by Paul Hess

Tracking Hawks' Migration Patterns

Three generations of techniques—stable isotope analysis, satellite telemetry, and banding recoveries—led to reports in 2003 that revealed many facets of Sharp-shinned Hawk and Broad-winged Hawk migration. Ruth B. Smith, Timothy D. Meehan, and Blair O. Wolf looked at stable hydrogen isotopes and leg bands to study movements of immature Sharp-shins (*Journal of Avian Biology* 34:387–392), and Aaron M. Haines and five coauthors used satellite telemetry to track individual Broad-wings' entire, long-distance migrations for the first time (*Wilson Bulletin* 115:166–169).

Smith's team sought to learn whether hatching-year Sharp-shinned Hawks migrate to their wintering grounds in a "leapfrog" or a "chain" pattern. In leapfrog migration, breeding populations from high latitudes winter farther south than populations from lower latitudes. In chain migration, northern and southern breeding populations maintain the same geographic order in their winter ranges. The researchers captured Sharp-shinned Hawks migrating through New Mexico and determined by analyzing stable hydrogen isotope values in their feathers whether individual hawks had hatched at relatively northern or southern latitudes. [For an excellent introduction to this remarkable new method, see Bruce A. Robertson's "Stable isotope analysis: Forging new links in bird migration" in the April 2004 issue of *Birding* (36:142–145).] Combining the isotopic information with banding data from the breeding and wintering grounds, Smith and her associates confirmed that hawks from populations south of Canada migrated through interior North America earlier and wintered farther south than those from more-northern populations. Thus, the Sharp-shinned Hawks migrated in a chain pattern. Learning the temporal and spatial pattern could have valuable implications for conservation. For example, the ability to monitor trends of early and late migrants separately might show whether a decrease in numbers involves the entire species or only the northern or southern populations. In the latter case, conservation efforts could be aimed more efficiently at just the one declining population.

Via satellite telemetry, Haines and his colleagues tracked individual Broad-winged Hawks for many months and thousands of miles from where their transmitters were attached on the breeding grounds. Within a defined degree of accuracy, the scientists could follow every zig and zag in a bird's route, learn where it stopped on its journey and for how long, where its migration ended, how it moved around its winter territory, and—with telemetric luck—track it long enough to watch the return trip. Ospreys, Swainson's Hawks, and Peregrine Falcons had been monitored previously by satellite, but this study was the first for Broad-wings.

The team fitted five adult females with radio tags at nesting locations in north-central Minnesota and western Maryland in spring 2000, and then tracked four of them along their entire fall migration routes. The fifth was out of contact until the next spring when she was halfway through her migration back to Minnesota. Departing in September 2000, the four others took this species' expected path, converging in Texas, following the Gulf Coast into Mexico, passing over the famous hawkwatch in Veracruz, and taking an inland course through Central America. Then the findings became more interesting. One bird soon stopped and wintered in Panama. The other three continued to Colombia, where one turned east to winter in Venezuela and two continued south past the equator to winter in southwestern Brazil and southern Peru. Their migration distances ranged between 5,625 kilometers to Panama and 7,770 kilometers to Peru. Rates of travel measured for three of the hawks ranged from 85 to 125 kilometers per day, averaging approximately 100, and the birds reached their win-

Although it is well known that Broad-winged Hawks breeding in eastern North America winter well to the south of the ABA Area, the actual particulars of long-distance movements of individual birds have been hard to pin down. A recent satellite telemetry study, however, has provided a detailed accounting of the migratory trajectories of individual Broad-wings. *Duluth, Minnesota; September 1999. © Brian Wheeler.*

For several decades, researchers have been concerned by steep declines in the populations of several shorebird species that concentrate in the Delaware Bay in late May and early June of each year. A new study of the *rufa* subspecies of the Red Knot confirms the decline and even points to an acceleration in the rate of population loss. *Delaware Bay shore, New Jersey; May 2001.*

tering areas between 15 October and 15 December.

Because of radio failures, only one bird could be tracked completely during its spring migration northward. She flew 7,868 kilometers in 74 days from Peru to Maryland, where she arrived on 22 May after a 15,638-kilometer roundtrip (about 9,700 miles) at the same nesting location from which she had departed eight months before. To have a virtual view of a Broad-wing's route for such a great distance and such a long time seems miraculous to the many of us who began watching hawks when the earth's only satellite was the moon.

Red Knot Numbers Fall

The eastern North American subspecies of the Red Knot (*Calidris canutus rufa*) is in big trouble. A worrisome decline has been publicized widely in recent years, usually in the context of a disappearing food supply at spring migrants' vital refueling stop in Delaware Bay. Grim new data from the subspecies' main wintering areas in South America confirm the severity of the knots' population loss. R.I. Guy Morrison, R. Kenyon Ross, and Lawrence J. Niles reported their findings in 2004 (*Condor* 106:60–70) after conducting aerial surveys along the coasts of Patagonia and Tierra del Fuego in Argentina and Chile from 2000 to 2003. The team found a sharp decrease in numbers of wintering knots during that mere four-year period—evidence of an accelerating decline.

Offering a hemispheric perspective, Morrison and his associates pointed to various studies that had estimated the total population of *rufa* at 100,000–150,000 until about 1990 and only 80,000 by the late 1990s. The team's recent surveys in South America, as well as banding studies by other researchers, indicate that the population might now be as low as 35,000–40,000.

Knots wintering on the coasts of Tierra del Fuego and Patagonia represented a large proportion of the decrease. Research in 1982–1985 had produced annual estimates of approximately 67,500 birds in that region, but the Morrison team found drastically reduced numbers. Counts decreased 24 percent to 51,255 birds during the fifteen-year period to 2000, and then plunged another 40 percent to 30,475 between 2000 and 2003. Overall, more than half the population of knots wintering in those areas had disappeared in two decades. The counts likely reflected real losses, Morrison and his associates said, and not redistribution of the wintering population to other areas or biases created by survey methods.

Meanwhile, the authors cited research showing a crash in numbers at Delaware Bay from more than 100,000 in the mid-1980s to fewer than 10,000 in 2003 (K.E. Clark et al. 1993, *Condor* 95:694–705; L.J. Niles, unpublished data). The bay shores in Delaware and New Jersey are the knots' most important stopover site during their spring journey nearly from pole to pole. The subspecies' collapse has been linked to commercial overharvest of the bay's horseshoe crabs, which are valued as fishing bait. The crabs' eggs are a critical source of fuel for the knots to complete their journey north and to maintain the necessary body condition for breeding. The authors also cited unpublished data by A.J. Baker and others, showing that increasing proportions of knots have been unable to achieve the weight levels required for those two needs and that annual survival of adult knots declined from 87 percent to 55 percent between the mid- and late 1990s. Morrison, Ross, and Niles concluded ominously that projected population trends using the latter figure are consistent with the trend observed in Tierra del Fuego, "demonstrating that the increased annual mortality could lead directly to the observed 50% decrease in the population, and implying that the population could become extinct or nearly so by 2010 if survival remains at the depressed level."

The first prospect for hope came in 2001, when the National Marine Fisheries Service banned all fishing for horseshoe crabs within a zone of federal waters at the mouth of Delaware Bay. In 2003, New Jersey and Delaware enacted rigorous state restrictions on the crab harvest. In March 2004 the Atlantic States Marine Fisheries Commission adopted significantly lower limits on the harvest in Delaware, Maryland, New Jersey, and New York. The Commission also placed special restrictions on

the harvest in Delaware and New Jersey between 1 May and 7 June each year to increase the number of spawning crabs available during the shorebirds' stopover period. The New Jersey Audubon Society considers the new rules "important, but not sufficient, steps toward saving the shorebirds." The Society advocates a total moratorium on crab harvesting in Delaware Bay until completion of a sound management plan. Future efforts will include seeking federal listing of the *rufa* subspecies as endangered, according to Eric Stiles (personal communication), the society's vice president for conservation.

Orchard Oriole Split Suggested

A new oriole species with two records in the United States appeared in the online supplement <www.ibispub.com/updates.html> to James F. Clements's *Birds of the World: A Checklist* in December 2003. It is Fuertes's Oriole (*Icterus fuertesi*), a Mexican population, which the American Ornithologists' Union currently classifies as a subspecies of the Orchard Oriole (*I. spurius*). Clements added *fuertesi* to his list after Jason M. Baker and four colleagues had suggested in July 2003 that it warranted status as a separate species based on genetic and other distinctions (*Auk* 120:848–859).

Fuertes's Oriole is an interesting bird. The adult male is a copy of our familiar Orchard Oriole in North America, with one conspicuous exception: Where the plumage of *spurius* is chestnut, *fuertesi* is pale ochre (hence its alternate name Ochre Oriole). Other notable differences have been described in juvenal plumage and in song features, although females and first-basic alternate males of the two races are reported to be indistinguishable. In contrast to the widespread breeding range, long-distance migration, and extensive geographic winter range of *spurius*, the breeding grounds of *fuertesi* are restricted to Mexico's east coast from southern Tamaulipas to southern Veracruz, and it migrates only a short distance to similarly limited wintering grounds on the Pacific slope of Mexico from Guerrero to Chiapas. In contrast to our usual image of Orchard Oriole as a habitat generalist, Fuertes's Oriole is a habitat specialist whose typical breeding environment is shrubby coastal dunes.

Baker and his colleagues compared variation in the mitochondrial cytochrome-*b* gene and a mitochondrial control region. They found that the average genetic distance between *spurius* and *fuertesi* for both DNA segments was, in their word, "tiny"—only slightly greater than the average distances within each subspecies. Further, the data showed genetic intermixing between the two taxa, strongly suggesting that the two are not reciprocally monophyletic (i.e., they do not represent mutually exclusive evolutionary ancestries). Thus, recommending a split of the Orchard Oriole was not a clear-cut call. On the other hand, some gene frequencies differed significantly between the two groups, strongly suggesting little or no current gene flow between them. This pattern would be consistent with their disjunct breeding ranges, which approach closely in the states of Hidalgo and Veracruz but do not meet. In the authors' view, the two populations are "diagnosably distinct" in their breeding ranges and adult male plumage coloration, meaning that every individual can be assigned to one population or the other by those attributes, and the minimal genetic distance could indicate simply that their divergence was quite recent.

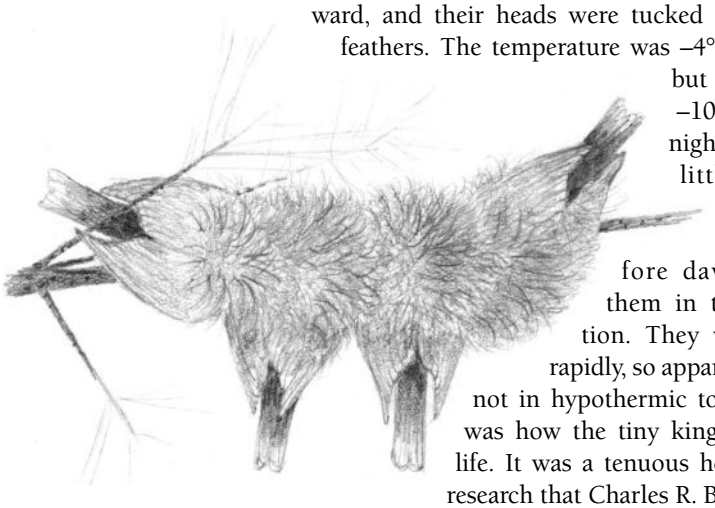
Shown here is a typical adult female Orchard Oriole. Or is it? Females of the Mexican race *fuertesi* are reported to be indistinguishable from those of the North American nominate subspecies. The *fuertesi* race, which has vagrated to Texas on at least two occasions, has been treated as a separate species by some authorities. *Cameron County, Texas; April 2001. © Brian Small.*

The only accepted records of Fuertes's Oriole north of Mexico are of two adult males in Cameron County at the southernmost tip of Texas. One was collected at Brownsville in April 1894 (R.W. Dickerman 1964, *Auk* 81:433), and the other maintained a territory for two summers near Arroyo City east of Harlingen in 1998 and 1999 (Mark Lockwood, personal communication). The Texas Bird Records Committee lists *fuertesi* as a recognizable subspecies that would qualify for the state list should it be elevated to species rank by the AOU, a step that has not been advocated in recent years by the AOU Check-list committee (J.L. Dunn, personal communication).

Golden-crowned Kinglets Huddle

Without a word about why he was up there, the polymath biologist Bernd Heinrich prefaced a discovery of Golden-crowned Kinglet behavior as follows: "On 25 November 2002, I saw three kinglets while I was perched about 12 m up in a spruce (*Picea* sp.) tree." Shortly after sunset from the perch outside his cabin in western Maine, he saw the first case to be documented of kinglets huddling together on an open branch at night for precious warmth. Heinrich described the event and a similar huddle that he saw a month later in a short, fact-filled article in 2003 (*Wilson Bulletin* 115:113–114).

In the second occurrence, at twilight on 27 December, he saw three kinglets fly into a pine tree and shortly found four of them huddled together about four meters above the ground. Their chests were pointed inward, their tails were pointed outward, and their heads were tucked into their back feathers. The temperature was –4° C at that time but fell to a low of –10° C during the night. Checking the little group later that evening and shortly before dawn, he found them in the same position. They were breathing rapidly, so apparently they were not in hypothermic torpor. Huddling was how the tiny kinglets hung onto life. It was a tenuous hold, judging by research that Charles R. Blem and John F. Pagels had reported in 1984 (*Condor* 86:491–492). Their metabolic calculations led them to doubt that Golden-crowned Kinglets' fat reserves could sustain such tiny birds in winter without energy-saving hypothermia.



It weighs less than a quarter-ounce, it is an obligate insectivore, and it winters successfully in the brutal cold and dark of Maine's interior conifer forests. How does the Golden-crowned Kinglet survive the winter? A recently documented adaptation, shown here in discoverer Bernd Heinrich's sketch, involves huddling by multiple individuals. © *Bernd Heinrich.*

Heinrich noted that kinglets forage uninterruptedly all day, feeding mainly on hibernating caterpillars, to build the reserves necessary to survive through nights as long as 16 hours in temperatures that may fall below –40° C across the boreal forests where they winter. His amazement at such a feat is especially meaningful because he happens to be an eminent expert on animal thermoregulation (primarily in insects). In fact, Heinrich gives Golden-crowned Kinglets a prominent role in his book *Winter World: The Ingenuity of Animal Survival* published in 2003: "When I'm in the warmth of my cabin and hear gusts of wind outside that moan through the woods and shake the cabin on wintry nights, I will continue to marvel at and wonder how the little featherpuffs are faring. They defy the odds and the laws of physics, and prove that the fabulous is possible."