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ENDANGERED SPECIES

Technical Bulletin Reprint

Wildland Management Center
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Scarce Resources and Common Species

By

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Is abundance a legitimate assay of a species' threat of extinction? Few would argue that a rare species is not at risk. Most would also embrace the converse, that common species are home free. These two assumptions direct many decisions about how resources are allocated in conservation programs. They arise from common sense and from the mathematics of extinction (e.g. Diamond 1984).

Common species are thought to be immune to extinction by virtue of their large population size and the vanishingly small probability that all members of a population will fail to replace themselves in the same period. We are faced, nonetheless, with a history of very common species gone extinct. Examples leap out from across the face of North America: the passenger pigeon, the Carolina parakeet, the heath hen. Other once wildly abundant species such as the Eskimo curlew and the bison now stagger at the brink of extinction.

Photo by J.P. Myers / VIREO

Because they concentrate in large numbers at a few key sites, migratory shorebird populations may be at risk despite their presently large numbers.

Common species at risk

All of these species passed through phases of low population number that have or would have qualified them as endangered. But would even prescient conservation scientists have recognized the risk of extinction and its sources had they been witnessing the declines in progress? Guided by numbers alone, the mathematics of extinction, they would probably have not. If nothing else they might have been too busy with recovery plans for their century's basket cases to detect what was happening to the more common species.

We believe that the link between abundance and extinction is not always as clean as the numbers suggest, and we develop here a case study using shorebirds *(Aves: Charadrii)* to illustrate our point. New World shorebirds include avocets, stilts, plovers, sandpipers, and curlews, among others. Shorebird population size estimates range between 100,000 and 1,000,000. These are not estimates that immediately suggest population jeopardy. However, four natural history traits conspire to put shorebird populations at risk: Long-distance migration, concentrations of large numbers of shorebirds in a few key areas, low reproductive rates, and habitat competition with humans (Myers *et al.* 1987).

Most shorebird species in the Western Hemisphere are highly migratory, with 40 of the 49 species migrating from wintering sites in Central and South America to breeding grounds in North America (Pitelka 1979; Morrison 1984). Thirty-one of these species breed in the Arctic, traveling up to 20,000 miles each year.

Migration a factor

Three major migration corridors exist: one along the Pacific coast, one along the Atlantic coast, and one through the western Gulf of Mexico and the Central Great Plains of North America. Certain species restrict their movements to single corridors, primarily those using the Pacific coast, while others use two or more corridors. Species migrating between the northern and southern hemispheres often follow an elliptical route, with their southward path in autumn east of their northward route in spring.

Along these migration corridors, shorebirds congregate in great numbers at a few critical stopover sites, known as staging areas, where they feed voraciously and rest before

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continuing on their northward or southward journeys. The birds fly nonstop from one staging area to the next, traveling up to three or four days at a time and covering several thousand miles. In general, species breeding farther north migrate to more southerly wintering sites.

To support a shorebird's energetic demands, food must be extraordinarily plentiful, highly accessible, present within a narrow time window, and available in areas with little or no disturbance. Few sites along the coastline migration corridors meet these criteria, making existing staging areas critically important.

Shorebird migration coincides not only with peaks of food abundance along the migratory path, but also with the brief period suitable for nesting in the arctic. The precocial chicks of the arctic nesting shorebird species depend completely upon a surface flush of insects in early to mid-July; chick hatching must coincide with this emergence. To put chicks out on the tundra by July is no mean feat, however, for adult arrival in the arctic is constrained by the presence of permafrost: a shorebird beak capable of pulling subsurface larvae out of frozen tundra, the prevailing condition until early June, has yet to evolve. Therefore, all the precursors to hatching — arrival, display, nest building, egg-laying, and incubation — must take place within three weeks or so. Given incubation periods of 20 to 30 days, arrival at the breeding grounds must be as early in the season as possible. In fact, arriving birds are thought to carry a few days' energy requirements stored as fat to see them through early season inclement weather.

Human land uses voraciously consume critical shorebird areas.

Most shorebirds make only one breeding attempt because of their short breeding season. The modal clutch size is four eggs. High predation rates mean that most eggs do not hatch. Those that do hatch usually fail to fledge. Survivorship among adult shorebirds, between 70% and 95% per year, compensates for these low reproductive rates. This dependence on adult survivorship, however, renders populations vulnerable to aberrantly high nonbreeding or migratory mortality. Several shorebird populations, most notably the Eskimo curlew *(Numenius borealis),* still bear deep scars from intense market hunting halted by national law and international treaty in the early 1900s. The Eskimo curlew hovers close to extinction, with only a few unsubstantiated sightings each decade.

Human land uses — construction, commerce, agriculture, and recreation — voraciously consume critical shorebird sites. At least 30% to 40% of all wetlands present when Europeans reached North America have been destroyed, "reclaimed," or diverted. Losses within several regions are much greater. For example, some 90% of wetlands along the east coast of the United States have been affected by draining, dredging, or filling, especially in the pursuit of mosquito control. In South America, industrial complexes, transport systems, shellfish aquaculture, and agriculture increasingly impinge on shorebird habitats, although quantitative data on the magnitude of these losses are as yet unavailable.

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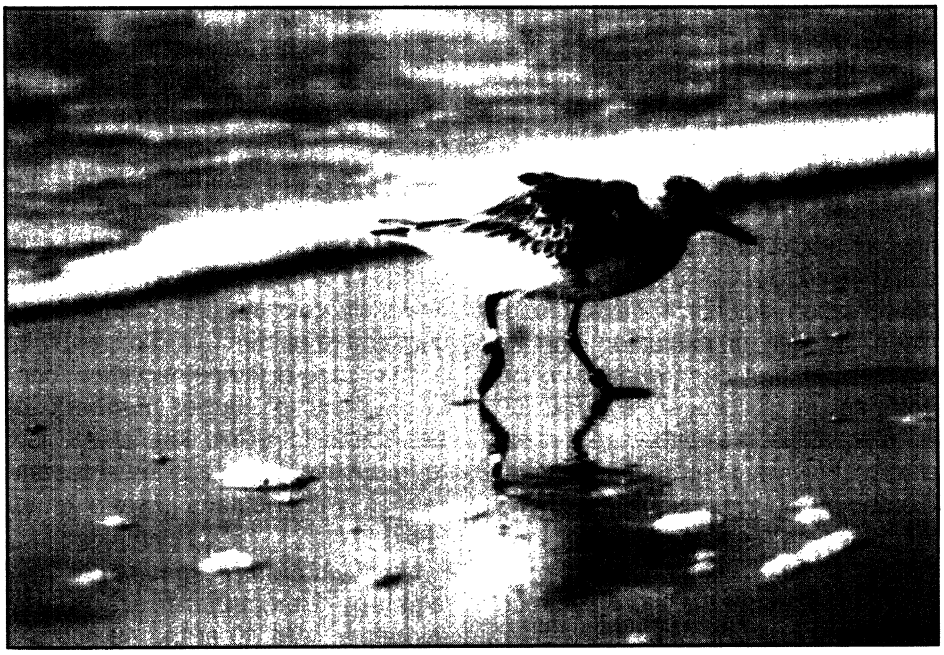

Photo by T. Amos / VIREO

Some shorebird show strong site fidelity. This sanderling, originally banded in Peru, was observed on the same stretch of Texas beach for three consecutive migrations.

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Shorebird concentration

Five estuary and bay systems in North America each support more than one million birds during migration: in spring, Copper River Delta (Alaska), Grays Harbor (Washington), Delaware Bay (between New Jersey and Delaware), and Cheyenne Bottoms (Kansas); in autumn, the Bay of Fundy (between New Brunswick and Nova Scotia) (Senner and Howe 1984). Each of these sites may support more than 80% of the breeding population of one or more shorebird species. In the eastern United States, at least 70% of all individuals using those migration routes will pass through either Cheyenne Bottoms or Delaware Bay. Roughly 80% of all US red knots *(Calidris canutus)* and 60% of Atlantic sanderlings *(Calidris alba)* stop at Delaware Bay. The situation is even more exaggerated at the west coast staging areas. Virtually all western sandpipers *(Calidris mauri)* in the world pause in the Copper River Delta, as do the majority of Western Hemisphere dunlins *(Calidris alpina).*

Abundance and endangerment

By putting "all the birds in one bay," shorebirds violate one of the basic premiese of the link between abundance and endangerment. In the traditional mathematics of extinction, the critical assumption is that the deaths or reproductive failures of individuals are independent. Clearly no such independence exists in the cases cited above. A single catastrophe could affect much, if not all, of a population. The extinctions of once common North American bird species, in fact, hinged upon the concentration of these widespread species into single geographic areas (Dawson *et al.* 1987).

Our concern about the implications of the four factors reviewed above arose out of logical considerations, not fact. Only within the last year has information become available to assess long-term shorebird population trends. Data, accumulated over the last decade under the auspices of the International Shorebird Survey and the U.S. Fish and Wildlife Service (USFWS), reveal alarming declines in shorebird populations (Howe and Harrington 1986). Of 12 species monitored for 12 years along the US east coast, ten have decreased, with an average decline of 44%. Over that period, sanderlings decreased some 80%. Several other shorebirds, including whimbrels, short-billed dowitchers, and, possibly, red knots also show alarming declines.

Together, the spatial and temporal constraints on shorebird migration convert migratory pathways into linked chains of critical sites. This has fundamental conservation implications, because threats to one site will have impacts on birds using other sites within the chain. Severing the chain by destroying one link puts at risk not only the birds dependent on that site, but the entire population.

This chain-like nature of shorebird dependency challenges traditional conservation practices, in which efforts are usually focused within the boundaries of single areas. Once perceived, this dependency also suggests an alternative strategy, one linking the critical sites in a network with coordinated management. The apparent curse of concentration then becomes a blessing, because it means that efforts can focus on a limited number of critical locations with some hope of comprehensiveness.

With these realizations, in 1985 the World Wildlife Fund-US (WWF-US), the International Association of Fish and Wildlife Agencies (IAFWA), and the Academy of Natural Sciences of Philadelphia (ANSP), joined to form the Western Hemisphere Shorebird Reserve Network (WHSRN). This network unites wildlife agencies, private conservation groups, and other organizations to support local wetland conservation initiatives.

In November 1985, the lower portion of the Delaware Bay estuary became the first site in the Reserve System. In a joint proclamation, the governors of Delaware and New Jersey pledged to collaborate on developing a management approach for the Delaware Bay that would preserve critical shorebird needs. Funds totaling over $2,000,000 were allocated to purchase key sites within the estuary.

A network of protection

The number of wildlife agencies, resource managers, and landowners participating in the program has expanded. By early 1987, over 35 government agencies from throughout the hemisphere have made commitments to support the network. These include state and provincial wildlife agencies, the U.S. Fish and Wildlife Service, the Canadian Wildlife Service, the Peruvian National Forestry and Wildlife Agency, the Suriname Ministry of Natural Resources and Energy, and most recently, the Argentinian National Park Administration. Federal participation by Brazil, Chile, and Panama is pending. Over 100 sites are under review for WHSRN membership. In a key step, USFWS Director Frank Dunkle proposed 52 national wildlife refuges for consideration as network members.

Membership in WHSRN is wholly voluntary. Management priorities remain the prerogative of the landowner. WHSRN's benefits come from the international recognition that membership confers upon a site, and the support this lends to local conservation initiatives. When appropriate, WHSRN can work with the relevant authority in devising appropriate conservation measures for a given site. Additional WHSRN goals are to enhance public awareness of local conservation

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issues, to train Neotropical biologists and conservationists involved in shorebird conservation, and to expand the data base guiding wetland conservation decisions.

The Bottom Line

Of North American shorebirds, only the piping plover *(Charadrius melodus)* and Eskimo curlew are formally listed as endangered. Many, in fact, are common. Yet, as our discussion suggests, even common species can face severe conservation problems. The challenge for conservationists is threefold: (1) to identify common species whose characteristics make them vulnerable; (2) to develop conservation plans for those species; and (3) to place those common species vulnerable to extinction by their natural history traits into competition for scarce conservation resources. Rightly, the final decision may continue to direct most funding toward the classically endangered. But more thought should be given to Hawk Mountain Wildlife Sanctuary founder Rosalie Edge's admonitions from the 1930's: "The time to save a species is when it is still common." This is when conservation steps may prove most efficient, not after the situation has become hopeless.

Think of it this way. In John James Audubon's time, by some estimates, up to 40% of all North American birds were passenger pigeons (Schorger 1955). Their disappearance has altered North American hardwood communities in ways we will never know.

Photo by J.P. Myers / VIREO

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