

# American Woodcock Winter Mortality in Southern New Jersey

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## INTRODUCTION

Unlike most species in the family Scolopacidae (sandpipers) that are typically found in wetlands or coastal habitats, the American Woodcock (*Scolopax minor*) prefers moist second-growth and brushy edges to wetlands for feeding, and open terrestrial habitats for breeding and courtship displays. American Woodcock breed in the eastern half of the United States north to Newfoundland and winter in the southern portions of this range (AOU 1998). In southern New Jersey, American Woodcock are common fall migrants, common winter visitors and uncommon summer residents (Sibley 1997).

American Woodcock forage primarily on soil invertebrates instead of aquatic invertebrates or vegetation like other scolopacids. Exploiting this food source can make American Woodcock especially vulnerable to severe weather that can freeze the soil and prevent the birds from getting food. Diefenbach and coworkers (1990) suggested that American Woodcock males would attempt to winter at more northerly latitudes to gain a reproductive advantage over individuals wintering farther south. Others have suggested that the northern limit to the wintering range will fluctuate with winter severity, thus setting up a scenario in which unseasonable or uncommon freezing could decrease the survival rate of individuals trying to winter at the extreme of their physiological threshold (Sheldon 1967, Wood et al. 1985). When caught in periods of unseasonably cold temperatures, American Woodcock become increasingly visible as they forage in unfrozen ground near roads and parking lots (Sibley 1997). Such conditions may lead to large mortality events that afford the opportunity to investigate sex, age, and breeding condition of local wintering populations.

## STUDY AREA AND METHODS

Dead and dying birds were found in southern Cape May County, New Jersey near Cape May (38°56' N 74°54' W) and West Cape May (38°56' N 74°56' W) on 29 and 30 January 2000. After 18 January, daytime

temperatures were at or below freezing for the remainder of the month. On 25 January, a major storm hit the region that dropped 15-38cm of snow, ice, and sleet in Cape May County. The storm continued throughout the day of 25 January and into 26 January, with significant enough snowfall to close schools, government offices, and most businesses.

This region is dominated by deciduous forests intermingled with moist meadows, wetland habitats, and coastline, but many birds were found on or near roads and parking lots where unfrozen ground was still available for foraging. As early as 21 January and as late as 1 February, starving birds were observed along roadsides and parking lots in the Cape May region (NJAS 2000). Over 400 dead or weakened individuals were observed in and around the area described, of which 34 have been retained as study skin or spread wing specimens at the Academy of Natural Sciences of Philadelphia (ANSP). At least 40 additional birds were found dead due to starvation and exposure after the storm, but were not transferred to ANSP.

Birds were salvaged under New Jersey State and United States Fish and Wildlife Service salvage and collecting permits held by ANSP. Specimens were immediately transferred to ANSP and held in a -20°C freezer until they were prepared as study skins or spread wings. For each specimen we recorded the mass (calculated using a Pesolaä spring scale), stomach contents, bursa of Fabricius (essentially a pouch at the distal end of the intestine that is found only in young birds and atrophies in adults) condition, degree of skull ossification, size and condition of gonads, and amount and location of subcutaneous fat or molt. We also saved frozen tissue samples (liver, heart, and pectoral muscle) for all salvaged specimens. All specimens, tissues, and related data are available from ANSP upon request.

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### RESULTS

The birds prepared for this study were salvaged 10 days after the first major freeze of the winter in January 2000. Most of these birds had no fat although some had traces of fat in the pterygiae (feather tracts). In fact, most individuals (especially males) showed signs of muscle atrophy, indicating birds had started metabolizing muscle mass for energy. All stomachs were found to contain only small bits of grit.

Of the 34 specimens prepared, 21 were males (Table 1) and 13 were females (Table 2). A marked difference

in mass was detected between the sexes with females averaging  $109.2 \pm 17.0\text{g}$  (range 95 – 160g) and males averaging  $87.2 \pm 9.5\text{g}$  (range 75.5 – 116g). All of the salvaged birds were adults based on the lack of a bursa of Fabricius and presence of a completely ossified skull. It appeared that a portion of males were entering a period of reproductive readiness as testes size averaged  $5 \times 3 \text{ mm}$  (range  $2 \times 1 - 10 \times 5 \text{ mm}$ ). Although females had relatively large ovaries, ( $10.3 \times 5.5 \text{ mm}$ , range  $7 \times 2 - 12 \times 10 \text{ mm}$ ), only two females showed signs of ova enlargement (both individuals had largest ovarian follicles of 2 mm in diameter).

**Table 1.**

Specimen data obtained from male American Woodcock salvaged during a winter die-off in January 2000.

ANSP Number	Locality	Weight (g)	Left Testis (mm)	Fat
189401	Cape May Point	78.5	4 x 3	no
189402	Cape May Point	81.5	8 x 3	no
189403	Cape May Point	91	3 x 2	no
189404	Cape May Point	116	5 x 2	light
189405	Cape May Point	80.5	8 x 4	no
189406	West Cape May	100	2 x 1	no
189407	Cape May Point	78	8 x 5	no
189408	Cape May Point	103.5	5 x 3	no
189409	Cape May Point	91	6 x 3	trace
189410	Cape May Point	83	6 x 3	no
189411	West Cape May	86	3 x 2	light
189412	Cape May Point	84	5 x 2	no
189413	West Cape May	90	3 x 1	no
189414	Cape May Point	81.5	6 x 4	no
189415	Cape May Point	86.5	4 x 2	trace
189416	Cape May Point	75.5	4 x 2	no
189417	Cape May Point	91	8 x 4	no
189418	Cape May Point	86.5	3 x 2	no
189419	Cape May Point	82	10 x 5	no
189420	Cape May Point	85	9 x 3	no
189421	Cape May Point	80.5	2 x 1	no
	<b>Mean</b>	<b>87.2</b>	<b>5.3 x 2.7</b>	
	<b>SD</b>	<b>9.5</b>	<b>2.4 x 1.2</b>	
	<b>Range</b>	<b>75.5 - 116</b>	<b>2 x 1 – 10 x 5</b>	

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**Table 2**

Specimen data obtained from female American Woodcock salvaged during a winter die-off in January 2000.

ANSP Number	Locality	Weight (g)	Ovary (mm)	Fat
189422	West Cape May	113	10 x 4	no
189423	West Cape May	104	11 x 5	no
189424	West Cape May	160	7 x 2	little
189425	Cape May Point	114.5	12 x 10	trace
189426	Cape May Point	105.5	11 x 7	trace
189427	Cape May Point	104	10 x 5	no
189428	Cape May Point	99	12 x 6	no
189429	Cape May Point	102	9 x 4	no
189430	Cape May Point	120	10 x 5	no
189431	Cape May Point	95	13 x 6	no
189432	West Cape May	96.5	10 x 5	no
189433	Cape May Point	97	9 x 6	no
189434	Cape May Point	109	10 x 6	no
	<b>Mean</b>	<b>109.2</b>	<b>10.3 x 5.5</b>	
	<b>SD</b>	<b>17.0</b>	<b>1.5 x 1.9</b>	
	<b>Range</b>	<b>95 - 160</b>	<b>7 x 2 - 12 x 10</b>	

### DISCUSSION

No published mass measurements of American Woodcock have been as low as those reported here (see citations in Keppie and Whiting 1994). Typically, American Woodcock reach their lowest weights during spring migration and the breeding season (Owen and Krohn 1973, Sheldon 1967). Based on large sample sizes, winter mass measurements are typically around 165g for males and 210g for females (see citations in Keppie and Whiting 1994). The masses presented herein, 87.2g for males and 109.2g for females, are roughly half those previously reported. This suggests that American Woodcock are able to sustain drastic food shortages for short periods of time by burning fat reserves and, if necessary, muscle mass as energy.

Studies of captive American Woodcock reported that individuals needed to consume 60 – 120g of earthworms per day to maintain their body mass at a constant level for two to eight weeks (Liscinsky 1972, Pettingill 1936). In this case however, the prolonged period of solidly frozen soil prevented birds from foraging on soil invertebrates and replenishing their depleted fat stores. We estimate that the birds salvaged

in this study lived at least 10 days without feeding prior to death. If we assume that the birds in this study had masses similar to those for winter birds presented by Keppie and Whiting (1994), we see that they lost half their body mass over this 10 day period (ca. 10-20g/day).

Diefenbach and coworkers (1990) suggested that because males will attempt to winter as far north as physiologically possible and have decidedly smaller body masses, males would experience lower winter survival than females. This was not supported by a longer term study of American Woodcock wintering along the Atlantic coast although this study did not overlap with any significantly severe winter weather and likely missed sexual bias in winter survival (Krementz et al. 1994). Data presented herein appears to support the hypothesis of Diefenbach and coworkers (1990) which states that males have lower winter survival than females. Of the 34 specimens salvaged in this study, 21 (63%) were males; because we do not know the pre-storm sex ratio of American Woodcock populations in southern New Jersey it is

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difficult to ascertain whether this sexual bias is a result of differential survival or simply a bias in the wintering population sex ratio.

We determined that all the birds salvaged in this study were adults based on the absence of a bursa of Fabricius and degree of skull ossification. Rieffenberger and Ferrigno (1970) found that 83% (n = 663) of the birds banded in their November study on the Cape May Peninsula were hatching year birds. This contrast in age ratio is due to the seasonal timing of the studies. Rieffenberger and Ferrigno dealt with migrating birds, the majority of which were juveniles, whereas this study dealt with an overwintering population likely composed of adults experienced with wintering at more northern latitudes.

Whiting and coworkers (1985) reported that female American Woodcock with ovarian follicles larger than 5.0mm in diameter were approaching breeding condition. Of the 13 female birds salvaged in this study, only two had enlarged follicles but none of these exceeded 5.0mm. For males, testis lengths greater than 6.0mm were found to contain spermatozoa in the seminal tubules (Olinde and Prickett 1991, Roberts 1980). In contrast to the females, nine of the 21 males studied herein had testis lengths  $\geq$  6.0mm, indicating that they were physiologically prepared to breed. This, combined with the fact that the majority of salvaged individuals were male seems to follow

the trends reported elsewhere. Diefenbach and coworkers (1990), Stamps and Doerr (1976), Pace and Wood (1979), and Stribling and Doerr (1985) have reported that males will attempt to winter at more northern latitudes to gain an advantage in obtaining optimal breeding territories. The fact that many of the males from this study were prepared to breed suggests that a cross-section of wintering males in New Jersey remain in a state of sexual readiness in anticipation of migrating females also prepared to breed. Thus, the dataset presented herein supports the hypothesis that males attempt to overwinter as far north as possible and remain physiologically prepared to breed in anticipation of obtaining premium breeding habitat and soliciting the maximum number of females.

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American Woodcock  
Cape May, NJ  
January 29, 2000  
*Photo by Marvin Hyett*

*Cassinia*