World traveling godwits keep a strict schedule

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A bar-tailed godwit with leg-mounted geo-locator at the Manawatu River estuary.

New research has shown bar-tailed godwits are hard-wired to keep to tight schedules for their extraordinary annual 30,000km return journey between New Zealand and Alaska.

A study by PhD ecology candidate Jesse Conklin, published this week in the international on-line science journal Nature Communications, is the first to use small, light-sensitive geo-locators to track shorebirds from non-breeding grounds to breeding sites in the opposite hemisphere.

Mr. Conklin was able to link the departure of 16 godwits from a single New Zealand estuary with breeding locations scattered across 1800km of Alaskan tundra and the precise timing of their return six months later. He says differences in departure and arrival times among birds are directly linked to the location of breeding sites.

His study showed godwits that departed New Zealand first were also first to arrive back - a finding he says is remarkable given that the godwits span out across 59-71° north latitude and may experience very different conditions and breeding success. "We knew that a given breeding site might have a narrow optimal arrival window to ensure breeding success, but this shows that even southbound migration is tightly-scheduled," he says.

The study strongly indicates the migratory birds' rigid timing is hard-wired, because they time their migration perfectly to arrive in Alaska just as melting snow makes their nest sites available - "an event that could hardly be predicted by cues available to godwits in New Zealand nearly two months previously".

The two-year project involved capturing birds from a small population of 200-280 godwits at the Manawatu River estuary in Foxton, and attaching leg-mounted, light-sensitive geo-locators before they departed in March and early April. The geo-locators record sunrise and sunset, allowing calculation of a latitude and longitude for each day of a bird's journey - starting with a 10,000km stretch to the Yellow Sea coast of Korea and China, and then a 6000km flight to southwest Alaska. After dispersing to coastal tundra across west and north Alaska to breed, they again congregate in southwest Alaska to refuel for the astonishing non-stop return flight to New Zealand between late August and early October.

The study suggests a biological predisposition for an optimal breeding arrival date as the primary driver of variation in the migration schedule. "The latitude of an individual bird's breeding site - and, by extension, the approximate timing of snow melt from that patch of Alaskan tundra - could be traced back to the bird's departure 7-10 weeks earlier and more than half a world away," Mr Conklin writes in the paper.

"The departure of birds from New Zealand and Alaska (two events separated by six months and over 11,000km) in approximately the same order and span of days is quite surprising, in light of potential intervening variation caused by individual differences in flight speed, stopover duration, migration distance, duration of suitable breeding conditions, breeding success, body size, moult speed, foraging ability and habitat quality."

He says his findings also highlight the potential impact of climate change on migratory birds because changes in the timing of annual snow melt may cause a mismatch between the timing of migration and breeding, which have been delicately balanced through millennia of evolution.

More information: *Nature Communications* website: www.nature.com/ncomms/index.html

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