these protection and restoration activities.



Black Turnstones breed only in a narrow coastal zone of western Alaska. Individuals typically return to the same locations each year. One male with colored bands was tracked for 5 years using the same 5-mile section of California beach each winter, and nesting in the same hectare in the Alaskan breeding zone. Photo by Tim Bowman.

Southern Pacific

Shorebird habitat in the Southern Pacific Region is concentrated along the coast and in the Central Valley of California. Tidal flats, tidal marshes, salt ponds, seasonal wetlands, beaches, and rocky shoreline are the principal shorebird habitats on the coast. In the Central Valley managed wetlands, flooded agricultural lands, hypersaline agricultural evaporation ponds, municipal sewage ponds, and vernal pool rangeland are the main habitats.

The region is used by millions of shorebirds annually, with internationally or nationally significant numbers of many species (e.g., Western Sandpiper, Snowy Plover and Mountain Plover).

Extensive habitat alteration has occurred over the past two centuries, resulting in the loss of over 90% of the region's historic wetlands. Urban development is likely to cause further habitat loss, especially in the Central Valley. Changes in cropping patterns may reduce the value of agricultural land to shorebirds and urbanization may reduce the water supply available for wetlands and agriculture. In many places, habitat quality has been reduced due to altered hydrology, increased sedimentation, and contamination. Mosquito abatement programs, oyster culture practices, salt pond management, and many other human land use activities may also affect shorebird management and conservation.

Interactions with other species are a further concern. The spread of exotic plants has reduced the extent of shorebird habitat. The introduction of non-native invertebrates into coastal wetlands has unpredictable effects on the shorebird food base. Introduced mammalian predators and expanding populations of native predators have caused decreases in shorebird breeding success.

Shorebird conservation in the Southern Pacific Region will require substantial effort just to maintain current populations. Nonetheless, regional priorities must include increasing populations of breeding species such as Snowy Plover, Killdeer, Black Oystercatcher, Black-necked Stilt, and American Avocet. Migratory and wintering populations of all key shorebird species in the region should be increased through habitat protection, management and restoration.

Critical management activities should be conducted in each habitat type, including increasing the area and quality of tidal wetlands along the coast and managed wetlands in the Central Valley, protecting coastal wetlands from development, limiting disturbance on coastal beaches and promoting the management and conservation of agricultural lands for shorebirds. Specific topics where research would facilitate effective shorebird conservation include improving our understanding of the extent and reasons for shorebird movements at large spatial scales, the factors that limit populations of species for which the region is especially important, and the effects of human disturbance. Focus also should be put on experimentation with management of human-built habitats such as salt ponds and rice fields. A framework for monitoring local and regional shorebird populations and their habitats and predators needs to be provided and new programs to educate the public about shorebird conservation need to be developed.

A working group should be formed to guide implementation of the U.S. Shorebird Conservation Plan in the Southern Pacific Region. The working group's efforts should be coordinated through the Joint Ventures currently active in the region. In addition, a coordinator should be hired to oversee Plan implementation, especially along the southern California coast, where currently there is no active Joint Venture.

Hawaii and the Pacific Islands

Because of the vast geography, isolation, and small land base, the U.S. Pacific Islands are often overlooked as habitat for shorebirds. The region stretches 5,000 miles from east to west across the Pacific Ocean and 3,000 miles from north to south, including: the Hawaiian Islands; Guam and the Northern Marianas Islands; Wake Is.; Johnston Is.; Baker and Howland Islands (in the Phoenix Islands); Jarvis, Kingman and Palmyra Islands (in the Line Islands); and the islands of American Samoa. A full regional plan is in development and should be completed by 2001.

The Pacific Islands are of critical importance for two species of arctic breeders, Bristle-thighed Curlew and Pacific Golden-Plover. The majority of both species' populations winter in the Pacific Islands, several of which are critical to the maintenance of these birds. The Islands are also of importance for several other migratory species including, in order of abundance: Ruddy Turnstone, Wandering Tattler, Gray-tailed Tattler, and Sanderling. All of these species are common in winter and widespread across the Pacific. Other species occur in lower numbers, but are regular winter visitors. These include Black-bellied Plover, Long-billed Dowitcher, Dunlin, Pectoral and Sharp-tailed sandpipers, and Lesser Yellowlegs. The U.S. Pacific Islands are also home to one endemic shorebird, the endangered Hawaiian Stilt or Ae'o (*Himantopus mexicanus knudseni*).

Threats to shorebirds in the region include: loss of habitat to urban, industrial, agricultural, and recreational development, non-native plants (degradation of habitat), non-native animals (predation, disease, competition, etc.), disturbance, and contaminants. Conservation of shorebird habitats in the Pacific Islands is of paramount importance in order to maintain healthy wintering and resident populations. In the Hawaiian Islands, habitats are being restored and managed to support both endemic and migratory species. Wetlands and beach strand habitats are particularly vulnerable on Pacific islands due to the limited acreage of these habitat types. The coastal areas of all main Pacific islands have been impacted by humans for well over 2000 years resulting in a mass extinction of native endemic birds and ground nesting seabirds. Some trends from Hawaii waterbird survey data show that shorebird numbers have declined during the past twenty years.

Islands of the western Pacific support more Asian, Palearctic nesting species, whereas the Hawaiian Islands support more Nearctic species. South of the equator, species diversity declines and Asian and North American nesting species are equally represented. Unfortunately, there is little published literature on the status, trends, and ecology of migratory shorebirds in this region. Basic concepts such as seasonal status, distribution and abundance, important migration stopover locations, and habitat requirements are often poorly understood.

Monitoring and research needs include better assessment of timing and abundance at key wintering and migration stopover sites; assessment of habitat use and needs at wintering and migration areas; better understanding of the linkages between wintering, stopover, and breeding areas; and refinement of habitat restoration and management techniques (adaptive management strategy) to meet the needs of resident and migratory species.

Intermountain West Flyway

Intermountain West

The Intermountain West (IMW) is a huge region, stretching from Canada to Mexico and from the Rocky Mountains to the Sierras Nevadas and Cascades. The six Bird Conservation Regions, (BCRs) of the IMW include an array of wetland habitats from saline sinks to alpine streams. Eleven species of shorebirds regularly breed in the IMW, and 23 additional species are annual migrants. Two IMW sites (Great Salt Lake, UT, and Lahontan Valley, NV) are recognized by WHSRN as Hemispheric Sites, and two other IMW sites (Mono Lake and Salton Sea, CA) are classified as International Sites. A number of additional IMW sites surpass WHSRN International site requirements, including Lake Abert and Summer Lake, OR.

The IMW region is North America's most important area for breeding Snowy Plover, American Avocet, Black-necked Stilt, and Long-billed Curlew. Up to 90% of the world's adult Wilson's Phalaropes molt/stage in the IMW's hypersaline lakes prior to migrating to South America. The IMW also hosts very large numbers of migrant Red-necked Phalarope, Long-billed Dowitcher, Western Sandpiper, and Marbled Godwit. The region, too, is the nation's most important for wintering Mountain Plover.

The Great Basin, one of the six BCRs in the IMW, stands out as enormously important for both breeding and migrant shorebirds. Of particular importance are the large hypersaline lakes, e.g. Great Salt Lake, UT; Lake Abert, OR; and Mono Lake, CA, and the salt lake/playa associated marshes of Utah, Oregon and Nevada.

The most important issue facing shorebird conservation in the IMW is the enormous human-driven competition for water. Finding ample, high quality fresh water will be the greatest challenge faced by future shorebird conservation interests. The IMW Plan addresses this and other issues through five goals and associated objectives and strategies. These goals are: 1) *Habitat Management*. The regional group will work to maintain and enhance diverse landscapes that sustain thriving shorebird populations by working to protect, restore, and manage shorebird habitat. 2) *Monitoring and Assessment*. The group will work to acquire information on shorebird distribution and abundance needed for shorebird conservation by developing monitoring and assessment programs responsive to local, regional, and national needs. 3) *Research*. In addition, new information will be collected to facilitate



shorebird conservation. This information will deal with the ecology of salt lakes and playas, major shorebird predators, and shorebird species of special conservation concern. 4) *Outreach*. The group will develop an informed and supportive constituency for long-term shorebird conservation through implementation of region-wide outreach programs. 5) *Planning*. We will achieve regional cooperation for shorebird conservation by developing a process to facilitate planning among states and agencies, and working toward integration of shorebird concerns with land management plans.

Perhaps a million shorebirds breed in the IMW, and millions of additional shorebirds migrate annually through the area. No inland region of North America is more important to maintenance of the continent's shorebird populations than the IMW. The hiring of a full time shorebird biologist/coordinator to work with the IMW shorebird group, and the IMW Joint Venture in implementing the IMW Shorebird Plan is the region's most urgent priority.

Central Flyway

Northern Plains/Prairie Potholes

The Northern Plains/Prairie Pothole Region (NP/PPR) encompasses two Bird Conservation Regions, the Prairie Potholes and the Badlands and Prairies, and all or parts of seven states, including eastern Montana, northeastern Wyoming, North Dakota, South Dakota, western Minnesota, north-central Iowa, and northeastern Nebraska. The landscape is characterized by rolling hills of prairie grasses, millions of depressional wetlands ranging in size from shallow temporary or seasonal wetlands to deeper semi-permanent wetlands, and agriculture.



To many people all five species of small sandpipers—collectively known as peeps—look alike. The two kinds shown here are Semipalmated (speckled upper breast, grayer backs) and Least sandpipers ('bibbed' upper breast, browner backs). Photo by Western Hemisphere Shorebird Reserve Network.

Thirteen species of shorebirds breed within the NP/PPR and require a landscape of grassland and wetland habitats for nesting and brood rearing. One of the major migration routes for western hemispheric shorebirds, especially long-distance migrants, traverses the Northern Plains/Prairie Pothole Region. Because long-distance migrations are energetically expensive, the availability of abundant habitat and food resources at migration stopovers within the NP/PPR is critical. Shorebirds use a wide range of habitat types within the NP/PPR, including dry grasslands, sand and gravel beaches, natural freshwater and alkaline wetlands, lake margins, and shallowly-flooded agricultural fields. During migration the unvegetated shallow waters and moist mudflats of freshwater or alkaline wetlands are

especially important. Dramatic fluctuations in water levels are commonplace in the NP/PPR, and shallow water and mudflat habitats are highly unpredictable in space and time. Due to the dynamic nature of wetlands in this region, shorebird habitat use is opportunistic and dispersed across the changing landscape.

Three major shorebird issues have been identified for the NP/PPR. These are: 1) endangered and threatened species, declining species, and species of special concern; 2) habitat loss, including fragmentation and degradation; and 3) the need for additional information to evaluate potential threats, such as contaminants, predation, and invasion of exotic plants, to migrating and breeding shorebirds.

Regional goals are: 1) to maintain biotic integrity and persistence of breeding shorebird populations in the NP/PPR; 2) to ensure that adequate stopover resources exist to support populations of migrating shorebirds; 3) to identify and fill information gaps, including the development of tools to use within the context of dynamic ecosystem processes; and 4) to coordinate with other conservation efforts in a cross-border landscape. A series of habitat goals and objectives and research goals aligning with the regional goals have been delineated.

Managing for shorebirds in the NP/PPR is challenging because of the dynamic nature of wetland conditions in time and space and because of the need to provide diverse wetland habitats for waterfowl and other wetland-dependent birds. An identified management and monitoring need is to enhance the landscape perspective of shorebird use of the plains, to acquire critical information on when and where 'ecological hurdles' may exist, such as the lack of suitable stopover habitat across large regions, and to create avenues for focused, coordinated management activities. To fill this need, an internet-based regional communication network apprising land managers and biologists of habitat availability and generalized shorebird movements within the U.S. interior is proposed.

Central Plains/Playa Lakes

Forty species of migrating shorebirds forage and rest within the interior of North America to replenish diminished fat reserves necessary to complete migration and enhance reproductive success when arriving on the breeding grounds. Thirteen of those species breed within the area. The interior is also a migrating, breeding, and wintering site for the federally listed endangered Piping Plover.

The Central Plains/Playa Lakes Region extends from Texas (excluding the coast) through eastern New Mexico and Colorado, western Oklahoma, Kansas, Nebraska and the south-eastern corner of Wyoming. Shorebird habitat types within the region include ephemeral wetlands such as playa lakes, semi-permanent wetlands, seasonally flooded wetlands (moist-soil type habitats), mud and alkali flats, wet meadows, short-grass prairie, agriculture fields, reservoirs, rivers, and a myriad of other water sources such as ditches and farm ponds.

Shorebirds of primary concern in the region include Piping Plover, Mountain Plover, Snowy Plover, American Golden-Plover, Long-billed Curlew, Upland Sandpiper, and Buff-breasted Sandpiper. Many of these species rely upon regional grassland and upland habitat. The region also is important to several species that depend heavily upon the Central Plains due to specialized migratory routes or other life history requirements, including White-rumped Sandpipers, Baird's Sandpipers, and Pectoral Sandpipers.

There are three Western Hemisphere Shorebird Reserve Network Sites in the region, Cheyenne Bottoms Wildlife Management Area and Quivira National Wildlife Refuge in south-central Kansas and the Salt Plains National Wildlife Refuge in north-central Oklahoma. In addition to these and other key migratory stopover sites in the region, shorebirds rely heavily upon chains of small wetlands that dot the landscape. Collectively, the sites in the region support a large percentage of the hemisphere's long-distance migrants, such as Stilt Sandpipers and White-rumped Sandpipers. These mosaics of ephemeral wetlands are critical to shorebird survival but are extremely dynamic and unpredictable, making management, monitoring and planning efforts very challenging. The hydrology of most of the wetlands within the region has been negatively altered by wetland drainage, agriculture practices, and urbanization.

Major shorebird issues in the region include the lack of baseline shorebird data and the lack of monitoring of federally and state listed species such as Piping Plover and Snowy Plover as well as other nesting species. Additionally, privately owned land is a major component (>85%) of the land base in this region. Shorebird conservation cannot be achieved with just the habitats set aside for wildlife purposes.

Many of the major challenges in conserving shorebirds in the Central Plains revolve around the complicated issues of the draining of aquifers and lowering of water tables due to over-pumping and water development projects. Other challenges include unpredictable rainfall, water quality, increased salinization of wetlands, and lack of funding to support shorebird habitat management activities. Recommended management efforts include securing and maintaining water rights; managing water levels to benefit invertebrates and to create dynamic hydroperiods; controlling the encroachment of undesired plant species; and meeting other waterbird habitat needs.



The Central Plains/Playa Lakes region can best contribute to hemispheric populations of shorebirds by concentrating on identifying, restoring, and protecting key shorebird staging and breeding areas in the region, improving the quality of habitat presently managed for shorebirds, maintaining an appropriate configuration of wetland and grassland habitats, working with private landowners to create a network of habitat, protecting water quality and availability, increasing and improving monitoring of shorebirds and shorebird habitat, and increasing the awareness and understanding of grasslands and wetlands within the region and their importance to shorebird populations. The cooperation of the Playa Lakes and Rainwater Basin Joint Ventures is essential to achieving these goals.

Mississippi Flyway

Upper Mississippi Valley/Great Lakes

The Upper Mississippi Valley/Great Lakes (UMVGL) region is a diverse area that includes five Bird Conservation Regions and provides important habitat for shorebirds, especially migrants. Thirty-two shorebird species occur in the region, with 25 being common or abundant. Twenty-three species are of moderate or higher concern in the region. High-priority species include: Greater Yellowlegs, Whimbrel, Buff-breasted Sandpiper, Short-billed Dowitcher, Marbled Godwit, Wilson's Phalarope, Upland Sandpiper, American Woodcock, and the Federally-listed Piping Plover; the latter five species breed in the region. Various habitats within the region, including natural and managed wetlands, river floodplains, lake shoreline, sand and gravel bars, reservoirs, and flooded agricultural fields, provide the shallow water and sparsely-vegetated conditions required by foraging shorebirds. However, interior areas like the UMVGL region experience dynamic climatic conditions, making habitat conditions for shorebirds unpredictable compared to coastal regions. Furthermore, loss of wetlands from urban development, river dredging and diking, and agriculture has reduced the amount of habitat in the region. A primary goal of the UMVGL Plan is to ensure the availability of shorebird foraging and nesting sites over a range of climatic conditions by protecting, restoring, and managing a variety of habitat types throughout the UMVGL region. At many intensively managed sites, water level manipulation and other management activities (e. g., burning or discing) can be used to provide habitat for shorebirds, usually without compromising other wildlife objectives. Ultimately, an integrated management approach should be adopted that combines region-specific information on wetland dynamics and life history strategies of a variety of wildlife species. The North American Waterfowl Management Plan's Upper Mississippi River and Great Lakes Region Joint Venture established waterfowl habitat conservation objectives that focus on providing complexes of ephemeral and permanent wetlands and associated upland habitats. Objectives include providing 3.6 million hectares (9.1 million acres) of wetlands and associated uplands in Joint Venture waterfowl production counties (northern latitudes), and 213,000 hectares (533,000 acres) of wetlands in waterfowl migration counties (mid-latitudes). Since most of these areas will also provide good shorebird habitat, the Joint Venture's habitat objectives have been adopted for the UMVGL Plan. The infrastructure and partnerships in place to implement the Joint Venture will be expanded to address shorebird habitat needs, although the type of habitat provided for shorebirds (especially shallow water) may at times differ from what is optimal for some waterfowl species. Information is needed on the following to accomplish the UMVGL Plan: regional abundance, distribution, chronology, and population trends of shorebirds; responses of shorebirds and their invertebrate food base to management activities; wetland distribution and habitat conditions during a variety of climatic patterns; and effects of human disturbance on shorebirds. Providing this and other information to land managers and private landowners will help ensure the conservation of shorebirds throughout the region. Regional needs for shorebird population monitoring, research, and education and outreach activities in the UMVGL region are identified in its full.

Lower Mississippi/Western Gulf Coast

The Lower Mississippi/Western Gulf Coast Region is rich with a variety of shorebird habitats. Shorebird habitats and patterns of use are divided rather distinctly between truly coastal (Gulf Coastal Prairies: GCP) and non-coastal habitats (Mississippi Alluvial Valley/West Gulf Coastal Plain: MAVGCP). Hence, these regions are treated separately throughout the Plan.

Mississippi Alluvial Valley/West Gulf Coastal Plain

Thirty-one of the 43 species found in the MAVGCP occur regularly. Species of high conservation concern span a variety of habitats and foraging guilds, ranging from terrestrial gleaners (e.g., American Golden-Plover) to aquatic probers (e.g., Least Sandpiper).

While a few shorebird species winter and breed in the MAVGCP, most of the shorebirds found in this region utilize the area as migratory stopover habitat. Clearing of much of the Mississippi Alluvial Valley, with resulting open agricultural fields, has resulted in tremendous potential for providing shorebird habitat. Supplying the necessary mix of water depth and vegetative structure at the appropriate times is the most important management issue in this region.

Habitats in the region that possess the greatest potential for shorebirds include agricultural fields, moist soil impoundments, semi-permanent impoundments, and aquaculture ponds. Recommended management practices for each of these habitat types are described in the regional plan. Because of the abundance of agricultural and aquacultural land with water control capabilities, and the prevalence of water management for waterfowl in the region, opportunities for shorebird habitat management are substantial. Perhaps the factor most important to maintaining and increasing habitat for shorebirds in the MAVGCP is outreach and education. Providing land managers and supervisors with specific management information (migration chronology, water depth, and vegetation density tolerances, etc.) should facilitate an increase in the quality and quantity of shorebird habitat in the region.

Regional habitat objectives previously were set for the Lower Mississippi Valley by the Lower Mississippi Valley Migratory Bird Initiative based on fall population estimates. Two general aspects of these objectives are in particular need of attention: 1) testing assumptions of the model upon which habitat objectives are based; and 2) inclusion of the West Gulf Coastal Plain BCR in the model. Because the habitat objectives model is based on untested assumptions regarding population size, obtaining a better estimate of shorebird population abundance and chronology are the highest research priorities. Of the two assumptions that have been tested, one (food density) appears to be valid and one (habitat carrying capacity: birds per hectare) may not be accurate and needs further testing and revision.

Coordination of continued planning, implementation, and evaluation of the MAVGCP Plan will be provided by the Lower Mississippi Valley Joint Venture Office. Interested members of the regional working group will serve as a technical advisory team, providing input to the LMV Joint Venture on the biological foundation and evaluation of shorebird habitat management objectives.

Gulf Coastal Prairie

Because of the geographic location of the Gulf Coastal Prairies (GCP) region, and the diversity of habitats provided by rice fields, beaches, coastal marshes and lagoons, large numbers of shorebirds migrate, winter, and breed on the Gulf Coast, making this one of the most important regions in the United States for this group of birds. In particular, of the 34 regularly occurring species in the GCP, five are considered Highly Imperiled (Snowy Plover, Piping Plover, Mountain Plover, Eskimo Curlew, and Long-billed Curlew), while 13 are of High Concern. Six of the 17 species with the highest priority scores are found predominately in beach habitats (Piping Plover, Snowy Plover, Wilson's Plover, Ruddy Turnstone, Sanderling, American Oystercatcher), with an additional far favoring wet meadow/prairie habitats (American Golden-Plover, Mountain Plover, Long-billed Curlew, Buff-breasted Sandpiper. In addition, Eskimo Curlew is in this category- if not already extinct).

A number of habitat management issues exist in this region, including encroachment of urban and industrial development in coastal areas, disturbance of beach and mudflat habitats, potential for chemical spills and other types of discharges, sea-level rise, decreasing freshwater inflows to coastal wetlands, invasive plant species, and



declining rice culture. This Plan outlines specific goals, objectives, and biological assumptions associated with each of these issues. Shorebird habitat goals for the region are to: 1) ensure at least stable populations of beach-nesting shorebird species (Wilson's Plover, Snowy Plover, American Oystercatcher); 2) ensure that habitat is not limiting to non-breeding shorebird species that utilize beach habitats; 3) ensure that habitat is sufficient for non-breeding maritime shorebird species that utilize non-beach habitats; and 4) ensure that habitat is not limiting to populations of shorebird species that utilize non-maritime habitats, especially during southward migration.

Attainment of these goals will require effective and much-increased implementation, monitoring, and evaluation. Coordination of these activities will be accomplished best through the Gulf Coast Joint Venture, with technical guidance provided by a shorebird technical advisory team.

Atlantic Flyway

Northern Atlantic

The North Atlantic planning region is one of the most heavily populated areas in the U.S. Many wetland habitats have been affected by development, causing wetlands loss, pollution, and increased human access leading to disturbance. The Atlantic coast beaches and bays, however, still have high quality habitats that have become more essential to shorebirds than ever before. The region is critical to the survival of hemispheric populations of some species (e.g., Red Knots, Piping Plovers, Whimbrels), which would be decimated by continued habitat degradation or catastrophic chemical or petroleum spills. Delaware Bay was the first Western Hemisphere Shorebird Reserve Network site, and provides critical habitat for huge concentrations of migrating shorebirds that use historically abundant supplies of horseshoe crab eggs to fuel their northward migrations.



Mixed species feeding flocks are common among shorebirds, such as these sandpipers, turnstones, and knots. Photo by David Twitchell.

The North Atlantic region has a number of inherent strengths supporting effective shorebird protection: 1) a huge constituency with reasonably good access to shorebird viewing opportunities; 2) large portions of publicly-owned coastal shorebird habitats; and 3) strong state land use regulations that affect actions on private land. However, the potent threats in the region are almost the flip side of the strengths. Large human population centers create a substantial threat from development and disturbance. They also cause a significant potential for resource conflicts. Further, the northeast Atlantic Coast is always under the threat of catastrophic oil spills and consequent damage to shorebird habitat or shorebirds themselves. The major weaknesses in existing protection center on inadequate funding for management and surveys, thus leading to an insufficient database on population, distribution, and habitats.

Combining these strengths, weaknesses and threats, our group developed a number of opportunities that may be unique to the North Atlantic region: first, strong state agencies create the potential for creative intra- and inter-state shorebird projects; second, the large human population and easy access to important shorebird sites creates a significant opportunity for improving recreational use of shorebirds with small increases in funding for developing access; and third, strong agency interest exists for developing interspecies management and protection.

The group considered the regional strengths and threats, and suggested the following high priority projects:

- Begin region-wide coastal surveys conducted by individual state agencies and coordinated by the USFWS throughout the region.
- Work on-site at known important areas to reduce disturbance, identify and protect critical food resources, and control predation.
- Significantly improve impoundment management, and coordinate habitat availability throughout the region.
- Create a strong emphasis on volunteer banding and wardening, as methods to increase awareness.
- Develop coordinated state and federal satellite habitat mapping, delineating all important shorebird habitats.
- Establish a number of “all bird” Joint Venture projects.
- Improve spill prevention and emergency response.



Slumbering Sanderlings. Photo by David Twitchell.

Southeastern Coastal Plain/Caribbean

The Southeastern Coastal Plains-Caribbean Regional Plan (SCPCR) articulates what is needed in this area to advance shorebird conservation. The Plan identifies priority species, outlines potential and present threats to shorebirds and their habitats, reports gaps in knowledge relevant to shorebird conservation, and makes recommendations for addressing identified problems. The SCPCR Plan should serve as a template for a regional strategic management plan, with step-down objectives, local allocations and priority needs outlined. Development of a separate Caribbean Shorebird Plan is underway and will be based in part on principles outlined in the SCPCR Plan.

The SCPCR is important for breeding shorebirds as well as for supporting transient species during both northbound and southbound migrations. Breeding species of highest regional priority include American Oystercatcher, Snowy Plover, Wilson's Plover, and Piping Plover. Shorebirds in the planning region face potential impacts primarily from: 1) chronic human-caused disturbance to roosting and nesting birds and possibly to foraging birds; 2) oil spills at strategic migration staging areas; 3) transfer of water rights that may directly or indirectly affect prey availability by reducing freshwater input into important estuarine habitats; 4) barrier beach stabilization; 5) contaminants; and 6) inadequate management capability on public lands. Also, there has been a well-documented loss of wetland habitats in the SCPCR during the last 200 years.

Three general habitat goals for the SCPCR are: 1) to provide optimal breeding habitat to maintain and increase populations of priority species; 2) to provide high quality managed habitat to support species migrating through or wintering in the region; and 3) to restrain human disturbance to tolerable levels for shorebirds throughout the year.

In the SCPCR, the challenge for directly providing habitat for migrating shorebirds can be partly met by public land managers fostering appropriate management, including disturbance management along with more traditional habitat management particularly of impounded wetlands. Over 5 million shorebirds are estimated to

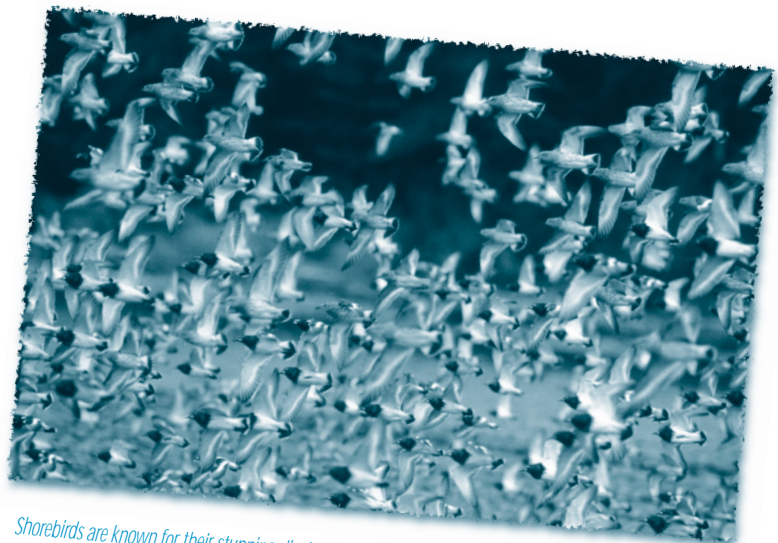
occur within the region during peak migration periods and about 2.5 million shorebirds are estimated to use inland and managed wetland habitats. Presently, about 50,000 acres of publicly managed wetlands are potentially available, with about 30,500 acres on National Wildlife Refuges alone. Collaborative interagency management efforts need to better target shorebirds throughout the region, starting with the provision of 4,000 acres in the year 2000. The SCPCR Plan calls for increasing habitat availability to 15,200 acres by 2002. If monitoring and research shows that more managed wetland habitat is needed to support upwards to 50% of all shorebirds using inland and managed habitats, then the Plan calls for providing 30,400 acres by 2005.

Meeting habitat objectives for nesting shorebirds will depend upon actions taken on lands managed cooperatively through public/private partnerships, especially along beach fronts, dredge spoil and oyster rake sites, and other near-shore habitats. Presently, the SCPCR Plan calls for the region to support a minimum 550 pairs of American Oystercatchers, 300 pairs of Snowy Plovers, 1500 pairs of Wilson's Plovers, and 55 pairs of Piping Plovers and to attempt to at least double these numbers during the next 50 years. These numbers will be subject to change as better demographic and habitat capacity information becomes available. Monitoring and assessment of management efforts should become a high priority for evaluating the success of nesting habitat protection measures.

Setting management objectives for roosting habitat should focus on areas where known concentrations of shorebirds occur and should concentrate on controlling sources of chronic human disturbance.



*Beach-nesting populations of shorebirds such as Snowy Plovers have declined precipitously in the United States, providing a special management challenge in a habitat popularly enjoyed for human recreation.
Photo from Western Hemisphere Shorebird Reserve Network.*



*Shorebirds are known for their stunning displays of aerial acrobatics. Flocks like these Surtbirds and Black Turnstones wheel and turn in impressively tight formations, which helps them avoid predation.
Photo by Philip Martin.*

Part 6: Shorebird Plan Implementation

Proposed Implementation Model

Implementation of the U.S. Shorebird Plan will require an active, committed, and diverse partnership of organizations both in the U.S. and in the other countries where shorebirds occur. Implementation at various scales will be accomplished through the following partnerships:

The U.S. Shorebird Plan Council

Implementation of the U.S. Shorebird Plan will be coordinated by the U.S. Shorebird Plan Council. The Plan Council is an advisory and steering committee for the U.S. Shorebird Conservation Plan, and is open to all of the partner organizations involved in development and implementation of the Plan. The Council supervised the development of the Plan, particularly with respect to integration with other migratory bird conservation initiatives, and continues to engage in strategic planning toward implementation of the regional, national, and international goals of the Plan.

The Council is open to participation by any organization committed to conservation of shorebirds, and depends on the involvement of interested organizations to guide implementation efforts under the Plan. The Council is currently chaired by Jon Andrew, Chief, Migratory Bird Management Office, USFWS, and the Vice-Chair is Bob Gill, USGS Alaska Biological Science Center. New participants are approved by the standing Council, which currently includes representatives of the following organizations and geographic areas:

National Shorebird Plan Technical Working Group Chairs:

Research and Monitoring
Education and Outreach

Shorebird Planning Regions:

Northern Atlantic
Southeastern Coastal Plains-Caribbean
Upper Mississippi Valley/Great Lakes
Lower Mississippi/Western Gulf Coast
Northern Plains/Prairie Potholes
Central Plains/Playa Lakes
Intermountain West
Northern Pacific
Southern Pacific
Alaska
Hawaii and the Pacific Islands

Current Partner Organizations:

American Bird Conservancy
Bureau of Land Management
Canadian Shorebird Conservation Plan
Canadian Wildlife Service
Department of Defense Partners In Flight
Ducks Unlimited
International Association of Fish and Wildlife Agencies
IAFWA Migratory Shore and Upland Gamebird Subcommittee
Manomet Center for Conservation Sciences



Shorebirds need to both rest and feed. In marine habitats, feeding is done during lower tides, while resting is at higher tides. During migration and winter, shorebirds and people alike are often squeezed on to smaller beaches as tide levels rise. Photo by David Twitchell.

National Audubon Society
 National Park Service
 NAWMP Joint Venture Coordinators
 North American Waterbird Conservation Plan
 Partners in Flight
 Point Reyes Bird Observatory
 The Nature Conservancy
 US Department of Defense Partners in Flight
 US Bureau of Land Management
 USFWS Division of Bird Habitat Conservation
 USFWS Division of Migratory Bird Management
 USFWS Non-Game Coordinators
 USFWS Refuges
 USDA Forest Service – Taking Wing Program
 USGS Patuxent National Wildlife Research Center
 USGS Alaska Science Center
 USGS Midcontinent Ecological Science Center
 USGS Forest and Rangeland Ecological Science Center
 Western Hemisphere Shorebird Reserve Network

Regional Shorebird Partnerships

During the development of the Plan, active regional groups formed in most Shorebird Planning Regions, and include a wide diversity of state, federal, and non-governmental organizations that were willing to participate in drafting the Plan. These groups are an important nucleus of ongoing regional shorebird conservation efforts focused on implementation of regional objectives. The needs of shorebirds in each region are best understood by organizations working in that region. The groups should endeavor to implement aspects of the Plan consistent with their regional goals and objectives. The functions of each group will vary widely among regions depending on the needs and interests of the active organizations. Most of the regional partnerships have formed active relationships with Joint Ventures organized under the North American Waterfowl Management Plan, and will participate as appropriate with Joint Ventures to implement habitat-related aspects of the regional shorebird plans. Additional aspects of the regional plans, including monitoring, research, and education and outreach, will be addressed as appropriate through Joint Ventures or other partnerships with organizations equipped to meet each role. It is important to note that any agency or landowner is encouraged to take the initiative to begin implementation of any regional goal. Ideally, their efforts would be communicated to the broader group of planning participants so that achievements and advancement of goals can be tracked.

Implementation through Joint Ventures

The Joint Ventures which were formed to implement the North American Waterfowl Management Plan have provided the most effective model for a public/private conservation partnership that exists today. The Joint Ventures have involved state and local governments and a wide range of non-governmental conservation organizations in productive partnerships to deliver conservation on the ground. Many existing Joint Ventures already have taken formal steps to embrace the goal of integrated bird conservation, and these Joint Ventures will represent the first efforts to deliver integrated shorebird conservation. The Regional Shorebird Working Groups have all embraced the concept of working closely with the Joint Ventures in their respective areas as the primary partners in providing integrated delivery of shorebird conservation activities on the ground. In other areas of the country that do not have an existing partnership, additional Joint Ventures will need to be formed and funded. Collectively, these Joint Ventures should deliver integrated habitat conservation on the ground for all birds, including shorebirds.



Linking with other Bird Conservation Initiatives

In the last few years, there has been unprecedented interest in development of conservation plans for birds. Four major initiatives, including the North American Waterfowl Management Plan, Partners In Flight, the U.S. Shorebird Conservation Plan, and the North American Colonial Waterbird Conservation Plan, are now in existence, with others being contemplated. This groundswell of interest and support has created a unique opportunity to advance the conservation of shorebirds as part of a broad increase in support for overall bird conservation. In addition, the development of the North American Bird Conservation Initiative, which will coordinate the activities of all these specific initiatives both nationally and internationally, will dramatically raise the visibility of bird conservation. Implementation of the Shorebird Plan will be carried out through integrated activities with each of these other initiatives whenever possible.

The same approach, applied not just to bird conservation needs, but also to those of other interests (i.e. other wildlife species, agriculture, development, etc.) would allow planners to define the nature of landscapes desired for the future. All of society's interests, be it flood control, public health, or bird conservation, must somehow coexist on our landscapes. The ultimate goal is to build the partnerships needed to achieve truly integrated conservation planning, so that we can protect and manage sustainable environments that meet the needs and desires of future generations.

Shorebird Plan Implementation Funding Needs

This section summarizes the highest priority programs needed to ensure that stable and self-sustaining populations of shorebirds are preserved in the United States.

Shorebird and Integrated Waterbird Proposals at the Federal Level

1) National Shorebird Research Program

This program, described in detail above, should be funded at a total of \$3.75 million per year. Research for shorebird conservation is currently funded through a wide variety of small programs, is limited in amount, and lacks overall coordination. Current funding is inadequate to meet high priority topics for shorebird conservation research. High priority research needs include subjects like the effects of human disturbance, effectiveness of current management practices, techniques for effective multiple species management, identification of causes for species declines, etc. This program would result in improved information on high priority shorebird conservation issues, with an emphasis on guidelines and techniques for integrated management of shorebirds and other waterbirds.

2) North American Shorebird Monitoring Program

Basic data on the status and trends of shorebirds is critical to successful management programs, so this program is a very high priority for funding. The Monitoring Program report of the U.S. Shorebird Conservation Plan details the specific protocols that must be implemented to determine the population trends of shorebirds that occur in the U.S. Implementation of these protocols is a major goal of the Plan. The scope, justification, and expected benefits are provided in the report. The total cost of the program is approximately \$1.5 million per year.

3) Integrated Waterbird Management Training

Development of a training program on Integrated Waterbird Ecology and Management for Federal and State Agencies is necessary to ensure that maximum shorebird conservation benefits are achieved from ongoing and future management efforts for wetlands and associated habitats. Current shorebird training programs targeted at USFWS staff have been very effective at increasing awareness, understanding, and application of shorebird management issues among management and regulatory staff. However, other government agency staff, including Forest Service, BLM, National Park Service, and state agency staff have had limited access to appropriate training. In addition, the development of new waterbird initiatives creates the need for integration of management activities for diverse species.



An integrated approach would address multiple taxonomic groups, including shorebirds, marshbirds, colonial waterbirds, and waterfowl. Integrated management is more complex than management for single species or taxonomic groups, and is best addressed as part of a coordinated program. Development of the capacity to conduct integrated training on waterbirds will require substantial material development and technical input. Integrated training for waterbird management would ensure that appropriate state and federal staff have access to the most up-to-date approaches to management of wetland and deepwater habitats for multiple species. The workshops will increase the amount of management activity for waterbirds by increasing awareness and understanding of management opportunities and challenges, and by supporting the use of multiple species management that can benefit many groups of non-game birds. Costs for development of the training program would total \$350,000 with implementation of the program costing approximately \$180,000 per year.

4) Shorebird Sister Schools Program

Development of a national Shorebird Sister Schools program will ensure that public education includes information on the needs of shorebirds and exposes children to their interesting and unusual biology. The Shorebird Sister Schools program has been an extremely effective model for increasing elementary education opportunities on shorebird ecology, migration, and conservation. The program involves schools from throughout the Hemisphere in tracking the annual migration of shorebirds through their respective regions, and has been most active in the Pacific Flyway. This model should be expanded to cover the remainder of the country. Increasing exposure of children to shorebird ecology and conservation will ensure ongoing interest and support for shorebird conservation programs. The program would cost approximately \$270,000 per year to support one national coordinator and three regional coordinators for the Pacific, Atlantic, and Central/Mississippi flyways.

5) Support for Regional Shorebird Plans and Joint Ventures

The Regional Shorebird Conservation Plans summarized above outline the most critical projects and programs needed in each area of the country to support shorebird conservation. Collectively, these projects will ensure that the United States does its part to guarantee that the shorebirds of the Western Hemisphere are protected, and that stable and self-sustaining populations persist. The details describing projects needed in each region are provided in the detailed regional reports. The Shorebird Plan partnership is committed to raising the funds necessary to support these regional projects. Existing Joint Ventures will in most cases serve as the primary delivery partnerships for the shorebird plan, and securing full and permanent funding for current and planned Joint Ventures is a high priority for Shorebird Plan implementation.



*During winter, Black Turnstones, which breed only in Alaska, are specialists of rocky, intertidal habitats along the Pacific coast of the United States and Mexico.
Photo by Mike Patterson.*

NABCI Recommendations for National Programs that Benefit Shorebirds

The North American Bird Conservation Initiative is proposing several important national programs that will benefit bird conservation broadly. Several of these programs are of particular importance for shorebirds, and these are listed below. The Shorebird Plan partnership fully supports all the goals of NABCI, but will play a particularly significant role in supporting the development of the following programs:

1) Increase funding support for the North American Wetlands Conservation Act (NAWCA).

NAWCA has been a major catalyst for migratory bird habitat conservation since 1989. It has been a major conservation success, contributing significantly to the effectiveness and maturation of Joint Venture partnerships developed through the North American Waterfowl Management Plan. However, many worthy projects involving millions of dollars of non-federal funding commitments go uncompleted each year due to insufficient NAWCA funding. NAWCA has never been appropriated at more than half of its authorized funding. One of the most immediate steps to more comprehensively address bird conservation needs should be to maintain full fund for the North American Wetlands Conservation Act.

2) Pass an analog act to NAWCA to support conservation of upland bird habitats.

NAWCA has been a successful model for addressing the needs of wetland habitats for bird conservation. Building upon that model, analogous federal legislation should be passed to address critical upland habitat needs in the U.S. and other countries sharing populations of birds. To facilitate efficiency and integrated bird conservation delivery, the existing mechanism of the North American Wetlands Conservation Council should be used as the foundation for this broadened, more inclusive, integrated conservation approach. This program would provide support for conservation of grassland nesting shorebird habitat.

3) Increase funding, federal and non-federal, for other partner-based habitat conservation programs.

Increased support is needed for programs in several federal agencies, e.g., USFWS's Partners for Fish and Wildlife program, USFWS's Coastal program, and USDA Forest Service's Taking Wing program. Increased funding is essential at the state level where much of the nation's habitat conservation is focused. The challenge cost share programs of several federal agencies also serve as effective catalysts for bird conservation delivery. These programs should be expanded to adequately take advantage of the public and private non-federal partners willing and desiring to help fund bird habitat conservation.

4) Contribute to improved habitat conservation in Western Hemisphere nations sharing U.S. bird populations.

Just as bird conservation needs vary across regions of the U.S., needs and successful approaches differ across international borders. However, the U.S. shares many bird populations with other nations, and should partner with them to comprehensively address the full range of habitat and management needs of those shared populations. Funding for federal programs supporting habitat conservation outside the U.S., e.g., North American Wetlands Conservation Act international projects, the Borderlands Program, and USFWS's International Affairs Small Grants Program, should be increased to more adequate levels, with appropriate levels of matching non-federal funds, and funding for the Western Hemisphere Shorebird Reserve Network should be increased to support the inclusion of critical sites in other countries.

5) Develop and implement comprehensive monitoring and assessment capabilities to fully address bird conservation needs.

Effective management decisions must be based on sound understanding of the status and trends of bird populations and their relationships to habitats throughout their annual life cycles. Existing monitoring and assessment programs for migratory bird populations should be enhanced, and similar programs for birds for which little or no reliable data are available should be developed.

6) Cooperatively enhance management capabilities for birds at all geographic scales based on sound science, measurable conservation objectives, and an adaptive process of planning, implementation, and evaluation.

Evaluation of relationships among habitats, management actions, and population responses must be an ongoing activity to refine and integrate bird conservation practices. Capabilities of existing migratory bird research programs should be restored and enhanced, and new programs should be developed for bird groups having little or no current scientific support. Adaptive ecological models for important breeding, wintering, and migratory staging areas for major bird groups should be identified and developed, guided cooperatively by groups such as the USFWS/USGS Adaptive Management and Assessment Team.

7) Strengthen cooperation and funding among land management agencies and land-related regulatory agencies that directly and indirectly affect bird conservation.

Actions of federal and state agencies affect bird conservation in important ways. In many cases, however, existing funds for natural resource conservation are not expended as effectively as possible to gain the broadest resource benefits, including birds. Improved coordination within and among many of these agencies could lead to improved bird conservation. A strategic plan for the U.S. Departments of Agriculture and Interior should be developed to enhance funding capabilities and delivery of habitat protection and restoration activities governed by provisions of



the Farm Bill, recognizing statutory modifications as appropriate. Due to their impacts on land management, comprehensive and integrated bird conservation commitments and strategies should also be established, in consultation with the Department of Interior, by the U.S. Departments of Transportation, Defense, Energy, the Federal Energy Regulatory Commission, and Environmental Protection Agency.

8) Fully fund the 10 existing bird conservation Joint Ventures, and support the development of 10-20 new Joint Venture partnerships.

Several North American Waterfowl Management Plan Joint Ventures already have taken steps to be the delivery mechanism for other migratory bird initiatives. To carry out, coordinate, and communicate the regional planning, monitoring, evaluation, and delivery of actions necessary for integrated bird conservation, the 10 existing regional Joint Ventures should be fully funded. Further, to deliver the integrated conservation actions of all bird conservation initiatives in areas not included in existing joint ventures, 10-20 new Joint Venture partnerships should be developed.

9) Conduct cost-effective, integrated delivery of bird conservation on a regional basis.

Comprehensive bird conservation joint ventures, from coast-to-coast, are necessary for cost-effective, integrated conservation of bird populations and habitats. This must be facilitated through a coordinated planning process within each bird initiative to step down identified national needs and priorities to regional action plans, and to identify individual management actions generating the greatest benefits. Although some broadly beneficial programs and management actions can be identified now, regionalization should be accelerated and finalized.

10) Develop an effective outreach and education program that promotes enhanced wild bird-related recreational and educational opportunities for the American people.

The support and participation of the American public as partners in this national and international bird conservation effort is essential. Funding and other resources required to achieve the vision of national bird conservation will not flow without their support. However, rapidly growing participation in bird-related recreational pursuits clearly demonstrates the public's strong collective interest in birds. With the majority of U.S. bird habitats in private ownership, the active, voluntary participation of landowners and the general public in delivering management actions is a cornerstone of successful bird conservation. The support of the American public has been critical to the successes achieved to date, and must be maintained and strengthened through an effective, partner-driven outreach and education program about bird populations, their habitats, and responsible natural resource conservation.



Bar-tailed Godwits are widespread across Northern Europe, but also breed in smaller numbers in Alaska. The Alaskan-breeding birds winter along with the old-world populations in southeast Asia, Australia, and New Zealand. Photo by Tim Bowman.

Part 7: *List of Shorebird Conservation Plan Technical Reports*

Regional Shorebird Conservation Plan Reports

Alaska
Northern Pacific
Southern Pacific
Hawaii/Pacific Islands
Intermountain West
Northern Plains/Prairie Potholes
Central Plains/Playa Lakes
Upper Mississippi Valley/Great Lakes
Lower Mississippi/Western Gulf Coast
Northern Atlantic
Southeastern Coastal Plains-Caribbean

National Shorebird Conservation Plan Technical Reports

A Comprehensive Monitoring Program for North American Shorebirds

National Shorebird Research Needs: A Proposal for a National Research Program and Example High Priority Research Topics

Shorebird Education and Outreach Needs in the United States

National Shorebird Conservation Assessment: Shorebird Conservation Status, Conservation Units, Population Estimates, Population Targets, and Species Prioritization

Estimates of Shorebird Populations in Canada and the Western Hemisphere

The North American Bird Conservation Initiative in the United States: A Vision of American Bird Conservation

All of these technical reports can be downloaded from the U.S. Shorebird Conservation Plan website, at <http://www.manomet.org/USSCP.htm>



Appendix 1. Shorebird Population Estimates and Population Targets

SPECIES	BINOMIAL NAME	POPULATION ESTIMATE	CONFIDENCE	TENTATIVE TARGET	PROPOSED ACTION
Black-bellied Plover	<i>Pluvialis squatarola cyanosurae</i>	150,000	Low	272,700	Halt declines, then restore to calculated 1972 levels.
	<i>P.s. squatarola</i>	50,000	Low	90,900	Increase recommended to compensate for extensive loss of U.S. West Coast intertidal habitat.
American Golden-Plover	<i>Pluvialis dominica</i>	150,000	Low	?	Halt declines, determine extent and then reverse decline with goal of restoring to 1972 levels.
Pacific Golden-Plover	<i>Pluvialis fulva</i>	16,000	Low	16,000	Population change status unknown.
Snowy Plover	<i>Charadrius alexandrinus nivosus (interior)</i>	13,200	Good	13,200	Information lacking on extent of decline; numbers at modestly healthy level, so increase goal not warranted until better information exists.
	<i>Ch. a. nivosus (Pacific)</i>	2,000	Good	3,000	Increase to level called for by recovery plan.
	<i>Ch. a. tenuirostris (Gulf & Caribbean)</i>	500	Good	Recovery plan not completed	Increase to level called for by recovery plan.
Wilson's Plover	<i>Charadrius wilsonia</i>	6,000	Low	10,000	Coastal beach nesting habitat greatly reduced; population small—increase to ensure viability.
Semipalmated Plover	<i>Charadrius semipalmatus</i>	150,000	Low	150,000	Population change status unknown.
Piping Plover	<i>Charadrius melodus circumcinctus (Gt. Plains)</i>	3,300	High	6,000	Monitor nonbreeding season habitat loss, including riverine sandbars, determine historic population size and restore population to same level.
	<i>Charadrius m. melodus (Atlantic)</i>	2,600	Good	4,000	Increase to level called for by recovery plan.
	<i>Ch. m. circumcinctus (Gt. Lakes)</i>	300	Good	300	Population recovery plan calls for 150 breeding pairs.
Killdeer	<i>Charadrius vociferus</i>	2,000,000	Low	2,440,000	Halt declines, then restore to calculated 1980 levels.
Mountain Plover	<i>Charadrius montanus</i>	9,000	Good	20,000	Calculated 1970 population=20,000 based on BBS decline rates.
American Oystercatcher	<i>Haematopus palliatus</i>	7,500	Moderate	?	Coastal beach nesting habitat greatly reduced and at risk; monitor pop. to determine population trends.
Black Oystercatcher	<i>Haematopus bachmani</i>	8,900	Moderate	11,900	Halt declines, determine extent and then reverse decline with goal of restoring to 1970 levels.
Black-necked Stilt	<i>Himantopus mexicanus mexicanus</i>	150,000	Low	150,000	Population change status unknown.
	<i>H. m. knudseni</i>	1,600	Good	1,600	Goal from Endangered Species Recovery Plan is 1,500.
American Avocet	<i>Recurvirostra americana</i>	450,000	Moderate	450,000	Investigate suspected declines.
Greater Yellowlegs	<i>Tringa melanoleuca</i>	100,000	Low	100,000	Population change status unknown.



Appendix 1. Shorebird Population Estimates and Population Targets, cont.

SPECIES	BINOMIAL NAME	POPULATION ESTIMATE	CONFIDENCE	TENTATIVE TARGET	PROPOSED ACTION
Lesser Yellowlegs	<i>Tringa flavipes</i>	500,000	Low	2,400,000	Halt declines, then restoration to calculated 1980 levels.
Solitary Sandpiper	<i>Tringa solitaria cinnamomea</i>	4,000	Poor	>4,000	Investigate suspected declines.
	<i>T. s. solitaria</i>	21,000	Poor	>21,000	Investigate suspected declines.
Willet	<i>Catoptrophorus semipalmatus inomatus</i>	160,000	Poor	160,000	Population change status unknown.
	<i>C. s. semipalmatus</i>	90,000	Poor	90,000	Population change status unknown.
Wandering Tattler	<i>Heteroscelus incanus</i>	10,000	Poor	10,000	Population change status unknown.
Spotted Sandpiper	<i>Actitis macularia</i>	150,000	Poor	150,000	Population change status unknown.
Upland Sandpiper	<i>Bartramia longicauda</i>	350,000	Poor	470,000	Halt decline, then restore to calculated 1980 levels.
Eskimo Curlew	<i>Numenius borealis</i>	<50	Poor	>100%	Determine status. If population exists, manyfold increase necessary for recovery.
Whimbrel	<i>Numenius phaeopus rufiventris</i>	40,000	Low	105,000	Monitor populations and non-breeding season habitat loss.
	<i>N. p. hudsonicus</i>	17,000	Low	42,500	Calculated population in 1972 was 42,500; halt declines, then evaluate restoration to 1972 levels.
Bristle-thighed Curlew	<i>Numenius tahitiensis</i>	10,000	Good	13,300	Calculated population was <13,300; halt declines, then evaluate restoration goals.
Long-billed Curlew	<i>Numenius americanus</i>	20,000	Moderate	28,500	30% loss of Great Plains habitat; restore to 1970 levels; increase by 30%.
Hudsonian Godwit	<i>Limosa haemastica (Hudson's Bay)</i>	36,000	Moderate	36,000	Population change status unknown.
	<i>Limosa haemastica (Alaska)</i>	14,000	Low	18,700	Decline suspected, population small; increase by 25%.
Bar-tailed Godwit	<i>Limosa lapponica</i>	100,000	Moderate	100,000	Population change status unknown.
Marbled Godwit	<i>Limosa fedoa (Gr. Plains)</i>	168,000	Moderate	258,500	Restoration goal based on 35% increase (commensurate with habitat loss); halt declines, determine extent and then reverse decline with goal of restoring loss.
	<i>L. f. beringiae (Alaska)</i>	2,000	Low	2,000	Population change status unknown.
	<i>L. f. fedoa (Hudson's Bay)</i>	1,500	Low	3,000	Population small—double to ensure viability.
Ruddy Turnstone	<i>Arenaria interpres morinella</i>	180,000	Moderate	>180,000	Halt declines, determine extent and then reverse decline with goal of restoring to 1970 levels.
	<i>A. i. interpres (Alaska)</i>	20,000	Poor	20,000	Population change status unknown.
	<i>A. i. interpres (High Arctic Canada)</i>	35,000	Poor	35,000	Population change status unknown.
Black Turnstone	<i>Arenaria melanocephala</i>	80,000	Good	80,000	Population change status unknown.
Surfbird	<i>Aphriza virgata</i>	70,000	Moderate	?	Halt suspected declines, determine extent and reverse with goal of restoring 1970 levels.



Appendix 1. Shorebird Population Estimates and Population Targets, con't.

SPECIES	BINOMIAL NAME	POPULATION ESTIMATE	CONFIDENCE	TENTATIVE TARGET	PROPOSED ACTION
Red Knot	<i>Calidris canutus roseaari</i>	150,000	Moderate	?	Evaluate; winters in So. Am. where intertidal habitat is disappearing with likely effect on population size.
	<i>C. c. rufa</i>	170,000	Good	240,000	Evaluate Delaware Bay counts; halt declines, then restore to 1980 levels.
	<i>C. c. islandica</i>	80,000	Good	?	Evaluate population change; winters in Europe where extensive intertidal habitat loss has occurred in recent decades.
Sanderling	<i>Calidris alba</i>	300,000	Low	1,500,000	Uncertain recovery goal. Population may have recovered somewhat since period during which decline was calculated. Halt decline if ongoing and restore 1972 levels.
Semipalmated Sandpiper	<i>Calidris pusilla</i>	3,500,000	Low	8,200,000	Halt declines, then evaluate restoration to calculated 1972 levels.
Western Sandpiper	<i>Calidris mauri</i>	3,500,000	Good	3,500,000	Halt declines, determine extent and then reverse decline with goal of restoring to 1972 levels.
Least Sandpiper	<i>Calidris minutilla</i>	600,000	Poor	1,400,000	Halt declines, then evaluate restoration to calculated 1972 levels.
White-rumped Sandpiper	<i>Calidris fuscicollis</i>	400,000	Moderate	400,000	Investigate suspected declines and set population goal accordingly.
Baird's Sandpiper	<i>Calidris bairdii</i>	300,000	Moderate	300,000	Population change status unknown.
Pectoral Sandpiper	<i>Calidris melanotos</i>	400,000	Poor	400,000	Population change status unknown.
Purple Sandpiper	<i>Calidris maritima belcheri</i>	15,000	Moderate	15,000	Population change status unknown.
	<i>C. m. maritima</i>	?	Poor	?	None. Non-breeding habitat in Iceland/Europe.
Rock Sandpiper	<i>Calidris ptilocnemis cousei</i>	75,000	Low	75,000	Population change status unknown.
	<i>C. p. ptilocnemis</i>	25,000	Moderate	41,700	30-50% decline suspected, population fairly small; increase by 40% (?).
	<i>C. p. tschuktschorum</i>	50,000	Low	50,000	Population change status unknown.
Dunlin	<i>Calidris alpina pacifica</i>	550,000	Low	>550,000	Halt declines, determine causes and extent of decline, then evaluate goals.
	<i>C. a. arctica</i>	750,000	Low	>750,000	Halt declines, then restore to 1980 levels.
	<i>C. a. hudsonia</i>	225,000	Low	>225,000	Halt declines, determine extent and then reverse decline with goal of restoring to 1970 levels.
Stilt Sandpiper	<i>Calidris himantopus</i>	200,000	Low	200,000	Population change status unknown.
Buff-breasted Sandpiper	<i>Tryngites subruficollis</i>	15,000	Low	150,000	Strong declines suspected; increase by >90%.
Short-billed Dowitcher	<i>Limnodromus griseus caurinus</i>	150,000	Low	?	Population change status unknown.
	<i>L. g. griseus</i>	110,000	Low	204,000	Halt declines, then evaluate restoration to calculated 1972 levels (204,000).
	<i>L. g. hendersoni</i>	60,000	Low	>60,000	Halt declines, determine extent and then reverse decline with goal of restoring to 1970 levels.
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	500,000	Poor	500,000	Population change status unknown.



Appendix 1. Shorebird Population Estimates and Population Targets, cont.

SPECIES	BINOMIAL NAME	POPULATION ESTIMATE	CONFIDENCE	TENTATIVE TARGET	PROPOSED ACTION
Common Snipe	<i>Gallinago gallinago</i>	2,000,000	Poor	4,345,000	Restore to calculated 1950 population level.
Wilson's Phalarope	<i>Phalaropus tricolor</i>	1,500,000	Low	2,800,000	Halt declines, then restoration to calculated 1972 levels.
Red-necked Phalarope	<i>Phalaropus lobatus</i>	2,500,000	Poor	5,000,000?	Halt declines, determine extent and then reverse decline with goal of restoring to 1970 levels.
Red Phalarope	<i>Phalaropus fulicaria</i>	1,000,000	Poor	1,000,000?	Halt declines, determine extent and then reverse decline with goal of restoring to 1970 levels.

NOTES:

The population estimates and targets provided here are only a first approximation. In many cases population targets are extremely conservative because available information is limited, and larger population recovery may be needed for some species to meet the overall goals of the Plan. Establishing population targets known to be sufficient for achieving the vision of protecting shorebirds in the United States will require significant funding for the monitoring and research needs outlined in the national Plan, and will result in modified targets that will be revised as more detailed information becomes available. Population estimates and targets will be revised as new information becomes available. Updated information will be posted at the U.S. Shorebird Conservation Plan website at: <http://www.manomet.org/USSCP.htm>.

Population estimates and goals for American Woodcock will be established by the Woodcock Task Force.

CONFIDENCE IN POPULATION ESTIMATES IS RATED AS FOLLOWS:

Poor: A population estimate based on an educated guess.

Low: A population estimate based on broad-scale surveys where estimated population size is likely to be in the correct order of magnitude.

Moderate: A population estimate based on a special survey, or on broad-scale surveys of a narrowly distributed species whose populations tend to concentrate to a high degree either a) in a restricted habitat, or b) at a small number of favored sites. Estimate thought to be within 50% of the true number.

Good: A calculated estimate based on broad-scale mark:recapture ratios or other systematic estimating effort resulting in estimates on which confidence limits can be placed.

High: Number obtained from a dedicated census effort and thought to be accurate and precise.



Appendix 2. Relative Importance of Each Shorebird Planning Region for Each Species

SPEC	SPECIES NAME	PACIFIC				IM WEST	CENTRAL		MISSISSIPPI		EASTERN		
		1	2	3	4	5	6	7	8	9	10	11	12
BBPL	Black-bellied Plover	B,M	M,W	M,W		M,W	m	M	M	M,W	M,w	m	M,W
AGPL	American Golden-Plover	B				m	M	M	M	M	m	m	m
PGPL	Pacific Golden-Plover	B,M			M,W								
SNPL	Snowy Plover		B,M,W	B,M,W		B,M,W		M,B		b,M,W			B,W
WIPL	Wilson's Plover									B,m,w	b		B,W
SEPL	Semipalmated Plover	B,m	M,w	M,w		M,w	M	M	M	M,w	M	m	M,W
PIPL	Piping Plover						B,M	B,M	B,M	M,W	B,m		B,M,W
KILL	Killdeer	b	M,W	B,M,W		B,M,W	B	M,W,B	B,M	B,M,W	B,m,w	b,w	B,W
MOPL	Mountain Plover			M,W		B,m,W	b,m	M,w,B		m,w			
AMOY	American Oystercatcher									b,W	B		B,W
BLOY	Black Oystercatcher	B,W	B,M,W	B,W									
BNST	Black-necked Stilt		m	B,M,W	B	B,M,W	b	B,M		b,M,W	m		B,m,W
AMAV	American Avocet		m	B,M,W		B,M,W	B	M,w,B		b,M,W	m		m,w
GRYE	Greater Yellowlegs	B,M	M,W	M,W		M,W	M	M	M	M,W	M	m	M,W
LEYE	Lesser Yellowlegs	B,m	M	m,w		M,w	M	M	M	M,W	M	m	M,W
SOSA	Solitary Sandpiper	B	m			m	M	M	b,M	M,w	M	m	M
WILL	Willet		m,w	b,M,W		B,M,W	B,M	B,M,w	m	B,M,W	B,M,w		B,M,W
WATA	Wandering Tattler	B	M	M,w	M								
SPSA	Spotted Sandpiper	B	b,m,w	B,M,W		B,M,W	B,M	B,M,w	B,M	b,M,w	B,M	b,m	b,M,W
UPSA	Upland Sandpiper	b				b,m	B	B,M	b,m	M	b,m	m	b,M
ESCU	Eskimo Curlew	m,b						M		M	M		
WHIM	Whimbrel	B,M	M,w	M,w		M		M	m	M	M	m	M,w
BTCU	Bristle-thighed Curlew	B,M			M								
LBCU	Long-billed Curlew		m,w	b,M,W		B,M,W	b	B,M		M,W			m,w
HUGO	Hudsonian Godwit	B,M					M	M	M	M	M		m
BRGO	Bar-tailed Godwit	B,M											
MAGO	Marbled Godwit	B,M	M,w	M,W		b,M,W	B,m	m	b,m	M,W	m	m	M,W
RUTU	Ruddy Turnstone	B,M	M,w	m,w	M	m	m	m	M,w	M,W	M,w	m	M,W
BLTU	Black Turnstone	B,M,w	M,W	M,W									
SURF	Surfbird	B,M,w	M,W	m,w									
REKN	Red Knot	B,M	M	M,W		m			m	M,w	M		M,W
SAND	Sanderling	b,m,w	M,W	M,W		m	m	m	M	M,W	M,w	m	M,W
SESA	Semipalmated Sandpiper	B,M				m	M	M	M	M	M	m	M
WESA	Western Sandpiper	B,M	M,w	M,W		M,W	m	M	m	M,W	m		M,W
LESA	Least Sandpiper	B,M	M,w	M,W		M,W	m	M,W	M	M,W	M	m	M,W
WRSA	White-rumped Sandpiper	B				m	M	M	M	M	M	m	m
BASA	Baird's Sandpiper	B,m		m		M	M	M	M	M	m	m	m
PESA	Pectoral Sandpiper	B,M	m	m		m	M	M	M	M	m	m	M
PUSA	Purple Sandpiper								m		W		w
ROSP	Rock Sandpiper	B,W	m,w	w									

Appendix 2. Relative Importance of Each Shorebird Planning Region for Each Species

SPEC	SPECIES NAME	PACIFIC				IM WEST	CENTRAL		MISSISSIPPI		EASTERN		
		1	2	3	4	5	6	7	8	9	10	11	12
DUNL	Dunlin	B,M	M,W	M,W		M,W	M	m	M	M,W	M,W	m,w	m, W
STSA	Stilt Sandpiper	B	m			m	M	M	M	M,w	m	m	M,w
BBSA	Buff-breasted Sandpiper	m, B	m				M	M	M	M			M
SBDO	Short-billed Dowitcher	B,M	M,W	M,W		m	M	m	M	M,W	M	m	M,W
LBDO	Long-billed Dowitcher	B,M	M,W	M,W		M,W	M	M,W	M	M,W	m	m	m,W
COSN	Common Snipe	B	b,m, W	W,b		B,M,W	b	b,M,W	B,M	M,W	B,M,w	m	M,W
ANWO	American Woodcock						B	B,W	B,M	B,W	B,M,W	b,M,w	B,W
WIPH	Wilson's Phalarope		b,m	b,M		B,M	B	B,M	b,M	M	m	m	M
RNPH	Red-necked Phalarope	B,M	M	M		M	M	m	m	m	M		m
REPH	Red Phalarope	B,M	M,w	M,w		m				m	M		m,w

REGION NUMBER/NAME:

1	Alaska	5	Intermountain West	9	Lower Mississippi/Western Gulf Coast
2	Northern Pacific	6	Northern Plains/Prairie Potholes	10	Northern Atlantic
3	Southern Pacific	7	Central Plains/Playa Lakes	11	Appalachians
4	Hawaii/Pacific Islands	8	Upper Mississippi Valley/Great Lakes	12	Southeastern Coastal Plains–Caribbean

CODE:

B=Breeding, M=Migration, and W=Wintering.

B,M,W=high concentrations, region extremely important to the species relative to the majority of other regions.

B,W,M=common or locally abundant, region important to the species.

b,w,m=uncommon to fairly common, region within species range but occurs in low relative abundance relative to other regions.

Area Importance scores for the Bird Conservation Regions within each Shorebird Planning Region are available at <http://www.manomet.org/USSCP/files.htm>



Appendix 3. National Shorebird Prioritization Scores

SPECIES	PT	RA	TB	TN	BD	ND	CONSERVATION CATEGORY
Black-bellied Plover	5	3	2	2	2	1	3
American Golden-Plover	5	3	2	4	2	3	4
Pacific Golden-Plover	3	5	2	2	5	4	4
Snowy Plover	5	5	4	4	3	4	5
Wilson's Plover	3	5	4	4	4	3	4
Semipalmated Plover	3	3	2	2	1	1	2
Piping Plover	5	5	5	4	5	4	5
Killdeer	5	1	3	3	1	2	3
Mountain Plover	5	5	4	4	5	4	5
American Oystercatcher	3	5	4	4	3	4	4
Black Oystercatcher	3	5	4	3	3	4	4
Black-necked Stilt	3	3	3	2	1	2	2
American Avocet	3	2	3	4	2	3	3
Greater Yellowlegs	3	4	2	2	2	1	3
Lesser Yellowlegs	5	2	2	3	2	1	3
Solitary Sandpiper	3	4	4	2	3	2	4
Willet	3	3	3	3	3	3	3
Wandering Tattler	3	5	2	2	3	2	3
Spotted Sandpiper	3	3	2	2	1	1	2
Upland Sandpiper	5	2	2	4	2	3	4
Eskimo Curlew	5	5	3	4	5	5	5
Whimbrel	5	4	2	2	3	2	4
Bristle-thighed Curlew	3	5	2	4	5	3	4
Long-billed Curlew	5	5	4	4	3	3	5
Hudsonian Godwit	3	4	3	4	4	4	4
Bar-tailed Godwit	3	4	2	4	4	3	4
Marbled Godwit	4	3	4	4	3	3	4
Ruddy Turnstone	4	3	2	4	2	2	4
Black Turnstone	3	4	4	4	5	3	4
Surfbird	4	4	2	4	4	3	4
Red Knot	5	2	2	4	3	3	4
Sanderling	5	2	2	4	2	1	4
Semipalmated Sandpiper	5	1	2	3	3	3	3
Western Sandpiper	5	1	2	4	4	2	4
Least Sandpiper	5	2	2	2	2	2	3
White-rumped Sandpiper	3	2	2	2	3	3	2
Baird's Sandpiper	3	2	2	2	3	3	2
Pectoral Sandpiper	3	2	2	3	2	3	2
Purple Sandpiper	2	5	2	3	3	3	2
Rock Sandpiper	3	3	3	4	5	4	3
Dunlin	5	2	2	3	2	3	3
Stilt Sandpiper	3	3	3	4	3	3	3
Buff-breasted Sandpiper	4	5	3	4	3	4	4
Short-billed Dowitcher	5	2	2	4	3	2	4



Appendix 3. National Shorebird Prioritization Scores, con't.

SPECIES	PT	RA	TB	TN	BD	ND	CONSERVATION CATEGORY
Long-billed Dowitcher	2	2	2	3	4	3	2
Common Snipe	5	1	3	2	1	2	3
American Woodcock	5	1	4	4	2	3	4
Wilson's Phalarope	5	1	3	4	2	5	4
Red-necked Phalarope	4	1	2	3	2	1	3
Red Phalarope	5	1	2	3	2	1	3

SPECIES with SUBSPECIES SCORE	PT	RA	TB	TN	BD	ND	CONSERVATION CATEGORY
Black-bellied Plover	5	3	2	2	2	1	3
<i>Pluvialis squatarola squatarola</i>	5	4	2	2	3	4	4
<i>P.s. cynosurae</i>	U (3)	3	2	4	4	2	3
Snowy Plover	5	5	4	4	3	4	5
<i>Charadrius alexandrinus nivosus</i> (Pacific Coast)	5	5	5	5	5	5	5
<i>C.a. nivosus</i>	4	5	4	4	3	3	4
<i>C. a. tenuirostris</i>	5	5	4	4	5	5	5
Piping Plover	5	5	5	4	4	4	5
<i>Charadrius melodus melodus</i>	5	5	5	4	5	4	5
<i>C. m. circumcinctus?</i> (Great Lakes)	5	5	5	4	5	5	5
<i>C. m. circumcinctus</i> (Great Plains)	5	5	5	4	4	4	5
Black-necked Stilt	3	3	3	2	1	2	2
<i>Himantopus mexicanus</i>	3	4	4	3	2	2	3
<i>H. m. knudseni</i>	3	5	5	5	5	5	4
Solitary Sandpiper	3	5	2	2	3	2	3
<i>Tringa solitaria solitaria</i>	U (3)	5	2	2	2	1	2
<i>T. s. cinnamomea</i>	U (3)	5	2	2	3	2	3
Willet	3	3	3	3	3	3	3
<i>Catoptrophorus semipalmatus semipalmatus</i>	3	4	3	3	4	2	3
<i>C. s. inornatus</i>	U (3)	3	4	3	3	2	3
Whimbrel	5	4	2	2	3	2	4
<i>Numenius phaeopus hudsonicus</i>	5	5	2	3	4	3	5
<i>N. p. rufiventris</i>	U (3)	4	2	3	3	3	3
Hudsonian Godwit	3	4	3	4	4	4	4
<i>Limosa haemastica</i> (Alaska)	U (3)	5	2	4	5	5	4
<i>Limosa haemastica</i> (Hudson Bay)	3	4	3	4	5	5	4
Marbled Godwit	4	3	4	4	3	3	4
<i>Limosa fedoa fedoa</i> (Great Plains)	4	3	4	4	3	3	4
<i>L. f. fedoa</i> (Hudson Bay)	4	5	3	3	5	3	4
<i>L. f. beringiae</i>	3	5	2	4	5	4	4
Ruddy Turnstone	4	3	2	4	2	2	4
<i>Arenaria interpres interpres</i> (Alaska)	U (3)	5	2	4	4	1	3
<i>A. i. interpres</i> (Canada to Europe)	U (3)	4	2	2	2	2	3
<i>A. i. morinella</i>	4	3	2	4	4	2	4



Appendix 3. National Shorebird Prioritization Scores, con't.

SPECIES with SUBSPECIES SCORES	PT	RA	TB	TN	BD	ND	CONSERVATION CATEGORY
Red Knot	5	2	2	4	3	3	4
<i>Calidris canutus rufa</i>	5	3	2	4	4	2	4
<i>C. c. islandica</i>	U(3)	4	2	4	4	3	3
<i>C. c. roselarri</i>	U(3)	3	2	4	4	3	3
Purple Sandpiper	2	5	2	3	3	3	2
<i>Calidris maritima maritima</i>	U(3)	5	2	2	4	3	4
<i>C. m. belcheri</i>	3	5	2	2	4	4	4
Rock Sandpiper	3	3	3	4	5	4	3
<i>Calidris ptilocnemis tschuktschorum</i>	3	4	3	3	5	4	4
<i>C. p. ptilocnemis</i>	4	5	4	5	5	5	4
<i>C. p. cousei</i>	3	4	3	3	5	4	4
Dunlin	5	2	2	3	2	3	3
<i>Calidris alpina pacifica</i>	4	2	2	4	4	3	4
<i>C. a. arctica</i>	5	4	2	5	5	3	5
<i>C. a. hudsonia</i>	4	3	2	3	3	3	3
Short-billed Dowitcher	5	2	2	3	3	2	3
<i>Limnodromus griseus griseus</i>	5	4	2	3	4	3	4
<i>L. g. hendersoni</i>	4	4	2	3	3	3	4
<i>L. g. caurinus</i>	U(3)	3	2	4	4	3	3

NOTES:

- PT* Population Trend
RA Relative Abundance
TB Threats during the Breeding Season
TN Threats during the Non-breeding Season
BD Breeding Distribution
ND Non-breeding Distribution

CONSERVATION CATEGORIES:

- Category 5* Highly Imperiled
Category 4 Species of High Concern
Category 3 Species of Moderate Concern
Category 2 Species of Low Concern
Category 1 Species Not at Risk

Conservation categories are explained in the text. Conservation scores will be revised as new information becomes available. Updated information will be posted at the U.S. Shorebird Conservation Plan website at: <http://www.manomet.org/USSCP/files.htm>



Appendix 4: Uncommon Shorebird Species Recorded in the U.S.

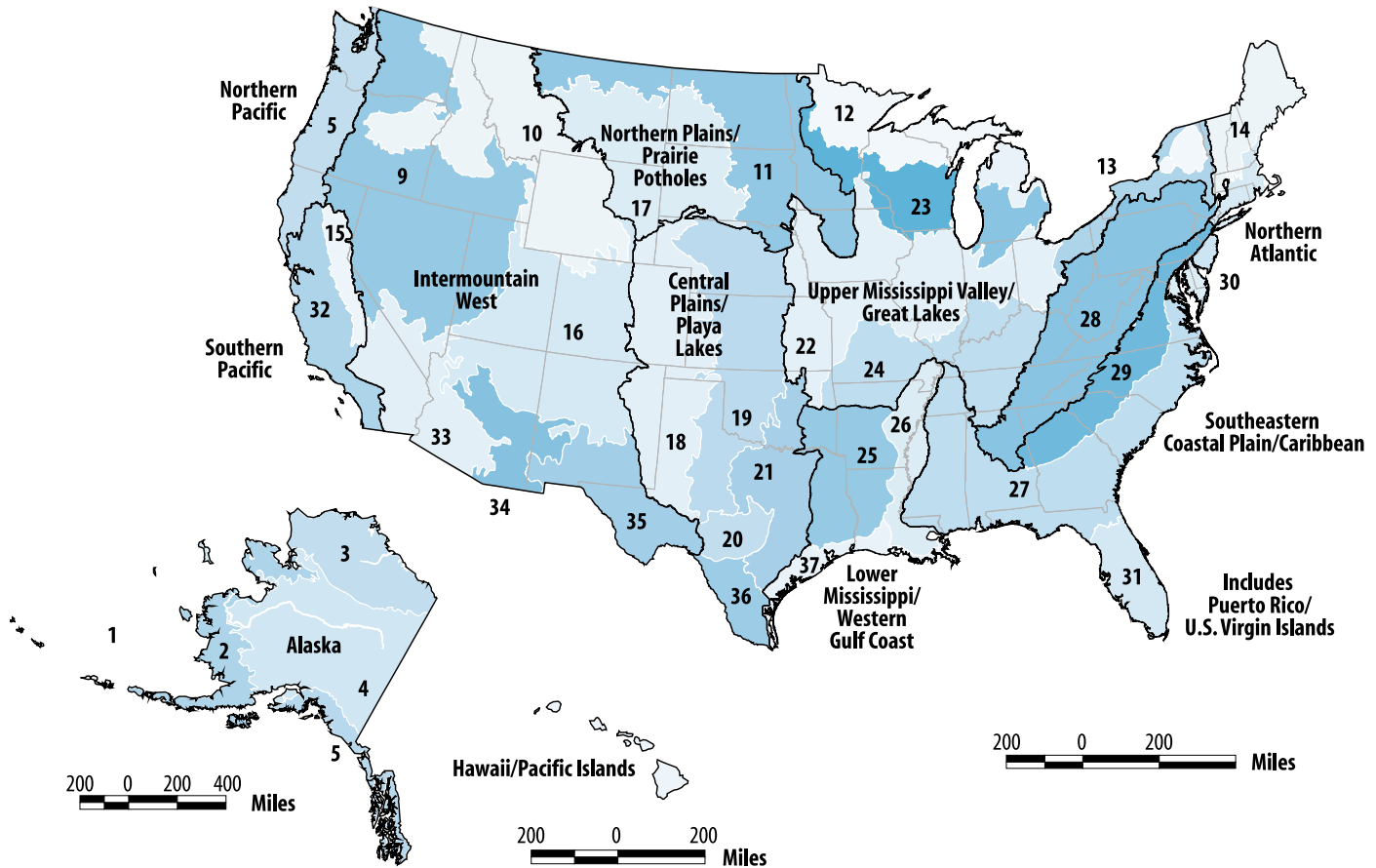
Rare or vagrant shorebirds in the United States (American Ornithologists' Union, 1998)

STATUS	COMMON NAME	SCIENTIFIC NAME
Rare or sporadic breeders from Europe or Asia	Mongolian Plover Common Ringed Plover Eurasian Dotterel Wood Sandpiper Common Sandpiper Red-necked Stint Curlew Sandpiper Ruff	<i>Charadrius mongolus</i> <i>Charadrius hiaticula</i> <i>Charadrius morinellus</i> <i>Tringa glareola</i> <i>Actitis hypoleucos</i> <i>Calidris ruficollis</i> <i>Calidris ferruginea</i> <i>Philomachus pugnax</i>
Migrants or vagrants from Europe or Asia	Oriental Pratincole Northern Lapwing Eurasian Golden Plover Little Ringed Plover Black-winged Stilt Common Greenshank Marsh Sandpiper Spotted Redshank Green Sandpiper Gray-tailed Tattler Terek Sandpiper Little Curlew Eurasian Curlew Far Eastern Curlew Black-tailed Godwit Great Knot Little Stint Temminck's Stint Long-toed Stint Spoonbill Sandpiper Broad-billed Sandpiper Jack Snipe Pin-tailed Snipe Eurasian Woodcock	<i>Glareola maldivarum</i> <i>Vanellus vanellus</i> <i>Pluvialis apricaria</i> <i>Charadrius dubius</i> <i>Himantopus himantopus</i> <i>Tringa nebularia</i> <i>Tringa stagnatilis</i> <i>Tringa erythropus</i> <i>Tringa ochropus</i> <i>Heteroscelus brevipes</i> <i>Xenus cinereus</i> <i>Numenius minutus</i> <i>Numenius arquata</i> <i>Numenius madagascariensis</i> <i>Limosa limosa</i> <i>Calidris tenuirostris</i> <i>Calidris minuta</i> <i>Calidris temminckii</i> <i>Calidris subminuta</i> <i>Eurynorhynchus pygmaeus</i> <i>Limicola falcinellus</i> <i>Lymnocyptes minimus</i> <i>Gallinago stenura</i> <i>Scolopax rusticola</i>
Migrants or vagrants from south of the United States	Double-striped Thick-knee Collared Plover Northern Jacana	<i>Burhinus bistriatus</i> <i>Charadrius collaris</i> <i>Jacana spinosa</i>



Appendix 5. Shorebird Planning Regions and Bird Conservation Regions

Shorebird Planning Regions and NABCI Bird Conservation Region Numbers and Names



Alaska

- 1 Bering Sea/Aleutian Islands
- 2 Western Alaska
- 3 Arctic Plains and Mountains
- 4 Northwestern Interior Forest
- 5 Northwestern Pacific Rainforest (Alaska)

Northern Pacific

- 5 Northwestern Pacific Rainforest (Alaska)

Southern Pacific

- 15 Sierra Nevada
- 32 Coastal California

Hawaii/Pacific Islands

Not numbered – Hawaii

Intermountain West

- 9 Great Basin
- 10 Northern Rockies
- 16 Southern Rockies/Colorado Plateau
- 33 Sonoran and Mojave Deserts

- 34 Sierra Madre Occidental
- 35 Chihuahuan Desert

Northern Plains/Prairie Potholes

- 11 Prairie Potholes
- 17 Badlands and Prairies

Central Plains/Playa Lakes

- 18 Short Grass Prairie
- 19 Central Mixed Grass Prairie
- 21 Oaks and Prairies
- 20 Edwards Plateau
- 36 Tamaulipan Brushlands

Upper Mississippi Valley/Great Lakes

- 12 Boreal Hardwood Transition
- 13 Lower Gt Lakes/St. Lawrence Plain
- 22 Eastern Tall Grass Prairie
- 23 Prairie Hardwood Transition
- 24 Central Hardwoods

Lower Mississippi/Western Gulf Coast

- 25 West Gulf Coastal Plain/Ouachitas
- 26 Mississippi Alluvial Valley
- 37 Gulf Coastal Prairie

Northern Atlantic

- 14 Atlantic Northern Forest
- 30 New England/Mid-Atlantic Coast

Southeastern Coastal Plains—Caribbean

- 27 Southeastern Coastal Plain
- 29 Piedmont
- 31 Peninsular Florida

Not numbered – Puerto Rico/U.S. Virgin Islands

BCRs entirely within Canada or Mexico

- 6 Boreal Taiga Plains
- 7 Taiga Shield and Hudson Plains
- 8 Boreal Softwood Shield
- 38 Mexico (additional BCRs to be defined)

Note:

There is no regional shorebird plan for bird conservation
Region 28 – Appalachian Mountains



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