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Shorebird Conservation: Protecting Habitats for Hemispheric Migrants

Crossing thousands of miles between North and South America, migratory shorebirds depend upon a few distantly separated, vital staging sites as critical "links in their migration chain." Some of these sites enjoy legal protection and community support, while many others are threatened by growing economic development pressures. On a global scale, shorebird habitats continue to be degraded, and threats to critical wetlands from unsustainable land and water uses are increasing. In the Western Hemisphere it is now apparent that coordinated site protection across the entire shorebird range, from the Arctic to austral South America, is essential for sustained conservation.

Shorebirds, also known as "waders" in Europe and Asia, are usually associated with some kind of water's edge at some time of their lives. Sometimes that might mean the edge of a river or lake as well as the ocean shores. Many are even found in the prairie potholes and ponds of central North America, and they may build their ground nests in habitats as diverse as tallgrass prairies, remote lichen-covered tundra, sandy beaches, and upland farm fields. The term "shorebirds" does not include the other water-associated birds (such as gulls, terns, herons, cranes, ducks, or geese) that share these environments but fill distinct niches.

Western Hemisphere shorebird populations (more than 47 species of sandpipers, plovers, oystercatchers, and related birds from the Charadriidae, Scolopacidae, and Haematopodidae families) continue to suffer substantial declines. Of the 41 shorebird species that migrate through North America, 5 have declined by 25% or more over the last five years, and 16 others have projected or actual population declines of 5-20% (Harrington 1995). Only the upland sandpiper appears to have a stable or increasing population. The evidence comes from over twenty-five years of field data that the Manomet Center for Conservation Sciences has coordinated through the International Shorebird Survey (ISS), from Point Reyes Bird Observatory, and from other sources documenting relative abundance, migration chronology, and the key areas used by these birds.

Globally, there are over 175 species of shorebirds, and in the Eastern

Photo by David C. Twichell

Hemisphere they are believed to be suffering similar declines. Although the need for improved conservation is clear, several key factors limit progress. Shorebird habitat management priorities are often absent in key areas, there is a lack of adequate scientific information, and public support is weak. In general, this may be correlated with the lack of public awareness regarding the ecological and human importance of wetlands.

Naturalists since Aristotle's time have marveled at how these small birds navigate over vast distances. Even today we lack a complete understanding of how they can so precisely find their way from the far reaches of Tierra del Fuego up to extreme-Arctic lands and back again. How can these slight, elegant birds fly nonstop for 2-3 days, covering up to 2,000 miles (averaging 50 miles per hour) between rest stops? *How* do they do it? *Why* do they do it? Try this: Go to your favorite fast-food restaurant and consume the highest-fat selections they offer. Eat fast and don't stop eating until you have doubled your weight, all within a few days (about 4,000 burgers in all). Now, run outside and don't stop until you cover at least 1,000 miles without food or water. Stop and do it all over again. Get the picture? This is the shorebird migration that occurs beautifully and naturally every year, spring and fall, across the globe.

If only shorebirds could tell us the stories of their experiences. The physical feat alone is beyond our comprehension. The accomplishment of navigating night and day high over the world's largest rainforests, mountain ranges, vast stretches of oceans, and into the remote tundra is truly mind-boggling. Perhaps even more intriguing is, How do the newborn chicks, departing on their first southward migration after the adults have left, find their way over totally unfamiliar territory to wintering grounds so distant and unknown?

Recent physiological research indicates that shorebirds undergo dramatic internal changes in preparation for the long migrations. Their flight muscles enlarge and internal organs are greatly reduced to cut extra baggage for the trip. They also develop an exceptional metabolic ability to convert food into stored fat for the extended flights of 50-60 hours to come. Once at the nesting grounds, the female then rapidly produces up to four eggs which may weigh as much as 50% of her total body weight. Faced with a very brief Arctic summer, newborn shorebirds begin walking and feeding on insects within hours of hatching. Often the adult females will depart first, soon after their chicks begin foraging, leaving any brief parenting to the father, who will leave before the chicks have their flight feathers completely developed. Traveling south, the juveniles follow a similar pattern of concentrating at critical staging sites where they seem to know where to find the abundant

food for their first migration across completely unfamiliar skies.

Hudsonian godwits and red knots are long-distance travelers and may cover over 20,000 miles round-trip every year (Harrington 1996). Snowy and piping plovers travel more modest distances between their summer and winter residences, wintering along the Gulf of Mexico coastline and nesting in the northern prairies of the U.S. and Canada, similar to many ducks and geese. Woodcock and snipe are also shorebirds, but generally migrate short distances or not at all.

Even the most efficient shorebird needs to replenish fuel and rest to make such an extreme voyage. Knowing when and where to find that food may be the key evolutionary feat of these awesome birds; it may also be their point of greatest vulnerability to the human species. Just when we are discovering the intricacies of the most successful and spectacular migratory beings on the planet, we may be unwittingly preparing to annihilate them.

Migrating wildlife follow distinct routes determined by the species' capabilities and dietary needs. Shorebirds follow the food supply and arrive at critical sites just as the maximum abundance of prey becomes available. The shorebirds' diet is selected for its high energy content. The availability of food depends on climate, season, and competition. Successful feeding also depends upon having minimal disturbances, as well as roosting security during stopovers. Despite their relatively small, delicate appearance, shorebirds are actually voracious predators, consuming thousands of insect larvae, small clams, snails, worms, and other invertebrates. Plovers are usually visual hunters and can be seen "stalking" prey, while many sandpipers use a rapid probing technique with specialized beaks that can "smell" the prey and feel movements in the soil.

Probably no other animal species on Earth migrates the great distances and concentrates to the extremes shorebirds do. (Arctic terns, also famous for their long-distance migration, differ significantly by using a "short hop" strategy.) This makes them very special in terms of their ecological niche, but also can make them highly vulnerable to loss of a single critical wetland "stepping stone" upon which their migrations depend. Often shorebirds are found by the hundreds of thousands concentrated at a single site, making the whole species extremely vulnerable for those intense few weeks. If any one site were lost to or degraded by development or pollution, whole populations could face devastating consequences.

Every year new threats to shorebirds and their habitats are developing. Delaware Bay on the U.S. Atlantic coast may host 75% of the Western Hemisphere's red knot population (along with individuals of many other

species) during a few critical weeks each spring (Clark and Niles 1993). Dramatic increases in the harvest of spawning horseshoe crabs as eel bait may have affected the supply of surplus crab eggs. These eggs may be an irreplaceable energy supply required to complete the last flight directly to the shorebirds' Arctic nesting grounds and to produce eggs. There is growing concern about this impact on the birds, and new state regulations to manage the crab harvest have been developed by New Jersey and Delaware. At issue is more than conservation: the bird migration annually generates over US$10 million in tourism income for the region.

Wetlands worldwide are being filled, drained, polluted, and degraded to such an extent that all life in these diverse ecosystems may be in peril. Although economic analysis of global wetlands suggest they are by far the most productive ecosystems on the planet (Costanza et al. 1997), yielding about US$33 trillion in products and services per year, almost double the world total gross domestic product (GDP). The United States has already destroyed over 50% of its original wetlands, Canada nearly a third, and many other countries follow this trend as development pressures grow and the values of wetlands are severely underestimated. Water supplies to many western U.S. wetlands must compete with agriculture and municipal demands. Cheyenne Bottoms, Kansas, which hosts up to 90% of the stilt sandpipers, depends upon the limited Arkansas River —and may have to share it with a proposed large-scale hog production and processing project. Proposed construction of a Legacy Highway over the eastern-shore wetlands of Great Salt Lake, Utah, would directly affect one of North America's most vital inland sites for shorebird and waterfowl staging and nesting. San Francisco Bay is being invaded continually by exotic species that may disrupt natural productivity vital for over 1 million shorebirds. Oil spills such as that from the *Exxon Valdez* threaten spectacular sites like the Copper River Delta in Alaska, where over 15 million shorebirds stage during both spring and fall migrations. The issues are endless, and sustainable protection requires dedicated support from scientists, environmentalists, and communities as well as the public agencies mandated to conserve wildlife.

It was in response to this challenge that the Western Hemisphere Shorebird Reserve Network (WHSRN) was formally conceived in 1986, with the goal of addressing shorebird conservation from a science base. A group of scientists from the Manomet Center for Conservation Sciences, World Wildlife Fund, National Audubon Society, and the Philadelphia Academy of Natural Sciences had been studying shorebird migration and discovered the unique concentration patterns occurring in special staging

sites. Realizing that these few sites were vital and spread over the shorebirds' international range, they concluded that only a multi-organizational, international network would be able to provide effective conservation. (A similar network of sites is currently being developed by the Eastern Australasian Shorebird Reserve Network with support from Wetlands International.)

The science base of the WHSRN is Manomet's ISS, which comprises field data gathered by volunteer collaborators working in over 1,650 sites for 26 years—the largest database of its kind. In addition, WHSRN draws upon data from the U.S. Fish and Wildlife Service (USFWS), the Canadian Wildlife Service (CWS), and many other sources that have indicated significant declines in shorebird populations. Further, Manomet recently signed a broad memorandum of understanding with the USFWS under which over 500 national wildlife refuges will become eligible for WHSRN support for monitoring, training, habitat project development, and information exchanges.

Scientific understanding of shorebird migrations and the need for protected areas has been refined over the past quarter-century. New analysis by Manomet of ISS information is now helping us to understand the shorebirds' migration, population trends, and ecological role in the wetlands. The unique strategy of shorebird migration became the foundation for the network of over 120 organizations collaborating in the protection of nearly 9 million acres of vital habitat. The network is considered a model program for international cooperation and the environmental motto "think globally and act locally." Everyone in the network has local responsibility for his or her important site: sites which, collectively, contribute to sustaining the hemispheric populations of shorebirds.

Delaware Bay was the first site in the WHSRN, and now 35 critical sites in seven countries are officially recognized, with over 150 potential additions believed to exist in North America alone (Harrington and Perry 1996; Morrison et al. 1995). Currently there are over a dozen nominations pending for additions to the WHSRN, all initiated by local organizations. Additional nomina-tions can be made at any time by organizations or agencies responsible for a given site.

WHSRN sites, always nominated by the owners and local stakeholders, must satisfy two sets of criteria. Biological criteria require a minimal shorebird use to indicate the level of concentration occurring at the site: Hemispheric Sites host over 500,000 birds per year, International Sites host 100,000 to 500,000, and Regional Sites have at least 20,000. Data are taken from local reports, independent studies, and our own monitoring. The second set of criteria requires that all local stakeholders (landown-

ers, managing agencies, communities, organizations, businesses, etc.) be fully informed and supportive of the designation. This, we believe, is essential to the long-term success of on-site conservation, since these stakeholders identify the resources and needs, set priorities and responsibilities, and will ultimately be responsible for the management and benefits.

Ownership of WHSRN sites is highly variable, including diverse coalitions such as San Francisco Bay (California) and Chaplin Lake (Saskatchewan), each with over a dozen participants, as well as single-owner national wildlife refuges and national forests, state-owned sites such as Great Salt Lake, and combined public–private ownerships, as at Cheyenne Bottoms (state of Kansas and The Nature Conservancy). We strongly encourage the participation of nearby communities and local businesses who may have a stake in the protection and development of the area. Active collaboration to achieve common goals has been our most significant strategy to avoid unproductive conflicts and get science-based conservation implemented.

WHSRN is currently coordinated by the Manomet Center for Conservation Sciences and has a partnership with Wetlands International: the Americas for developing services to sites in Canada and South America. The WHSRN Advisory Council is a stakeholder body representing state, federal, and private partners, including the sites, which guides the Network's strategic planning and development. A Scientific Advisory Board, composed of shorebird scientists from North and South America, advises WHSRN on site designations, reviews scientific aspects of proposals and projects, and assures that we maintain our strong scientific foundation. The Manomet staff is very limited, with a senior scientist, an education–outreach specialist, and the director. Funding has been requested to support additional positions so we can improve services to the Network sites and implement more effective conservation projects. Wetlands International supports WHSRN with its own staff in Ottawa. Probably the most impressive aspect has been the network of nearly 900 volunteers who have provided field data to the ISS.

Protected areas share common needs but have limited resources to fulfill their missions. WHSRN promotes and coordinates the "twinning" of northern and southern sites that share shorebird species and conservation needs. Linked sites are able to exchange information and ideas, support each other as they address common issues at distant points of the network, and learn from each other's experiences.

An example of twinning is the Canadian Wildlife Service's work at the Bay of Fundy, which has been paired with that of counterparts in Suriname,

to study semipalmated sandpipers and improve their habitat management practices at both ends of the bird's range. Another exciting project has been recently developed with Canadian, U.S., and Mexican sites to strengthen their training, monitoring, public outreach, and land management capabilities. A "Linking Communities and Wetlands" workshop was held with representatives from a site in Mexico, the USA, and Canada who jointly discussed mutual issues for a cooperative strategy to benefit the shorebirds they share. Another initiative on joint training of biologists working in the breeding, migration, and non-breeding sites for shorebirds has begun this year, involving participants from the west coast of Mexico, north-central USA, and south-central Canada. These sites include national and state parks, wildlife refuges, and private lands that have critical saline habitats for the same populations of American avocets, marbled godwits, and yellowlegs. Working together as a team, these sites clearly can have a much stronger program of conservation and public awareness than can any one alone.

Official recognition of the international ecological significance of a site—such as is afforded by membership in the WHSRN—gives it great political status in the eyes of agencies, funders, and the local communities. It provides an important tool for the protection of the site when threats may develop, and facilitates local and regional coordinated management. In addition, the site becomes a resource of information for the other Network sites. WHSRN also develops funded projects for multiple sites, provides training in shorebird ecology and habitat management for biologists, facilitates information and experiential exchanges among sites, and provides direct assistance when threats develop. Organization of public activities that promote aware-ness and local economic benefits, such as shorebird festivals, have had remarkable success at several sites.

As the need for effective landscape- and regional-scale conservation becomes more apparent, the International Association of Fish & Wildlife Agencies, representing all 50 U.S. states, has funded the development of a U.S. National Shorebird Plan. Design of this plan, coordinated by Manomet, will be closely integrated with the North America Waterfowl Management Plan for waterfowl and Partners in Flight plans for songbirds. Completion of these, along with a new shorebird plan in Canada now beginning, not only will provide strategic guidance for research and land management for the major groups of migratory birds, but will establish the groundwork for much needed plans throughout North and South America.

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