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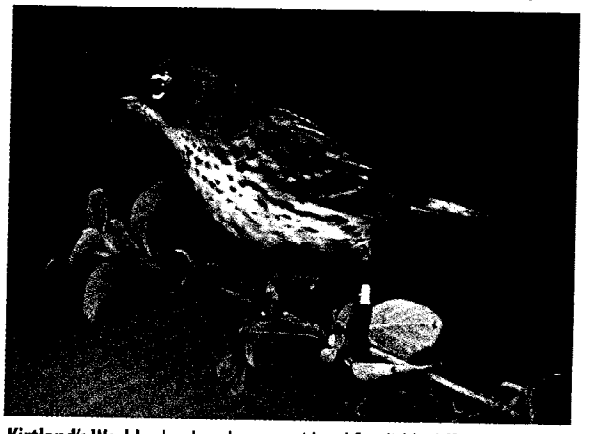
hours when the sun was low in the sky" (*Wilson Bulletin* 88:500–503). Whether it is seen or not, the show will go on, but perhaps only if Shorebird Plan partners succeed in their conservation mission.

Kirtland's Warbler Winter Ecology

Many attempts to study wintering Kirtland's Warblers in the Bahamas have been studies in frustration because the birds have been so difficult to find. Josselyn Van Tyne and Harold Mayfield, the foremost scholars of Kirtland's Warbler breeding biology, searched for 59 days without seeing one. James Bond, a leading expert on birds of the West Indies, encountered only one in 100 days of trying. John T. Emlen, the author of an important monograph on Bahamian landbirds, saw none in 500 hours of effort. Unsuccessful until her third trip to the islands, Mary Clench of the Carnegie Museum in Pittsburgh wrote with palpable joy in the Audubon Society of Western Pennsylvania *Bulletin* in June 1978: "After years of searching the length and breadth of the Bahamas in winter, I was finally looking at a Kirtland's Warbler."

Imagine, then, a research team's exhilaration after finding 60 Kirtland's Warblers at 15 locations on Eleuthera Island during the winter of 2003–2004. This count was not merely unprecedented; it was equivalent to nearly one-third of the entire total of reports from the Bahamas between 1879, when Charles B. Cory collected the first specimen, and 1997, when all accessible historical records were compiled by J. Christopher Haney, David S. Lee, and Martha Walsh-McGehee (*Condor* 100:201–217). Many of the unsuccessful attempts were made as the Kirtland's Warbler was approaching extinction and very few birds were present on the islands. The search is easier now, because the population has increased substantially, but the discoveries are no less significant.



Kirtland's Warbler has long been considered fiendishly difficult to find on its wintering grounds in the Bahamas. But a recent mistnetting-and-banding study, funded in part by the U.S. Forest Service and conducted by a research team that includes Bahamian students, has been highly successful. Since 2002, the team has banded 50 Kirtland's Warblers on the island of Eleuthera alone. *Eleuthera Island, Bahamas; April 2004. © Dave Currie.*

The team, which included two student trainees, was part of the Kirtland's Warbler Training and Research Project, a cooperative venture by the Bahamian and U.S. governments, the College of the Bahamas, the Ornithology Group of the Bahamas National Trust, and The Nature Conservancy. Three leaders, Eric Carey, Joseph M. Wunderle, Jr., and David N. Ewert, explained the team's goals in 2004 (*Journal of Caribbean Ornithology* 17:81–85). In contrast to intensive conservation management on Kirtland's Warbler breeding grounds in Michigan, no such activities had been con-

ducted on the wintering grounds in the Bahamas. The project was designed to study the winter distribution and ecology of this endangered species, as well as the year-round ecology of poorly-studied Bahamian endemics, and to teach Bahamian citizens how to manage all the birds' habitats. "Unfortunately," Carey and his colleagues wrote, "the Bahamas, as well as many other island territories of the Caribbean, lacks citizens who are trained in natural resources management or other closely related fields." With a grant from the U.S. Forest Service, the project began in 2002 when two biology students at the College of the Bahamas were trained in field research methods. By the 2004–2005 winter, five students had participated. "The project is building Bahamian biologists," Field Director Dave Currie said (personal communication).

The research team has banded more than 50 Kirtland's Warblers on Eleuthera since 2002, including six at a site initially discovered by the Ornithology Group of the Bahamas National Trust. Many of the banded birds have returned to the same territories in subsequent winters. One banded on the Michigan breeding grounds in 1995 was back on the island in the fall of 2004—at least nine years old and after more than 25,000 miles of migrations. To develop effective conservation efforts, the researchers must learn what ecological features make the sites on Eleuthera so attractive. Currie said the project will continue to add knowledge of Kirtland's winter habitat requirements, increase emphasis on studies of endemic Bahamian species, and train more students in field techniques. Fifty-six years since Van Tyne's and Mayfield's frustration, a new era of Kirtland's Warbler research is flourishing.

Gloger's Rule posits that populations of birds (and other organisms) tend to be darker in humid environments and paler in arid climes. For example, the *lilianae* subspecies of **Eastern Meadowlark** in the Desert Southwest is notably paler than populations of this species in less-arid climates. What is the mechanistic basis of the pattern known as Gloger's Rule? A recent study indicates that feather-degrading bacteria, which are more abundant in humid environments, are thwarted by darker, more-melanized pigments. *Sierra Vista, Arizona; February 2003. © Rick & Nora Bowers.*

Gloger's Rule Revisited

German zoologist Constantin Lambert Gloger's name is forever linked to an ecological pattern of plumage variation that he described in 1833. "Gloger's Rule" is the tendency within a species for populations in regions of high relative humidity to be more heavily pigmented than populations of the same species in regions of low relative humidity. The phenomenon is conspicuous in many avian families. Robert M. Zink and J. V. Remsen, Jr., examined studies of 52 North American species and concluded in 1986 that 50 of those species supported the rule (*Current Ornithology* 4:1–69). Among familiar examples are darkly-colored subspecies of the humid Pacific Northwest such as the "Black" Merlin (*suckleyi*) and the "Sooty" Fox Sparrow group (*unalaschcensis* and closely related races). Well-known pale races of the dry Southwest include "Desert" (*saltonis*) Song Sparrow and "Lilian's" (*lilianae*) Eastern Meadowlark. The tendency does not refer only to those populations classified as subspecies; for example, unnamed House Sparrow populations in the Pacific Northwest are darker than those elsewhere on the continent, as Richard F. Johnston and Robert K. Selander reported in 1971 (*Evolution* 25:1–28). Nor is Gloger's Rule applicable only to birds; mammals, land snails, and many insect taxa show the same tendency.

A common pattern across diverse phyla leads to the question, Why? What adaptive values might such variation offer? The late evolutionary biologist Ernst Mayr was baffled in 1963 when he wrote in *Animal Species and Evolution*, "The precise selective factors responsible for Gloger's Rule are still a mystery." Various adaptive factors have been proposed—none of them mutually exclusive. Perhaps the value is cryptic background-matching of darker plumage in dark, humid forests and paler plumage in bright, dry deserts. Perhaps different advantages in thermoregulation are afforded by dark plumage in shaded, wet environments and by pale plumage in sunny, arid surroundings. Or, as more recent research has suggested, perhaps feather-degrading bacteria are an agent of natural selection for dark, melanin-based plumage. Edward H. Burtt, Jr., and Jann M. Ichida took a step toward this hypothesis in 1999 after discovering feather-degrading bacteria in the plumage of living, wild birds (*Auk* 116:364–372). Without yet making a connection to Gloger's Rule, they wondered how seriously birds might be affected by bacterial damage to the feathers.

By 2004, evidence for a bacterial role in Gloger's Rule began to emerge from the laboratories of Ohio Wesleyan University. Using domestic chicken feathers, Gerald Goldstein