

MOVEMENTS AND SURVIVAL RATES OF PARK MALLARDS

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Heusmann (1972) defined a park duck as a bird spending at least part of the day during part of the year in close company of humans and having access to artificial feed. In this paper the term "park" refers to a variety of locations involving public and private properties in urban, suburban, and rural settings. In all cases, ducks were accustomed to being fed by people. The purpose of this paper is to describe movements and survival rates of Mallards (*Anas platyrhynchos*) banded in parks in Massachusetts.

METHODS

During January and February, 1971-1976, 2515 male and 2037 female Mallards were banded at 19 Massachusetts parks. An additional 591 adult males and 284 adult females, and 199 immature males and 186 immature females were banded at 9 parks during July through September, 1970-1976. Birds were captured by cannon nets, bait traps, drive traps, and nightlighting. Birds were trapped during 1 to 7 seasons in various parks.

All birds were banded with U.S. Fish and Wildlife Service bands. Records also were kept of all previously banded birds we encountered. Recovery data were obtained from the Service's Bird Banding Laboratory for both live and dead recoveries. Recovery locations were plotted by 10-minute latitude and longitude blocks for locations outside Massachusetts and by town of recovery within the state. Winter-banded Mallards were treated separately from summer-banded birds.

Survival rates were calculated from harvest recoveries according to methods described by Brownie et al. (1978) for winter-banded birds. For comparison, recapture data from 6 parks with a consistent banding history also were used to estimate survival rates (Jolly 1965).

RESULTS AND DISCUSSION

Movements.—Recoveries (primarily by hunting) of winter-banded park Mallards were categorized by distance for recoveries taken during the breeding-migration period and winter period (Table 1). During the breeding-migration period, 51% of the band recoveries for males and 37% of the recoveries for females occurred within 15 km of the banding site. My field observations indicated that many males returned to parks to undergo their annual molt while females were still on their nesting grounds. A large proportion of females that wintered in parks were recovered at greater distances and probably had left the metropolitan area to nest. The percentage of band recoveries for all males and females within 50 km of the banding site were 62% and 64% respectively.

Few birds were recovered south of the banding sites during the breeding-migration period, but 19% of the recoveries occurred more than

100 km west of the banding site and 14% were recovered on northern areas (Table 1). Although males and females appeared to migrate west in equal proportions, 16 of 27 males were recovered more than 400 km west of their banding site compared to only 3 of 13 females (Figs. 1 and 2).

Mallards banded during the winter months tended to winter in the same area in succeeding years, with 68% of the total reported recoveries of males and 78% of the recoveries of females occurring within 15 km of the banding site (Table 1).

For birds banded during the summer months, 67% of the males and 82% of the females recovered during the breeding-migration period were within 50 km of their banding site (Table 2). The majority of these birds also wintered at or near where they were banded.

While banding birds in parks, R. G. Burrell, R. H. Bellville and I encountered 127 Mallards that had been previously banded elsewhere. I divided these birds into 3 categories: banded by us in another park, banded by us outside of a park, and banded by someone else.

Of 71 birds that moved between parks, 41 (58%) were from parks less than 10 km away; 19 (27%) came from parks 10–25 km distant, 6 (8%) from parks 25–50 km away, 1 (1%) from a park 62 km away, and 4 (6%) from parks that were 133–145 km distant. There was no pattern to the movements. For example, birds banded during summer months at Norumbega Park, Newton, were found wintering at Norumbega as well as in 6 other parks ranging from 5.7 to 47.7 km away. While 34 of the 71 birds involved in the interpark movements were found in 1 park during the summer and another during winter months, 24 of the recaptures involved Mallards that wintered in different parks in different years, and 13 involved birds using different parks during the summer season. Males (39) and females (32) appeared equally prone to interpark movements. Both adults and immatures were involved.

Some birds apparently moved between nearby parks frequently, whereas others remained in a single park year round. Some movements out of parks were necessitated by frozen water areas, but movements between parks also were evident in important year round parks such as Norumbega. Seasonal movements of birds between parks were probably greater than my data indicated because I was unable to sample all summering areas.

We also retrapped 24 Mallards that we had banded on non-park, wild areas. All but 1 had been banded during the pre-season period and all but 5 were originally banded as immatures. Eight birds were retrapped within 15 km of their original banding site and 41 were within 15–50 km. One bird had moved 102 km west of where it was banded.

We encountered 32 Mallards that were banded by other people. Sixteen were banded at the Parker River National Wildlife Refuge in Newburyport, Massachusetts, during summer months and were found wintering in 9 parks 34 to 91 km south of the refuge. The remaining 16 foreign recoveries were banded out of state: 3 from Quebec, 2 from

TABLE 1. Recovery distances of winter-banded park Mallards from point of banding.

Distance	First year recoveries		Later year recoveries		Total	
	Male	Female	Male	Female	Male	Female
Recovered between 1 Apr. and 15 Nov.						
within 15 km	30	12	32	10	62	22
15-50 km	8	8	5	8	13	16
51-100 km	3	1	0	0	3	1
over 100 km South	2	1	1	0	3	1
over 100 km West	13	5	10	6	23	11
over 100 km North	<u>10</u>	<u>4</u>	<u>7</u>	<u>4</u>	<u>17</u>	<u>8</u>
Total	66	31	55	28	121	59
Recovered between 16 Nov. and 30 March						
within 15 km	14	13	25	12	39	25
15-50 km	2	0	4	1	6	1
51-100 km	0	1	3	2	3	3
over 100 km South	1	0	4	1	5	1
over 100 km West	3	1	1	1	4	2
Over 100 km North	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	20	15	37	17	57	32

New Brunswick, 1 from Maine, 3 from Vermont, 2 from New York, 3 from Ontario, 1 from Ohio, and 1 from Virginia.

Survival rates.—Survival rate estimates (Brownie et al. 1978) for winter-banded Mallards were 61.2% for males and 47.9% for females. Based on the Jolly (1965) multiple recapture method survival rate estimates were 57.7% and 56.2%, respectively. No difference was found between the 2 survival rate estimates for either males or females (z test, $P > 0.05$). Most survival rate estimates for Mallards are based on summer-banded birds. Anderson (1975:20) indicated that survival rates for Mallards banded in the northeastern United States during 1961-1970 were 59.1% for adult males and 52.1% for adult females. Survival rate for adult male Mallards banded in Illinois during the winters of 1963-1970 was 70.4% (Brownie et al. 1978:51). Figley and VanDruff (1981) estimated a mortality rate of 22% (78% survival rate) for suburban Mallards in New Jersey.

Nearly all the Mallards that winter in Massachusetts do so in park situations (Heusmann 1974); therefore, I could not compare the survival rates of wild and park Mallards. The Black Duck (*Anas rubripes*) is the most frequently harvested duck in Massachusetts. Because the 2 species are similar in many aspects, I asked W. W. Blandin and J. D. Nichols to compare the recovery rates for wild Black Ducks ($\delta = 0.030$, $\text{♀} = 0.024$) wintering along coastal Massachusetts areas during 1971-1976 with



FIGURE 1. The distribution of direct and indirect band recoveries of Massachusetts winter-banded male park Mallards.

those of wintering Massachusetts park Mallards ($\delta = 0.025$, $\text{♀} = 0.019$) using Brownie et al. (1978) estimates. The z test failed to indicate a significant difference for either males or females ($P > 0.05$). They compared Mallard survival rates ($\delta = 0.612$, $\text{♀} = 0.479$) with those of Black Ducks ($\delta = 0.692$, $\text{♀} = 0.710$) using Brownie et al. (1978) methods. The z test failed to show evidence of a significant difference for males ($P > 0.05$) but indicated a highly significant difference for females ($P < 0.01$), suggesting that survival rates for female Mallards in parks were lower than those of wild Black Duck females. My summer samples were too small to permit estimation of survival rates.

Personnel from the Massachusetts Division of Fisheries and Wild-



FIGURE 2. The distribution of direct and indirect band recoveries of Massachusetts winter-banded female park Mallards.

life and park visitors have expressed the belief that park waterfowl are relatively sedentary birds. In reality, park Mallards can be grouped into 3 categories similar to those described by Figley and VanDruff (1981); (1) tame residents that spend the entire year, including the breeding season, in parks, (2) wilder residents that spend most of the year in parks but nest outside the parks, and (3) wild migrants that only appear in the parks during late fall and winter. Only a few of the birds that fit in the first or second category migrate south, although they may move to different parks to winter.

Data by Heusmann and Burrell (1974) suggested that 10–15% of winter park flocks in Massachusetts may consist of tame residents. In this study, 28% of the band recoveries were from areas 100 km or more

TABLE 2. Recovery distances of summer-banded park Mallards from point of banding.

Distance	Direct recoveries		Indirect recoveries		Total	
	Male	Female	Male	Female	Male	Female
Recovered between 1 April and 15 Nov.						
within 15 km	5	6	13	6	18	12
15-50 km	1	2	2	0	3	2
51-100 km	1	0	2	1	3	1
over 100 km South	0	0	3	1	3	1
over 100 km West	0	0	1	0	1	0
over 100 km North	<u>1</u>	<u>0</u>	<u>2</u>	<u>1</u>	<u>3</u>	<u>1</u>
Total	8	8	23	9	31	17
Recovered between 16 Nov. and 30 March						
within 15 km	3	5	5	1	8	6
15-50 km	1	1	0	0	1	1
51-100 km	1	1	0	1	1	2
over 100 km South	2	1	0	0	2	1
over 100 km West	0	0	1	1	1	1
over 100 km North	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	7	8	6	3	13	11

away and I considered these birds to be wild migrants. The remaining birds (57-62%) are Massachusetts residents that nest in wild areas and move into the parks after the breeding season. The percentage may actually be higher because band reporting rates are depressed near the point of banding (Henny and Burnham 1976).

Twelve males banded in Massachusetts parks were recovered in the Midwest, but only 1 female was. A second female, banded in Ohio, was captured in a Massachusetts park. These 2 ducks offer the only evidence in this study that females move between the midcontinent area and Massachusetts. Larger males may winter farther north than smaller females. Figley (pers. comm.), banding in New Jersey, 350 km to the south, indicated that only his winter-banded park Mallards were recovered out of state. They included 2 females and a male in Pennsylvania, a female in New York, a male in Quebec, a female in Ontario, a male in Texas, and a female in Minnesota. He also winter-trapped a male banded in Quebec and a female from Michigan.

Anderson and Henny (1972) indicate that at least a portion of Mallard population pairing occurs on the wintering grounds and that males follow their mates to their natal homes. If Massachusetts-reared males were pairing with midwestern females wintering in parks, it would be logical to expect more midwestern recoveries of females than actually occurred. Since most of the recoveries involved winter-banded ducks, the origins of the Mallards are unknown. The only evidence I found of a Massa-

chusetts-reared Mallard migrating west was a male banded as an immature in a park during August and shot a few months later in Saskatchewan.

It is possible that males raised in the mid-continent area migrate east to winter where they decoy into park flocks. Drakes that are unsuccessful in pairing on the wintering ground may then return to their natal area to seek mates. I recorded first-year recoveries of males in North Dakota, Minnesota, Wisconsin, Iowa, and Illinois. Data presented by Anderson and Henny (1972), however, indicate that such movements are limited and eastern recoveries of mid-continent birds that do occur tend to be south of New England. The recoveries of Mallards from the Midwest that do occur in New England are from the Missouri River Basin and the Great Lakes area. Such movements may be involved in the range expansion of the Mallard reported by Johnsgard and DiSilvestro (1976).

SUMMARY

Park waterfowl can be divided into 3 categories: park residents, local residents, and wild migrants. While most birds remain within 50 km of a park, more than a quarter of the birds move over 100 km to nest. Mallards banded during the winter months tend to winter in the same area during succeeding years. The survival rate of wintering park mallards was 61% for males and 48% for females. Parks are important to the ecology of the Mallard in Massachusetts and virtually all wintering by Mallards in the state occurs in parks. In this manner, the parks are important to both year-round residents and wild-nesting birds. Any management plans for the Mallard in the Northeast must consider the role of parks in the ecology of the Mallard.

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