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An Example of Ruby-throated Hummingbird Survival of a Record May Snowstorm

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ABSTRACT

Subsequent recaptures of individuals from a sample of 15 Ruby-throated Hummingbirds (*Archilochus colubris*) captured on 17 May 2002, ahead of a record late snowfall on 18 May 2002, in the Adirondack Mountains of New York indicated that 73.3 % of these birds survived. In addition to an accumulation of 7-8 cm (3 in) of snow from this storm, there followed three nights of sub-freezing temperatures. Similar capture data for hummingbirds at this location in May 2001 and 2003 showed comparable recapture rates of 75.0% and 76.7%, respectively, suggesting the unprecedented May 2002 storm did not affect survival adversely.

INTRODUCTION

In 1991, I began a constant-effort feeding operation for Ruby-throated Hummingbirds at Jenny Lake, 7 km west of Corinth, Saratoga Co., NY, in the Adirondack State Park (Yunick 1997). Feeders were put out at the very end of Apr or the first few days of May in anticipation of migrant arrivals 5-10 May and were maintained typically until late Sep following early or mid-Sep departure of the last of the summer resident hummingbirds.

The meteorological events of 17-22 May 2002, involving a record late snow accumulation on 18 May (NOAA 2002a), afforded a unique opportunity to examine the ability of hummingbirds captured just prior to this storm to survive it based on their subsequent recapture. My first 2002 banding session took place on 17 May under very pleasant weather conditions, just hours before a coastal low pressure system moving from Virginia to New Jersey, ultimately to Nova Scotia by 19 May, brought the heaviest measurable snow (2.2 in) ever recorded in May at Albany, NY, 58 km (36 mi) south of Jenny Lake (NOAA 2002a). I measured 7-8 cm

(3 in) at Jenny Lake on the morning of 18 May, when snow stopped falling. Temperatures hovered near freezing and incoming high pressure following the low caused chilling NW winds, causing nighttime temperatures in eastern New York to go below freezing to as low as 25° F for 2-4 d thereafter, depending on location (R. G. O'Keefe pers. comm.).

METHODS

The feeding operation, as previously described (Yunick 1997), involved three feeders positioned under a roof overhang of a summer cottage starting in 1991. Initial banding efforts involved capture by mist net; but in 1999, I began using a modified Sargent trap, a wire-mesh cube measuring 27cm (18 in) on a side, baited with a sugar-water feeder (Russell and Russell 2001). When I began using this modified Sargent trap, one of the three feeders was located in the open trap at the same place where that feeder had been used previously. Banding began typically in mid-May once hummers had established themselves at the feeders.

When I conducted a banding session, the two feeders outside the trap were taken down and the trap was operated for a minimum of approximately two hr to standardize trapping effort, unless inclement weather shortened the session. To accommodate seasonal changes in rate of consumption of sugar water, I started the season with one or two 8-oz feeders. Once use became established, I operated three feeders. As consumption increased, I replaced one or more 8-oz feeders with 32-oz feeders, as needed, to maintain continuity of supply of sugar water, but the number and positions of the feeders remained constant year to year. Sugar water was made by dissolving 49 g of cane sugar in well water to give 8 oz of solution (18.3 wt-percent sucrose) for the smaller feeder, or four times that

Table 1. A Comparison of Ruby-throated Hummingbird Capture Data for 2001-2003.

Capture Dates	Trapping Effort, hrs	Captures						Subsequently Recaptured			
		Banded		Return		Total					
		M	F	M	F	M	F	M	F	Total	Percent
17 May 2002	2.4	3	3	2	7	5	10	4	7	11	73.3
22 May 2001	2.9	7	6	2	1	9	7	5	7	12	75.0
11-23 May 2003	4.5	3	6	10	11	13	17	12	11	23	76.7
Total	9.8	13	15	14	19	27	34	21	25	46	75.4

amount for the larger feeder, as previously described (Yunick 1997).

Weather data at Jenny Lake were of my own taking, while regional data were gathered from Internet sites maintained by the National Weather Service of the National Oceanic & Atmospheric Administration (NOAA) whose nearest office was located at Albany, NY. NOAA Daily Weather Maps were consulted (NOAA 2002b) and certain other May 2002 climate data from parts of eastern New York were supplied by Raymond G. O'Keefe, Warning Coordination Meteorologist, of the National Weather Service's Albany office (pers. comm.).

In order to assess the regional impact of this record storm, approximate distances from Jenny Lake to locations of National Weather Service weather stations, as well as to its volunteers who supplied storm data, were determined by measurement on an American Automobile Association map of New York. Not every one of these volunteers' observation locations was known precisely, in which case the named town, city or village of the volunteer was used as the location. Elevations of the National Weather Service volunteers' locations were estimated from National Geographic Topographic Maps on CD-ROM, Northeastern USA, 2001, Part Number 113-400-003. Elevation data of the Jenny Lake area at 2, 4, and 6 km from the site were taken from U.S. Geological Survey topographic maps, 7.5-min series using the following quadrangles with their dates of issue in parentheses: Conklingville (1983), Porter Corners (1983), Lake Luzerne (1968) and Corinth (1983).

RESULTS

Table 1 presents the hummingbird capture data segregated by new bandings of males (M) and females (F) as well as first captures of the year of returning birds banded in previous years. One of those female returns captured 17 May 2002 was a bird which was 6 yr 11 mo old based on her banding in 1996; and when she was recaptured again on 2 Aug 2002, she was 7 yr 2 mo old—my oldest age record for a Ruby-throated Hummingbird at Jenny Lake. For comparison purposes, I included data from my first banding session in 2001 and my first two such sessions in 2003 as a measure of what possible impact this storm might have had on these newly arrived 2002 summer residents.

All of the 11 birds recaptured from the sample of 15 birds handled on 17 May 2002 were recaptured within 2002. The lapse of time from 17 May to their latest recapture in 2002 averaged 56.5 da with a range of 9-93 d. Three of these birds were again recaptured in subsequent years out to 2005. In the May 2001 sample, five of the recaptures occurred in following years out to 2004, while the other seven recaptures occurred in 2001, their latest recapture ranged 6-68 d, average 35.6 d. The May 2003 sample consisted of birds captured on two dates (11 and 23 May) because the first banding session on 11 May resulted in only five return captures as not many birds had arrived yet. Among the 30 birds from both dates, 12 were recaptured in subsequent years out to 2006; and for the 11 birds recaptured within 2003, the lapse of days between their May capture and last capture of the year ranged 8-68 d, average 36.7 d. One of these 2003

Table 2. Snowfalls Recorded 18 May 2002 in Eastern New York by NOAA and Its Weather Cooperators.

County	Location	Approx. Distance from JL		Snowfall, in	Approx. Elev.
		mi / km	Direction		ft / m
Albany	Albany	36 / 58	S	2.2	280 / 85
	Knox	42 / 68	S	4.5	1200 / 365
	Ravena	55 / 89	S	2.8	200 / 60
Columbia	near Schodak	56 / 90	S	2.5	200 / 60
Greene	Lexington	75 / 120	SW	5.8	1330 / 405
	Prattsville	71 / 113	SW	8	1165 / 355
Montgomery	Glenn	34 / 55	SW	2.9	700 / 215
Rensselaer	Grafton	41 / 65	SE	4.5	1480 / 450
Schenectady	Duanesburg	37 / 59	SSW	2	700 / 215
Schoharie	Jefferson	63 / 101	SW	5	1880 / 575
	Summit	60 / 95	SW	6.5	2100 / 640

returns was a male banded 30 May 2002 and recaptured 11 times more in 2002, then following its return capture on 11 May 2003 was recaptured another 13 times in 2003.

Table 2 summarizes NOAA snowfall data (NOAA 2002a) from the 18 May 2002 storm and also includes information on distances and elevations above sea level of these monitoring sites all located south of Jenny Lake. Other data (R. G. O'Keefe pers. comm.) were as follows:

1) 5 mi (8 km) SE of North Creek, Warren Co., NY, located 26 mi (40 km) N of Jenny Lake at approximately 970 ft (295 m) elevation recorded only a trace of snow and for the 5-d period 18-23 May recorded daily minimum temperatures of 25-31° F. Daytime maxima were 48-54° F for 19-22 May, and finally a more seasonable 72° F on 23 May.

2) The Warren Co. airport (Floyd Bennett Memorial Field) near Glens Falls, NY, located 16 mi (25 km) ENE of Jenny Lake at 330 ft (100 m) elevation did not routinely measure snowfall, but recorded 0.55 in of precipitation on 18 May and had five days of sub-freezing minima, 18-22 May, ranging 27-32° F, while maxima for the first four of those days were 48-56° F.

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3) Four mi S of Saratoga Springs, Saratoga Co., NY, located 18 mi (30 km) SE of Jenny Lake at approximately 250 ft (75 m) elevation recorded a trace of snow and minima of 27-36° F and maxima of 52-56° F for 19-21 May.

4) Albany Co. Airport (see Table 2) reported daily minima of 33-37° F for 19-23 May with only one sub-freezing temperature of 29° F on 20 May. Daytime maxima were 50-57° F for 18-21 May, then more seasonable thereafter.

At Jenny Lake, the heavy wet snow stuck to vegetation, including hummingbird food sources that were in bloom at the time, making this storm different and more extreme than just a one-night temperature drop to just below freezing as might otherwise occur at this time of year. The weather of the afternoon of 17 May to the morning of 18 May was an extraordinary experience. While I banded on the afternoon of the 17th, the sun was bright and the air comfortable in the 60's F. By dinner the sky had become leaden gray followed by light rain at nightfall. During the night, the patter of rain on the roof ceased and when I awoke on the 18th, everything was white with snow and it continued snowing until about 1000 hr. Territorial male

hummers guarded the areas near the feeders making feeding by other hummers difficult.

But most spectacular against this snowy backdrop were the extraordinarily large gatherings of birds at my three sunflower seed tray feeders. Brilliantly plumaged Rose-breasted Grosbeaks (*Pheucticus ludovicianus*) stood next to Evening Grosbeaks (*Coccothraustes vespertinus*) and American Goldfinches (*Carduelis tristis*) and Purple Finches (*Carpodacus purpureus*), creating an amazing array of colors. The air temperature that day never exceeded 35° F. When I left for home on 19 May at about 1400 hr, the air temperature was 40° F. When I returned to Jenny Lake on 22 May, the 0940 air temperature was 48° F and it warmed to 61° F by 1515 hr when I left. I made 19 hummer captures in two hours of trap operation that day; six of those captures were of a single territorial male intent on defending his food source. By 23 May, air temperatures returned to the more normal 70's F.

From the USGS topographic maps, I determined the following elevations of Jenny Lake and its nearby environs atop the Kayaderosseras Range within the SE corner of the Adirondack Park:

At Jenny Lake – lake elevation, 1236 ft (377 m),
banding station elevation, 1280 ft (390 m);
Within 2 km (1.2 mi) radius – from 1040 to 1810 ft
(317-552 m);
Within 4 km (2.5 mi) radius – from 706 to 1980 ft
(215-604 m);
Within 6 km (3.7 mi) radius – from 560 to 2009 ft
(171-612 m).

DISCUSSION

NOAA (2002a) characterized the 2.2 in snowfall of 18 May 2002 at Albany at 280 ft (85 m) elevation as "...the heaviest measurable ever" for the month of May. Traces of snow have fallen as late as 28 May in 1902 (NOAA 2002a), thus making this storm a formidable test of Ruby-throated Hummingbird survivability to not only cold weather, but to the snow and cold's impact on its insect and nectar food sources. Table 2 shows that most of the storm's measured impact was to the south of Jenny Lake at generally higher elevations with snowfall amounts related to elevation. The elevations of the Jenny Lake environs were as high as some of the more southerly areas which received the greatest measured snowfall. These nearby Jenny Lake

elevations also indicate that the immediate area frequented by these newly arrived hummers was mostly at elevations well above those of Saratoga and Albany to the immediate south.

The rates of subsequent recapture in Table 1 indicate that on average 75% of these first birds of the season remained in the area as summer residents. The remaining 25% which were not recaptured were possibly migrants in passage which left the area, or birds which resisted recapture during the summer season, or birds which perished. Other capture data for the years 2000-2006 show that 49.8% of hummingbird captures in May were return birds banded in previous years (Yunick, unpub. data). Both of these May recapture rates of approximately 75% within season and 50% from previous seasons strongly suggests that these Jenny Lake birds were primarily a summer resident population as opposed to a migrant population. The similarity of the in-season recapture rates in 2001 and 2003 to that of the storm year 2002, suggests that the impact of this record storm did not adversely impact the survivability of the birds that experienced the storm. To what extent, if any, my feeding activity may have influenced this outcome I cannot determine.

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