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Observations From 43 Years, 1970-2012, of Banding an Adirondack Breeding/Wintering Population of Red-breasted Nuthatches (*Sitta canadensis*)

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ABSTRACT

The banding of 1604 Red-breasted Nuthatches (*Sitta canadensis*) at an Adirondack Mountain, New York, location over 43 years, 1970-2012, where the species breeds and is a year-round resident, led to the recapture of 402 (20.0 percent) of them as return birds in years following banding out to a maximum age of 7yr-2mo for a male and 5yr-6mo for a female. The return rate of banded males was 21.3 percent, 18.5 percent for females. Immature birds at time of banding ($n=795$ or 49.6 percent of those banded) were 56.3 percent male, 43.7 percent female, while the entire population of 1604 adults and immatures was 57.5 percent male, 42.5 percent female. In only eight of the 43 years did banded females outnumber males, vice versa in the other 35 years. Capture data indicated that in some years of irruptive migration, nuthatches wintered at this location while in some few winters the species was conspicuously absent. The dates of capture of each year's first immature were grouped by five-year intervals and became progressively earlier from 20 Jul in the 1971-75 interval to 15 Jun in the 2006-10 interval, most progressively 2000-10.

INTRODUCTION

The Red-breasted Nuthatch (*Sitta canadensis*) is a common breeding bird in the coniferous and mixed-coniferous forests at higher elevations in New York state, such as in the Adirondack Mountains, (Bull 1974, McGowan 2008) as well as across the boreal forests of Canada (Ghalambor and Martin 1999). It is also a winter irruptive migrant across North America (Bock and Lepthien 1972, 1976).

While I was engaged in a 43-yr. study, 1970-2013, of Black-capped Chickadees (*Poecile atricapillus*) at my year-round Adirondack feeding/banding station near Corinth, NY (Yunick 2014), Red-breasted Nuthatches were also captured as breeding and wintering birds. Data were gathered on timing of fledging, sex ratios of immatures and adults, return rates, longevity and variability in irruptive movements. In an attempt to better understand what role birds banded at Jenny Lake might play in the species' irruptive migrational pattern, comparative fall banding data from an Atlantic Ocean barrier beach location (Island Beach State Park, South Seaside Park, New Jersey) 375 km (234 mi) south of Jenny Lake well removed from the species' breeding range in distance and type of habitat were analyzed with respect to timing of irruption and variability from year to year, as were observational data from a distant northerly coastal location at Gaspe, Quebec (Ball 1947) 988 km (614 mi) northeast of Jenny Lake.

METHODS

As described previously (Yunick 2014) banding was conducted starting in Aug 1970 at my seasonal camp in the Adirondack State Park at Jenny Lake, 7 km west of the Village of Corinth, Saratoga County, New York at 43°16' 13.55" N 73°54' 36.54" W. The banding station was at an elevation of about 370 m (1270 ft) in lakeside forest dominated by white pine (*Pinus strobus*), Eastern hemlock (*Tsuga Canadensis*), sugar maple (*Acer saccharum*) and lesser amounts of oak (*Quercus spp.*), American beech (*Fagus grandifolia*) and spruce (*Picea spp.*).

During the "winter" season, Oct-Apr, exclusive of 1970-72 but continuously 1973-2013, three sunflower seed feeders were employed, each with a 12-m or 6-m mist net within 1-2 m of the feeder. Visits were made at intervals of 6-15 da to conduct

a banding session and refill feeders. May, early Jun and late Sep were transition periods when weekend visits were made for the same purpose; and during the "summer" season of late Jun through early Sep, I was either in residence or visiting regularly on weekends. During this summer season a total of one 6-m and five 12-m mist nets were operated within up to 10 m of the three feeders.

Red-breasted Nuthatches were aged as follows: very newly fledged Hatching-Year (HY) birds were recognized by yellow coloration at the base of the mandible. Within 10-14 da the yellow became white resembling nuthatches of all ages. Throughout the summer season, HYs were recognized by fresh, unworn juvenal plumage, compared to worn plumage in After-Hatching-Year (AHY) birds; and/or incompletely pneumatized skulls as far as into Nov (Yunick 1980) and/or preformative molt of only coverts and body plumage, while AHYs were undergoing prebasic molt involving body, coverts and flight feathers. Sex was determined by dull black crown color in HY males (M) or shiny black in AHY/Ms while females (F) had varying degrees of slate blue-gray in the crown with AHY/Fs exhibiting a brood patch during the breeding season (Pyle 1997).

Banding data from Island Beach State Park, New Jersey, were obtained annually from the station compilers 1962-1991 (Charl Warburton, Katherine Price, Herman Cooper and Glenn Mahler, pers. comm.).

RESULTS

Jenny Lake data are summarized in a series of tables as follows.

Table 1 is an annual compilation of monthly captures of newly banded nuthatches and newly recaptured return nuthatches banded in previous years. A return bird is counted only once in any given year, but may be recaptured and included again in a subsequent year. The asterisks in this and some subsequent tables reflect my absence in Jul 1970 before the project began or the lack of a snow-proof feeder which made winter feeding impossible. Once a snow-proof feeder capable of holding a one to two-week supply of seed was finally designed and put into use in 1972-73, it sup-

plied daily uninterrupted feeding thereafter to the present time. Banding sessions occurred in every month of all years (except those noted with asterisks), a total of 2126 sessions over the 43-year period as follows: Jul 359, Aug 266, Sep 241, Oct 105, Nov 111, Dec 109, Jan 101, Feb 105, Mar 116, Apr 145, May 202 and Jun 166. Blank spaces in any monthly column of this and any following table of Jenny Lake data indicate that no new nuthatches were captured during the banding sessions conducted that month.

Table 2 expands the captured population to include repeat captures of any previously banded or returned bird reflecting the total number of individuals captured each month. In each month, a repeat bird is counted only once for that month regardless of the number of its captures during that month, and is counted similarly in subsequent months for as many months as it was captured.

Table 3 summarizes the number of birds banded as well as recaptured annually as returns. As an example, in 1974-75 the 12 birds returned after one year of banding came from the cohort of 64 banded in 1973-74 and the one bird caught four years after banding came from the six banded in 1970-71.

Table 4 is an annual compilation of nuthatches never recaptured based on their month of banding. These birds are assumed to have emigrated or perished.

Table 5 shows the annual sex distribution of HY nuthatches at time of banding from Jun through Nov after which time skull examination no longer differentiated HY from AHY as HYs completed pneumatization (Yunick 1980).

Table 6 extends the annual distribution of sex ratio at time of banding by month of banding to include nuthatches of all ages: HY, AHY as well as Unknown (U, birds captured late in the year after completion of molting and/or skull pnematization).

Table 7 represents a summary of Island Beach, New Jersey, capture data, 1962-1991. Noted are summarized first and last dates of banding operation, first and last dates of bandings of nuthatches as well as a compilation of capture and net-hour information. My files were incomplete lacking summaries for 1970, 1981 and 1982 noted by asterisks in the table.

Table 1. Red-breasted Nuthatches Banded/Returned (B/Rt) by Month at Jenny Lake, New York, for the years 1970-71 through 2012-2013; asterisks indicate months of either no feeding or no banding activity.

Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	B/Rt	Total
70-71	*	1/0	4/0	*	*	*	*	*	*	*	1/0		6/0	6
71-72	2/1	2/0	1/0		2/0		*	*	14/0	5/0	1/0		27/1	28
72-73		1/0	4/0	1/0	3/0	1/0			4/0	0/1	1/0		15/1	16
73-74		6/0	2/0		1/0	9/2	14/1	11/1	13/0	4/0		4/0	64/4	68
74-75		5/0	4/1		2/0	2/0			1/4	2/2	1/4	3/2	20/13	33
75-76	5/7	18/10	5/1	2/2	1/0		0/2	0/1	2/0			2/0	35/23	58
76-77	8/4	2/0	9/2							1/0			20/6	26
77-78		7/0	7/2		4/0	6/1		10/1	5/0	5/0	0/1		44/5	49
78-79	6/2	1/0	3/0	1/1			1/1	0/4	2/1	1/0			15/9	24
79-80	4/4	13/0					0/2		3/2				20/8	28
80-81	3/4	11/2	8/0	6/0	3/0	11/0	23/2	23/2	3/0	1/0	1/1	6/0	99/11	110
81-82	2/2	9/3	4/0	0/1	1/1	0/1	3/2	0/1	2/0	0/1			21/12	33
82-83		11/0	1/0	1/2	2/0	5/0	1/1	1/0	2/1	1/1			25/5	30
83-84	1/0	6/3	4/2	3/1			1/0	0/1	1/0		2/0		18/7	25
84-85	1/0	3/0	1/0			1/0	1/1			1/1		3/0	11/2	13
85-86	1/0	4/0	10/2	0/1	1/0	3/0	6/0	6/0	7/0	1/0		4/0	43/3	46
86-87		4/2	3/2		0/1		2/0	4/0	3/1	1/2			17/8	25
87-88	4/0	2/1	1/0			1/1	1/0	5/1	7/2	3/0			24/5	29
88-89	17/4	9/1	22/5	1/2			0/1	1/0	3/0		1/0		54/13	67
89-90	3/1	15/2	3/1	2/3	1/0	3/3	4/1	6/2	2/2	8/1	4/0	2/0	53/16	69
90-91	7/4	25/4	10/0	1/0	3/0	6/1	3/2	2/0	6/0	10/3	2/0	2/0	77/14	91
91-92	8/0	19/6	3/4	1/0					4/2	3/0	0/1		38/13	51
92-93	3/5	5/5	6/2	5/0			0/1		2/1	3/0	2/0	6/0	32/14	46
93-94	7/0	32/1	7/0			8/1	11/2	10/0	19/1	17/0	2/1		113/6	119
94-95	3/3	1/0	6/0	1/0				2/0	2/0			6/0	21/3	24
95-96	8/5	22/6	23/3	2/0	2/1	2/0	0/1	1/0		1/0	3/0		64/16	80
96-97	6/3	12/2										6/0	24/5	29
97-98	5/7	13/2	9/0	0/2	2/0		3/0	4/1	1/0	1/0			38/12	50
98-99	1/1	9/2	9/0		1/1		0/1			2/4		5/1	27/10	37
99-00	25/7	33/4	9/1	3/0	1/0	1/0				6/0	4/0		82/12	94
00-01	9/4	5/0										6/0	20/4	24
01-02	1/0	7/4	4/5	4/2	2/1	2/0	1/0	1/0	2/0	1/1	1/0	1/0	27/13	40
02-03	4/3	16/1	5/2	0/1			1/0	1/1	0/1	0/1	0/1		27/11	38
03-04	8/1	4/4	1/0		2/0	4/0	2/0	7/1	6/0	11/1		4/0	49/7	56
04-05	1/1	0/5	6/7		3/3	1/1			2/1	3/0	2/0	2/0	20/18	38
05-06	11/1	16/2		6/0	20/2	9/1	11/2	4/1	3/1	2/1	1/0	2/0	85/11	96
06-07	9/9	11/2	2/1	0/2		1/0			0/1	3/2		3/0	29/17	46
07-08	10/5	11/2	11/4	2/0	3/1	0/1	1/1		1/0	1/0	2/0	10/0	52/14	66
08-09	6/8	6/1	5/0		1/0	1/0	2/1	5/1	6/3	2/0		5/0	39/14	53
09-10	5/6	5/0	2/0							1/1	1/0	7/0	21/7	38
10-11	4/4	5/3	17/1	3/0	4/0	2/0	3/0		1/0	2/1	1/0		42/9	51
11-12	6/0	3/2				1/0	3/0		1/1		1/0	2/0	17/3	20
12-13	2/8	3/0	1/4	6/3	6/1	4/1		2/0	2/0	1/0		1/0	28/17	45
Total														
B	206	393	232	51	71	84	98	106	132	104	34	92		1604
Rt.	114	82	52	23	12	14	25	19	25	24	9	3		402
Rt. %	35.6	17.3	18.3	31.1	14.5	14.3	20.3	15.2	15.9	18.8	20.9	3.2		20.0

Table 2. Total captures of individual Red-breasted Nuthatches (bandings, returns and repeats) by month at Jenny Lake, New York, for the years 1970-71 through 2012-13; asterisks indicate months of either no feeding or no banding activity.

Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
70-71	*	1	4	*	*	*	*	*	*	*	1		6
71-72	3	3	2		2		*	*	15	9	2		36
72-73		1	4	1	4	1	1	1	4	1	2		20
73-74		6	2	1	2	16	24	26	27	27	6	7	144
74-75		5	7	3	4	4	2	3	6	8	9	10	61
75-76	12	11	14	7	8		9	6	2		3	2	74
76-77	12	2	13				1		1	1	1		31
77-78		7	11	1	6	12	1	13	13	14	2	2	82
78-79	8	2	4	3	1	2	5	5	7	3			40
79-80	8	10	8	2	3	1	3	1	7	5	1		49
80-81	7	15	9	6	4	15	39	49	19	12	8	8	191
81-82	4	13	7	5	6	6	6	4	7	5	1	1	65
82-83		11	4	7	7	9	6	9	10	11	5	2	81
83-84	1	9	12	11	3		2	2	5	5	3		53
84-85	1	3	1			2	4	2		2	2	4	21
85-86	1	4	13	2	6	6	11	10	19	13	3	8	96
86-87		6	8	2	3		3	10	10	7	2	1	52
87-88	4	4	1			2	3	10	19	16	11	6	76
88-89	21	16	36	14	8	6	5	5	13	9	11	6	150
89-90	4	18	10	13	8	11	13	22	20	34	17	9	179
90-91	11	32	17	1	6	17	20	13	9	34	8	9	177
91-92	8	26	15	7	7	2	3	5	9	16	14	9	122
92-93	8	13	17	16	4	4	4	5	10	11	10	9	110
93-94	7	37	10			14	25	17	44	49	7	1	211
94-95	6	2	8	4	3	3	4	7	6	4	3	13	63
95-96	13	35	40	16	18	7	7	5	5	5	5	2	158
96-97	9	21	1				1				1	10	43
97-98	12	19	15	8	6	3	11	11	7	4	2	3	101
98-99	2	12	19	3	4	3	8		1	13	9	14	88
99-00	32	49	27	17	9	4	2	5	4	12	7	4	172
00-01	13	8	2									6	29
01-02	1	11	17	17	10	9	10	4	8	6	6	4	103
02-03	7	20	15	9	4	2	8	5	5	5	7	3	90
03-04	9	13	6		4	10	5	15	12	33	5	7	119
04-05	2	5	14	6	12	9	2	4	8	7	9	7	85
05-06	12	21		11	39	36	44	36	34	21	13	18	285
06-07	18	15	7	5	2	3	2	2	2	9	6	8	79
07-08	15	16	23	15	15	5	3	3	4	8	4	13	124
08-09	14	10	7		1	3	6	14	19	7	4	11	96
09-10	11	10	3							2	5	10	41
10-11	8	10	26	10	14	5	12	6	14	11	3	4	123
11-12	6	8				2	4	4	5	3	3	6	41
12-13	10	6	11	17	18	13	8	12	9	12	3	2	121
Total	320	546	470	240	251	247	327	351	419	454	224	239	4088

Table 3. A summary of Red-breasted Nuthatch bandings and return captures showing return capture history after banding at Jenny Lake, New York, for the years 1970-71 through 2012-13.

Year	Banded		Returned		Returned, Years After Banding					
	N	%	N	%	1	2	3	4	5	6
70-71	6	100	0	0						
71-72	27	96.4	1	3.6	1					
72-73	16	94.1	1	5.9	1					
73-74	64	94.1	4	5.9	3	1				
74-75	20	60.6	13	39.4	12			1		
75-76	35	60.3	23	39.7	8	15				
76-77	20	76.9	6	23.1	1	2	3			
77-78	44	89.8	5	10.2	1			4		
78-79	15	62.5	9	37.5	7				2	
79-80	20	71.4	8	28.6	4	4				
80-81	99	90.0	11	10.0	8	2	1			
81-82	21	63.6	12	36.4	9	2	1			
82-83	25	83.3	5	16.7	2	2		1		
83-84	18	72.0	7	28.0	6	1				
84-85	11	84.6	2	15.4		2				
85-86	43	93.5	3	6.5	2	1				
86-87	17	68.0	8	32.0	6	1	1			
87-88	24	82.8	5	17.2	3	2				
88-89	54	80.6	13	19.4	7	3	1	1		1
89-90	53	76.8	16	23.2	8	4	2	1		1
90-91	77	84.6	14	15.4	7	3	2	1	1	
91-92	38	74.5	13	25.5	8	4	1			
92-93	32	69.6	14	30.4	6	5	2	1		
93-94	113	95.0	6	5.0	2	2	2			
94-95	21	87.5	3	12.5	2		1			
95-96	64	80.0	16	20.0	10	4		1	1	
96-97	24	82.8	5	17.2	3	2				
97-98	38	76.0	12	24.0	8	3	1			
98-99	27	73.0	10	27.0	5	3	1	1		
99-00	82	87.2	12	12.8	6	2	2	1	1	
00-01	20	83.3	4	16.7	3	1				
01-02	27	67.5	13	32.5	3	7	2		1	
02-03	27	71.1	11	28.9	7	1	2	1		
03-04	49	87.5	7	12.5	2	3		2		
04-05	20	52.6	18	47.4	12	2	3		1	
05-06	85	88.5	11	11.5	8	3				
06-07	29	63.0	17	37.0	13	3	1			
07-08	52	78.8	14	21.2	5	8	1			
08-09	39	73.6	14	26.4	11	1	1	1		
09-10	21	75.0	7	25.0	5		1	1		
10-11	42	82.4	9	17.6	3	4		1		1
11-12	17	85.0	3	15.0	1		2			
12-13	28	62.2	17	37.8	5	8		1	2	1
Total	1604	80.0	402	20.0	224	111	34	20	9	4

Table 4. Monthly totals of Red-breasted Nuthatches never recaptured that were banded at Jenny Lake, New York, for the years 1970-71 through 2012-13; asterisks indicate months of either no feeding or no banding activity.

Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
70-71	*		3	*	*	*	*	*	*	*	1		4
71-72		2	1				*	*	8	5	1		17
72-73		1	3		2				3				9
73-74		2				1	2	1	4	2		3	15
74-75		3	2			1			1	1		1	9
75-76	3	11	4	1					1			2	22
76-77	5	1	8										14
77-78		4	5		1	1		5		3			19
78-79	5		2							1			8
79-80	2	5	5						1			3	16
80-81	1	4	4	4	1	1	6	12	1	1		4	39
81-82	1	5	1						1				8
82-83		5	1		1								7
83-84	1	1	4	1							1		8
84-85		2	1							1		2	6
85-86	1	3	7					1	2			3	17
86-87		2	1						1	1			5
87-88	1	1							1	1			4
88-89	8	2	10	1				1					22
89-90	2	7		1				1		2	4	1	18
90-91	2	8	5	1			1	1		3	1	2	24
91-92	5	9	1							1			16
92-93	1	2		1						2	1	6	13
93-94	3	16	5			2	3	1	3	7	1		41
94-95	2		1						1			5	9
95-96	3	14	11	2						1			31
96-97	3	3										4	10
97-98	3	8	4						1	1			17
98-99		2	5									4	11
99-00	7	16	7							2			32
00-01	4	4										5	13
01-02	1	3	1						1	1	1	1	9
02-03	2	7	1					1					11
03-04	3		1					1	1	4		4	14
04-05	1		4		1						2		8
05-06	3	6		1	3		2			1		1	17
06-07	4	5	1			1				2		1	14
07-08	4	7	5						1	1		1	19
08-09	3	2	3					1	3	2		4	18
09-10	1	1	2							1	1	6	12
10-11	4	2	7	1					1	2	1		18
11-12	1	1										2	4
12-13	2	1		2	1	1							7
Total	92	178	126	16	10	8	14	26	36	49	15	65	635
Banded	206	393	232	51	71	84	98	106	132	105	34	92	1604
% Not Recapt.	44.7	45.3	54.3	31.4	14.1	9.5	14.3	24.5	27.3	46.7	44.1	70.7	39.6

Table 5. Sex ratio of newly banded HY Red-breasted Nuthatches, Jun to Nov, at Jenny Lake, New York for the years 1971 through 2013 expressed as Males/Females (M/F). Male percentages below 50% are highlighted in bold font for the 11 years out of the 43 when females outnumbered males.

Year	Jun	Jul	Aug	Sep	Oct	Nov	Total	Male, %
1971				1/0			1/0	100
1972				3/1	0/1		3/2	60.0
1973			2/0			0/1	2/1	66.7
1974	2/1		1/1	2/1			5/3	62.5
1975	1/1	1/2	9/5	0/2	1/0		12/10	54.5
1976	0/2	4/4	0/1	5/3			9/10	47.4
1977			4/3	2/1		2/0	8/4	66.7
1978		1/5	0/1	2/1			3/7	30.0
1979		3/1	4/2	3/1			10/4	71.4
1980	8/3	1/1	8/3	3/5	1/2	0/1	21/15	58.3
1981	4/2	1/1	3/3	0/3			8/9	47.1
1982			7/4	0/1		0/1	7/6	53.8
1983		1/0	3/3	3/0			7/3	70.0
1984		0/1	2/1	0/1			2/3	40.0
1985	2/0	0/1	2/1	4/3			8/5	61.5
1986	1/3		3/1	0/1			4/5	44.0
1987		3/1	1/1	1/0			5/2	71.4
1988		8/7	4/5	13/8			25/20	55.6
1989		2/1	7/8	1/2	2/0	1/0	13/11	54.2
1990	1/0	3/1	12/12	6/3	1/0	0/2	23/18	56.1
1991	2/0	5/3	11/7	0/3			18/13	58.1
1992		2/1	3/2	2/3	1/0		8/6	57.1
1993	2/3	3/3	17/10	4/3			26/19	57.8
1994		2/1	1/1	0/5	1/0		4/7	36.4
1995	5/1	5/2	11/7	5/10	1/1		27/21	56.3
1996		2/4	6/6				8/10	44.4
1997	5/2	3/2	8/0	3/0			19/4	82.6
1998		0/1	7/2	4/5		0/1	11/9	55.0
1999	2/1	7/15	9/6	4/1	3/0		25/23	52.1
2000		1/6	3/2				4/8	33.3
2001	2/3	1/0	1/2		1/0		5/5	50.0
2002	1/0	4/0	10/5	2/1			17/6	73.9
2003		4/4	3/1	0/1			7/6	53.8
2004	3/1	1/0	3/1				7/2	77.8
2005	1/0	5/2	9/6		5/1	5/4	25/13	65.8
2006	0/1	2/7	5/6	1/0			8/14	36.4
2007	1/0	8/0	3/2	2/1			14/3	82.4
2008	5/2	1/4	2/4	1/4		1/0	10/14	41.7
2009	1/4	2/3	4/1	2/0			9/8	52.9
2010	2/5	2/1	1/0	3/4			8/10	44.4
2011		4/2	2/1				6/3	66.7
2012	1/1	1/1	1/0	1/1			4/3	57.1
2013			1/0	1/1	0/1		2/2	50.0
Total	52/36	93/88	193/127	84/80	17/6	9/10	448/347	56.3
% M	59.1	51.4	60.3	51.2	73.9	47.4	56.3	

Table 6. Monthly sex ratio of all Red-breasted Nuthatches banded at Jenny Lake, New York for the years 1970-71 through 2012-13 expressed as Males/Females (M/F). Male percentages below 50% are highlighted in bold font indicating those years when females outnumbered males.

Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total	M, %
70-71		1/0	1/3										2/3	40.0
71-72	1/1	1/1	1/0		1/1				11/3	4/1	1/0		20/7	74.1
72-73		1/0	4/1	0/1	2/1	1/0			1/3		1/0		10/6	62.5
73-74		3/3	1/1		0/1	8/1	7/7	8/3	5/8	2/2	2/2		36/28	56.3
74-75		3/2	2/2		0/2	1/1			1/0	1/1	1/0	1/1	10/9	52.6
75-76	3/2	11/7	2/3	1/1	1/0				2/0			0/2	20/15	57.1
76-77	4/4	1/1	6/3							0/1			11/9	55.0
77-78		4/3	6/1		4/0	4/2		5/5	4/1	3/2			30/14	68.2
78-79	1/5	0/1	2/1	0/1			1/0		1/1	1/0			6/9	40.0
79-80	3/1	5/3	4/1						1/2			9/3	22/10	68.8
80-81	1/2	8/3	3/3	3/3	2/1	6/5	14/7	8/15	2/1	0/1	1/0	4/2	52/43	54.7
81-82	1/1	5/4	0/4		1/0		1/2		1/1				9/12	42.9
82-83		7/4	0/1	0/1	0/2	3/2	1/0	1/0	0/2	1/0			13/12	52.0
83-84	1/0	3/3	3/1	1/2			0/1		1/0		1/1		10/8	55.6
84-85	0/1	2/1	0/1			1/0	0/1		0/1			2/1	5/6	45.5
85-86	0/1	3/1	6/4		1/0	2/1	4/2	1/5	4/3	1/0		1/3	23/20	53.5
86-87		3/1	1/2				2/1	1/3	3/0	1/0			11/7	61.1
87-88	3/1	1/1	1/0			0/1	1/0	4/1	5/2	2/1			17/7	70.8
88-89	8/7	4/5	12/9	1/0				0/1	2/1		1/0		28/23	54.9
89-90	2/1	7/8	1/2	2/0	1/0	1/2	2/2	4/2	1/1	3/5	3/1	2/0	29/24	54.7
90-91	4/2	13/12	7/3	1/0	1/3	6/0	2/1	1/1	3/3	4/6	1/1	2/0	45/32	58.4
91-92	5/3	11/8	0/3	1/0					2/2	2/1			21/17	55.3
92-93	2/1	3/2	3/3	3/2					2/0	1/2	1/1	2/4	17/15	53.1
93-94	3/4	19/13	4/3			6/2	7/4	7/3	14/5	10/7	1/1		71/42	62.8
94-95	2/1	0/1	1/5	1/0				2/0	1/1			5/1	12/9	57.1
95-96	6/2	14/8	9/14	1/1	2/0	2/0		0/1		1/0	1/2		36/ 28	56.3
96-97	2/4	6/6										5/2	13/12	52.0
97-98	3/2	13/0	7/1		2/0		1/2	2/2	0/1	1/0			9/8	78.4
98-99	0/1	7/2	4/5		0/1				0/2			2/3	13/14	48.1
99-00	8/16	21/12	8/1	3/0	1/0	1/0			5/1	3/1			50/31	61.7
00-01	1/8	3/2										2/3	6/13	31.6
01-02	1/0	2/5	2/2	3/1	1/1	1/1	1/0	0/1	2/0	1/1	1/0	1/0	16/12	57.1
02-03	4/0	10/6	2/3				1/0	1/0					18/9	66.7
03-04	4/4	3/1	0/1		1/1	1/3	0/2	2/4	3/3	5/6		3/1	22/26	45.8
04-05	1/0		4/2		1/3	1/0			2/0	1/2	2/0	1/1	13/8	61.9
05-06	5/4	8/7		5/1	11/9	4/5	5/6	0/4	2/1	1/1	0/1	2/0	43/39	52.4
06-07	2/7	5/6	2/0			0/1			2/1			1/2	12/17	41.4
07-08	9/1	8/3	8/3	1/1	2/1		1/0		0/1	1/0	1/1	7/4	38/15	71.7
08-09	2/4	2/4	1/4		1/0	1/0	2/0	4/1	4/2	1/1		1/4	19/20	48.7
09-10	2/3	4/1	2/0							1/0	0/1	2/5	11/10	52.4
10-11	1/2	4/1	12/5	1/2	2/2	1/1	3/0		1/0	1/1	1/0		27/14	65.8
11-12	4/2	2/1				0/1	1/2		1/0		0/1	1/1	9/8	52.9
12-13	1/1	2/1	1/0	3/3	4/2	3/1		2/0	1/1	1/0		0/1	18/8	64.3
Total	100	233	133	31	42	54	57	53	83	58	21	58	923	
%M	50.3	60.2	56.8	60.8	57.5	64.3	58.8	50.5	59.8	62.9	63.6	55.8	57.5	57.5

Table 7. Red-breasted Nuthatch (RBNU) capture data, 1962-1991, from Island Beach State Park, South Seaside Park, Ocean County, New Jersey.

Year	Dates of Operation First	Last	Dates of Banding First	Last	Season Tot. Banded	Daily Max.	Max. Date	Season Net-hr	RBNUper 1000 N-h
1962	24Aug	4Nov	12Sep	23Oct	23	4	30Sep	28,836	0.80
1963	2Aug	27Oct	25Aug	26Oct	725	55	23Sep	35,362	20.5
1964	24Aug	1Nov	7Sep	19Oct	9	2	1/3Oct	*	*
1965	9Aug	31Oct	13Aug	31Oct	201	17	26Sep	19,371	10.4
1966	13Aug	31Oct	2Sep	30Oct	38	6	7Oct	13,941	2.7
1967	26Aug	30Oct	7Oct	30Oct	4	1	4 dates	15,830	0.25
1968	25Aug	30Oct	26Aug	30Oct	504	63	14Sep	14,905	33.8
1969	6Aug	31Oct	27Aug	31Oct	406	76	14Sep	8,952	45.4
1970	*								
1971	4Aug	31Oct	29Aug	29Oct	26	5	22Sep	2,967	8.8
1972	5Aug	29Oct	7Sep	26Oct	172	47	23Sep	3,250	52.9
1973	18Aug	28Oct	8Sep	28Oct	10	2	28Oct	3,939	2.5
1974	31Aug	3Nov	18Sep	31Oct	8	4	27Oct	4,025	2.0
1975	8Aug	2Nov	17Aug	31Oct	266	25 ¹	14Sep ¹	5,189	51.3
1976	15Aug	30Oct	29Aug	30Oct	56	7	25Sep	4,425	12.6
1977	20Aug	30Oct	20Aug	29Oct	104	10	8Oct	3,681	28.3
1978	1Aug	19Nov	27Aug	15Nov	23	7	23Sep	3,877	5.9
1979	6Aug	17Nov	15Oct	15Oct	2	2	15Oct	4,098	0.49
1980	17Aug	9Nov	24Aug	9Nov	47	8	20Oct	3,109	15.1
1981	*								
1982	*								
1983	7Aug	5Nov	13Sep	30Oct	20	6	15Oct	1,976	10.1
1984	12Aug	3Nov	25Oct	25Oct	1	1	25Oct	*	*
1985	10Aug	9Nov	7Sep	27Oct	79	4	14Sep	3,093	25.5
1986	8Aug	1Nov	7Sep	25Oct	153	34	25Sep	5,857	26.1
1987	8Aug	8Nov	16Sep	31Oct	28	5	5/8Sep	5,829	4.8
1988	19Aug	26Nov	11Sep	26Oct	20	5	6Oct	4,701	4.6
1989	29Jul	25Oct	26Aug	25Oct	67	11	30Sep	3,446	19.4
1990	25Aug	11Nov	3Sep	27Oct	41	11	25Oct	3,413	12.0
1991	10Aug	16Nov	7Oct	21Oct	13	4	19Oct	5,922	2.2

¹ In addition to 25 being the maximum daily banding total on 14 Sep., a near maximum of 21 were banded on 28 Aug.

DISCUSSION

After the first few years of this banding project, it became apparent that newly fledged young of several locally breeding species began to appear at the feeders in Jul and it would be appropriate to organize data on an annual basis running from 1 Jul to 30 Jun of the following year. Hence the data in most of the tables were organized in this fashion.

Irruptive Behavior – Monthly capture data in

Table 1 show evidence of apparent irruption that brought increased numbers of wintering birds to Jenny Lake in the years 1973-74, 1980-81, 1990-91, 1993-94 and 2005-06, while in other years the local population was at a low or had migrated from the area as in the years 1976-77, 1978-79, 1979-80, 1983-84, 1984-85, especially 1996-97 and 2000-

01 followed by 2009-10 and 2011-12. When the monthly captures are augmented to include repeat captures denoting the total individuals captured each month as in Table 2, the five years of increased capture noted above remain years of increased numbers while the bleak years of 1976-77, 1996-97, 2000-01, 2009-10 and 2011-12 still remain years of scarcity.

Another perspective on irruptive behavior at Jenny Lake comes from examining data on birds never recaptured at Jenny Lake in Table 4 as well as migration data from an Atlantic coastal site south of Jenny Lake, Table 7, and observations by Ball (1947) at an Atlantic coastal site north of Jenny Lake. Ball's (1947) northerly site was at Forillon on the Gaspé peninsula, Quebec, Canada, at 48° 45' 00.68" N, 64° 10' 00.13" W, 988 km (614 mi) NE of Jenny Lake while Island Beach State Park, New Jersey at latitude/longitude coordinates 395-0740 is 375 km (234 mi) S of Jenny Lake. Island Beach State Park is a 32-km long north-south barrier beach where at times up to a dozen net lanes were in operation scattered latitudinally lacking one precise location, hence the use of the generic degree block coordinates 395-0740 used by the Bird Banding Laboratory of the U. S. Geological Service.

Ball (1947) noted first appearance dates of Red-breasted Nuthatches at Forillon, 1937-1941, over the date range of 13 Jul – 2 Aug, average date 25 Jul with large flights on 13 Jul 1937 and 15 Aug 1941. The Island Beach data in Table 7 show a wide variation in annual capture rates of birds/1000 net-hrs typical of an irruptive species. By extracting data from the top ten years in Table 7, capture yields were 15.5 to 52.9 birds/1000 net-hrs; the first dates of capture ranged 17 Aug to 7 Sep, average 25 Aug; and the dates of daily maximum captures ranged 14 Sep to 20 Oct, average 24 Sep.

Now, considering Table 4 depicting banded birds at Jenny Lake which were never recaptured, the greatest percentage never recaptured, 70.7 percent, occurred in Jun when 84.6 percent of the birds banded were newly fledged HYs and their lack of recapture can be attributed most likely to mortality. Jul and Aug bandings were 91.0 and 81.6 per-

cent HY, respectively; and 44.7 and 45.3 percent, respectively were never recaptured, possibly a mixture of HY mortality and presence of irruptive migrants. By Sep, the percentage of HY birds in the banded sample drops to 70.1 while the percentage of those birds never recaptured rises to 54.3 percent, most likely representing passing irruptive migrants.

One notable example of Mar and Apr return migration occurred in 1994. The winter of 1993-94 had been a good irruption year based on the data in Tables 1 and 2. Between 2 Mar and 9 Apr, 33 nuthatches were banded on five dates and only one was ever recaptured beyond Apr into 1995 and 1996. Seven were never recaptured at all while the other 25 were recaptured only as repeats within Mar and Apr, 1994 and never beyond.

In summary, the larger numbers of bandings in Aug and Sep coupled with high percentages of non-recaptures of these birds at Jenny Lake in that time period comports with the earlier dates of irruptive activity in Jul-Aug at the northerly site at Gaspé, Quebec, and the Aug-Sep peak movement at the southerly site at Island Beach State Park, New Jersey, supporting the conclusion that some years irruptive Red-breasted Nuthatches pass through Jenny Lake. Winter data indicate in some other years they come to Jenny Lake to spend the winter. In some few winters they are nearly totally absent.

Return Rates, Sex Ratio and Longevity – From among the 1604 nuthatches banded in this study, 402 of them (20.0 percent) were recaptured one or more times as return birds in a following year. The monthly distribution of these recaptures is represented at the bottom of Table 1 and was highest at 35.6 percent in Jul as birds that nested locally in Apr-Jun began returning to the feeders to feed young. The lowest return rate of 3.2 percent occurred among birds banded in Jun, a high percentage of which were HYs, probably reflecting high mortality. Return rates differed considerably between males (M) and females (F) as did the numbers originally banded. The M/F ratio of 795 banded HYs (representing 49.6 percent of the 1604 nuthatches

banded) was 56.3 percent male (Table 5). In only 11 of the 43 years did HY/Fs outnumber HY/Ms. In the entire banded population (HY and AHY) of 1604 nuthatches, 57.5 percent were male and in only eight of the 43 years did females outnumber males, most notably in 2000-01 when not a single nuthatch was captured Oct-May. The return rate on 922 banded males was 21.3 percent (n=196) compared to 18.5 percent (n=126) on 681 banded females. Among the total 322 returns, the male percentage was 60.9 percent, even higher than the 57.5 percent males at time of banding. Only four return females out of 126 returns (3.2 percent) reached five years or older, while 13 of 196 male returns (6.6 percent) were as old.

When the capture histories of these return birds are examined further, males are longer lived than females. The oldest male in this study was banded 19 Feb 1983 as an AHY/M and reported killed Aug 1989 by a cat about 400 m from where banded making it at least 7yr-2mo old. The oldest female banded 22 Oct 1978 as an AHY was last captured and released 24 Dec 1982 making her at least 5yr-6mo old. The longevity data base of the Bird Banding Laboratory (2017) lists records of 5yr-8mo (sex unknown) from Vermont, 6yr-6mo from Wisconsin and 6yr-9mo from Pennsylvania, the latter two male. Klimkiewicz et al. (1983) list another male banded 11 Jan 1962 and trapped and released 13 Dec 1968 where banded on Mt. Desert Island, Maine, age 7yr-6mo.

Male captures appeared to be more prevalent than females at the feeders. Both sexes were extremely tame and allowed close human approach and were in some cases repeatedly recaptured, males more so than females. The five individuals of both sexes with the most repeat captures were as follows (see below) showing the number of recaptures following banding over the time span in yr-mo from banding to last recapture.

Timing of Fledging – The dates of capture of each year's first HY Red-breasted Nuthatches were analyzed. Dates were grouped by five-year periods (1971-75, 1976-80, etc.) and the average date plotted against the eight five-year periods from 1971 to 2010 in Fig. 1. They show a trend of progressively earlier capture of these birds at these feeders especially so recently in 2001-05 and 2006-10. These data showing an advance in timing of fledging are new for this nesting species, perhaps a manifestation of climate change. The earliest date was 10 Jun 2006, latest 2 Sep 1972 (next latest 19 Aug 2013). Twenty-two of those dates were in Jun, 13 in Jul, four in Aug and one in Sep. In the last two five-year periods, 2001-05 and 2006-10, nine of the ten dates occurred in Jun, the tenth date on 4 Jul. Sommers (2008) as part of the New York state Breeding Bird Atlas shows egg dates of 30 Apr-17 Jun, nestlings 25 Apr-18 Jul and fledglings 10 May-19 Aug.

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Female		Male	
No. of Recaptures	Time Span	No. of Recaptures	Time Span
29	3-6	55	4-1
25	1-5	30	2-7
23	4-8	29	4-3
21	5-2	29	6-11
18	2-4	29	6-1

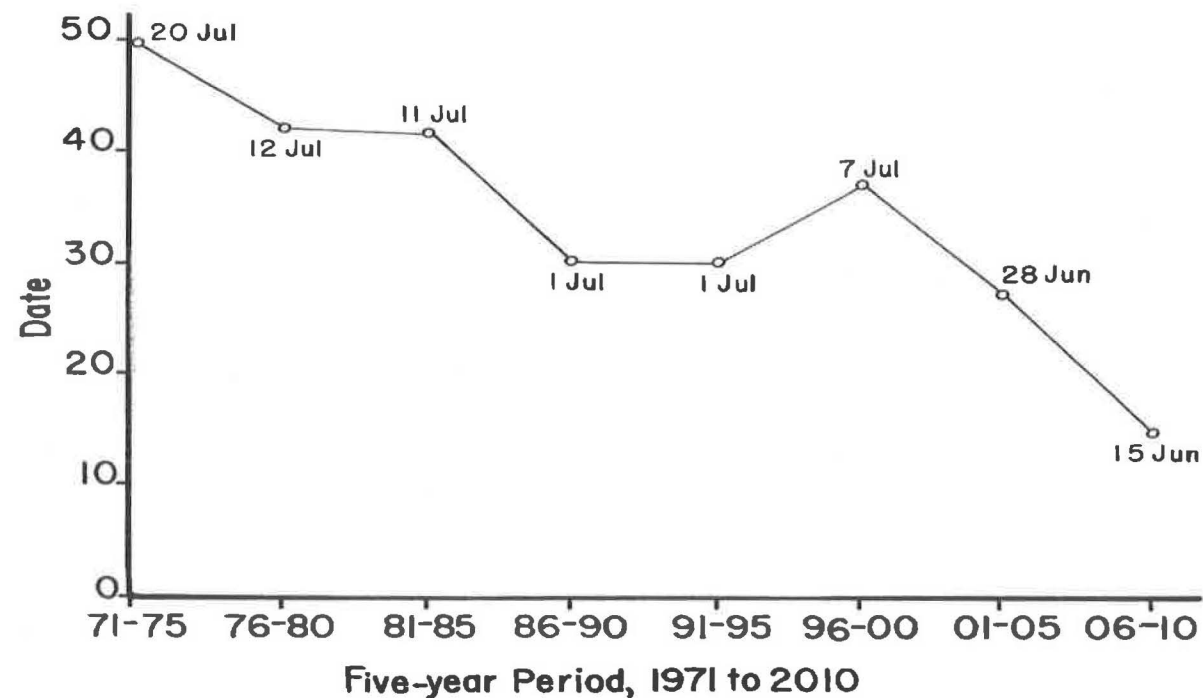


Fig. 1. Dates of first capture of newly fledged Hatching-Year Red-breasted Nuthatches at Jenny Lake, New York. First-capture dates were grouped into five-year periods and averaged for each of eight five-year periods from 1971-75 to 2006-10 and plotted by date on the left axis where 1 Jun represents Day 1 and 20 Jul represents Day 50.

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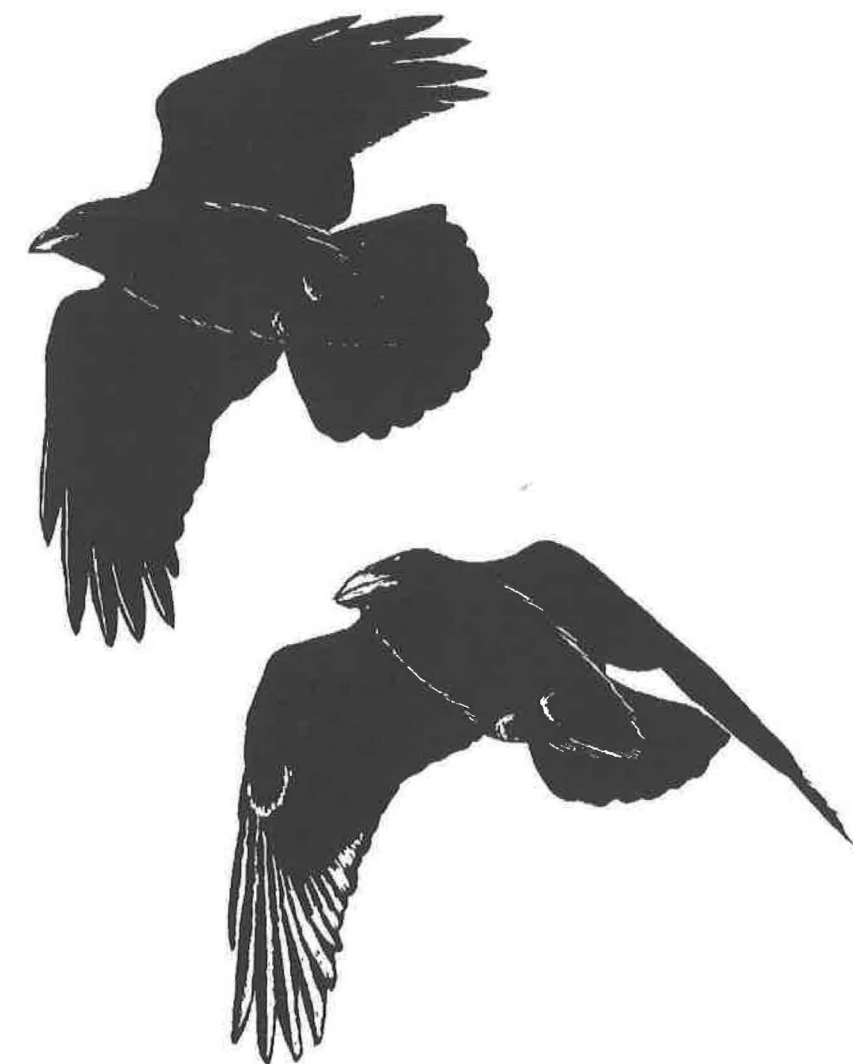
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Common Ravens by
George West