

In the October 2007 *Bulletin* there was an article entitled “The Longest Non-stop Migratory Flight in the World” which reported on a female Bar-tailed Godwit (E7) who flew non-stop 10,219 km in 7 days 13 hours from New Zealand to the Yellow Sea near the China-North Korea border on the way back to the breeding grounds in Alaska. This amazing feat was recorded via a satellite transmitter but, due to the size of the transmitter, this method only works for large shorebirds such as godwits which weigh 190-630g. Satellite transmitters are still too heavy for smaller waders.

The British Antarctic Survey (BAS) has long been using archival light level geolocators that record time-stamped periodic ambient light levels on large seabirds. They have recently been used in New Zealand on Bar-tailed Godwits using a leg-band mount, and in Sweden on Redshank using a harness mount. Locators have been developed down to only 1g and are small enough to be applied to migratory birds weighing as little as 50g. The main disadvantage of archival geolocators is that the birds must be recaptured and the devices removed to obtain the data collected which is not an easy task with a migratory shorebird.

With the advent of these new smaller geolocators, the Victorian Wader Study Group (VWSG) decided to commence trials on medium-sized waders. They selected Ruddy Turnstone because:

- a) relatively high recapture rates due to small populations (<100) present in limited locations and with birds exhibiting strong site fidelity;
- b) no information on where their breeding grounds were located;
- c) they are the most robust of the waders visiting Australia with fat-free birds weighing 90-100g which they can double prior to migration.

Initial trials with harness mounted dummy geolocators failed as the birds gained weight with some being so round that the problem was likened to trying to put a harness on a tennis ball. The harness simply slipped off. However trials with a dummy geocator glued and tied to the flap of a conventional leg flag proved successful and the tested birds appeared comfortable and walking normally.

The first geocator was deployed on a Ruddy Turnstone at Flinders on 8 April 2009, followed by five more on 21 April. All birds were adults and five of the six had been caught at Flinders previously. Three were males and three were females. Two more geolocators were put on birds caught at Carpenter Rocks, South Australia, on 23 April, both of which were retraps from that location.

All Ruddy Turnstones had left Flinders by early May and the first returned birds were seen on 11 September 2009. The first two birds carrying geolocators were seen on 18 October and three birds were present by the time of the first catching attempt with a cannon-net on 20 October. Only one of the birds carrying a geocator was caught on that occasion and a further four attempts were made over the following months until 8 January 2010 when three birds carrying geolocators were caught, making four in total, 3 males and a female, all of which had been fitted on 21 April. Their individual leg flag codes were ANB, ANC, APU (female) and 9Y.

Geocator data is used to calculate the date and time of dusk and dawn and, from this, the latitude and longitude of the geocator at the time of recording. Since the daily behaviour of Ruddy Turnstone is likely to include resting on one leg or feeding

amongst mounds of seaweed, this potentially creates variability on apparent shading to the light sensor and requires computer software to reject false and noisy transitions caused by the shading.

At the start of their northward migration all four turnstones made a non-stop flight of 7,600 km in six or seven days from Flinders to Taiwan, with one bird (9Y) leaving on 27 April and the other three 4 May. All birds followed similar, but not identical, paths towards the breeding grounds in northeast Siberia after staging in Taiwan for 8-17 days to refuel. The birds then made one to three stops of 3-8 days as they travelled north-north-east for a further 4,500-5,000 km across China and Korea to the north Sakhalin / Sea of Okhotsk / East Yakutia region in Siberia. The geolocators stopped registering useful data to determine location between 4-12 June as the birds encountered continuous daylight.

The geocator on 9Y started showing intermittent light and dark periods of around 7 hours per day from 26 June to 14 July, suggesting that nesting activity may have been occurring.

Locations were discernible from three of the four geolocators in late July or early August when night time darkness reappeared in the data. The fourth geocator (ANB) had apparently failed by that time and had stopped registering data. Both APU and ANC, which apparently nested near the Yakutia coast, moved to the southeast at the start of the southward migration and travelled via Korea and Vladivostok respectively on their way back through Asia to Flinders. Their geocator casings were damaged allowing sea water to enter so the geolocators stopped registering data at those two locations.

In contrast, 9Y moved through northeast Siberia to the Aleutian Islands off southwest Alaska in late July, remaining there until 15 October. It then flew non-stop for 6,200 km in four days to the Gilbert Islands (Kiribati) in the central western Pacific. It remained there for six weeks, departing 29 November to fly 5,000 km in four days to the coast of eastern Australia, arriving back at Flinders on 8 December. The round-trip migration totalled 27,000 km, rivalling E7's 29,000 km trip between Alaska and New Zealand. Calculation of speed shows that the bird is mostly flying at an average ground speed of 50-55 km/hour but the flight to the Gilbert Islands averaged 65 km/hour which suggests that the birds generally set off when they have a favourable tail wind.

9Y was given a new geocator in 2010 and the data shows that the bird substantially followed the same route again. This time, however, it stopped in the Marshall Islands (5,200 km) and Vanuatu before returning to Flinders. This is the first time a wader has been tracked with a geocator on its complete migration in successive years. Turnstones live up to 20 years and such a bird following this 27,000 km trans-Pacific route would have flown over 500,000 km in its lifetime!

#### References:

Minton, C., Gosbell, K., Johns, P., Christie, M., Fox, J.W. & Afanasyev, V. 2010 Initial results from light level geocator trials on Ruddy Turnstone *Arenaria interpres* reveal unexpected migration route. *Stilt* 57 (2010): 21-28

<http://www.awsg.org.au/pdfs/Ruddy-hell.pdf>

<http://www.awsg.org.au/pdfs/Turnstone-geolocator.pdf>