Fall 1999

AUTUMN MIGRATION OF THE NORTHERN SAW-WHET OWL ON THE LOWER DELMARVA PENINSULA 1994-1999

Barton J. Paxton
Center for Conservation Biology
Department of Biology
College of William and Mary
Williamsburg, VA 23187-8795

Bryan D. Watts
Center for Conservation Biology
Department of Biology
College of William and Mary
Williamsburg, VA 233187-8795

Recommended Citation:

Paxton, B.J and B.D. Watts. 2000. Autumn migration of the Norther Saw-whet Owl on the Lower Delmarva Peninsula 1994-1999. Center for Conservation Biology Technical Report, CCBTR-00-02. College of William and Mary, Williamsburg, VA. 11pp.

A Cooperative Project By:

National Oceanic and Atmospheric Administration

The Center for Conservation Biology is an organization dedicated to discovering innovative solutions to environmental problems that are both scientifically sound and practical within todays social context. Our philosophy has been to use a general systems approach to locate critical information needs and to plot a deliberate course of action to reach what we believe are essential information endpoints.

ACKNOWLEDGEMENTS

We thank Brian Sullivan for his invaluable contribution to all aspects of the 1999 field season. We thank Sue Rice, Don Schwab, and Scott Flickinger for permitting access to the Eastern Shore of Virginia National Wildlife Refuge, the Gatr Tract/Mockhorn Island Wildlife Management Area, and Kiptopeke State Park, respectively. Several additional individuals assisted with net rounds and owl processing, including; Franchesca Saens, and Jamie Cameron. We especially wish to recognize the outstanding assistance and support we have received over the past 15 years from refuge staff Irene Morris, Bob Carpenter and Jerry Loomis.

This project was supported in part by a grant from the Virginia Department of Environmental Quality and from funds provided by the Center for Conservation Biology.

Table of Contents

INTRODUCTION

In eastern North America, Northern Saw-whet Owls (*Aegolius acadicus*) breed primarily in the forests of Canada and the northern United States (Cannings 1993). Some scattered breeding locations occur in the mountains of Maryland, Virginia, West Virginia, Tennessee and North Carolina (Am. Ornithol. Union 1983, Smith et al. 1988). Although Saw-whet Owls are resident year-round throughout much of the breeding range, some populations migrate to wintering areas at lower latitudes (Mueller and Berger 1967a, Holroyd and Woods 1975, Weir et al. 1980). The winter range of most northeastern populations is believed to be in the east-central United States, but the limits of this range are uncertain (Cannings 1993). Sporadic winter records of this species exist for all southeastern states including Florida (Holroyd and Woods 1975, Miller and Loftin 1984, Smith et al. 1988).

The Atlantic Coastal Plain may serve as a Saw-whet Owl migration route extending from Nova Scotia to the southeast (Holroyd and Woods 1975). Duffy and Kerlinger (1992) demonstrated that substantial numbers of Saw-whet Owls migrate at least as far south as Cape May, New Jersey every year. Beginning in 1991, Saw-whet Owls have also been banded each fall at several locations in Maryland including Assateague Island National Seashore (Brinker et al. 1997). Despite evidence that Saw-whet Owls use the Atlantic Coast as a flyway to wintering areas, there are very few fall or winter records of this species in Virginia. The species is described as a rare winter visitor on Virginia's Coastal Plain (Kain 1987).

Each autumn huge numbers of migrating passerines, shorebirds and diurnal raptors are concentrated on the lower Delmarva Peninsula. It seems likely that the peninsula should also function as a migration bottleneck for Saw-whet Owls reluctant to cross the Chesapeake Bay. Since the nocturnal habits and secretive nature of this species make detection very difficult, an annual banding study was needed to document the occurrence of Saw-whet Owls on the lower Delmarva Peninsula.

The objectives of this ongoing study are to: 1) determine the magnitude of the autumn migration of Saw-whet Owls on the lower Delmarva Peninsula, 2) analyze the spatial dynamics of migration on the lower Delmarva Peninsula, 3) determine the seasonal timing of migration, and 4) investigate differences in the timing of migration between age classes.

METHODS

A banding study of fall migrating Northern Saw-whet Owls was conducted on the Eastern Shore of Virginia during the fall of 1999. Owls were trapped at 3 stations located within a 10 km^2 area at the southern tip of the Delmarva Peninsula. Stations were located on the Eastern Shore of Virginia National Wildlife Refuge, Gatr Tract/Mockhorn Island Wildlife Management Area, and Kiptopeke State Park. Each station was wooded with a mixture of loblolly pine (*Pinus taeda*) and/or hardwoods (*Quercus* sp.) and contained moderate to dense understory vegetation.

A continuous line of 6 mist nets was erected along an east/west axis at each station. Mist nets were 12 m long by 2 m tall and were made of 61 mm, black nylon mesh. An electronic audio-lure was situated at the center of each net lane to attract migrating owls. Audio-lures consisted of a cassette tape player, amplifier and loud-speaker. A continuous broadcast of a Saw-whet "advertising call" was played (Cannings 1993). The effectiveness of audio-lures has been demonstrated by increased capture rates over passive trapping (i.e. trapping without an audio-lure) at other owl banding stations in the United States. Capture rates are increased 5 to 10 fold when an audio-lure is used (Erdman, *personal communication*).

Banding operations began 15 October 1999 and continued nightly, weather permitting, through 15 December 1999; trapping was also conducted on two additional nights in late December. On each night, nets were opened and audio-lures were started at sunset. Nets were usually checked for owls in rounds occurring at 21:00, 24:00, 3:00, and dawn. An individual round involved driving to all 3 stations in the order in which they were opened and inspecting nets for captured owls. The order in which stations were opened was varied night to night. Captured owls were stored in holding boxes and taken to the College of William and Mary field station (located on the Eastern Shore of Virginia National Wildlife Refuge) for processing. All owls were later released near the original site of capture.

Owls were banded with U.S. Fish and Wildlife Service aluminum tarsal bands. Wing chord measurements were recorded to the nearest millimeter and mass was recorded to the nearest gram. Wings were inspected for evidence of molt to determine age according to criteria established by the U.S. Fish and Wildlife Service (Anonymous 1977). Saw-whet Owls were aged as hatching year (HY) if all primary and secondary remiges and coverts appeared uniform in color or as after

hatching year (AHY) if primary and secondary remiges were not uniform in color, indicating the presence of more than one generation of feathers.

RESULTS

Banding operations were conducted on 53 nights during the months of October, November, and December 1999. Total effort was 10297 net-hours (3 stations X 6 nets/station X hours of operation). A total of 700 Northern Saw-whet Owls were captured, including 173 on the night of 7 November, resulting in a capture rate of 13.2 owls/trap-night or 6.8 owls/100 net-hours. Trapping occurred on 48 nights during the traditional banding dates of 21 October to 15 December. Total effort during this period was 9,633 net-hours with 695 Northern Saw-Whet Owl captured. Capture rates for this period were 14.5 owls/night or 7.2 owls/100 net-hours. Both the number of birds captured and the capture rate were the second highest recorded throughout the 6-year study (Table 1).

Table 1: Effort, capture totals, and capture rates for Saw-whet Owl trapping on the lower Delmarva Peninsula, 21 October – 15 December, 1994-1998.

	1994	1995	1996	1997	1998	1999
Trap-Nights	32	44	42	40	22	48
Net-Hours	6,903	9,481	8,817	8,212	4,499	9,633
Owl Captures	52	1,007	106	101	22	695
Owls/Trap-Night	1.6	22.9	2.5	2.5	1.0	14.5
Owls/100 Net-Hours	0.8	10.6	1.2	1.2	0.5	7.2

Seventeen of the owls captured were recoveries from other banding stations, and one owl captured on 7 November 1999 was banded as an AHY bird on the lower Delmarva in 1996 (Table 2). Capture rates varied between the three trap sites. Kiptopeke accounted for 44.1% of new captures followed by the Gatr Tract (39.2%) and the Eastern Shore of Virginia National Wildlife Refuge (16.7%). This pattern of greater numbers of captures at both Kiptopeke and the Gatr Track than at the Eastern Shore of Virginia National Wildlife Refuge is consistent with that observed since 1995 (Table 3).

Table 2: Recoveries of Saw-whet Owls on the lower Delmarva Peninsula, 1999 (Blanks indicate that no information was available at the time this report was prepared).

Recovery Date	Banding Location	Year Banded
4 November 1999	Assateague Island, MD	1999
7 November 1999	Lower Delmarva Peninsula	1996
7 November 1999	Assateague Island, MD	1998
12 November 1999	Cape May, NJ	1999
13 November 1999	Cape May, NJ	1999
17 November 1999		
17 November 1999	Cape May, NJ	1999
17 November 1999	Cape May, NJ	1999
18 November 1999	Assateague Island, MD	1998
20 November 1999	Assateague Island, MD	1999
27 November 1999		
27 November 1999		
28 November 1999	Cape May, NJ	1999
28 November 1999	Cape May, NJ	1999
29 November 1999	Cape May, NJ	1999
29 November 1999	Cape May, NJ	1999
1 December 1999	Cape May, NJ	1999
2 December 1999	Assateague Island, MD	1998

Table 3: Summary of capture locations for Saw-whet Owls on the lower Delmarva Peninsula, 21 October – 15 December, 1994-1998.

	Station 1 Refuge		Station 2 Gatr Tract		Station 3 Kiptopeke		
Year	#	%	#	%	#	%	Total
1994	17	32.7	21	40.4	14	26.9	52
1995	237	23.5	323	32.1	446	44.4	1007
1996	29	27.4	40	37.7	37	34.9	106
1997	19	18.8	35	34.7	47	46.5	101
1998	3	13.6	8	36.4	11	50.0	22
1999	117	16.8	272	39.1	306	44.0	695

The temporal distribution of captures during 1999 continues to exhibit a bimodal pattern (Figure 1). With additional years data, it is becoming increasingly evident that migration is bimodal with most hatching-year birds moving through the lower Delmarva in early to mid November and a

greater proportion of after-hatching-year birds moving through in late November and early December. Further data are needed to adequately evaluate this pattern.

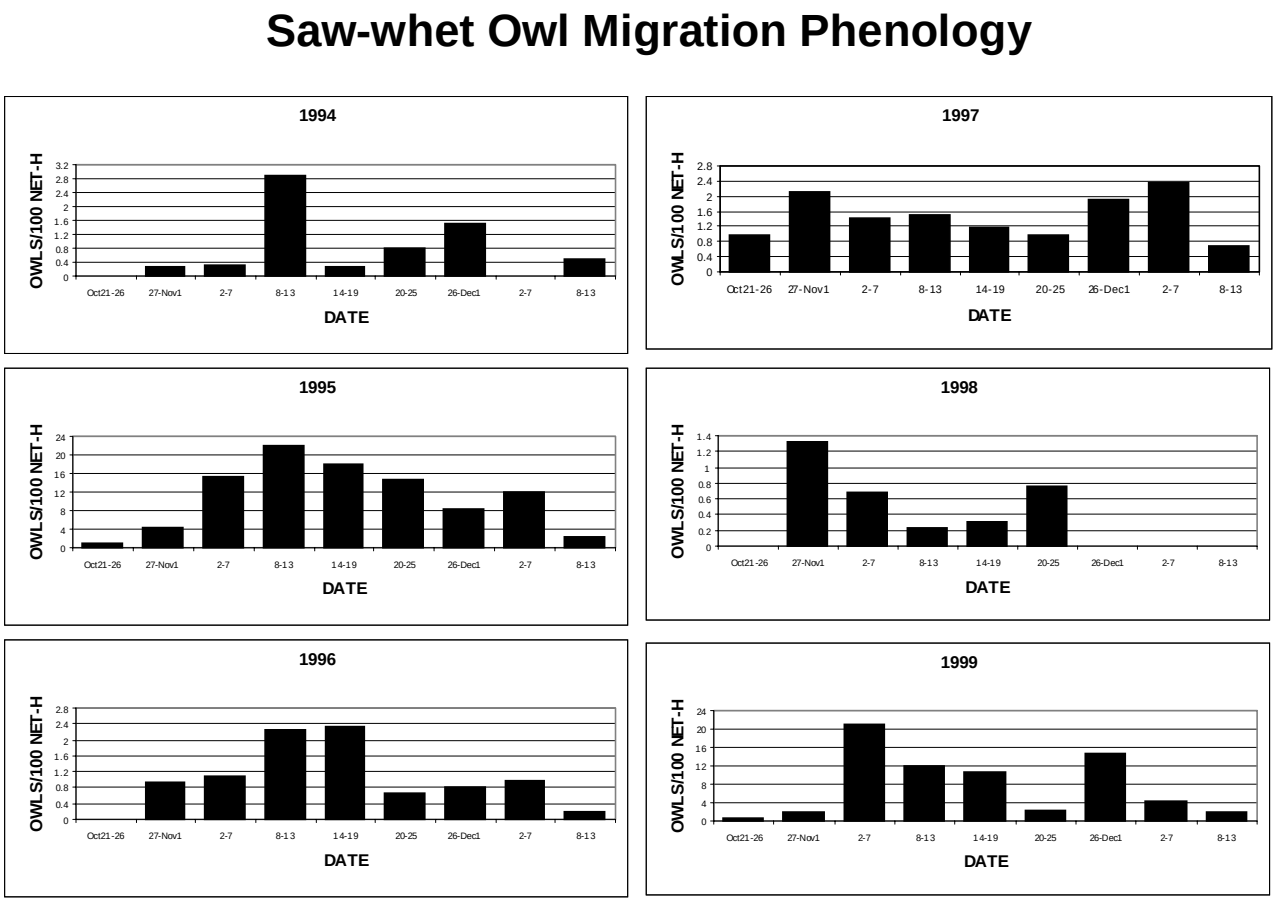

Figure 1. Seasonal capture rates of Northern Saw-whet Owls on the lower Delmarva Peninsula, 1994-1999. Each season was divided into nine different six-night time intervals. Note that the scale of the Y-axis changes in different years. Only 5 time periods were covered in 1998.

Age ratios in 1999 were 80.4% hatching-year birds and 19.6% after hatching-year birds. These age ratios are most similar to those of 1995 (also a year in which an unusually high number of owls were captured). While young to adult ratios have varied widely since 1995, it appears that during invasion years the majority of the migrants moving through the lower Delmarva Peninsula are hatching-year birds (Table 4).

Table 4: Patterns in age ratios of Saw-Whet Owls captured 21 October – 15 December, 1994 - 1999.

	Hatching-year Birds		After Hatching-year Birds	
Year	Number	%	Number	%
1995	836	83	171	17
1996	15	14	91	86
1997	59	58	42	42
1998	11	50	11	50
1999	559	80.4	136	19.6

DISCUSSION

Although Northern Saw-whet Owls occur regularly on the Atlantic Coast each autumn, the magnitude of the migration is irruptive in nature. The number of Saw-whet Owls trapped at Cape May, NJ during 1980-1988 ranged from a low of 8 owls in 1984 to a high of 115 owls in 1980 (Duffy and Kerlinger 1992). Our data demonstrate that considerable year to year variation exists in the number of owls migrating through the lower Delmarva Peninsula. In 1995, the owl capture rate on the Delmarva was almost 10 times higher than in 1996, 14 times higher than in 1994, and 21 times higher than in 1998. The 1999 capture rate, while lower than that of 1995, was 6 times higher than in 1996 and 1997, 7 times higher than in 1994 and 14 times higher than in 1998. It has been suggested that annual variation in the number of Saw-whet Owls is almost entirely due to variations in breeding success (Weir et al. 1980). However, huge variation in the magnitude of migration is likely to be caused by a number of additional factors. Newton (1979) suggests that the most important cause of annual fluctuations in the number of migrating raptors is variation in the amount of available prey. In years with particularly harsh weather, such as unusually cold temperatures and early snow cover, prey availability may decrease drastically. Predators may be forced to migrate to lower latitudes in search of a sufficient prey base. As a result, the magnitude of the raptor migration may be larger than normal.

Age ratios of captured owls were found to vary between years. During the invasion years of 1995 and 1999, 83% and 80.4% of the Saw-whets trapped on the lower Delmarva were immature

birds while that trend was reversed in 1996 when 86% of owls caught were adults. This suggests that exceptional levels of productivity are a contributing factor in causing a major irruption year for this species. However, the difference in the number of immature Saw-whet Owls trapped in 1995,1996 and 1999 is probably too extreme to be accounted for by variation in productivity alone. In 1995 more than 800 immature Saw-whet Owls were trapped on the lower Delmarva while in 1996 only 15 immature owls were captured, in 1999 the number of immature owls captured increased to over 500 individuals. Fluctuations in the abundance of prey may be an important factor contributing to this difference. Lack (1954) proposed that prey cycles may intensify the effect of food shortages because low prey years may often be preceded by years of abundant prey in which predator populations experience low mortality and high productivity. The combination of high population levels and sudden prey shortages may cause a major migration year for a species that is capable of migrating in irruptive fashion. Such factors may have been responsible for the Saw-whet Owl invasions seen on the Atlantic Coast in 1995 and 1999.

The seasonal timing of the Saw-whet Owl migration on the lower Delmarva lags about 1.5 to 2 weeks behind the passage of this species on the Cape May Peninsula. Duffy and Kerlinger (1992) found a mid-migration of 7 November for Saw-whets trapped at Cape May. This is 9 days before the mid-migration date on the lower Delmarva. During 1980-1988, 90% of Saw-whet captures at Cape May occurred during a 5 week period between 16 October and 19 November. On the lower Delmarva 90% of Saw-whets were caught during a 5-week period occurring between 1 November and 5 December. However, it is increasingly clear that age classes move during slightly different time periods.

Although Saw-whet Owls breed almost exclusively in the northern forests of the United States and Canada, substantial numbers penetrate the Southeast each fall and winter. Prior to the start of owl banding efforts in 1994, there was only a scattering of fall and winter records of Saw-whet Owls on Virginia's coastal plain. However, in both 1995 and 1996, more Saw-whets were captured on the Eastern Shore of Virginia than at any other owl banding site in the eastern United States. Clearly this species occurs on Virginia's coastal plain as a regular transient each fall. Descriptions of Saw-whet Owls as rare on the coastal plain should be attributed to the secretive nature of the species rather than to its relative abundance.

LITERATURE CITED

AMERICAN ORNITHOLOGIST'S UNION. 1983. Checklist of North American birds, 6th ed. Allen Press, Inc., Lawrence, KS, 877 pp.

ANONYMOUS. 1977. North American bird banding techniques. Vol. 2, Part 6. Aging and sex ing. U. S. Fish and Wildlife Service.

BRINKER, D.F., K.E. DUFFY, D.M. WHALEN, B.D. WATTS AND K.M. DODGE. 1997. Autumn migration of Northern Saw-whet Owls (*Aegolius acadicus*) in the Middle Atlantic and North eastern United States: What observations from 1995 suggest. *In* Biology and conservation of northern forest owls. U.S. For. Serv. Gen. Tech. Rep NC-190.

CANNINGS, R.J. 1993. Northern Saw-whet Owls (*Aegolius acadicus*). *In* The Birds of North America, No. 42 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D. C.: The American Ornithologists' Union.

DUFFY, K. AND P. KERLINGER. 1992. Autumn owl migration at Cape May Point, New Jersey. Wilson Bull. 104(2):312-320.

HOLROYD, G.L. AND J.G. WOODS. 1975. Migration of the Saw-whet Owl in northeastern Florida. Florida Field Nat. 12(1):11-12.

KAIN, T., ed. 1987. Virginia's birdlife: An annotated checklist. 2nd ed. Virginia Society of Ornithology, Virginia Avifauna 3.

LACK, D. 1954. The natural regulation of animal numbers. Oxford: University Press.

MILLER, L.M. AND R.W. LOFTIN. 1984. The Northern Saw-whet Owl in northeastern Florida. Florida Field Nat. 12(1):11-12.

MUELLER, H.C. AND D.D. BERGER. 1967. Observations on migrating Saw-whet Owls. Bird Banding 38(2):120-125.

NEWTON, I. 1979. Population Ecology of Raptors. Berkhamsted, England: T & A D Poyser.

SMITH, D.G., D.H. ELLIS, AND B.A. MILLSAP. 1988. Owls. Pages 89-117 *in* Proc. Southeast raptor management symposium and workshop. Natl. Wildl. Fed., Washington, D.C.

WEIR, R.D., F. COOKE, M.H. EDWARDS, AND R.B. STEWART. 1980. Fall migration of Saw-whet Owls at Prince Edward Point, Ontario. Wilson Bull. 92(4):475-488.