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## Birds Fly More Than 7,000 Miles Nonstop, Study Shows

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In Its Annual Fall Migration, One Godwit Traveled From Alaska to New Zealand in Eight Days

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Wednesday, October 22, 2008; A09

The bar-tailed godwit, a plump shorebird with a recurved bill, has blown the record for nonstop, muscle-powered flight right out of the sky.

A study being published today reports that godwits can fly as many as 7,242 miles without stopping in their annual fall migration from Alaska to New Zealand. The previous record, set by eastern curlews, was a 4,000-mile trip from eastern Australia to [China](#).

The birds flew for five to nine days without rest, a few landing on South Pacific islands before resuming their trips, which were monitored by satellite in 2006 and 2007.

As a feat of sustained exercise unrelieved by sleeping, eating or drinking, the godwit's migration appears to be without precedent in the annals of vertebrate physiology.

"The human species doesn't work at these levels. So you just have to sit back in awe of it all," said Robert E. Gill Jr., a biologist with the [U.S. Geological Survey](#), who headed the study.

The birds were expending energy at eight-to-10 times the rate they do at rest. The previous record for a boost in energy output is seven times the "basal metabolic rate." Peak output in human beings, achieved by Tour de [France](#) bicyclists, is a sixfold increase.

"What this suggests to me is that we haven't yet mined the depths, we really don't know what the extremes are," said Kimberly A. Hammond, a physiological ecologist at the [University of California at Riverside](#) not involved in the research.

As astounding as the feat is the fact that it represents a highly evolved solution to a problem, not a fluke or one-time occurrence.

The nonstop, over-water route is free of predators and substantially shorter than a hopscotching route down the eastern coast of Asia, which is the alternative. Landing and eating -- literally, refueling -- would expose the birds to disease and parasites when they are probably somewhat immune-suppressed. Refueling also would add weeks to the trip and itself take energy.

All in all, flying nonstop across most of the north-south span of the [Pacific Ocean](#) is the safest thing to do.

The death rate during the migration is unknown but presumably low, as the population of bar-tailed

godwits, estimated at 100,000, has been stable and long-lasting.

"This system would not have perpetuated itself if mortality were a big problem," said Gill, whose study is being published today in *Proceedings B*, a journal of [The Royal Society](#), in England.

Gill and his colleagues outfitted 23 bar-tailed godwits with satellite transmitters that periodically sent a signal detected by a satellite.

Female godwits are substantially larger than males. A one-ounce, battery-powered device was surgically implanted in them, with the antennas exiting their bodies just beneath the tail. The smaller males got a solar-powered device weighing less than half an ounce strapped to their backs.

Nine of the transmitters functioned well enough on the southward flight to provide evidence of sustained, nonstop flight.

One female flew directly from the Yukon-Kuskokwim Delta of Alaska to New Zealand in eight days. Other birds either landed short of their destination in the Solomon Islands and Papua New Guinea, or the signal was lost near those places. Four were later identified in New Zealand by leg bands.

The birds weigh no more than 1.5 pounds when they leave. Half of that is fat, which they burn off completely during the flight. Some of the males may have lost their transmitters in flight as their bodies shrank.

The starting and stopping places are not chosen by chance. The Kuskokwim Delta is rich in food supply, which the birds must consume in prodigious quantities before leaving. The wintering site in New Zealand is largely free of predators. When the birds arrive in early October, they molt almost immediately.

The birds leave from late August to late September, departing only with favorable tail winds. How much of their journey is wind-aided is something the researchers hope to determine by overlaying the birds' routes with day-by-day meteorological data.

A major mystery is how high the birds fly. Gill said that since word of his research has spread, researchers on boats in the Pacific have told him of seeing godwits 3,000 feet high and "smoking by at deck level."

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