Turkey Vulture Marking History: The Switch from Leg Bands to Patagial Tags

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ABSTRACT

In North America, leg bands were applied to 1399 Turkey Vultures (*Cathartes aura*) prior to computerization of banding records in 1955, and 726 since. The switch to wing or patagial tags on adult vultures began in 1970; it gained momentum after the publication of Henckel (1976), which pointed out that damaging cement-like concretions formed around standard leg bands of any size. Application of leg bands to adults became uncommon after 1980. A flurry of patagial tag use, as a substitute for leg bands, came almost to a halt after the 1979 season, and then resumed in 1994 - 1998, by which time 528 patagial tags or wing streamers had been applied.

INTRODUCTION

The use of deserted farmhouses as nest sites by Turkey Vultures (*Cathartes aura*) is a recent phenomenon in Saskatchewan (Houston et al. 2002; Houston and Terry 2003). Easy access to such nests offered an opportunity to mark nestling vultures, to learn how long they stay at their natal site before dispersal, and perhaps in future years, with many nest sites under observation, to learn the extent of vulture dispersal and their age at first breeding (the only breeder of known age to date was 11 years old; Kirk and Mossman 1998). Patagial tags seemed the obvious answer.

The Banding Office stipulated that one person in any new wing-tagging project must visit someone experienced in applying patagial tags, observe that person applying a tag, and then apply a tag under supervision. PHB offered this service in California in Jun 2003 to Brenton Terry, a subpermittee of CSH.

As we entered our new project we wished to determine the extent of previous use of leg bands in North America, with special emphasis on flightless young, and to note the chronology, results of use, and durability of patagial tags placed on both flightless young and adults.

METHODS

Numbers of standard leg bands applied to Turkey Vultures from 1920 to 1954, inclusive, were obtained from Low (1950), Van Velzen (1964), and the annual issues of *Bird Banding Notes*, 1932 - 1944. The Bird Banding Laboratory provided data on all Turkey Vulture banding and subsequent encounters since 1955. The status code of "3000" indicated use of a standard aluminum leg band, "3390" for use of patagial tags, or "3250" for use of streamers, and "3890" for attachment of a radio transmitter. Because we were interested in numbers of nestlings banded in the past, data were calculated separately for each age group, and for each state and province (the latter not of importance for this article).

In North America, standard leg bands were applied to Turkey Vultures more often before banding records were computerized in 1955 than afterwards: 26 were banded in the first decade through 1931, and 1373 between 1932 and 1954, inclusive (Table 1). About half of this early banding was the work of Victor H. Coles, first between Oct 1934 and early Jun 1935 near Hampton, VA (Johnston 2003: 148; precise dates derived from the printout of Coles' recoveries). In three consecutive years before Coles' Virginia banding, there had been 7, 10 and 15 vultures leg-banded in all North America, so it should be a safe assumption that, of the 476 vultures banded in the 1934 - 1935 fiscal year, Coles banded 450 to 460 of

various places in Ohio during May - Sep 1936 and Apr - Jun 1937, accounting for most of the 180 vultures banded in those two years. No breakdown by age categories is available for banding totals through 1954, but age at banding is reported in computerized reports of recoveries; among the 120 recoveries from this early period are 1 "local" (age code 4, banded in 1953), 30 "immatures" (HY, age code 2), and 10 "juveniles" (age code 3, a code discontinued in 1962, but probably indicating flightless young).

Patagial tags used by PHB consisted of a two-digit black alphanumeric on a white herculite tag, somewhat smaller than those used on California Condors (Wallace et al. 1980) and Golden Eagles (Bloom unpubl.). Vultures tagged by PHB in Orange County, CA, were observed opportunistically by PHB and co-workers while conducting research on other species and thus represent a relatively minimal effort. Since several vultures were resident and known to prefer certain roosts, the number of re-sightings could have been in the hundreds had that been the goal. Of 50 Turkey Vultures wing-tagged by Bloom, 29 participated in an experimental contaminant study and were held in captivity for several months before release (Valencia 2003).

Table1. Turkey Vulture banding and wing tagging in North America. Age "other" represents one-year-old or greater.

Years	Mark	Age	Number Marked	Recoveries Encounters	Percent Encounters
1923-1931	Leg Bands		26	5	19.23%
1932-1942	Leg Bands		868	90	10.37%
1943-1954	Leg Bands		505	25	4.95%
Subtotal	Through 1954		1399	120	8.58%
1955-1969	Leg Bands	other	107	5	4.67%
1955-1969	Leg Bands	locals	114	1	0.88%
1970-1998	Leg Bands	other	332	6	1.81%
1970-1998	Leg Bands	locals	173	4	2.31%
1970-1998	Radios		40	1	2.50%
1970-1998	Patagial tags	other	453	27	5.96%
1974-1998	Patagial tags	locals	75	9	12.00%
Subtotal	Since 1955		1294	53	4.10%
TOTAL			2693	173	6.42%

After 1955, standard leg bands were applied to 287 "locals" (nestlings and flightless young) and 63 hatch-year birds able to fly, most before 1979, and 448 were applied to adults (AHY) and other ages such as SY and ASY. Additional color bands were placed on 52 of the leg-banded birds. Forty adult vultures had a radio attached, 4 in 1976, 2 in 1986, 1 in 1987, 4 in 1994, 20 in 1995 and 9 in 1996.

Patagial tags were applied to 75 "locals" between 1974 and 1998, 40 of these by J. D. Bittner in Ohio, 1975 - 1979. Another 453 patagial tags or streamers were applied to adults, beginning in 1970 (Table 1). Adding leg bands and wing tags together, when both methods were being used, the three highest yearly marking totals since 1955 were 100 in 1975, 141 in 1978 and 113 in 1979.

RESULTS

Recoveries from banding through 1954 - While solidification of bands on vultures with excrement can occur in less than a week, many vultures have survived this impediment many years and did not suffer foot amputation, as evidenced by 31 leg-banded birds that survived three years or more (Table 2). Stewart (1977) reviewed the results of leg banding of Turkey Vultures through 1975, but did not mention banders' names; he mapped 32

vultures that moved from one state to another, including 11 of Coles' Virginia vultures and six of Coles' Ohio vultures that were recovered in other states. Stewart reported that the two oldest survivals of a vulture with leg band intact were at 11 and 15 years. The latter was an adult, 34-706672, banded by Coles on 9 Apr 1937 at Sugar Grove, OH, and found dead northwest of Zanesville, OH, 55 km northeast of the banding site on 8 Apr 1953. Since it was banded as an adult, it was at the very least 16 years 10 months of age, the longevity record for this species (Clapp et al. 1982). Over half the 120 encounters through 1954 were of vultures banded by Coles, with a high proportion shot and trapped. After the advent of patagial tags, more were read by telescope (Table 3).

Table 2. Turkey Vulture life table based on 171 recoveries.

	MONTHS		YEARS																TOTAL
Age	0-6	7-12	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	21	
Leg bands	38	27	25	9	15	5	1	5	1	0	1	0	0	2	0	0	1	0	130
Wing tags	2	14	9	2	3	2	1	0	0	0	0	0	0	0	0	0	1	1?	33
Total	40	41	24	11	18	7	2	5	1	0	1	0	0	2	0	0	1	?	163
Excluded: one code 56, band on skeleton, and seven code 98, "band only"																			8
Each year is assumed to begin on July 1																			171

Table 3. "How found" codes for 173 recoveries of Turkey Vultures.

	Pre-1955				
Code	Coles	Others	Total	Post-1955	TOTAL
0 found dead	22	16	38	14	52
1 Shot	14	12	26	2	28
3 Injured	3	3	6	2	8
4 In trap	14	3	17	0	17
10 mortality		3	3	0	3
13 hit window/object				1	1
14 hit by car	1		1	1	2
15 weather	1		1		1
20 disease		2	2	1	3
28 caught by hand				1	1
33 caught at nest				1	1
45 dead on hiway				2	2
29,52 read by telescope				12	12
56 band obtained		1	1	1	2
89 T&R* diff block	1		1	1	2
97 misc	1	1	2		2
98 band only	5	6	11		11
99 T&R* same block	1	10	11	14	25
Totals	63	57	120	53	173

*T&R - trapped and released; blocks refer to ten-minute blocks of latitude and longitude.

[Another supposed 15-year-old Turkey Vulture on the recovery printout under AOU species number "3250" was disqualified because an initial report on longevity records identified the band 41-801846 as belonging instead to a Black Vulture (Kennard 1975; this identity verified by Mary Gustafson in microfilmed banding records)].

Encounters since 1955 - The 53 more recent encounters include three leg-banded vultures of special interest, the first two of which add to Stewart's map. An adult banded in Florida in Mar 1972 was found dead in Ontario in Oct six years later. A nestling banded in Ohio in Jul 1975 was killed on a highway in Florida in Feb 1979. An adult of unknown age leg-banded by J. A. Jacobs in New Jersey on 5 May 1972 was captured on its nest (code "33"), 70 km to the northeast in the same state on 15 May 1979. One of 40 vultures affixed with a radio was found dead in the same state as tagged (Virginia).

The 24 encounters of adult vultures carrying patagial tags and three carrying streamers are worthy of mention. Of 13 encounters of adults tagged in New Jersey, 10 were trapped and released, one found dead, and one found injured, all within New Jersey, while another injured bird was found in Florida. One North Carolina adult was sighted within that state. Two adults from Virginia were sighted a year later in Maryland. From five adult vultures tagged in Ohio, three were sighted the following spring in Ohio, one was sighted in Florida and one was found dead in Kentucky.

[A potential longevity record, not listed by Klimkiewicz (2002), is of an adult given a patagial tag by Patty Parker, a subpermittee of Helmut Mueller, in North Carolina on 2 Oct 1978. It is listed in the band recovery records as resighted (code "29") in Maryland on 15 Feb 2000. Mary Gustafson (pers. comm.) urges caution, since this record is based on a patagial tag number-letter combination, connected to an "air number" band for entry purposes, and not a leg band, and hence is most probably an example of "Baysinger's rule." (Earl Baysinger was director of the Bird Banding Laboratory from 1968 to 1971; he noted that if a recovery sounds too good to be true, on further investigation it probably will prove not to be true). Had this been a valid record, the bird would have been at least 22 years, 8 months old.]

Of 50 (47 AHY, 3 HY) wing-tagged vultures (20 in San Luis Obispo County and 30 in Orange County, CA) between 25 Jul 1996 and 1 May 1997, 22 (44%) were re-observed on one-to-five occasions, four of them photographed by people not part of our study. The oldest sighting was of an AHY vulture tagged on 15 Nov 1996 and last sighted 23 May 2004. One bird tagged on 14 Nov 1996 and re-sighted on 13 May 2002 was missing the ventral portion of its wing tag suggesting the occasional loss of tags over time. Most re-sightings were within 25 km of where captured; however, occasional observations of white-tagged vultures from as far away as Oregon suggest greater movements of some individuals. Because banding office staffing for years did not allow time to enter re-sightings by banders, only two of the above records in this paragraph are as yet entered as part of the official recoveries and encounters. Two of the vultures from the Orange County study area were killed by cars on the same highway in different years.

There were nine encounters from nestlings given patagial tags. Of those tagged in Ohio by J. David Bittner, one was found dead in Georgia and another was sighted in Florida; in Ohio two were shot, one was found dead, and one was retrapped and then a month later sighted by telescope. Of two tagged by Howard L. Cogswell in California, one was sighted and one was found dead, both within the state.

DISCUSSION

The recovery/encounter rate for leg-banded birds decreased steadily over time (Table 1). Part of this is explained by the high proportion of recoveries from vultures found dead by shooting or in traps in the pre-computer era through 1954. Since 1955, only two vultures have been reported shot and none caught in traps. Since their initiation in 1970, patagial tags, which allow reading of numbers on live birds, have resulted in more encounters than would have occurred had leg banding alone persisted (Table 2).

Ed Henckel's succinct and important note in Volume 1 of this journal (*NABB*) in Sep 1976, told of banding over 70 vultures the previous year. On recapturing 14 of these, he found that a 7B band, which fit well when first applied, would load up with excrement which would then solidify within six to eight weeks. This was due to the vultures' "urohydrosis," excreting down their legs as a presumed cooling mechanism. Swelling of the banded lower leg and foot then ensued, leading to both a loss of use in perching and walking, and an inability to tuck that foot against the vulture's body, hindering flight. In extreme instances this could lead to amputation of that tarsus. Henckel's recommendation that leg bands no longer be used on vultures had a profound impact on marking practices, as noted above. Use of leg bands on nestlings became uncommon after 1979; the next year, Wallace and colleagues published detailed instructions on how to apply patagial tags.

Leg bands applied to two captive vultures by PHB solidified on the tarsus within four days and were then removed. Knowing of Henckel's experience, CSH left four nestlings unbanded, after having placed two bands on the tarsi of nestling vultures at one nest each in 1972 and 1974.

It is probable that more patagial tags have been applied than is evident from the banding office records. Current practice requires that fictitious "air numbers" be assigned to the usual band number field on a banding schedule, while the patagial tag number is placed in the color code field. For example, J. A. Jackson (pers. comm.) relates that he placed patagial tags on 33 Black Vultures in Mississippi in the mid-1970s, but did not then know how to report them to the banding office.

In Saskatchewan, the continent-wide evidence and our own local experience, led us in 2003 to launch province-wide publicity to locate nests through the medium of Trevor Herriot's "birdline" program on CBC radio, and in the *Western Producer* prairie farm newspaper. We then began the tagging process as young vultures reached a 1.5-m wingspan in each of the reported deserted houses within our province. Fourteen nestlings were wing-tagged in 2003 and another 30 in 2004.

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