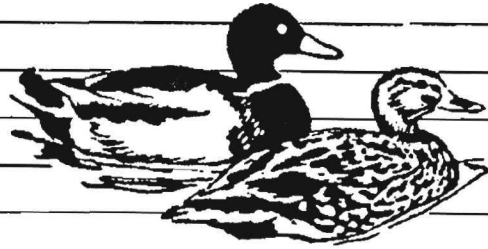


Research



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Intensive Seasonal Predator Removal Had Little Effect on Duck Nest Success in Waterfowl Production Areas

Nest success of dabbling ducks in Waterfowl Production Areas (WPA's) in North Dakota, South Dakota, and Minnesota is usually less than the 15-20% needed to maintain duck populations. Predation by mammals, especially red foxes (*Vulpes vulpes*), striped skunks (*Mephitis mephitis*), raccoons (*Procyon lotor*), badgers (*Taxidea taxus*), and Franklin's ground squirrels (*Spermophilus franklinii*) causes most nest failures. Managers seek ways to reduce depredations of eggs in duck nests in WPA's.

We Evaluated the Use of Seasonal Predator Removal

During 1987-90, we worked with U.S. Fish and Wildlife Service (FWS) wetland management districts in western Minnesota and eastern North Dakota to remove predators from WPA's. Data were obtained from 12 pairs of removal (predators removed) and control (no predators removed)

WPA's. Nine pairs (seven in Minnesota and two in North Dakota) were studied for 1 year and three pairs (one in Minnesota and two in North Dakota) were studied for 2 years. Study area pairs had similar habitat characteristics, and the predator removal treatment was randomly assigned to one WPA of each pair. The WPA's ranged from 61 to 301 ha. We treated each study area year (one WPA for 1 year) as an independent datum. Study constraints stipulated that (1) predators would be removed seasonally from within WPA's only, (2) removal methods would include only those approved for widespread use by FWS managers, and (3) removal schemes would be suitable for adoption by FWS managers.

Predator removal was conducted by experienced trappers. Trapping with live traps, quick-kill body-gripping traps, and padded foothold traps were the primary removal methods. Snares were used in two areas, and a few predators were shot or dug from dens. Some

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trappers were assisted by trap-attenders who tended the traps on the days between visits by trappers. Trapping of each area began in late March or early April and ended in early or mid-July. A total of 611 adult predators (47% skunks, 20% raccoons, 18% Franklin's ground squirrels, 11% foxes, 2% badgers, and 3% other species), 55 juvenile predators, and 179 nontarget animals were removed during 30,872 trap-days (one functional trap for 1 day). The nontarget animals were mostly (97%) mammals, primarily thirteen-lined ground squirrels (*Spermophilus tridecemlineatus*), and included only five birds (no raptors).

Predator Removal Resulted in a Small Increase in Duck Nest Success

We searched nearly all habitats of each WPA three times for duck nests. The searches were conducted at 3-week intervals beginning in early May and ending in late June. We used ATV- and jeep-pulled chain drags to search most uplands, and persons walking with switches to search wetlands and wooded areas. Nests were revisited at about 7- to 10-day intervals until their fate was determined.

We found 998 duck nests that were suitable for analyses; 948 were in uplands and 50 were in wetlands. The nests were 56% blue-winged teal (*Anas discors*), 20% mallard (*A. platyrhynchos*), 10% gadwall (*A. strepera*), 6% northern shoveler (*A. clypeata*), 4% northern pintail (*A. acuta*), and 4% other. Duck nest success in uplands was 1 to 52% in removal areas and 1 to 62% in control areas. Mean nest success in uplands was 13.5% in removal areas and 5.6% in control areas ($P = 0.05$). Mean nest success in wetlands was 2.2% in removal areas and 15.9% in control areas ($P = 0.75$), but samples were small. Overall causes of nest failures averaged 86% depredated, 11% abandoned, and 3% other, with no difference ($P = 0.78$) between removal areas and control areas.

Number of Predators Removed Was Unrelated to Nest Success

Nest success in uplands of removal areas was not related to the total number of adult carnivores removed ($P = 0.76$) or to the total number of predators removed ($P = 0.95$). Data for nest

success in wetlands were too few for meaningful comparisons with numbers of predators removed.

Predator Removal Had Little Effect on Predator Populations

We determined the species composition of the predator community at each area from searches for tracks of carnivores, sightings of predators, and livetrapping of Franklin's ground squirrels. The predator communities at removal areas and at control areas were similar. Foxes, skunks, and raccoons were common or abundant at nearly all areas. Badgers and coyotes occurred at many areas but generally were uncommon. Minks occurred at nearly all areas. Franklin's ground squirrels occurred at most areas and were abundant at some areas. American crows were occasionally seen at areas in Minnesota but were absent from nearly all areas in North Dakota.

We detected no effect of predator removal on the occurrence or activity levels of predator species, except skunks. In most areas, predator species present at the beginning of the removal period were still present at the end of the period. We searched 200- × 200-m plots in and along the perimeter of each area during late April, early June, and late June to determine activity levels (proportion of plots with tracks) of the large carnivore species. We detected no difference between removal areas and control areas in the activity indices for foxes ($P = 0.43$) and raccoons ($P = 0.13$), but found a difference for skunks ($P = 0.03$). Data for other species were insufficient for analyses.

Predator Removal Was Costly

Trappers (includes trap-attenders) recorded the total time they spent in each removal area conducting predator removal. Areas were trapped for an average of 97 days, and trappers visited nearly all areas daily. The average duration of daily visits was 1.4 h/area. One trapper could service no more than 4 WPA's/8-h workday. By using these figures and the 1990 wage of \$8.56/h paid to trappers in Minnesota, we calculated the direct salary costs of removing predators from each area to be \$1,661 (97 days × 8 h/day × \$8.56/h ÷ 4 WPA's). This does not include costs of training, equipment and supplies, transportation, supervision, and overhead.

Several Factors Hindered the Success of Predator Removal

The WPA's we studied are in a fragmented agricultural region occupied by predator communities that are particularly harmful to nesting ducks. The WPA's probably were more attractive to predators than were most adjoining private lands. Moreover, because of drought (North Dakota) or location (Minnesota [fewer duck species in abundance than in North Dakota]), abundance of duck nests in many of our areas was low. We found <25 nests per area in half the areas. These factors, along with immigration of predators into the areas and presence of predators that evaded capture, overpowered our efforts to substantially increase duck nest success.

Constraints placed on our trappers limited their effectiveness, especially (1) restricting the removal of predators to WPA's only, (2) restricting the choice of removal methods, (3) tending traps daily, and (4) requiring inflexible 8-h workdays that began and ended at headquarters. However, for legal, social, and humane reasons, these types of constraints are

necessary in most present-day predator removal programs.

Managers contemplating predator removal programs should recognize the difficulty of the task and carefully consider their choice of locality for such programs. Severe predation rates may be symptomatic of areas where managers will have greatest difficulty accomplishing cost-effective predator removal. Programs that stress numbers of predators removed or amount of area treated over the thoroughness of removal effort are likely to be ineffective.

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