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Use of Small Fences to Protect Ground Bird Nests from Mammalian Predators

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High predation seriously complicates many bird nesting - brood rearing studies. Considerable expense and effort can be invested in preparation for obtaining data on the nesting, incubation, and brood rearing behavior of individual birds, but those efforts can prove futile if the nest is destroyed by predators at an inopportune time. Nest destruction rates on ground-nesting birds in prairie regions are often high. For example, Miller (1971) found that since the 1940's nest destruction rates in most studies of prairie ducks were 70 percent or greater and Sargeant (1972) found that many hen ducks were killed, presumably at the nests, by red foxes (*Vulpes vulpes*). Because of the high probability of nest destruction and possible loss of the hen, protection of specific nests would greatly increase the feasibility and efficiency of many studies.

Fences of various sorts have long been used by game keepers and poultry raisers to fence birds in and predators out, but they are generally regarded as impractical and too costly for application to field studies. Recently, however, a 2000 m electric fence was effectively used to protect a nesting colony of sandwich terns (*Sterna sandvicensis*) from predation by red foxes in Scotland (Forster 1975). The purpose of this paper is to describe a small fence nest-protector that was tested on individual nests of sharp-tailed grouse (*Pedioecetes phasianellus*) and ducks in Stutsman County, North Dakota, and used in a field study of northern shovelers (*Anas clypeata*) at the Delta Waterfowl Research Station, Delta, Manitoba.

PROCEDURES

The nest-protector consisted of a 5.1 cm mesh chicken-wire fence, 61 cm high and 30.5 m long, which was erected in a rectangular shape around nests of laying or incubating birds (Fig. 1). The fence was staked upright at approximate 2.5 m intervals and each corner was supported by a guy wire. The fence was pegged to the ground at 0.6 to 1.2 m intervals with hooked metal rods; vegetation was parted so the bottom edge would fit flush with the ground. Two strands of electric fence wire were attached at an outward angle approximately 10 and 25 cm, respectively, above the chicken-wire and energized with a portable electric fence-charger placed in a metal box outside but adjacent to the fence. Approximately 1 hour was required for two individuals to erect a nest-protector.

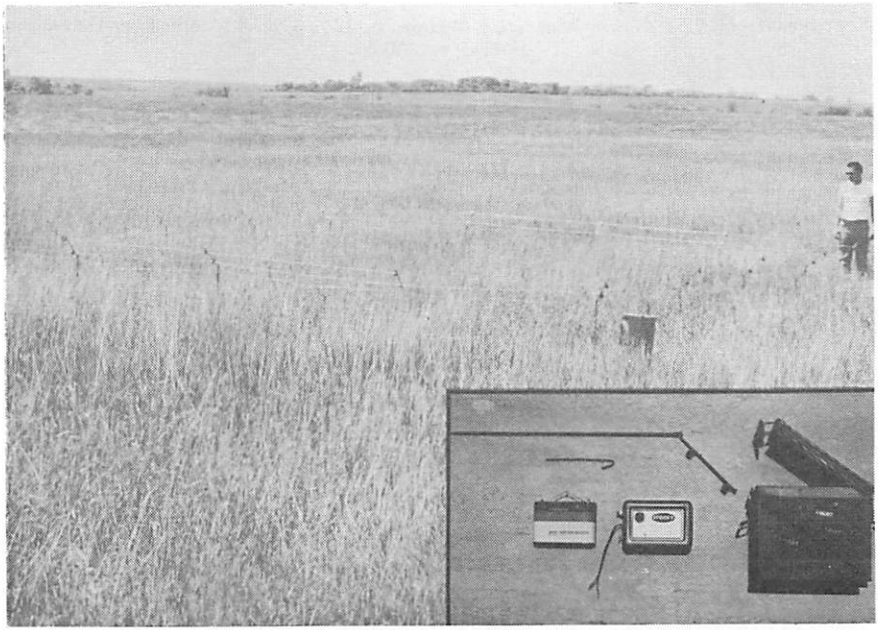

FIGURE 1. An erected fence nest-protector and components needed for construction. Shown enlarged are the electric fence-charger, battery, metal box for protecting the charger, stake with insulators for supporting the wire mesh and electric fence wire, and hooked metal rod for pegging the wire mesh to the ground.

Nest-protectors were placed around nests of 3 sharp-tailed grouse, 2 blue-winged teal (*A. discors*), 1 pintail (*A. acuta*), and 1 northern shoveler in North Dakota; 11 unprotected nests of the above duck species plus the mallard (*A. platyrhynchos*) served as controls. We located the nests with a cable-chain drag as described by Higgins et al. (1969) and then divided the nests among those to be fenced and those to be controls. At least one control nest was near each fenced nest. Birds usually were re-flushed when the nest-protectors were erected. Test and control nests were visited at weekly intervals until their fate was determined. Vegetation touching the electric wires was broken off by hand. The nests were in three groups at widely separated locations, and thus were exposed to different groups of predators. Mammalian predators active in the areas included red fox, raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), badger (*Taxidea taxus*), and mink (*Mustela vison*).

In 1974 nest-protectors without electric wires were placed around eight northern shoveler nests at the Delta Station to facilitate a study of incubation behavior. Nest success was also recorded for 22 unfenced shoveler nests in the same area, which served as controls. Mammalian predators at the Delta Station were the same species as on the North Dakota Study areas.

RESULTS AND DISCUSSION

Of the 15 protected nests in the test and field studies, 67 percent hatched, 20 percent were deserted, and 13 percent were destroyed by predators (Table 1). Of the 33 control nests, 21 percent hatched, 12 percent were deserted, and 67 percent were destroyed by predators. The difference in hatching rates between protected and control nests was highly significant ($P<0.01$, $x^2=9.94$, 1 d.f.). There was no significant difference in the desertion rates of the protected and control nests. The sharp-tailed grouse that deserted was a laying hen that was flushed twice the same day. Desertion by the two protected northern shovelers also occurred during the laying period. As an example of the nest tenacity of some birds, we cite on incubating sharp-tailed grouse, which remained on her nest while the nest-protector was erected around her; that nest ultimately hatched.

Table 1. Fates of nests enclosed by fence nest-protectors and control nests in Stutsman County, North Dakota and near Delta, Manitoba.

	Protected			Controls		
	Hatched	Deserted	Destroyed	Hatched	Deserted	Destroyed
North Dakota						
Sharp-tailed grouse	2	1	0	0	0	0
Blue-winged teal	2	0	0	1	1	5
Pintail	0	0	1	1	0	0
Northern shoveler	1	0	0	0	0	1
Mallard	0	0	0	0	1	1
Manitoba						
Northern shoveler	5	2	1	5	2	15
Total	10 (67%)	3 (20%)	2 (13%)	7 (21%)	4 (12%)	22 (67%)

Predators observed or identified by sign at individual nest-protectors included the red fox, raccoon, striped skunk, and mink. Destruction of the two nests was attributed to a mink in the North Dakota tests and to a red fox in the Manitoba study. The fence offers little protection from mink, which can move through 5.1 cm chicken-wire mesh. Nest destruction by the red fox probably would have been avoided if electrified wires had been used (Forster 1975).

A few eggs failed to hatch, possibly because individual hens remained off their nest too long during and immediately after erection of the nest-protector. Birds that were flushed during visits to nests always cleared the fence. Two sharp-tailed grouse chicks of one brood were observed walking through the meshes of the chicken-wire without difficulty. Several duck broods appeared to have paced back and forth against one or more sides of the fence before departing; two dead shoveler ducklings were found along one fence. Because the chicken-wire was

easily traversed by ducklings, the delay in departure probably was caused by a reluctance of the hen to fly over the fence when leading her brood from the nest. Delayed departures could be alleviated by raising the chicken-wire at selected sites along the fence just before hatching. By placing the ground exits at opposite corners, a hen pacing on any single side of the nest-protector would almost immediately encounter one of the exits.

The nest-protector appeared to reduce predation greatly and has potential uses in many types of studies. The fence we used was relatively inconspicuous and was easily erected and maintained. Components of the nest-protector were reusable. The importance of the fence-charger and electric wires, a major cost in the nest-protector, was unknown and proved largely unnecessary in the Manitoba study, but as demonstrated by Forster (1975) the electrified wire adds a degree of certainty to the protection of a nest. An obvious benefit of small fences is that they offer an alternative to predator control for certain studies and situations where predation must be reduced.

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