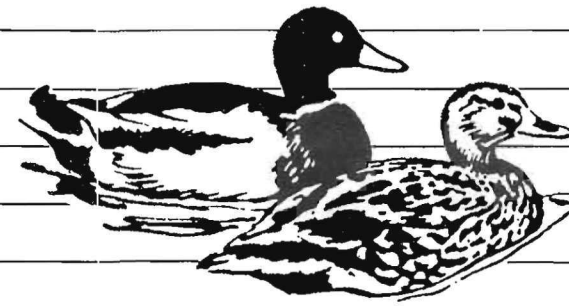
Research
Information bulletin
U.S. DEPARTMENT OF THE INTERIOR
NATIONAL BIOLOGICAL SURVEY
NO. 10
DATE 1994



Electrified Fences Reduced Predation on Least Tern and Snowy Plover Eggs and Chicks

High rates of predation on eggs and chicks can severely reduce reproduction in ground-nesting waterfowl and shorebirds. Wildlife managers have used electrified fences for more than 50 years to protect breeding waterfowl from predators. We evaluated the usefulness of electrified fences for decreasing predation by mammals on eggs and chicks of the endangered least tern (*Sterna antillarum*) and the listing candidate snowy plover (*Charadrius alexandrinus*) and for establishing new nesting colonies by these species.

Study Sites and Methods

The study was conducted on the salt flat of the Salt Plains National Wildlife Refuge, Oklahoma. In 1991, an electrified fence was constructed around a 16-ha (400 × 400 m) area. An area that had not been used by nesting least terns in previous years was selected to preclude adverse effects on an established nesting colony and to determine the efficacy of an electrified fence for establishing a new nesting colony. One solar-powered unit (Gallagher B-150 energizers, 12-V DC, with deep cycle 12-V batteries; Gallagher Power Fence, Inc., San Antonio, Texas) was used to provide power for the fence. The fence consisted of five wires spaced at 14, 28, 42, 62, and 86 cm from the ground. Soil from the salt flat was used to make 15 ridges (about 10 m long × 0.5 m wide × 0.2 m high) to serve as nesting platforms inside the fence and to attract adult terns and plovers during the breeding season (May–July).

In 1992, electrified fences were constructed around two 3.75-ha areas (250 × 150 m) about 3.0 km east of the 16-ha site. The power for these fences was also provided by solar units. However, unlike the 16-ha site, the two smaller sites had been used by nesting terns and plovers during the year before the fences were constructed.

Nests inside and outside the enclosures were checked every 3 days, and daily mortality of the eggs and chicks and nesting success were estimated with the Mayfield Method. We compared the daily mortality inside the fences with daily mortality outside the fences.

Mortality Reduced in Fenced Areas

At the 16-ha site, the daily mortality of eggs and chicks of least terns was significantly higher outside than inside the fence in 1991 ($t = 2.56$, $P = 0.012$) and in 1992 ($t = 1.93$, $P = 0.037$; Table 1), and the daily mortality of eggs and chicks of snowy plovers was the same inside and outside the fence in 1991 ($t = 0.92$, $P = 0.190$) and in 1992 ($t = 1.44$, $P = 0.083$; Table 1). The least terns and the snowy plovers established a nesting colony in this site. The number of least tern nests rose from 3 in 1991 to 10 in 1992, and the number of snowy plover nests rose from 2 in 1991 to 13 in 1992 (Table 1).

At the combined 3.5-ha sites, the daily mortality of eggs and chicks of least terns was the same inside and outside the fences in 1992 ($t = 0.91$, $P = 0.207$; Table 2), but the daily mortality of eggs and chicks of snowy plovers was significantly higher outside than inside the fence in 1992 ($t = 1.73$, $P = 0.049$; Table 2). The absence of differences was probably due to large standard errors from the small number of nests. The small number of nests ($n = 5$) in the 16-ha site in 1991 was attributed to the rare use of the area by nesting least terns and snowy plovers before the fence was constructed. The small number of birds that nested in the 3.5-ha sites in 1992 was attributed to flooding of nest habitat.

Electrified Fences Are Useful

The sample size in our investigation was too small for definitive conclusions. Nevertheless, the comparison of mortality of eggs and chicks inside and outside the enclosures suggested that electrified fences are useful for raising nesting success and for establishing nesting colonies of least terns and snowy plovers . Electrified fences can protect large areas of nesting habitat where single nest enclosures are not practical. Unlike nest enclosures, fences can be constructed without disturbing the birds; that is, before the birds arrive to nest. The maintenance of fences requires only periodic clearing of debris and checking for the presence of power. We estimated that the construction of the large (400 × 400 m) fence cost $1,200 for materials and about 40 person-hours for labor.

For further information contact:

Russell B. Utych
Oklahoma Cooperative Fish and Wildlife Research Unit
404 Life Sciences West,
Oklahoma State University
Stillwater, Oklahoma, 74078
(405) 744-6342

or

Rod Krey
Salt Plains National Wildlife Refuge
Route 1, Box 76
Jet, Oklahoma
(405) 626-4794

or

David M. Leslie, Jr.
Oklahoma Cooperative Fish and Wildlife Research Unit
404 Life Sciences West,
Oklahoma State University
Stillwater, Oklahoma, 74078
(405) 744-6342

Table 1. Daily mortality rates of eggs and chicks and nesting success of least terns and snowy plovers inside and outside a 16-ha area enclosed by an electrified fence in the Salt Plains National Wildlife Refuge, Oklahoma, 1991 and 1992.

Variables	1991		1992	
	Inside	Outside	Inside	Outside
Least terns				
n[a]	3	11	10	7
Nesting success (%)	81.0	7.8	50.5	7.1
Daily mortality rate	0.010	0.114[b]	0.032	0.119[b]
Standard error	0.015	0.038	0.016	0.042
Snowy plovers				
n[a]	2	9	13	9
Nesting success (%)	77.8	48.7	55.1	22.8
Daily mortality rate	0.010	0.028	0.024	0.057
Standard error	0.014	0.014	0.010	0.021

[a] Number of nests.
[b] Rate was greater ($P < 0.05$) outside than inside the fence.

Table 2. Daily mortality rates of eggs and chicks and nesting success of least terns and snowy plovers inside and outside two (combined) 3.5-ha areas enclosed by electrified fences in the Salt Plains National Wildlife Refuge, Oklahoma, 1992.

Variables	Least terns		Snowy plovers	
	Inside	Outside	Inside	Outside
n[a]	4	2	7	14
Nesting success (%)	64.9	24.7	56.3	17.2
Daily mortality rate	0.020	0.065	0.023	0.068[b]
Standard error	0.020	0.044	0.016	0.021

[a] Number of nests.
[b] Rate was greater ($P < 0.05$) outside than inside the fence.