
Evidence of Irruptive Movements of the Downy Woodpecker (*Dryobates pubescens*)

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ABSTRACT

A review of extensive banding data on the Downy Woodpecker (Dryobates pubescens) from a coastal New Jersey site at Island Beach State Park from 1962 to 2009 in the Fall and 1993 to 2010 in the Spring; as well as 1970 to 2018 annual data from an Adirondack State Park location at Jenny Lake in Saratoga County, New York, suggest the species is an irruptive migrant. Previous studies designated it as a resident or, when re-encountered elsewhere, subject to long-range dispersal.

INTRODUCTION

The Downy Woodpecker (*Dryobates pubescens*; hereafter downy) is a widespread resident breeding woodpecker in North America (Jackson and Ouellet, 2002) and was found in 88% of the 2000-2005 New York State Breeding Bird Survey blocks (McGowan, 2008). Those blocks where it was not present were among the highest elevations of the Adirondack Mountains in northern New York and Allegany hills of southwestern New York. Bull (1974) regarded it as a “common migrant” along the Long Island, New York, coast and described several instances of New York-banded woodpeckers found elsewhere, or banded elsewhere found in New York at distances of 170, 450 and 800 miles (272, 720, and 1280 km). In an extensive review of banding data on this species, Browning (1995), and discussed further by Jackson and Ouellet (2002), concludes that there is no demonstration of a two-way connection required of a true migrant. They suggest these reported fall movements may be examples of dispersal, not migration.

In the time period Aug 2014 to Mar 2015 at my Adirondack Mountain banding station, I banded 17 downies representing 5.2 times the average of 3.3 banded per year over the entire 48 years of banding at this location, 1970-2017. That event, coupled with extensive banding experience in

spring and fall at Island Beach State Park, a coastal barrier beach along the Atlantic coast of New Jersey, prompted a review of spring and fall Island Beach data as well as Jenny Lake annual data in an attempt to shed further insight on the movements of this species.

METHODS

Jenny Lake – Banding was conducted starting in Aug 1970 in Adirondack State Park at Jenny Lake, 7 km west of the village of Corinth, 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 late June through early September, I was either in residence or visiting regularly on weekends; during May, early June and late September I visited the study site on weekends. During Oct-Apr, excluding 1970-1972, I made visits at intervals of 6-15 days to refill feeders and conduct banding sessions. Three sunflower seed feeders were employed during the 1970-2018 summer seasons, and once a snow-proof feeder design was developed, it was employed in the 1973-2018 winter seasons assuring an uninterrupted supply of seed through the course of the study. Each feeder had a 6-m or 12-m mist net within 1-2 m of the feeder in Oct-Apr, and in other months an additional three 12-m nets were within 10 m of the feeders.

Banding sessions lasting typically a minimum of 2 hr, longer if feeding activity continued, were conducted every month of the year except during the winter months of 1970-1971 and 1971-1972 before I had devised and employed a winter snow-proof feeder. The number of banding sessions conducted per month beginning in June when newly fledged juveniles began to appear were as follows: Jun, 185; Jul, 381; Aug, 387; Sep, 257; Oct, 112; Nov, 125; Dec, 122; Jan, 117; Feb, 119; Mar, 128; Apr, 165; and May 218 for a total

of 2,316 banding sessions. Annual data were similarly represented on a 1 Jun-31 May basis, for example 1 Jun 2017 through 31 May 2018 would be represented as the year 2017-2018, and other years accordingly.

Island Beach State Park – The late Elise M. Dickerson commenced a fall banding program at Island Beach in 1956 (Dickerson 1958) within the scope of the “Operation Recovery” cooperative program begun by the late Chandler S. Robbins for banding stations along the East Coast. The Park is 17.3 km long and varies from 0.7 to 1.6 km wide situated on a north-south barrier beach with the Atlantic Ocean to the east and Barnegat Bay to the west. It was accessed from Central Avenue in the municipality of South Seaside Park, Ocean County, New Jersey. Leck (1972) and Martin (1959) described the park habitat. Varying numbers of east-west net lanes were operated in the fall by licensed banders continuously since 1956 and in the spring since 1968. The net lanes occur in two adjoining 10-minute latitude-longitude blocks: 394-0740 and 395-0740.

Participating banders submitted to the station coordinator daily results consisting of numbers of species and individuals captured as well as net-hr of capture effort which were combined to create an annual fall and annual spring summary from which data were extracted for this analysis. A net-hr is defined as a 12-m net in use for one hr. My involvement in the fall banding began in 1964 continuing to date and in spring from 1993.

RESULTS

Jenny Lake – There were 156 downy Woodpeckers banded over the 48-yr period, 1970-2017, in 2,316 banding sessions - results are summarized in Table 1, (*please see Appendix for Tables*) averaging 3.3 per year. November was the month of greatest number banded: 37 or 23.7% of the total (in 125 banding sessions, 5.4% of the total sessions), while in Nov-Jan, the time of peak abundance, the total was 75 bandings or 48.1% of the total banded (in 364 banding sessions, 15.7% of the total sessions). Of the 155 banded through 2016-2017 with an opportunity to return through 2017-2018, 44 individuals (28.4% of those banded) were

captured as return birds (summarized in Table 2). A return is defined as a recapture of a banded bird more than 90 days after banding or after last recapture. Birds banded in October and November showed the highest return rates of 45.5 and 40.5%, respectively, primarily because an October or November banded bird could be recaptured any time February through March and be considered a return. Such a return is an intra-seasonal return rather than a return that has spanned one or more breeding or migration seasons between captures. Table 3 compares month of banding with month of return recapture.

Further examination of these 44 return captures revealed 11 of them (25.0%) were intra-seasonal recaptures and 33 (75.0%) were birds that had been recaptured after one or more intervening breeding or migration seasons as inter-seasonal recaptures. These 33 birds represent a return rate of 21.3% of the original cohort of birds banded. Seven of the 33 were birds ranging in age from 3yr02mo to 4yr09mo, while the remainder were less than 3yr old.

With regard to the extraordinary banding of 17 downies (5.2 times the annual average) in Aug 2014-Mar2015, several aspects are noteworthy: fifteen of them (88.2%) were recaptured one to nine times each for a total of 62 recaptures through 6 Apr 2015 (one of those 15 was an apparent breeding bird being recaptured in Jun, Jul, and Aug 2015); the remaining 14 were *never recaptured again* through Oct 2019, suggesting they had not dispersed to a Jenny Lake breeding area, rather were migrants. No other group of downy's banded through the 48 years of this study displayed such abundant recapture behavior. Using the return rate of 21.3% noted above, one could reasonably expect this cohort of 14 birds to produce three return recaptures, which so far, four years after the event has not happened, making them extraordinary.

Island Beach/Fall – Table 4 summarizes 44 yrs of fall data out of the 48-year period 1962-2009 when 2,244 (see footnote at bottom of Table 4) downy Woodpeckers were banded based on 2,452 days of banding and 269,222 net-hrs of banding effort. Downy captures averaged 7.92/1000 net-

hrs ranging from 0.51 to 16.97, a factor of 33.3 times. While netting effort varied, being greatest in 1962-1968, less so thereafter in 1969-2009, similar wide variations exist in downy captures year-to-year for both of these periods. The year 1963 was extraordinary in that 600 downies were banded at a record yield of 16.97/1000 net-hrs with a record 57 downies banded on 13 Oct in stark contrast to 1967 when 29 were banded for the entire season at a yield of 1.83/1000 net-hrs and no more than three were caught on any one day.

My participation spanned 54 yrs in the period 1964-2018 (missed 1969) for a total of 432 days of banding, 24,488 net-hr of capture effort, 176 downy Woodpeckers banded for a yield of 7.12/1000 net-hrs close to 7.92/1000 net-hr for the station overall. Dates of my coverage ranged 11 Sep-19 Nov with ca 90% of the dates in Oct. One HY/F banded 21 Oct 1999 was recaptured there as a return on 2 Oct 2001, while another HY/F banded 18 Oct 2005 was collected as a specimen 2Sep2009 at Towanda, Bradford Co., Pennsylvania, ca 290 km northwest of Island Beach.

Island Beach/Spring – While spring banding began at Island Beach in 1968 (Leck 1972), I did not participate until 1993 through 2018, 27 yrs, 192 days of banding, 8,827 net-hrs of capture effort over a range of dates 28 Apr-24 May, all dates but three in May. Two Downies were banded as After-Hatching-Year (AHY) birds: one AHY/F 14May 1996 and one AHY/M 2May2017; total yield, 0.23 birds/1000 net-hrs.

Station records in my possession for 1993-2010 (missing 2003 and 2005) for 16 of the 18 yrs indicate banding coverage ranged 3Mar-14Jun, 489 days of banding (average 31 days/yr, range 22-51), 30,969 net-hrs of capture effort (average 1,936 net-hrs/yr, range 1,061-3,400). Six downies were caught during these 16 yrs, 0.19/1000 net-hrs, all as one per date as follows: 14May1996, 5 Apr1997, 20Apr2000, 18Apr and 22May2008 and 15Apr2010, illustrating the span of dates of their occurrence.

Sex Ratio – The 156 downies banded at Jenny Lake consisted of 88 females (F), 59 males (M) and nine birds (5.8%) of unknown sex, the unknowns being juveniles lacking definitive crown plumage

to classify them as F or M. The F/M ratio of the birds of known sex was 1.49:1 while the F/M ratio of the 44 return captures was 1.59:1. Information on the sexual identity of the 2,244 downies banded in fall at Island Beach was not available, but from the 176 which I banded there the F/M ratio was 0.81:1, reversed in favor of M. The two birds I banded there in spring had a F/M ratio of 1:1.

DISCUSSION

Able (2004) assesses the diverse spectrum of migration patterns of birds. Browning (1995) and others referred to in the Migration section of Jackson and Ouellet (2002) contend the downy is not a migrant species. That conclusion is consistent with Able's (2004) definition of "obligate annual migration." Browning (1995) relies on Gauthreaux (1982) to enhance his argument: "Individuals that moved in an unexpected direction may be dispersing, a behavior Gauthreaux (1982) defined generally as a movement of an individual from its point of origin to a locality where it might reproduce."

The downies that arrived at Jenny Lake during 2014-2015, spent the winter season being repeatedly recaptured then disappeared in Mar and Apr not to be recaptured again did not fit this definition. The six May bandings over 16 yrs at Island Beach suggests little if any breeding at Island Beach despite the erratic and sometimes large fall flights, i.e., 600 banded in fall 1963, 16.97 downies/1000 net-hrs. Banders at Island Beach quickly became familiar with spectacularly heavy fall migrant flights of all species given cold front passage with northerly winds described by Leck (1972). Three personal experiences there demonstrate extraordinary downy concentrations: (1) 25-27 Oct 1972, 10 downies banded in 146 net-hrs for a yield of 68.49/1000 net-hrs; (2) 16 banded 17-24 Oct 1980 in 797 net-hrs for a yield of 20.08/1000 net-hrs; and (3) 9-16 Oct 2007, seven banded in 375 net-hrs for a yield of 18.67/1000 net-hrs. Contrasting with these occasions of abundance there were other years of scarcity. In seven of my 54 yrs there in October and 2,410 net-hrs of capture effort, yielded zero downy captures, and in 16 of those 54 years, only single downies were captured in 7,183 net-hrs of capture effort: a yield of 2.23/1000 net-hrs, well below the 44-yr. annual average of 7.92/1000 net-hrs. Similarly, Table 4

shows a wide variation in annual abundance for the entire Island Beach banding operation.

Further examination of Island Beach downy capture data for the years 1993 through 2010 (when both Fall and Spring data were available) adds another perspective. Below is a listing of the six spring captures compared to the banding yields of the previous fall.

Spring Capture Date	Previous Fall Yield birds/1000 net-hrs
14 May 1996	7.98
5 Apr 1997	2.00
20 Apr 2000	8.31
18 Apr 2008	4.83
22 Apr 2008	4.83
14 Apr 2010	2.95

Two of these years, 1995 and 1999, represent fall capture yields above the 44-yr annual average of 7.92/1000 net-hrs, while the other three years are below that average. This does not suggest that spring bandings at a coastal migration site are necessarily the result of abundant captures the preceding fall.

Looked at from another perspective during this same 1993-2010 period is this comparison of fall/spring-captures for the 10 highest years of fall captures compared to the results of the following spring. Seven of those ten fall maxima yields were followed by yrs of no spring captures.

Year	Fall Yield Birds/1000 net-hrs	Spring Capture
1992	4.01	None
1993	5.63	None
1994	3.15	None
1995	7.98	One, 14May 1996
1997	4.48	None
1999	8.31	One, 20Apr 2000
2001	4.91	None
2006	5.27	None
2007	4.83	Two, 18 Apr and 23 May 2008
2008	5.44	None

All of this poses two questions: (1) Why was there such a mix of occasional extraordinarily high fall concentrations some years as well as other contrasting fall seasons of scarcity at Island Beach; and (2) Why was the species consistently very rare

in May during the breeding season even following preceding years of high fall abundance? Further, the collection two yrs later in Pennsylvania, 270 km NW of Island Beach of one banded in October at Island Beach prompts consideration. When recovered on 2 Sep 2009, this female may or may not have been on its breeding territory, so its migratory status is tentative.

Another migrational strategy described by Able (2004) is irruptive migration as exhibited by certain resident species which respond to declines in local food availability such as seeds (finches, nuthatches and chickadees) or small mammals (tundra predators). Frequently cited examples of the former include Bock and Lepthien (1972) on Red-breasted Nuthatch (*Sitta canadensis*) and Pine Siskin (*Spinus pinus*), Bagg (1969) on Black-capped Chickadee (*Poecile atricapillus*) and Bock and Lepthien (1976) on 10 species: Clark's Nutcracker (*Nucifraga columbiana*), Red-breasted Nuthatch, Bohemian Waxwing (*Bombycilla garrulus*), Evening Grosbeak (*Coccothraustes vespertinus*), Purple Finch (*Haemorhous purpureus*), Pine Grosbeak (*Pinicola enucleator*), Common Redpoll (*Acanthis flammea*), Pine Siskin, Red Crossbill (*Loxia curvirostra*), and White-winged Crossbill (*L. leucoptera*).

The banding data described here for the downy suggest it is an irruptive species, per Able (2004), in at least part of its range, moving some years in large numbers along the Atlantic Coast, not so in others, possibly consistent with Bull (1974) calling it a sometimes migrant along the outer beaches of Long Island, New York. The cause of these irruptive movements is currently unknown and will be left to future researchers to determine. The missing piece to this puzzle remains evidence of true migration data that show individuals move seasonally from point A to point B and back to point A. Such movements could be linked to an irruptive pattern but, thus far, we seem to have evidence for irruptive movements, but not true migration (J.A. Jackson, pers. comm.).

The sex ratio of the downy banded in fall at Island Beach favoring males over females (F/M 0.81:1, n=176) appears to be unique. At my Jenny Lake feeders, the ratio favored females 1.49:1 at time of banding (n=156), 1.59:1 among return captures

(n=44), and 2.40:1 (n=17) during the 2014-15 irruption. At a feeder study in Iowa, Jackson (1970) found females prevailed at 1.75:1 (n=44). His study was conducted during the months of April through August and November and December. Browning (1995) conducted an extensive review of 3,784 re-encounters of banded Downy Woodpeckers in the files of the U. S. Bird Banding Laboratory. There were 20 records of banded birds that moved more than 32 km inter-seasonally within a year or between years (Browning's Table 1). Of known sex at time of banding were 17, 16 of which were female, F/M 16.0:1. There were 13 records of intra-seasonal movement (Browning's Table 2), nine of which were of known sex, F/M 2.0:1. It is not immediately apparent why the sample of Downies banded at Island Beach was skewed in favor of males at F/M 0.81:1.

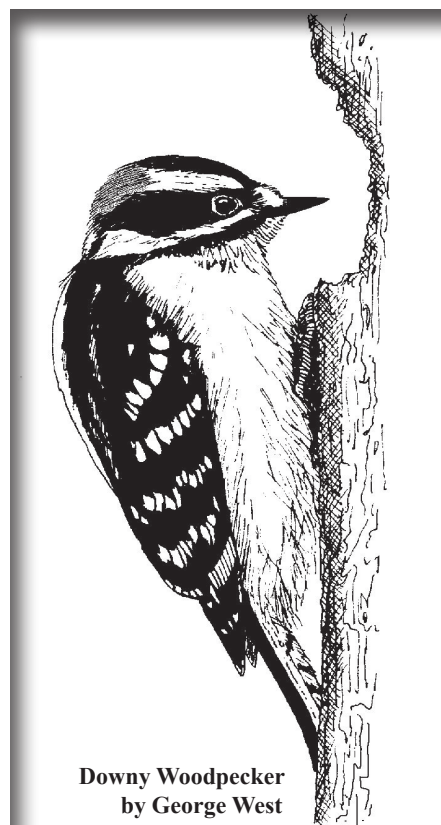
ACKNOWLEDGMENTS

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Appendix

Table 1. Downy Woodpecker bandings at Jenny Lake, Saratoga Co., New York 1970-71 through 2017-18

Year	Month												Total	Five-yr Total
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May		
1970-71													0	
1971-72												1	1	
1972-73													0	
1973-74								1	1				2	16
1974-75	5	2				2	2						11	
1975-76				1		1							2	
1976-77	1	1											2	
1977-78				1		2	1						4	
1978-79			1										1	15
1979-80									2	1			3	
1980-81	2		2		1								5	
1981-82						4	1						5	
1982-83				1	1	1							3	
1983-84						2							2	13
1984-85													0	
1985-86					2	1							3	
1986-87													0	
1987-88			1										1	
1988-89		1		1	1	6							9	18
1989-90	2	1					1	2					6	
1990-91		1				1							2	
1991-92				1									1	
1992-93					1		1	2			1		5	
1993-94						1							1	14
1994-95								1			1		2	
1995-96			2	1	1	1							5	
1996-97				1									1	
1997-98		1	1										2	
1998-99				1			1						2	8
1999-2000					2	1							3	
2000-01													0	
2001-02					1							1	2	
2002-03			1					3					4	
2003-04							3	2					5	17
2004-05			1			1							2	
2005-06				1		1		1	1				4	
2006-07			1			2	1		1				5	
2007-08				1		2							3	
2008-09			2					2	1				5	20
2009-10	1			1		1				2	1		6	
2010-11								1					1	
2011-12			1						1				2	
2012-13						1	1						2	
2013-14													0	29
2014-15			1			5	6	4		1			17	
2015-16		4		1				1			2		8	
2016-17		1	1		1	1					1		5	
2017-18												1	1	
Total	11	12	15	12	11	37	18	20	7	4	6	2	155	

Table 2. Return rates of Downy Woodpeckers banded at Jenny Lake, Saratoga Co., New York based on month of banding, 1970-71 through 2017-18.

Month	No. Banded	No. Returned	% Returned
Jun	11	2	18.2
Jul	12	4	33.3
Aug	15	3	20.0
Sep	12	3	25.0
Oct	11	5	45.5
Nov	37	15	40.5
Dec	18	3	16.7
Jan	20	4	20.0
Feb	7	2	28.6
Mar	4	0	0
Apr	6	3	50.0
May	2	0	0
Total	155	44	28.4

Table 3. A comparison of the month of banding with month of return capture of Downy Woodpeckers banded at Jenny Lake, Saratoga County, New York, banded 1970-71 through 2016-17 and return captured 1971-72 through 2017-18.

Month Banded	Month of Return Capture												Total
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Jun	1					1							2
Jul						1	1	1				1	4
Aug						1	1		1				3
Sep		1			1		1						3
Oct				1				1		3			5
Nov	1	1	1	1	1					5	4	1	15
Dec							1			1	1		3
Jan							1		2			1	4
Feb		1				1							2
Mar													0
Apr				1								2	3
May													0
Total	2	3	1	3	2	4	5	2	3	9	5	5	44

Table 4. Downy Woodpecker bandings at Island Beach State Park, Ocean County, New Jersey in fall, 1962-2009, showing range of dates when banded, season total, total net-hrs, birds/1000 net-hrs, maximum one-day capture with date, and number of total banding days each year.

Year	Dates Banded	No. Banded	Net-hrs	Birds/1000 net-hrs	Max Capture No./Date	Days Banding
1962	25Aug-2Nov	287	28836	9.94	24/16Sep	72
1963	3Aug-27Oct	600	35362	16.97	57/13Oct	83
1964	25Aug-1Nov	111	**	**	9/26Sep	58
1965	10Aug-30Oct	197	19371	10.17	12/19Sep	74
1966	13Aug-31Oct	92	13941	6.6	8/8Oct	65
1967	29Aug-28Oct	29	15830	1.83	3/3dates	65
1968	26Aug-30Oct	193	14905	12.95	17/29Sep	65
1969	16Aug-31Oct	82	8952	9.16	8/28Sep	83
1970	**	**	**	**	**	**
1971	17Aug-31Oct	33	2967	11.12	4/13Oct	75
1972	26Aug-29Oct	28	3250	8.62	12/26Oct	68
1973	27-28Oct	2	3939	0.51	1/27-28Oct	44
1974	11Sep-3Nov	52	4025	12.92	7/27-28Oct	39
1975	23Aug-2Nov	24	5189	4.63	4/7Oct	52
1976	4Sep-30Oct	11	4428	2.48	3/12Sep	48
1977	15Sep-28Oct	20	3681	5.43	5/23Oct	55
1978	3Sep-12Nov	9	4548	1.98	2/29Oct	66
1979	18Aug-10Nov	18	4098	4.39	4/16Oct	74
1980	31Aug-9Nov	42	3435	12.23	6/21Oct	48
1981	**	**	**	**	**	**
1982	**	**	**	**	**	**
1983	2Sep-5Nov	14	1976	7.09	3/17Sep	40
1984	8-Oct	1	1880+	0.53	1/8Oct	55
1985	1Sep-20Oct	18	3093	5.82	3/15Sep	52
1986	16Aug-18Oct	22	5857	3.76	3/23Aug	59
1987	9Aug-8Nov	31	5829	5.32	4/3Oct	57
1988	1Sep-21Oct	45	4701	9.57	8/1Oct	58
1989	27Aug-25Oct	16	3446	4.64	5/24Oct	45
1990	27Aug-28Oct	17	3413	4.98	2/several days	57
1991	2Sep-20Oct	13	5922	2.2	3/15Sep	58
1992	20Aug-7Nov	16	3990	4.01	3/12Oct	54
1993	22Aug-28Oct	23	4085	5.63	5/6Oct	48
1994	27Aug-16Oct	16	5087	3.15	3/27Aug	54
1995	25 Aug-26Oct	25	3131	7.98	3/25Aug	47
1996	15Sep-10Nov	5	2496	2	1/several days	42
1997	2-21Oct	10	2232	4.48	2/8and11Oct	41
1998	29Sep-25Oct	5	3249	1.54	1/5 dates	50
1999	30Aug-28Oct	30	3609	8.31	4/8Oct	35
2000	20-23Oct	2	3242	0.62	1/20Oct	41
2001	8Sep-31Oct	17	3463	4.91	2/23Sep	50
2002	4Sep-22Oct	8	3165	2.53	2/21Oct	45
2003	1Oct-2Nov	2	2388	0.84	1/1Oct2Nov	46
2004	**	**	**	**	**	**
2005	22Aug-7Nov	12	2144	5.6	2/18and29Oct	63
2006	12Aug-5Nov	23	4361	5.27	2/several days	64
2007	19Aug-14Nov	18	3726	4.83	4/14Oct	56
2008	16Aug-12Nov	18	3306	5.44	6/24Oct	54
2009	14Sep-29Oct	7	2374	2.95	2/11Oct	47
44 Years	3Aug-14Nov	2133	269,222	7.92		2452

** indicates no data available that year

The actual total banded was 2244, but since there were no net-hrs reported for 1964, 111 birds were subtracted from the total giving 2133 for calculating the 7.92 overall birds/1000 net-hrs