

TRACKING SASKATCHEWAN NESTLING TURKEY VULTURES

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Between 1923 and 1980, 2125 Turkey Vultures were leg-banded in eastern North America, with 136 (6.4%) recoveries and encounters.^{3,6} Seven were banded in Saskatchewan during this period: two nestlings in a cave near Big Beaver (1965), two in a conglomerate cave near Ravenscrag (1972), and two in a riverbank cave southwest of Eston (1974). The seventh Turkey Vulture was banded as an adult after capture in a cave south of Big Beaver (1973). No recoveries resulted.

In 1975, when Ed Henckel recaptured 14 of his 76 Turkey Vultures banded in New Jersey, he discovered all had injured tarsi from hardening of vulture excreta around the aluminum leg bands.⁴ Consequently, the use of leg bands on vultures was prohibited by the U.S. and Canadian banding offices.

Other research techniques were required to study migration routes, wintering areas and age of breeding of vultures on the northern Great Plains. We report results obtained from attaching patagial tags and one satellite transmitter to 44 nestling Turkey Vultures in south-central Saskatchewan during 2003 and 2004.⁹

Methods

Most nesting vultures were located through landowners who responded to

newspaper and radio interviews with CSH.¹⁰ All reports were investigated and each nest was visited once during the first two weeks of August. A patagial tag (so called because it is fastened to the wing patagium) was attached to unfledged young at each nest. The tags were green Herculite with white letters, H-0 to H-55. In 2003, 14 nestlings were tagged and in 2004, 30 nestlings. Patagial tags were applied by Brent Terry, Michael Blom and Marten J. Stoffel. Helen Trefry, Canadian Wildlife Service, assisted GLH with the attachment of the PTT transmitter.

The high rate (at least 93%) of fledging success in 2003 encouraged us to apply a solar satellite platform transmitter terminal (PTT, manufactured by Microwave Telemetry Inc, Maryland) to a nestling Turkey Vulture the following year, the first transmitter attached to a nestling of this species in North America. We chose a nestling vulture, within ten days of fledging, in a deserted log house near Ranger, SK. The PTT was attached on August 5, 2004 to the vulture's upper back with quarter-inch teflon webbing (Bally Ribbon Mills). This vulture also received wing tag H-25. The Animal Care Committee, University of Saskatchewan, approved the handling of the nestling vultures. The PTT weighed 35 g and had been refurbished after being carried by an

TABLE 1. Frequencies of each LC accuracy code during each leg of Turkey Vulture travel

<u>Migration Zones</u>	<u>Location accuracy code (LC)</u>						<u>Total</u>	<u>1stDate</u>	<u>Time</u>	<u>LastDate</u>	<u>Time</u>	<u>#days</u>	<u># locations per day</u>
	<u>B</u>	<u>A</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>							
At nest site	35 15.8%	48 21.7%	76 34.4%	37 16.7%	17 7.7%	8 3.6%	221	Aug 5	09:23 hr	Sept 19	16:24 hr	46	4.80
Southward:	33	36	95	43	23	15	245	Sep 22	13:37 hr	Oct 30	22:09 hr	39	6.28
Canada & USA	13.5%	14.7%	38.8%	17.6%	9.4%	6.1%							
Southward:	18	10	38	20	8	7	101	Nov 1	11:49 hr	Nov 29	12:42 hr	28	3.61
Latin America	17.8%	9.9%	37.6%	19.8%	7.9%	6.9%							
Wintering:	64	43	82	48	25	8	270	Nov 30	16:58 hr	Apr 13	22:40 hr	135	2.00
Costa Rica	23.7%	15.9%	30.4%	17.8%	9.3%	3.0%							
Northward:	12	4	16	6	3	5	46	Apr 15	10:45 hr	Apr 26	18:14 hr	11	13.82
Latin America	26.1%	8.7%	34.8%	13.0%	6.5%	10.9%							
Northward:	29	22	53	28	12	8	152	Apr 27	20:41 hr	May 27	13:45 hr	30	7.57
United States	19.1%	14.5%	34.9%	18.4%	7.9%	5.3%							
Summering:	58	47	30	47	25	20	227	May 28	15:13 hr	Jul 30	23:16 hr	63	3.60
Nebraska	25.6%	20.7%	13.2%	20.7%	11.0%	8.8%							
Total Locations	249	210	390	229	113	71	1262					352	3.59

Osprey to Costa Rica and back, twice.^{5,8} Four hours of exposure to a bright sky is considered sufficient to power the PTT for 24 hours.¹²

Results

Argos assigns an index for the accuracy of each location it receives from a PTT, termed the Location Class or LC.¹ For category LC 3 (n = 71 in our study) the estimated accuracy is less than 150 m, for LC 2, between 150 and 500 m (n = 113), for LC 1, between 500 and 1000m (n = 229), and for LC 0, greater than 1 km (n = 390). Argos assigns no level of accuracy for LC A (n = 210) or LC B (n = 249), but Miller et al. determined that LC 0 should be within 10 km accuracy, LC A within 20 km and LC B within 35 km.¹³ We chose to use only LC 3, 2, 1 and 0 ratings for mapping purposes, and used the highest rating available for each day.

Sightings of wing-tagged vultures.

Many tagged vultures were reported by landowners near the nest sites for four to six weeks after fledging. Six nestlings have been sighted at a later time and distant from their nest sites. Three of these birds were tagged in 2003 and three in 2004. One bird from each year was seen twice: in their first and third years. The four other birds were seen only once: in the first year (1), second year (2) and fourth year (1). The sighting details follow, given in order of tagging dates.

1. Nestling H-15. 1 yr and 3 yr, tagged east of Mont Nebo, SK on August 5, 2003, was seen by Mike Desjarlais, feeding on a carcass in a ditch on the Fishing Lake First Nation, SK on June 28, 2004, 270 km southeast of its natal site. It was sighted again by Robin Garvey, feeding in a ditch beside Highway 23 near Chelan, SK on April 22, 2006, 240 km southeast of its natal site.

2. Nestling H-12. 4 yr, tagged near Bapaume, SK on August 5, 2003, was photographed by Jim von Holwede, 7 km east of Glaslyn, SK on May 20, 2007, only 35 km west of its natal site.

3. Nestling H-19. 2 yr, tagged near Nora, SK on August 6, 2003, was sighted by Orlando Gomez and Adrian Naveda Rodriguez at the Maracaibo Zoo across the bay from Maracaibo, Venezuela (star in Fig. 1), initially on November 5, 2005, and repeatedly throughout December, 2005. It was 5470 km from its natal site.

4. Nestling H-36. 1 yr, tagged near Nora, SK on August 6, 2004, was sighted by Lorne Robb, 20 km west of Fort Qu'Appelle, SK on September 8, 2005, 70 km south of its natal site.

5. Nestling H-50. 1 yr and 3 yr, tagged near Hanley, SK on August 10, 2004, was sighted by Angela Schmalz, 16 km south of Shellbrook, SK, 165 km north of its natal site on May 25, 2005. It was sighted again by Nelson Schneider, 3 km north of Kyle, SK on May 18, 2007, 140 km southwest of its natal site.

6. Nestling H-53. 2 yr, tagged south of Shell Lake, SK on August 12, 2004, was sighted on a fencepost 10 km north of Grandora, SK on July 1, 2006, 110 km south of its natal site.

Satellite locations

The nestling vulture outfitted with the backpack transmitter and patagial tag H-25 on August 5, was flying well on September 12, 2004 and sitting with its sibling on the roof of a vacant house about 1 km from the natal site. On September 22, its first day of migration, the vulture traveled 60 km southeast (Fig. 1). Thereafter, it moved short distances, stopping often. The vulture's greatest rate of travel was between

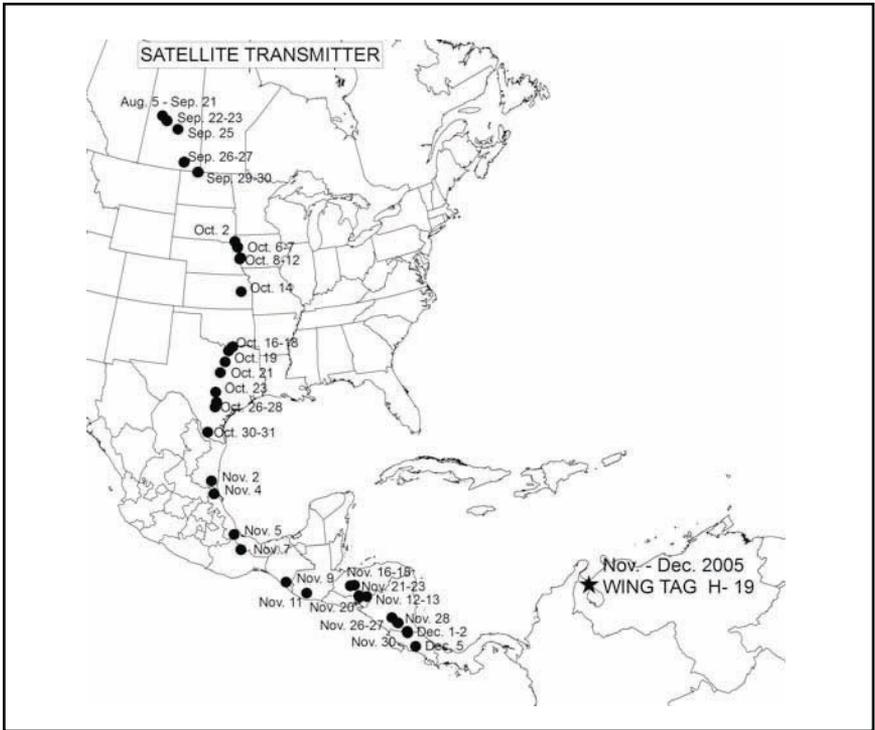


Figure 1. Southward movement of the Saskatchewan-fledged Turkey Vulture nestling H-25 with satellite transmitter from September 22 - December 5, 2004. The star in northern Venezuela indicates the Maracaibo Zoo, where a different vulture, H-19, resided from November 8 through December 2005. Map by Kathy M. Meeres.

Sherwood, North Dakota and Volga, South Dakota, when it flew 634 km in a day and a half. It stopped for four days in the Missouri River valley near Sioux City, Iowa, and then after an all-day flight of 120 km, stopped in the valley north of Omaha, Nebraska for four and a half days. Between 0653h on October 14 at Barclay, Kansas, and 1747h on October 15 near Vernon, Oklahoma, it traveled 375 km before stopping at Lake Texoma on the Oklahoma-Texas border for two days. Later it spent four days near San Antonio, Texas. It traversed the 1,200-km length of Mexico in 10 days, then flew another 700 km through Guatemala, Honduras, El Salvador, Nicaragua, and northern Costa Rica in 23 days.

The vulture arrived at its wintering site December 3, 72 days after starting the southward migration. It remained at this area of coffee plantations on steep hillsides, 900 to 1,200 m above sea level, in the mountains south of San José, Costa Rica, until April 13, 2005. The direct-line distance from its natal site was 5,321 km.

The first 100 km leg of its northward migration, to Tilaran in northwest Costa Rica, did not occur until April 13, a day after the first vultures had been reported back in Saskatchewan. The vulture stopped near Mason, Texas, from April 30 to May 17, before reaching Nebraska, about 90 km southwest of Lincoln, on May 28 (Fig. 2). It moved

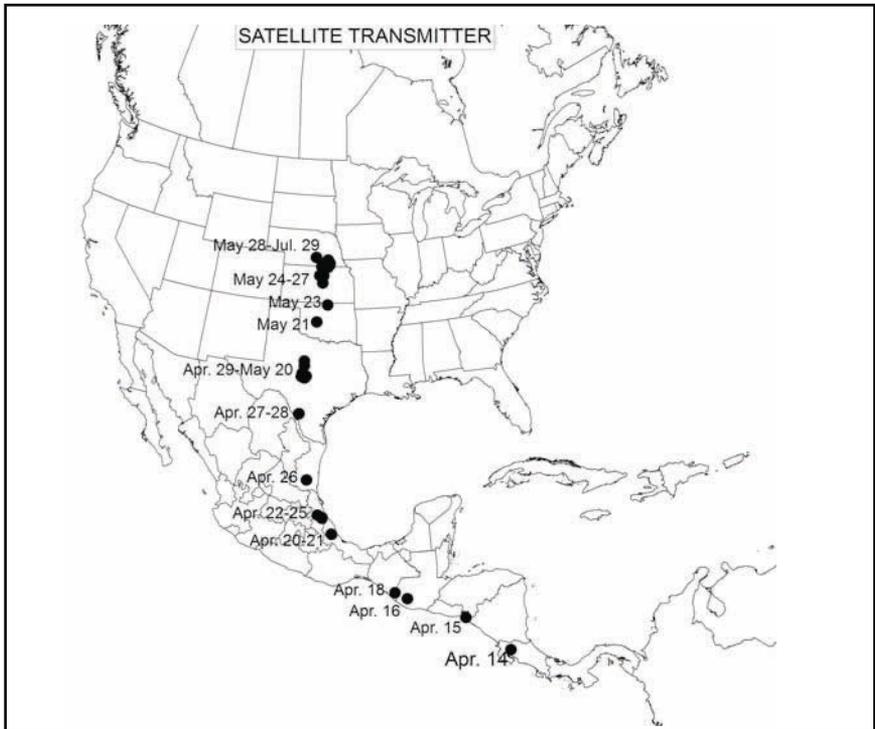


Figure 2. Northward movement of Saskatchewan-fledged Turkey Vulture nestling with satellite transmitter from April 13 - July 30, 2005. Map by Kathy M. Meeres.

short distances within that general area until July 4. The last signal was received on July 30, 2005.

During the last 27 days, 57% of the 119 locations provided the least reliable signal ratings (36 rated LC Z, 17 LC B and 15 LC A) and during the last two days 11 of 14 were poor signals (3 of Z, 3 of B and 5 of A), indicating that the transmitter was no longer oriented in a position to be detected by a sufficient number of satellites. The battery strength dropped steadily in July, meaning the transmitter was no longer receiving sufficient light, and the temperature and activity reports indicated that the PTT did not move. We concluded that the bird died on or about July 4.

In total, 1,262 locations were determined by the Argos satellites, not including approximately 200 inaccurate "Z" transmissions. The first 221 were from or near the natal site; 245 were on the southward migration through Canada and the United States; 101 through Mexico and Central America; 270 on the wintering area of Costa Rica; 198 on the northward migration, and a final 227 on its apparent "summering ground" in southeastern Nebraska (Table 1). The percentage breakdown of locations by accuracy class is roughly similar to that reported by Britten et al. for 30 g PTTs on female Peregrine Falcons.²

In 17 instances involving LC 0 locations exclusively, the Latitude 1/

Longitude 1 readings were clearly incorrect, whereas the alternate Latitude 2/Longitude 2 readings were in keeping with the preceding and subsequent positions of the vulture; for these 17 instances, the Latitude 2/ Longitude 2 readings were used. Six LC 0 locations were excluded because of biologically implausible deviations of 45, 55, 75, 105, 150 and 945 km at right angles from the south-north trajectory.¹³

Because of the near-polar orbit of each satellite, the number of daily passes over a transmitter increases with latitude.¹ Therefore we expected the number of locations reported per day to diminish towards the equator, but were unable to explain the almost four-fold increase in locations reported during the vulture's more rapid northward travel through Latin America, as compared to the southward trip through the same region (Table 1).

Discussion

During migration, when vultures typically use soaring flight during daytime to take advantage of thermals, the bird with the transmitter moved slowly. We had too few readings to determine hourly flight speed, but the minimal data we have seem consistent with the 40 km/h speed reported by Coles,³ based on observations of a vulture flying alongside a locomotive, and the 55 km/h estimated by Kirk and Mossman.¹¹ The vulture stopped for longer periods and had a slower rate of migration than the other two Saskatchewan species, a Swainson's Hawk and an Osprey, that previously carried PTTs.^{5,7,8} While Peregrine Falcons rarely stop on migration (GLH unpublished data), this vulture on its southward migration had two stops for one day, four for two days, one for three days and two for four days, before traveling the 1,200 km length of Mexico

in 10 days. Except for a three-day stop near Poza Rica, Veracruz, its northward migration proceeded more briskly as far as Mason, Texas, where it stopped for 19 days. It stopped two more days near Salina, Kansas, before reaching its presumed "summering grounds" in Nebraska on May 28. Was it already sick or injured? Was it heading for Saskatchewan?

In our wing marking study to date, the only patagial tag sighting from the "winter quarters" in Venezuela was at two years, 5470 km distant from the natal site.

If the patagial tags remain in place, and if a cohort of tagged vultures survives and returns to breed on the Canadian prairies, our study has the potential over the next decade to determine where vultures spend their non-breeding years, the age at which first nesting occurs, and the range of natal dispersal distances. Survival of patagial tags among Bloom's California Turkey Vulture population, with re-sightings of 22 of 50 vultures for up to seven years, gives some hope in this regard.⁶ A long-term study in North Carolina showed that Black Vultures did not begin to breed until eight years of age.¹⁴ The single published breeding record of a Turkey Vulture of known age is eleven years.¹¹

Despite these suggested late ages of first breeding, at least some of the immature birds are returning to their natal province in subsequent years for some as yet unknown biological reason. Five tagged Turkey Vultures returned to Saskatchewan in seven instances: a) three instances were of one-year-old birds seen at distances of 70, 165 and 270 km from their natal sites; b) one was of a two-year-old seen at 110 km; c) two were of three-year-olds at 140 and 240 km, and d) one

was a four-year-old at 35 km from the natal site. The rate of natal fidelity versus dispersal remains to be determined, but since we have applied 7 more transmitters and 217 more wing tags during 2005-2007, we are certain that additional encounters will accumulate over the years to come.

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