by Paul Hess

# House Sparrows Across the Sea

In concern for House Sparrows, the United States and Great Britain are a philosophical ocean apart. American birders typically view them as ne'er-do-wells in downtown gutters, alien party-crashers at feeders, and usurpers of native birds' nest cavities, worth little except to lift a day's 99-species list to an even hundred. American ornithologists have been especially harsh, as when Arthur Cleveland Bent recommended in *Life Histories of North American Birds*, "A long trench can be baited with grain, and, after the birds have learned to feed there, a large number can be killed by a raking shot."

The widespread and familiar **House Sparrow** is a species in decline. Population losses in the U. K. have aroused considerable concern, but relatively little attention has been paid to the fact that numbers are dropping in North America, too. *United Kingdom; February 2003. © Dave Tipling / VIREO.*

What a contrast is British sentiment! The House Sparrow is considered "our plump little town friend" by *The Illustrated London News*, "our cheery neighbour" by the Royal Society for the Protection of Birds, and "this treasured bird ... a much loved part of British life" by the government's Minister for Nature Conservation. As in other parts of Europe, the treasure is dwindling in Britain, where a gloomy report of severe declines appeared in 2005. Numbers have fallen by 60 percent in urban and suburban areas and by 47 percent in rural areas since the mid-1970s, according to Robert A. Robinson, Gavin M. Siriwardena, and Humphrey Q. P. Crick (*Ibis* 147:552–562). Based on data from three nationwide monitoring projects, they estimated Britain's present population at 13 million. "Missing! Ten Million House Sparrows," the British Trust for Ornithology exclaimed on its web site <www.bto.org>.

Two-thirds of this population is associated with human habitats and the rest with open farmlands, Robinson and his colleagues said. Losses on farms are generally blamed on more-efficient planting and tighter storage containment, which reduce the availability of weed seeds and spilled cereal grains, and on increased pesticide use, which reduces invertebrates essential for feeding young. Declines in urban and suburban areas are harder to explain. Studies have implicated cleaner streets, better-tended gardens, pesticides, modern buildings with no cavities for nests, toxins from unleaded gasoline, proliferating cats, avian predators such as Eurasian Sparrowhawks (*Accipiter nisus*), and even electromagnetic waves from telecommunication towers. "Hard evidence to support any of these is lacking," J. Denis Summers-Smith, a prominent expert in House Sparrow biology, remarked in 2003 (*British Birds* 96:304–307).

Hence, urgent calls for more research. A national newspaper has offered £5,000 to the first person who explains the decline. The government is funding a "Save the House Sparrow Initiative". Bird protection groups are appealing to the public for money to support further study. As of October 2005, the British Trust for Ornithology had received £96,774—some of it from sales of *Spud Finds a Home*, a book for children ages 2–6, which tells of Spud the Sparrow's hunt for a place to nest. Few stones, it seems, are left unturned.

Can you imagine such urgency in North America, where the House Sparrow is comparably declining? Breeding Bird Survey numbers are down 60 percent in the U. S. and 40 percent in Canada since 1980. Christmas Bird Count averages of birds per party-hour fell 45 percent in the U. S. and 35 percent in Canada between the 1980–1984 and 2000–2004 periods. Here, because the minus for House Sparrows is seen as a plus for native species, the Cornell Laboratory of Ornithology advises its Birdhouse Network how to deal with these usurpers: "We recommend that you deter them from nesting in your boxes, or remove them permanently from the area where you provide your nest boxes." Spud the Sparrow would shudder.

# Chickadee Hybrids in a Narrow Zone

Given experience with both species, birders can normally distinguish a Carolina Chickadee from a Black-capped

Chickadee in *nearly* all of the two species' respective ranges. Note the emphasis on *nearly*. Along a narrow geographic belt extending from Kansas to New Jersey, with a dip down the Appalachians, the distinction is not so straightforward. In many places it cannot be made at all, because most chickadees in the belt may be hybrids—even if they look like one or the other species. These centers of confusion are locations where the Carolina and Black-capped breeding ranges meet and where the two species interbreed freely in a well-studied hybrid zone. Bit by fascinating bit, researchers are attempting to answer fundamental questions: What governs the zone's location? How does it persist so narrowly, at some places only 12–15 miles wide? Why is it shifting northward, with the Carolina range expanding and the Black-capped range contracting? The answers have enormous ecological and evolutionary implications.

This chickadee, exhibiting plumage characteristics of Black-capped, sounded to the photographer like a Carolina. The bird was photographed in the contact zone between the two species, which is shifting northward for reasons that are not fully understood. *Pittsburgh, Pennsylvania; 27 November 2005. © Geoff Malosh.*

Research originating at Ohio State University in recent years has advanced understanding of the chickadees' genetic, ecological, and behavioral interactions in the zone. C. L. Bronson, Thomas C. Grubb, Jr., Gene D. Sattler, and Michael J. Braun examined genetic and geographic patterns in 29 chickadee pairs along a 14-mile transect across the zone in northern Ohio and announced the results in 2005 (*Auk* 122:759–772). They found a narrow trough of reduced reproductive success at the center of the zone—a location where genetic introgression between the parents was greater than at the ends of the transect where relatively "pure" parental species occurred. No trend was apparent in clutch size; instead, the trough involved lower hatching success. All nests with reproductive success less than 50 percent were found in an area extending only 3.5 miles along the middle of the transect. The lower success suggests that hybrids are at a selective disadvantage, and the geographic pattern of introgression points toward intrinsic genetic incompatibilities within hybrid pairs.

Could environmental factors across the zone have played a role, perhaps involving disadvantageous food availability, temperature, or precipitation? An experimental approach was necessary to remove environmental effects from the analysis. Bronson, Grubb, and Braun devised an innovative method of manipulation to remove environmental effects from the analysis, and they reported the results in 2003 (*Evolution* 57:630–637). The team transplanted chickadees of both parental species and hybrids into isolated woodlots within the zone—all, thus, in the same environment. Pure pairs of both species still had higher reproductive success than hybrid pairs, which demonstrated that intrinsic genetic incompatibilities are selecting against hybrids and maintaining the narrow zone. But why is the hybrid belt shifting northward? In an aviary experiment, Bronson, Grubb, Sattler, and Braun found an intriguing two-step pattern in male-male and female-male interactions: 1. Carolina males usually dominate Black-capped males. 2. Females of both species associate preferentially with dominant males. This apparent advantage for Carolinas might explain the gradual advance of their range limit, the authors suggested in 2003 (*Animal Behaviour* 65:489–500).

In an accompanying overview of past and current chickadee research, Robert L. Curry praised the Ohio studies as "a major contribution to the literature on both avian hybridization and parid biology" (*Auk* 122:747–758). Curry, who is directing studies at the hybrid zone in eastern Pennsylvania, emphasized that many unknowns remain. "That such a rich and important set of questions can be addressed through studies of abundant backyard birds underscores a fundamental fact of ornithology: There is always much to be learned about even our most familiar avian neighbors," he said.

# Island Scrub-Jay: A True Isolationist

When Henry W. Henshaw described what we now call the Island Scrub-Jay, he wrote in 1886, "The insular habitat of the bird would seem to preclude the possibility of intergradation with the mainland form..." (*Auk* 3:452–453). Henshaw could not have imagined how science would validate his assumption more than a century later. Genetic analyses reported by Kathleen S. Delaney and Robert K. Wayne in

2005 uncovered no signs of intergradation—not the slightest evidence of gene flow—between the scrub-jay on Santa Cruz Island and the Western Scrub-Jay, its mainland relative in the *Aphelocoma* genus (*Conservation Biology* 19:523–533).

Scrub-jays must be extraordinarily reluctant to fly over water. Although they are only 20 miles apart at the closest, no mainland individuals have been recorded on the island, or vice versa. If individuals of either species do travel across the water, they almost certainly do not interbreed with birds of the other species. Delaney and Wayne reached that conclusion after analyzing micro-satellite loci and mitochondrial DNA control-region sequences in Island and Western Scrub-Jays. Within the island sample they found exceedingly limited genetic diversity, which is a hallmark of small, isolated populations. More notably from a taxonomic standpoint, no mtDNA control-region haplotypes were shared by the island and the mainland birds—a pattern indicating an absence of gene flow between the populations not only at present but far into the past. The high level of mtDNA sequence divergence points to evolutionary separation of the two groups approximately 151,000 years ago, the authors said.

The genetic distance between the range-restricted **Island Scrub-Jay** and the widespread Western Scrub-Jay is considerable, indicating a long time since divergence of the two species and little if any gene flow since the time of their separation. *Santa Cruz Island, California; October 2004. © Joe Fuhrman.*

In light of their results, Delaney and Wayne urged that the Island Scrub-Jay be given high priority for conservation management. They noted that birds restricted to small islands are especially vulnerable to extinction by a great variety of specialized genetic and ecological problems that might not threaten species with widespread mainland populations. For those reasons, Partners in Flight ranks the Island Scrub-Jay as a "Watch List" species, PIF's highest-priority category for conservation. The concern is based on its small population size (7,000–9,000 by most estimates) and its extremely limited range (96-square-mile Santa Cruz Island but nowhere else in the Channel Islands, not even Santa Rosa Island just three miles away). The species does not, however, have federal or state status as endangered or threatened.

Despite that lack of special status, an important factor favors the species: Santa Cruz is part of the Channel Islands National Park and is no longer open to habitat destruction for profit. The Nature Conservancy owns 76 percent of the island, and the National Park Service owns the rest. Their conservation efforts have focused on restoring native flora in habitats severely damaged by feral pigs and sheep, and on managing the endangered island fox. Jonathan L. Atwood and Charles T. Collins rejoiced in 1997 that many areas of the island were "undergoing dramatic recovery" (*Birding* 29:476–485). Atwood and Collins saw no obvious threats facing the Island Scrub-Jay at that time, but they concluded that further research would be necessary to evaluate the population's long-term viability. As of 2006, it is viable enough to maintain Santa Cruz Island as a must-see birding destination.

## Arctic Seabirds Carry Pollutants

Some Arctic seabirds have a pernicious biochemical dark side, which concerned researchers are currently illuminating. The birds ingest pollutants in their oceanic diet and then contaminate lakes and ponds near their breeding areas with toxic guano. Two recent studies show similar patterns of contamination on remote Nearctic and Palearctic islands.

Northern Fulmars are the unwitting culprits on Devon Island in the Canadian Arctic, according to Jules M. Blais and six coauthors in 2005 (*Science* 309:445). In pond sediments below cliffs that house 10,000 breeding pairs of fulmars, the authors found elevated concentrations of hexachlorobenzene (HCB), DDT and its derivatives, and other organochlorine compounds—as well as worrisomely high levels of mercury. Concentrations of these chemicals are magnified as they proceed upward through the food chain from zooplankton, through squid and fish, and finally to feeders such as fulmars at the top.

Fulmars' role in the contamination was deduced from differing ratios of two stable nitrogen isotopes in ponds across a gradient of decreasing fulmar activity and ponds entirely away from seabird populations. Seabirds accumulate more nitrogen-15 from their food relative to nitrogen-14 from atmospheric and terrestrial sources. The researchers found significantly higher proportions of the heavy isotope in ponds with greater fulmar presence and, thus, more guano. In turn, ratios of the two isotopes correlated positively with levels of the contaminants, pointing to guano as the contaminants' source. At ponds used most heavily by fulmars, concentrations of HCB were 10 times higher, of mercury 25 times higher, and of DDT and its metabolites 60 times higher than at ponds outside the birds' influence. Mercury at three ponds most affected by guano approached or exceeded Canada's environmental quality guidelines for protecting wildlife. "[T]he combined effects of biomagnification and biological transport of contaminants dwarf the amount transported from atmospheric pathways," the authors said.

Ecologists are still discovering the ways in which top predators have surprising and significant effects on ecosystem processes. Recent work on the **Northern Fulmar**, for example, shows that the species bioaccumulates pollutants and then releases them into the environment—via guano—far from the birds' marine feeding grounds. *Santee Island, Ireland; May 2003. © Peter LaTourrette.*

Anita Evenset and six colleagues found evidence of similarly hazardous transport by several other arctic seabird species on remote Bear Island in the Barents Sea between Spitzbergen and the mainland of Norway. They reported in 2004 that concentrations of contaminants in sediments and organisms differed dramatically between two lakes on the island, which these researchers also attributed to guano, based on different proportions of nitrogen-15 (*Science of the Total Environment* 318:125–141). At a lake located near a large breeding colony of Dovekies and used by large flocks of Black-legged Kittiwakes and Glaucous Gulls, levels of persistent organic pollutants were much higher than levels at the other lake, where seabird activity was limited. For example, concentrations of PCBs were 14 times greater and the level of a persistent DDE derivative of DDT was 13 times greater at the heavily used lake. Notably higher concentrations were present at that lake in zooplankton, chironomids (midges), and arctic char (a fish highly prized by many seafood lovers). In fact, levels of PCBs and DDE in the muscle tissue of char were among the highest ever reported from remote arctic regions, according to Evenset and her colleagues. These birds we love to see and these fish we love to eat are linked in a most unwholesome way.