is welcome. The authors of *Evolution of Primary Producers in the Sea* go further and succeed in making a complex and at times perplexing subject accessible and exciting. Comprehensive and authoritative, their explorations of fundamental questions and global geobiological trends are engaging and thought provoking. The volume will be influential, and it should signal a turning point in phytoplankton research.

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ECOLOGY

Give Way to the Migrants

Thomas Alerstam

Migration represents a spectacularly successful strategy among animals, providing access to a richness of ephemeral and seasonal resources that can sustain large populations. Its importance for promoting abundance was stressed by Alfred Russel Wallace in his 1858 paper that set forth the fundamentals of natural selection in biological evolution and stirred Darwin to finally publish his long-considered ideas (*1*). Wallace pointed to the example of the passenger pigeon, which—in spite of its limited fecundity and flagrant exposure to predation—reached its immense abundance through rapid long-distance movements from depleted to fresh feeding grounds. The example illustrates, he argued, that animal populations "can never increase beyond the supply of food in the least favourable season." What he did not realize at that time was the passenger pigeon's great vulnerability to human exploitation. Within Wallace's lifetime (1823–1913), the species plummeted from tens of millions of birds. The last-known individual died in captivity in 1914.

The view of animal migration as a phenomenon of abundance and vulnerability forms the central theme of David Wilcove's *No Way Home*. His alarming message is that around the world great animal migrations are disappearing. Thus, international conservation efforts are urgently needed to save the migrants from the devastating effects of overexploitation, habitat destruction, human-created obstacles, and climate change.

Animals traveling thousands or tens of thousands of kilometers in the air, on land, or in water inspire much awe. To complete its annual return journey between northerly breeding latitudes and tropical winter regions, a tiny songbird must keep to seasonal and daily timetables, change its physiological machinery between phases of fuel consumption and fuel deposition, vary flight steps and fuel loads in relation to the crossing of benign or hostile regions, find its way by compass and navigation systems, negotiate weather and winds, and correctly adjust flight speed and altitude. The bird's endowment with all necessary instructions represents a striking manifestation of the accomplishments achieved by biological evolution.

No Way Home
The Decline of the World's Great Animal Migrations

by David S. Wilcove

Island Press, Washington, DC, 2008. 253 pp. $24.95. ISBN 9781559639859.

Wilcove, an ecologist at Princeton University, presents elegant and informed accounts of migrations in various taxa: birds (the New and Old World systems of billions of songbirds traveling to and from tropical winter quarters, red knots flying between the latitudinal extremes of the American continents, and bellbirds moving down and up the slopes in Central American cloud forests), insects (dragonflies that behave like migrating birds; monarch butterflies that depart each spring from high-altitude fir forests in Michoacán, Mexico, to start a multigenerational annual cycle of movement across North America; and now-extinct Rocky Mountain locusts that once moved in swarms of millions), terrestrial mammals (wildebeest of the Serengeti, springbok of South Africa, white-eared kob of Sudan, and bison and pronghorn of North America), sea mammals (right whale in the Atlantic and gray whale in the Pacific), sea turtles, and fish (Atlantic and Pacific salmon).

For each case, Wilcove takes us into the field to meet the animals (or to the scene of now-extinct migrations), often in company with researchers conducting exciting projects. Migration studies are currently in a phase of dynamic development, with novel tracking, physiological, and molecular techniques (*2*). In addition, the author provides fascinating stories of the animals' natural history, glimpses of recent scientific discoveries about migration performance and navigation mechanisms, and historical sketches. He also describes population trends and describes the threats and conservation efforts. These strands are skillfully woven together, making his comprehensive perspective on animal travelers a delight to read.

Some of the migrants' predicaments stem from the complexity in seasonally and spatially shifting uses of resources. Increased specialization often goes hand in hand with increased vulnerability. However, the picture is not altogether dark. Some migratory populations, such as the gray whale, have shown encouraging recoveries. In recent decades, reduced persecution and the banning of toxins have led to the comeback of many birds of prey, including both short- and long-distance migrants. Changing their migration routes to exploit new resources provided by farming, some populations of geese and cranes have dramatically expanded. Their opportunistic flexibility is facilitated by learning; knowledge of migration routes is transferred between generations that travel together in families or mixed flocks (*3*). For still other species, migration may promote range expansion, leading to the establishment of new travel routes and the colonization of new breeding destinations. I would have appreciated more discussion of factors that differ between declining and expanding migratory populations. How important in this respect are cultural versus genetic evolution of migratory routes, short versus long migration distances, and levels of complexity in the annual cycle and habitat requirements?

Absorbing and thought provoking, *No Way Home* deserves to be widely read and used to promote conservation action. It illustrates the importance of science for deepening our appreciation of animal migrations and for guiding our efforts to preserve them. There is no conflict between scientific exploration of migratory mechanisms and connectivity and aesthetic marveling at the superb arrangements of nature. The investigation of animal migration is a major challenge in biology, more fascinating and urgent than ever. Wilcove urges us to proactively protect threatened migration systems while the migrants are still abundant.

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