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Survival of Hand-reared Mallards (Anas platyrhynchos) on Artificial Farm Ponds

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ABSTRACT — The survival of hand-reared, game-farm mallards released on artificial farm ponds was studied in Goodhue County, Minnesota. Of the 300 ducklings released each year from 1965 through 1967, an average of 45 per cent survived until most were capable of flying. More ducklings survived when released on ponds fenced from livestock than on unfenced ponds. Grazing livestock severely reduce cover vegetation around unfenced ponds. A total of 3.7 per cent of the bands were recovered. The first year recoveries represent 64 per cent of all the bands reported. Thirty-nine per cent of the band recoveries occurred within 15 miles of the release site.

The deficiencies of waterfowl production on suitable natural habitat have led to programs of stocking pen-reared birds to re-establish nesting populations in several states. In some cases new waterfowl habitat has remained vacant, while in others some factor has decimated the numbers of breeding birds.

The causes of mortality of wild waterfowl are not clearly understood and, similarly, little is known about the nature of non-hunting deaths among hand-reared birds. The poor survival of pen-reared mallards led Lincoln (1934) and Errington (1936) to believe that release projects would be unsuccessful.

Lincoln (1934) was one of the first to compare the survival of hand-reared birds to wild mallards. Based on band recoveries from 125,000 wild and 3,500 hand-reared birds, he reported a 12 percent first year recovery rate for the wild birds and 1.5 percent for hand-reared birds.

Analysis of band recovery data from a five-year study in Ohio showed that the release of hand-reared ducklings into suitable habitat was an unproductive effort. About 74 percent of the released mallards were dead by the end of the first year, and there was little improvement in local nesting populations (Bednarik, 1965). Hunt (1958) indicated that only six to eight percent of the hand-reared mallards stocked in Wisconsin survived to become potential breeders.

Waterfowl biologists believe that wild ducks are better able to survive both natural predators and hunters than are strains of birds used in most propagation programs. Brakhage (1953) found that ducks hand-reared from pure wild stock did not survive at a rate comparable to wild-reared birds. This suggests that the method of rearing has a profound impact on survival.

Bishop (1965) attempted to re-establish a nesting mallard population by releasing domestic hens to mate with wild drakes. This effort was unsuccessful but may be worth further study.

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Some workers, however, have reported success in restoring or establishing waterfowl breeding populations using pen-reared birds (Nelson, 1963 and Burger, 1964). Foley (1961) found that a significant number of ducklings released in New York State survived, migrated, and returned the following spring to re-establish nesting populations. At the Kellogg Bird Sanctuary, mallards were established as a breeding species after the initial release of hand-reared birds (Pirnie, 1935, from Bednarik, 1965).

Release site a survival factor

The survival of hand-reared birds depends considerably on the nature of the release site. Several studies (Foley et al., 1961; Weller and Ward, 1959; Hunt et al., 1958) indicate that survival is related to gunning pressure. There was higher survival among birds released in refuge areas.

Hand-reared ducks behave differently from ducks reared naturally (Brakhage, 1953; Hunt, 1958); they are notably less wary than wild birds. Most investigators attribute high mortality of hand-reared birds to the taming that results from their exposure to humans.

Schladweiler (1969) placed radio transmitters for biotelemetry monitoring on hand-reared mallards and studied their survival rates and mortality factors. He found that these birds had poor survival and high vulnerability to hunting.

The varied evidence suggests that the role of artificial propagation in waterfowl management must be investigated in greater detail. This paper represents one such investigation, being concerned with the survival of pen-reared, game-farm mallard ducklings that were released on artificial farm ponds which were unpopulated by breeding wild waterfowl.

Study area in farm district

The artificial ponds used in this study were in an intensively-farmed area in Goodhue County of southeastern Minnesota. Most of the ponds were located in the upper end of the Belle Creek watershed four miles west of the town of Goodhue. The topography varied from gently sloping to very steep slopes. The county is classified by the Minnesota Department of Conservation as being of low value for breeding of waterfowl because of

TABLE 1. Survival of mallard ducklings released on farm ponds.

	Number of ducklings released	Number surviving until flying	Percent surviving until flying
1965	300	182	61
1966	300	133	44
1967	300	90	30
Average	300	135	45

the lack of suitable water habitat (Lee et al., 1964). There are no natural potholes or inland lakes in the county, but 475 artificial farm ponds exist there (Goettle, 1965). Nesting waterfowl are generally uncommon in this part of the state except along the Mississippi River, which flows about 14 air-miles northeast of the study area.

Method of handling ducklings

The 300 ducklings released each year (1965-1967) were obtained from a Wisconsin game farm and raised to five weeks of age on a farm in the study area. Unfortunately the ducklings were exposed to more than the normal amount of human contact required for their care. When they reached five weeks of age, the birds were sexed, banded, and released in groups of 20, evenly divided by sex. The study ponds were checked periodically and surviving ducklings were counted. Counts were made while the observer walked the shoreline with a hunting dog. Ducklings were flushed onto the open water.

Ten of the 36 ponds in the study area were classed as unsuitable for waterfowl because they lacked sufficient water or were subject to too much disturbance. The remaining ponds were classified as "grazed" or "non-grazed" by livestock, and 13 to 15 were used as release sites. They ranged from one-fourth to one acre in size and averaged about one-half acre.

Variations linked to pond conditions

Each year an average of 45 percent of the released game-farm ducklings survived until most were capable of flying (Table 1). Some birds may have been missed, so the counts represent the minimum number of survivors.

By comparison, the survival of ducklings released in New York State varied greatly. In one study, (Foley, et. al., 1961), 51.6 percent of the ducklings released at 35 days of age survived until flying, while in another study (Foley, 1954), 61.2 percent survived to flight age.

There was a difference in survival of ducklings liberated on the ponds with shores grazed or ungrazed by

TABLE 3. Band recoveries (total and by hunting seasons following release) of hand-reared mallards released on farm ponds.

	Recovery hunting season					
	1965	1966	1967	1968	1969	Total bands recovered
1965	5	7	0	0	1	13
1966		11	3	1	0	15
1967			5	0	0	5
Total	5	18	8	1	1	33

TABLE 2. Survival of mallards released on grazed and non-grazed farm ponds.

	Total released		*Number surviving*		*Percent surviving*	
	grazed	non-grazed	grazed	non-grazed	grazed	non-grazed
1965	120	180	45	137	38	76
1966	140	160	31	102	22	64
1967	140	160	30	60	21	38
Total	400	500	106	299	27	60

livestock (Table 2). Most of the ponds whose shores were grazed by livestock had either short grass or mud shorelines.

Three ponds had 100 percent survival as of the last day of counting; none of the shorelines on these ponds was grazed by livestock. Nine ponds had a total loss of ducklings, and six of those ponds had shorelines grazed by livestock.

From the data presented in Figure 1, it is obvious that the hand-reared birds suffered a large percent of their total mortality during the first week after release. Environmental stresses such as lack of food or harsh weather conditions did not appear to have lowered the survival rate of the released ducklings. Predation and perhaps wandering away from the ponds seems to have been responsible for most of the duckling losses. Several groups of ducklings regularly traveled up to one-fourth mile away in the creek bed above their respective ponds. One group often traveled to a farmyard for food. They left the area when ice formed on their pond. Although ducklings were often located more than 100 yards from the pond edge, they knew the way back to water.

The Great Horned Owl (*Bubo virginianus*) was the most obvious predator. This species was seen at several widely separated ponds. Evidence (feathers) indicated that owls were responsible for killing 16 ducklings at one pond. Traps in one pond yielded three large snapping turtles (*Chelydra serpentina Linn.*). Red foxes (*Vulpes fulva*) and raccoon (*Procyon lotor*) were seen at the ponds, and numerous tracks on the shoreline suggested regular visits by these two species. A farm dog was observed killing a duckling. Other possible predators include feral cats (*Felis domesticus*), hawks, weasels (*Mustela sp.*), mink (*Mustela vison*), and skunk (*Mephitis sp.*).

TABLE 4. Recovery rates of hand-reared mallards released on farm ponds.

	Total number banded	*Number "available"	Total number	Percent of total	**Percent of "available"
1965	300	182	13	4.3	7.1
1966	300	133	15	5.0	11.3
1967	300	90	5	1.7	5.6
Total	900	405	33	3.7	8.0

and
Mean

* Ducks surviving until able to fly and "available" to be recovered.

** Percent of "available" number of ducks recovered.

Ducks were observed to fly more than a mile from one release site to another. Their mobility at 70 days of age made accurate counts difficult.

Each year when the waterfowl hunting season opened in Minnesota, many of the 100-day old (plus) ducks were still at the release site. According to pond owners, heavy shooting losses occurred.

The released ducklings did not react to humans like wild birds, although they would quickly swim or fly to the opposite side of the pond upon the approach of the observer.

Evidence from recovered bands

Direct band recoveries are reported in Table 3. A total of 33 bands have been recovered. All but one of the recoveries were from ducks shot by hunters. No allowance was made for the ducks that died after release and were therefore unavailable for recovery (see Table 4). Bands collected by the observer from predator-killed birds were not reported.

Sixty-four percent of the band recoveries came during the first hunting season after release (see Table 5). Surprisingly, only 39 percent of the bands were recovered within a 15 mile radius of the release site. However, it may be assumed that a large number of bands were not reported by persons who hunted ponds that held the vulnerable mallards. This hypothesis is based on conversations with pond owners.

Although the sample is small, the band recovery data suggest that the surviving ducks migrated south over routes similar to those used by wild waterfowl (see Table 5).

Analysis of survival figures

The 3.7 percent recovery rate of the birds released in this study is difficult to compare with recovery rates reported by other studies. Time of release, age of released birds, genetic variability, quality of the release site, and other factors could affect the survival and subsequent recovery rate. Errington (1936) recovered 0.9 percent of 10,731 hand-reared mallards released. Other studies indicate recovery rates somewhere between the extremes cited in this paper.

The first hunting season recovery rate of 64 percent of the total bands returned varies considerably from that reported by other investigators. For example, Hunt (1958) reported a first year recovery rate of 94.3 percent and Brakhage (1953) found a first year recovery rate of 91 percent. This variation suggests that local hunters may not have reported bands from mallards they shot. The small number of bands recovered in the immediate vicinity of the release site also suggests that local hunters were not reporting bands.

A large number of hunters who shoot banded ducks probably fail to report the bands. Bellrose and Chase (1950) found that "reward" bands were reported 2.9 times more frequently than "non-reward" bands. Their study also reports that cripple mortality is about 30 percent of the number of ducks bagged or 9 percent of the total population.

TABLE 5. Band recovery date and location of hand-reared mallards released on farm ponds.

	Band number	Recovery date	Recovery location	*15 mile radius* inside	outside
1965	61525	10- -66	Wabasha, Minn.		X
	61691	10- -66	Red Wing, Minn.	X	
	61682	11-14-66	(unk.), Neb.		X
	61684	11-28-65	Turrell, Ark.		X
	61508	10-10-65	New Market, Minn.		X
	61504	10-10-65	New Market, Minn.		X
	61520	10-10-65	Faribault, Minn.		X
	61522	10-17-65	Red Wing, Minn.	X	
	61515	10-10-65	Hastings, Minn.	X	
	61690	10- -66	Spring Bay, Ill.		X
	61549	10-20-66	Utica, Ill.		X
	61650	11- 2-66	Thompson, Ill.		X
	61704	8- -69	Bath, Ill.		X
1966	31611	10- 5-68	Waconia, Minn.		X
	31748	10-16-67	Senlac, Sask. Canada		X
	31585	1- 7-67	Big Lake, Ark.		X
	31750	10-12-66	Zumbrota, Minn.	X	
	31575	11- 3-66	Red Wing, Minn.	X	
	31573	10- 9-66	Red Wing, Minn.	X	
	31718	11-13-66	Ft. Madison, Iowa		X
	31710	11-21-66	Edgewood, Iowa		X
	31720	11-21-66	Edgewood, Iowa		X
	*31521	10- 9-66	Red Wing, Minn.	X	
	31504	10-15-66	Red Wing, Minn.	X	
	31517	10- 9-66	Red Wing, Minn.	X	
	31716	10- 8-66	Rosemount, Minn.		X
	31519	10- -67	Red Wing, Minn.	X	
	31719	12-29-67	Gregory, Ark		X
1967	61100	11- 3-67	Readlyn, Iowa		X
	61176	11-15-67	Red Wing, Minn.	X	
	61187	10- 7-67	New Prague, Minn.		X
	61227	10- 7-67	Red Wing, Minn.	X	
	61087	11- 4-67	Zumbrota, Minn.	X	
Total				13	20

* Auto kill

Association with the observer and dog during the counting procedure probably resulted in the ducks becoming tame. This could have increased the birds' vulnerability to hunting.

When investigating the survival of ducklings released on large natural marshes, locating and counting of birds becomes a problem. In contrast, artificial ponds often have only a ring of terrestrial and emergent vegetation and ducklings are more readily found.

The reasons for disappearance of the 495 released ducklings were not easily learned. Many were victims of predators; 67 definite kill sites were discovered. This represents 7.4 percent of the released birds. For comparison, Foley (1954) released 722 mallards and located 37 predator kills (5.1 percent).

The higher duckling survival rate on ponds with ungrazed shores appears to be related to available cover. However, some fenced ponds had heavy losses, while some unfenced ponds had better than average survival (see Table 6).

Before they were able to fly, some ducklings walked considerable distances away from the ponds in which they had been released. It is possible that ducklings had wandered away from those ponds which had no evidence

TABLE 6. Number of released ducklings counted on individual ponds in 1965.

Pond	7/31	8/1	8/4	8/6	8/9	Date 8/16	8/18	8/21	8/25	8/28	9/5
Lexvold	20	20	18	18	18	0	16	1	7	15	17
Kunde	20	18	0	17	16	12	6	1	14	15	17
Bucky	20		20	20	20	20		20		20	14
Krissty	20	20	20	20	20	20	20	20	0	19	23
Hadler	20		6	6	1		0	0	0	0	0
Clem	20	20	20	16			16			15	15
Budensick	20	20		19			19			19	19
Nick	20			18		17				13	
Nodland	20	20	19	20	20	20	20	20	19	20	19
*Fursell	20	20	16		11		0	7		6	
*O'Connor	20		20		0	9	9	0		4	4
*O'Neil	20	20	20		0	18	0	18	17	16	
*Fogelson	20	20		0	0		1	1		1	0
*Eckblad	20	20		0	17	17	17	17	16	15	18
*Anderson	20		16	13	9	8				4	
Calculated No. alive	300	278	248	223	212	202	195	188	183	182	182
Calculated percent alive	100	92	83	74	70	67	65	63	61	61	61

* pond shores grazed by livestock

of predation but lost a large proportion of their ducklings soon after release. Most ducklings stayed in a close-knit group until some were able to fly. It seemes unlikely that a few would wander away at a time. Perhaps future band recovery data will provide a clue to these and other questions.

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