The Snowy Owl Satellite Telemetry Project

Norman Smith

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In a collaborative partnership between the Blue Hills Trailside Museum, the USGS Forest and Rangeland Ecosystem Center's (USGS-FRESC) Snake River Field Station in Idaho, and Boise State University, this ongoing study uses data collected via satellite telemetry to provide critical information on the physical health and elusive migration patterns of Snowy Owls wintering in Massachusetts.

Methods

In 1999 we learned two transmitter attachment methods from B. James Dayton, field biologist with the Center for Conservation Research and Technology, Baltimore MD. Both methods called for Teflon tubed ribbon, dental floss for stitching, and Superglue for curing the knots. The first method, as shown in Diagram 1, uses a piece of Teflon ribbon folded to create a two-part tunnel patch. This patch is placed on the

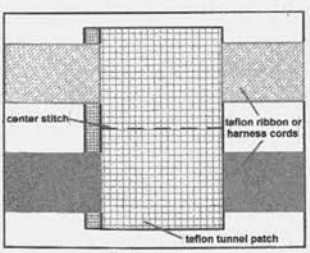


Diagram 1

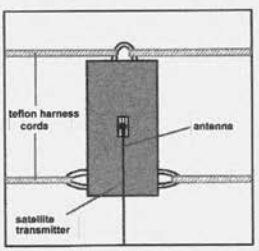


Diagram 2

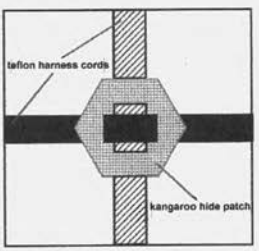


Diagram 3

**Diagram views are not actual size.*

breastbone of the bird, and the harness cords (Teflon ribbon) run through each side of the tunnel. The cords continue around the bird's body to meet in the back where the transmitter is placed. Diagram 2 shows how the Teflon is attached to the transmitter, which is placed on the back of the bird. The second method of attachment, as shown in Diagram 3, uses a pentagonal-shaped patch of kangaroo hide. Kangaroo hide was chosen for its durability. The patch is placed at the breastbone. The harness cords are woven through the patch, crossing in the middle. The rest of the attachment method is the same as previously discussed.

In choosing an attachment method, the comfort and well-being of the bird was the first and foremost consideration. Both methods were tried, and the one using the

kangaroo patch seemed to be the fastest and easiest method for us to apply. Dayton has used these methods on a variety of bird species.

First-Year Results

Snowy Owls usually arrive at Logan International Airport, Boston, in mid-November, and most leave by early April each year. During the five months these birds winter at Logan, we observed them, seeking good candidates for satellite tracking. A good Snowy Owl candidate is a healthy bird with an average to above average body weight and is a proficient hunter.

MIKE MCWADE

A 30 g satellite transmitter just attached to a Snowy Owl

During the first wintering season of this project (November 1999-April 2000), seven Snowy Owls were observed at Logan. Five of these seven were captured, banded, and color-marked. The first Snowy Owl was sighted on November 13, 1999. Visual observations were made during both day and evening hours using binoculars, spotting scope, and a night vision scope.

Out of the five owls captured, three good candidates were found. These candidates, captured on different dates, were brought to Blue Hills Trailside Museum. Each was held in a secluded outdoor enclosure for one week. This was to ensure their acceptance of the harness and transmitter and to observe each bird's behavior after the apparatus was attached.

The first Snowy Owl (ID #11976), color-marked blue, remained at Duxbury Beach, the release location, for approximately two weeks. It then headed directly to the Boston Harbor Islands, spending the remaining portion of the wintering season between the Harbor Islands and Logan. On March 10, 2000, this bird began its northerly migration.

The bird was tracked to Montreal and on to Annaville, Quebec. The final known movement of this bird was due north to a remote area of the province. We continued to receive low quality signals from the transmitter for three months. Those low quality signals indicated no movement and ambient temperature readings.

The second Snowy Owl candidate (ID #11977), color-marked green, was captured in mid-February. After its release on Duxbury Beach, this bird moved farther south into Barnstable County on Cape Cod. The bird returned to Duxbury Beach before beginning its northerly migration on March 7, 2000. It flew as far as Schuylerville, New York, where the transmitter readings began showing no further movement. We remained hopeful because data sensors on the transmitter suggested the bird was still alive with the equipment intact. Within a few weeks, no more transmissions were received, and it wasn't until November 2000 that we received a few good quality locations again, but unfortunately the data sensors showed local area temperatures, not those associated with the normal body temperature of a bird.

Near the end of February 2000, the third and final Snowy Owl candidate for this season was captured and harnessed. This bird (ID #11978), color-marked red, stayed at the release point for approximately one month before traveling southeast to Race Point, the tip of Cape Cod. On April 2, 2000, there were clear indications of trouble in the satellite data we received. Temperature readings again were those of the surrounding environment.

SCOTT CRIVELLARO

This Snowy Owl has preened the transmitter into its feathers, but the antenna is still visible.

Soon after this discovery, authorities notified us that the transmitter was recovered. We traveled to Race Point, spoke with the National Seashore Rangers, and retrieved not only the transmitter but also the badly decomposed carcass of the bird. After an autopsy, performed by the Tufts Veterinary Clinic in Grafton, MA, it was determined that the cause of death was a gunshot wound. This wound fractured a wing and one leg. Stories of this incident appeared in local newspapers and on Channel 4 News. The Massachusetts Animal Rescue League posted a reward of $2,000 for information leading to the prosecution of the shooter.

The fates of both birds, ID #11976 and #11977, may never be known. We have not been able to retrieve the transmitters or survey the land areas where the transmitters signaled trouble. We see two scenarios as plausible conclusions. The first scenario is that each bird was able to free itself from the harness and transmitter. The second scenario is that each bird died and the transmitters are still on the carcasses, possibly in some underbrush which hindered the transmissions. If not in underbrush, the antennas could be touching the ground, where the signal is being absorbed. Scavengers could have dragged the carcasses out of the underbrush or moved them in such a way as to allow data transmission to the satellite again.

This first year of the study provided very little data. As it went, the first bird we lost contact with was ID #11978. Although disappointed with losing this research candidate, we felt a sense of closure and understanding of the circumstances upon discovering the fate of this bird.

It was disheartening to then lose contact with the other two research candidates. Because of their remote locations and poor quality of transmission, it is unlikely we will ever know the fates of these birds. Upon reviewing all the data collected, we find that the Snowy Owls in our sample group are local wanderers, more so than we had first hypothesized. We were not fully aware of their meanderings on Cape Cod. Other

than the initial satellite data from the first northerly migration movements, it is impossible to know for sure what routes these birds would have traveled.

Second-Year Results

The second wintering season (November 2000-April 2001) was much anticipated. The first Snowy Owl was sighted at Logan on November 7, 2000. The high count for one day was seven Snowy Owls. The total number of Snowy Owls captured, banded, and color-marked for this season was nineteen.

Out of those captured, four were chosen for our sample group. In contrast to the year before, these birds were not held in an enclosure for one week. The birds were banded, color-marked, and each harnessed with a transmitter before being immediately released on Duxbury Beach. The reason for this change in procedure was to minimize the amount of stress these birds endured for this project.

The first research candidate (ID #11978) was harnessed with last year's refurbished transmitter and color-marked yellow. After release, the bird remained in the area for one week and then traveled south over areas of Falmouth and Barnstable County on Cape Cod. A week later, it returned to Logan before beginning its northerly migration. The bird was tracked over Lawrence, MA; Waterville Valley, NH; Chesuncook, ME; and Labrador City, Quebec. The bird was heading in a north-northwesterly direction.

Snowy Owl Migration Routes

Year 1

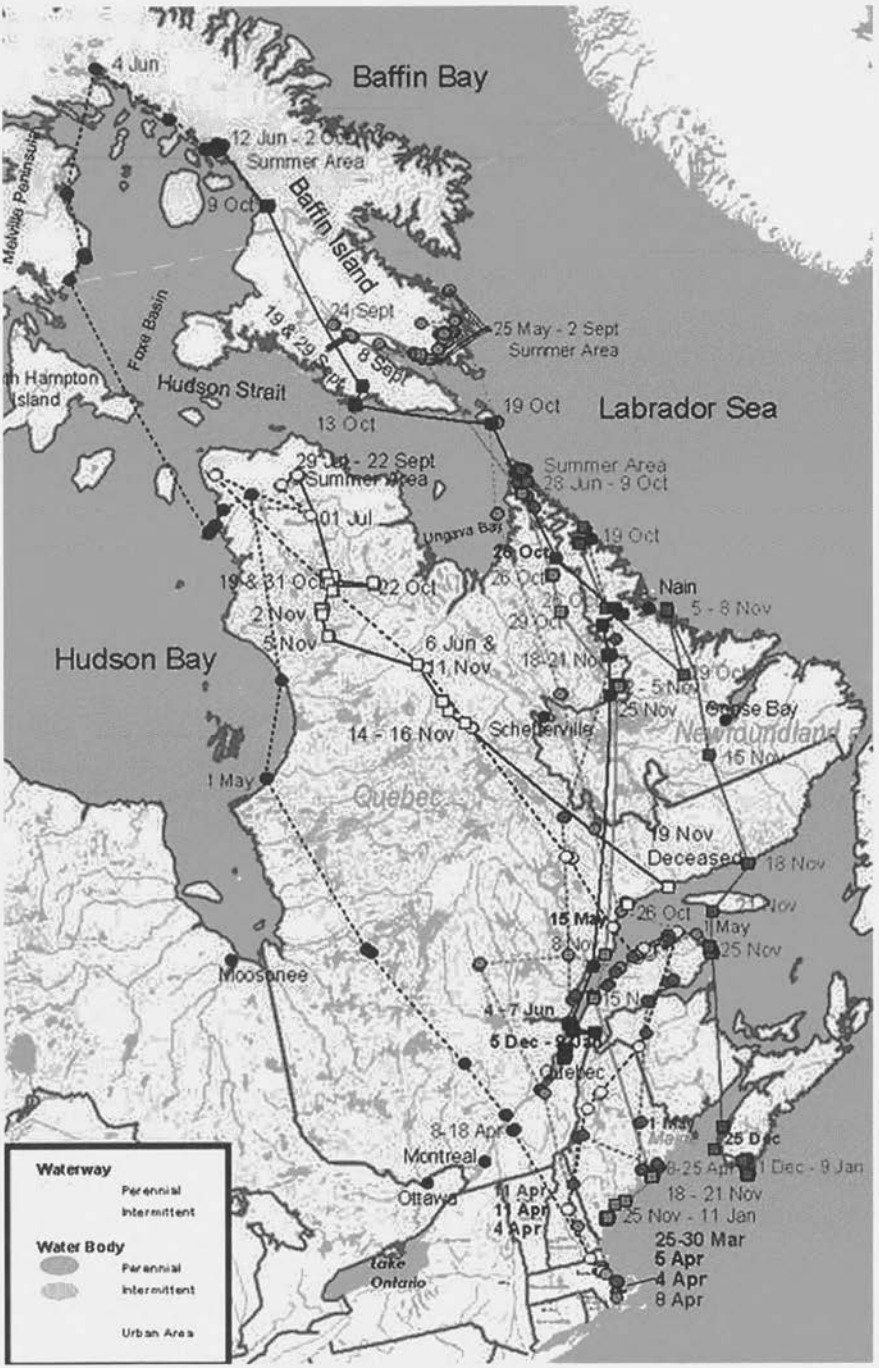
ID#	Release	Migration	2 weeks (direction)	4 weeks (direction)	6 weeks (direction)
11976	01-23-2000	03-10-2001	275 miles (NNW)	365 miles (ENE)	
11977	02-20-2000	04-03-2001	140 miles (WNW)	220 miles (W/S)	
11978	03-05-2001				

Year 2

ID#	Release	Migration	2 weeks (direction)	4 weeks (direction)	6 weeks (direction)
11978	02-02-2001	04-08-2001	535 miles (NNE)	660 miles (SW/NW)	1,020 miles (NW)
3252	02-07-2001				
3253	02-18-2001	04-08-2001	375 miles (NW/N/E)	625 miles (W/N)	800 miles (N/NE)
3254	03-03-2001	03-19-2001	85 miles(NW)	525 miles (NW)	875 miles (E/NE)
3252	04-04-2001	04-05-2001	540 miles (NW/NE)	620 miles (SW)	820 miles (NW)

These tables show the migration routes of all birds tracked so far in this study. All mile measurements are approximated from the release point of Duxbury Beach (example: ID# 11978 traveled 1020 miles from Duxbury Beach in a period of six weeks). The "/" mark denotes a change in direction (example: NW/N/E ID# 11978 was traveling northwest, headed north, and then east).

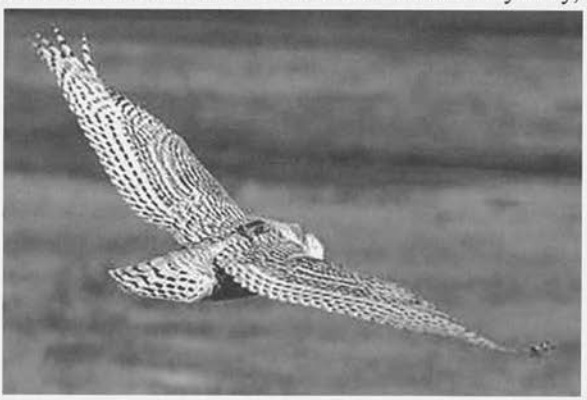
The second research candidate (ID #3252), color-marked purple, was released on February 7, 2001. This bird followed the same movements as the first one: staying at the release point for approximately one week before heading south to Cape Cod. Once on the Cape, it stayed in Barnstable County for five days before returning to Duxbury Beach. Two weeks later, it flew back to Logan. Over the remaining weeks of the wintering season, the bird traveled back and forth from Logan to the Boston Harbor Islands.



Map of Snowy Owl locations and migration routes up to January 15, 2002. Updates to this tracking map, and other information, are available on the Mass. Audubon web site at <http://www.massaudubon.org/Birds_&_Beyond/Snowy_Owl/index.html>.

In late March, we received some inconsistent data transmissions in reference to the temperature readings of the bird's body. Within days, the Metropolitan District Commission Park Rangers contacted us. A visitor to Lovell Island in Boston Harbor told the rangers that a Snowy Owl carcass was found hanging in a tree. The visitor removed the transmitter and gave it to the rangers. The details, few as we received, gave us cause for concern since Snowy Owls are seldom known to perch in trees. We surveyed the area but were unable to locate the carcass. Unfortunately, without it, the fate of that Snowy Owl may never be known.

Immediately after retrieving the transmitter, we were able to find another suitable candidate for the study. This new candidate began its northerly migration on April 8, 2001. It was tracked over New Hampshire, Vermont, and into Quebec. This bird (ID #3252) is the only study bird so far to have entered the Arctic Circle. From early May, the bird traveled to the northernmost points of Quebec and then farther on to the Melville Peninsula and points on Baffin Island just north of Prince Charles Island.



SCOTT CRIVELLARO

The third owl (ID #3253), color-marked pink, spent its entire wintering season on Duxbury Beach. It did not wander to other areas or return to Logan. On April 8, 2001, it also began its northerly migration. It was tracked through New Hampshire and Maine. In mid-April, the bird unexpectedly flew east-southeast and then a short distance south-southwest to Cape Rosier, ME. These uncharacteristic direction changes could be weather-related. After arriving in Cape Rosier, the bird then continued its migration almost due north, traveling through eastern Quebec and parts of Newfoundland.

The final candidate for this year (ID #3254) was color-marked green. After release on March 2, 2001, it remained at Duxbury Beach for several days and flew south to Mattapoisett, MA. It returned to Duxbury Beach and began its northerly migration in late March. This bird was tracked through New Hampshire, Maine, and Quebec. It, too, made a drastic direction change in mid-April. It flew from St. Edmond, Quebec, almost due east to the edge of eastern Quebec and then east-southeast to Ste. Felicite-Quest, ME. From there, the bird continued traveling north to Baffin Island, just below the Arctic Circle (see the map on page 92).

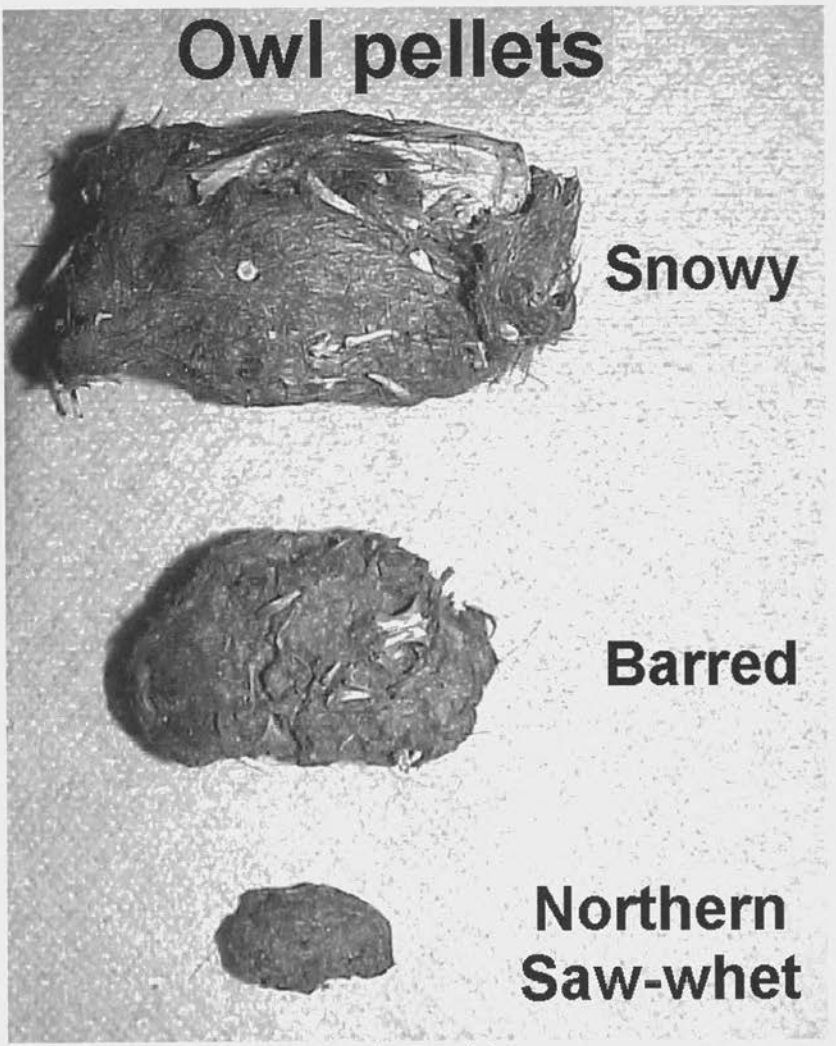
Conclusion

After two years, the Snowy Owl Satellite Telemetry Project is only beginning to provide the critical data we set out to find. Although we received minimal information on the first year's birds, we gained insight into how difficult it is for these birds to survive. The second year's data revealed valuable migration information and seem to

suggest that these birds wander greater distances during their wintering season than we had originally thought. We were also surprised to find that not all birds were in the Arctic Circle by early June, as we had originally assumed they would be.

***Norman Smith**, director of the Massachusetts Audubon Society's Blue Hills Trailside Museum, has been studying Snowy Owls since 1981 as part of a larger research program of the Snake River Birds of Prey Refuge in Snake River, Idaho. Assisted by his son Josh and daughter Danielle, he caught and tagged the birds, but only recently has satellite telemetry, along with transmitters attached to the birds, offered the opportunity to unveil the mystery of when the owls leave the area, where they go, their migration routes, and habitat needs. During the 2002 season he will be attaching three more transmitters. Follow the continuing project on the web at <http://www.massaudubon.org/Birds_&_Beyond/Snowy_Owl/index.html>.*

The original report and diagrams were created by Laura Niabi-Westcott, Special Projects Coordinater (Blue Hills).



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