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Increasing Waterfowl Production on Points and Islands by Reducing Mammalian Predation[1]

John T. Lokemoen[2], Richard W. Schnaderbeck[3], and Robert O. Woodward[2]

Abstract.--On 12 points, with electric predator barriers, there were 0.84 duck nests per acre with a hatching rate of 60%. On 12 control points, there were 0.23 nests per acre with a hatching rate of 8%. On 9 islands where predators were removed, there were 851 nests in 1986 with 87% nest success. In 1984 and 1985, before predators were controlled, these islands contained 52 nests with 8% nest success. The management cost to produce hatched young on treated points was $7.13 compared with $0.33 for each hatched young on islands.

INTRODUCTION

Recent studies of mallard (Anas platyrhynchos) mortality (Sargeant et al. 1984), hen success (Cowardin et al. 1985), and brood survival (Talent et al. 1983) have indicated severe losses of hens, eggs, and young to mammalian predators. As a result, biologists interested in managing breeding waterfowl have shown increased interest in regulating predation.

A study of waterfowl management methods (Lokemoen 1984) concluded that predator management was the most cost-effective technique to increase waterfowl production. Islands, where nests were separated from mammalian predators, were particularly beneficial to breeding waterfowl but islands were expensive to construct.

In this study we tried to create "safe nesting islands" for breeding waterfowl without using expensive construction methods. We used fences with electric wires to deter predators from points. These types of fences have been shown to reduce predator movement into nesting habitats (Forester 1975, Lokemoen et al. 1982). Also we attempted to increase waterfowl production on existing islands by removing mammalian predators. The point study areas were located in east-central North Dakota and the island study sites in north-eastern North Dakota.

METHODS

Five treated points were studied in 1985 and 7 in 1986. A similar number of control points located nearby contained no fences or predator control.

To create "safe nesting islands" we built wire fences across the base of points using 18 gauge 1-inch mesh poultry netting. The fence extended 5.5 feet above ground level (AGL) and 1 foot below ground level. The top 1 foot of the fence extended outward at a 45° angle. Fences extended into the lake 50-150 feet to water 2 feet deep. Two energized electric wires off-set 2.5 inches and 5.0 inches from the fence were placed on the outside of the fence 4 feet AGL. Another energized wire was placed 2.5 inches above the top of the poultry netting.

Mammalian predators were trapped within the fenced point exclosures using 220 conibear traps set in boxes. Sardines and dead fish were placed inside the boxes as bait. On 2 points, size 1.5 leg-hold traps were set to capture mink (Mustela vison). An average of 3.8 conibears and 0.5 leg-hold traps were set at each point. An average of 8 trips were made to each treated point to remove trapped predators and maintain the fence.

On islands, predators were removed after the ice melted in spring. Islands were walked to flush and shoot red fox (Vulpes vulpes) and traps and snares were set to remove other predators. An average of 3-110 conibears, 2-220 conibear traps, and 3 snares were set at each island. Predators were removed from 7 islands in the spring of 1986, and from 2 islands in Stump Lake during the springs of 1985 and 1986. An average of 4 trips were made to each island.

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All treated points, control points, and islands were searched for waterfowl nests 2-4 times during the nesting season. Nest searches involved 2-6 people walking abreast and pulling weighted ropes or riding all terrain vehicles and pulling a 5/16" chain to flush waterfowl hens and locate nests (Higgins et al. 1977). Each nest was marked with a flag when found and nests were revisited to determine fate and count hatched eggs. Nest success was determined by the modified Mayfield method (Johnson 1979). Nest numbers, nest success, and the number of young hatched were compared between treated and control points and at islands before and after predator control.

Costs of ducklings were estimated by dividing the annual management expenses for establishment and maintenance by the number of young ducks hatched. Cost estimates were the same as those used by Lokemoen et al. (1984). Labor costs were set at $6.50 per hour and transportation costs at $0.33 per mile. All costs were prorated for the life of the practice using the Water Resources Council standard amortization rate of 0.08875.

RESULTS AND DISCUSSION

Paired Point Comparisons

Treated points contained 280 nests with 60% nest success compared with 39 nests and 8% nest success on control points (Table 1). An average of 128.8 young hatched during each of the 2 years on the treated points compared to 2.4 young hatched per control point. Gadwalls (Anas strepera) comprised 39% of the total nests on points, blue-winged teal (Anas discors) 25%, mallards 11%, and pintails (Anas acuta) 10%.

Predation on control points in central North Dakota was severe and few waterfowl nesting attempts were successful. Electric barriers plus predator control greatly benefited duck nesting success but did not fully stop predation. Several hens were killed by raptors and eggs were destroyed by American crows (Corvus brachyrhynchos), which fences do not deter. Eggs were also destroyed by mink and raccoon (Procyon lotor), some of which swam around the fence and were not captured in traps.

The species composition of 47 predators captured on points included raccoon 40%, striped skunk (Mephitis mephitis) 32%, red fox 21%, mink 2%, and Franklin's ground squirrel (Spermophilus franklinii) 4%.

Table 1.--Number of nests, nest success and nest density on treated (T) points with predator barriers and on control (C) points in central North Dakota, 1985 and 1986.

Year		N	Acres	No. of nests	Nests per acre	Nest suc. (%)	Total young hatched
1985	T	5	149	112	0.75	55	571
	C	5	65	16	0.25	11	18
1986	T	7	184	168	0.91	63	975
	C	7	102	23	0.23	5	11
Total or avg.	T	12	333	280	0.84	60	1546
	C	12	167	39	0.23	8	29

Island Comparisons

The number of nests found on islands increased from 52 before predator control to 851 after predator control (Table 2). Nest success rose from 8% before predator removal to 87% after predator removal. An average of 790.6 young were hatched on each island in 1986 after predator control compared to 4.7 young hatched per island in 1984 and 1985 before predator control.

The density of waterfowl nests increased rapidly from 0.7 to 11.8 nests per acre after predators were removed from islands. On the 2 large islands in Stump Lake, nest densities increased from 0.2 nests per acre in 1984 to 13.3 nests per acre in 1986, a 66.5-fold increase.

Mallards and gadwalls formed 93% of the island nesting population. These 2 species also initiated 93% of the nests on Miller Lake Island, North Dakota (Duebbert et al. 1983). A few blue-winged teal, northern pintail, and lesser scaup (Aythya affinis) also nested on the islands.

After predator control was initiated, most nest losses on islands were attributed to mink or crows. A total of 18 predators were captured on the 9 islands in 1986. The species composition of predators captured on the 9 islands was 44% red fox, 39% mink, 11% raccoon and 6% striped skunk. Red fox and mink were more frequently captured on islands compared to points and striped skunk and raccoon were less frequently captured.

Duck Production Costs

The average total cost of each fence was $5,964.96, which yields an annual cost of $650.18 when amortized over 20 years. This expense plus an estimated $267.75 yearly cost of fence maintenance and predator removal resulted in a total annual cost of $917.93 for each fenced point (Table 3). By dividing the total annual cost by the total annual production we obtain a cost of $7.13 for each young hatched.

The estimated cost to hatch a duckling on an island was $0.33. This cost was lower than the cost of ducklings hatched on points because there were no construction expenses and islands had higher nest densities and success. Major island expenses were transportation and labor involved in visiting islands for predator removal.

The cost per young would decline if the number of successful nests on the treated points and islands increased. Numbers of nesting ducks might increase because of homing by successful hens and their young (Sowls 1955). Nest success might also rise if managers increase trapping effectiveness.

These data were obtained during 2 field seasons and must be considered preliminary. The results indicate, however, that the 2 management schemes can be highly effective. The response of ducks to predator-reduced nesting environments was rapid and production was greatly enhanced in the first year. Estimated costs of hatched young were comparable to or lower than fledged young costs estimated by others.

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Table 2.--Number and success of duck nests found on 9 islands in 1984 and 1985 before predator control and in 1986 after predator control near Devils Lake, North Dakota.

		Before		After	
Island Name	Size (a.)	No. of nests	Nest suc. (%)	No. of nests	Nest suc. (%)
North Salt	10	14	3	165[1]	61
Sheep	2	14	2	48[1]	86
McHugh	6	2	38	3[1]	36
Minnewaukan	5	5	10	19[1]	88
Pelican 1	2	2	19	21[1]	94
Pelican 2	2	4	19	31[1]	94
Calderwood	5	3	45	34[2]	83
Stump 1	25	5	-	293[2]	97
Stump 2	15	3	-	237[2]	95
Total or average	72	52	8	851	87

[1]Predator control conducted only in 1986.

[2]Predator control conducted in 1985 and 1986.

Table 3.--Estimated annual cost in dollars for management applications and for each duckling hatched on treated points and on islands with predator control in central North Dakota 1984-1986.

Activity	Points		Islands
	Annual Expenses		
Construction(fence)[1]	650.18	(None)	00.00
Transp.(400 mi)	$132.00	(184 mi)	$60.72
Labor (12 hrs)	78.00	(25 hrs)	162.50
Supplies (5 traps)[2]	7.75	(8 traps)[2]	11.63
Other (materials)	50.00	(Boat)[2]	25.83
Tot. annual costs	917.93		260.68
Avg. no. yg. hatched	128.8		790.6
Cost/yg. hatched	7.13		0.33

[1]Costs amortized over 20 years.

[2]Costs amortized over 10 years.

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