

PREY OF NESTING RED-TAILED HAWKS AND GREAT HORNED OWLS ON LOSTWOOD NATIONAL WILDLIFE REFUGE, NORTH-WESTERN NORTH DAKOTA

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Nesting Red-tailed Hawks recently invaded and Great Horned Owls have increased on Lostwood National Wildlife Refuge (LNWR) in northwestern North Dakota due to succession from mixed-grass prairie to aspen parkland.⁶ Information on diets of these raptors could help resource managers assess the species' needs and relationships with other fauna, but such data are available from few areas in the northern Great Plains.^{2,11} This paper summarizes composition of prey of Red-tailed Hawks and Great Horned Owls observed at nests on LNWR during a long-term study of raptor nesting ecology.⁶

Study Area and Methods LNWR is 108 km² of rolling to hilly, semi-arid grassland interspersed with numerous temporary to permanent wetland basins and an average of about 12 clumps of Quaking (or Trembling) aspen trees per 2.6-km² section. Physiography, geology, soils, habitat composition, climate, and history of the area have been described.⁶

I observed fresh (still edible) prey items during climbs to assess reproductive success at Great Horned Owl nests during early May and at

Red-tailed Hawk nests during late June, 1983-90. Prey were identified and left in nests. Data were pooled from all years for both raptor species and were summarized by relative (percentage) frequency.

Results and Discussion Forty-nine fresh prey were observed during about 200 climbs to Red-tailed Hawk nests and 53 fresh prey were observed during 78 climbs to Great Horned Owl nests. Although small prey were more likely to be overlooked than large prey by my methods, I assume effect of the bias was low. Birds were the most important prey of Red-tailed Hawks and especially of Great Horned Owls on LNWR (Table 1). Mammals generally comprise most Red-tailed Hawk prey during summer in other parts of the northern Great Plains^{2,11} and elsewhere.⁴ Nesting Great Horned Owls also tend to rely on mammals,⁴ although birds apparently dominate diets of Great Horned Owls in south central North Dakota.² Rabbits and hares, important prey of Great Horned Owls in other north-central states and in adjacent provinces,^{1,3,10} probably were not preyed on more often on LNWR because they were scarce in the area.⁵

Table 1. PREY OF RED-TAILED HAWKS DURING SUMMER AND OF GREAT HORNED OWLS DURING SPRING ON LOSTWOOD NATIONAL WILDLIFE REFUGE, NORTH DAKOTA, BASED ON OBSERVATION OF FRESH PREY AT NESTS, 1983-1990.

Prey ^a	Red-tailed Hawk		Great Horned Owl	
	number	% frequency	number	% frequency
Mammals				
Richardson's & Thirteen-lined ground squirrels	10	20.4	0	—
Meadow Vole and jumping mouse sp.	4	8.2	6	11.3
White-tailed Jackrabbit (juvenile)	1	2.0	5	9.4
Least Weasel	1	2.0	0	—
Total mammals	16	32.7	11	20.8
Birds				
Horned or Eared grebe	0	—	3	5.7
American Coot	2 ^b	4.1	12	22.6
Sora and Virginia rails	0	—	2	3.8
Duck ^c	18 ^d	36.7	14	26.4
Sharp-tailed Grouse	5 ^e	10.2	5	9.4
Blackbird ^f	1	2.0	6	11.3
Unknown passerines (juveniles)	5	10.2	0	—
Total birds	31	63.3	42	79.2
Other prey				
Smooth Green Snake	1	2.0	0	—
Band-winged Grasshopper (<i>Oedipodinae</i>)	1	2.0	0	—
Total	49	100.0	53	100.0

^a Prey were adult size unless otherwise indicated.

^b Both coot prey were juveniles.

^c Adult duck prey included Mallard, Northern Pintail, Blue-winged Teal, Northern Shoveler, Gadwall, American Wigeon, and Lesser Scaup.

^d Duck prey of Red-tailed Hawk included nine juveniles.

^e Grouse prey of Red-tailed Hawk included three juveniles.

^f Blackbird prey of Red-tailed Hawk was Red-winged Blackbird. Blackbird prey of Great Horned Owl included Yellow-headed Blackbird, Common Grackle, and Brown-headed Cowbird.



Red-tailed hawk delivers meadow vole prey to its nestling on Lostwood National Wildlife Refuge, North Dakota

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About 43% of Red-tailed Hawk prey and 64% of Great Horned Owl prey were species directly associated with wetlands, such as American Coot, ducks, and Yellow-headed Blackbird, even though wetland habitat comprised only 20% of LNWR. Thus, use of wetland-dependent prey by both raptor species was greater than expected based on the availability of wetland habitat. The most important prey groups were birds from wetlands (Table 1), especially American Coot for Great Horned Owls and ducks for both species of raptors. One-half of duck prey of Red-tailed Hawks were ducklings, all but one of these less than a week old. Female ducks made up 79% of 14 adult duck prey of Great Horned Owls. I did not estimate prey composition by biomass (weight) but believe wetland-dependent birds contributed most prey biomass used by nesting Great Horned Owls based on frequency of grebes, American Coot, and ducks observed. Wetland-dependent birds dominated biomass of the owl's diet on a nearby area of mixed land use.⁸

Another important prey group used by Red-tailed Hawks was ground squirrels (Table 1). Most (80%) were Richardson's Ground Squirrels that may have been captured on heavily grazed prairie adjacent to LNWR. Franklin's Ground Squirrels occurred on LNWR⁵ but were not observed as prey of either Red-tailed Hawks or Great Horned Owls.

Overlap in the diets of co-existing Red-tailed Hawks and Great Horned Owls has been studied previously in North America, based on prey remains or pellets at nests.^{2,4} However, a six-week disparity in nesting chronology between the two species on LNWR⁷ rendered such comparisons weak. In summer nearly one-half of

mammal and bird prey of Red-tailed Hawks were juveniles, but about the only juvenile vertebrate prey available in spring when Great Horned Owl diets were recorded were small (less than one-eighth grown) jackrabbits; the owls used this prey (Table 1). Great Horned Owls would have preyed on different age classes and perhaps species of prey during summer compared to spring, as they did on nearby areas of mixed land use.⁸

My cursory survey suggests birds, especially those from wetlands, are the most important prey of nesting Red-tailed Hawks and Great Horned Owls on LNWR during each raptor's respective nestling period. Great Horned Owls seemed particularly tied to wetland-dependent prey, which supports observations of a strong affinity for wetland habitats by the owl on LNWR.⁶ Relative composition of Red-tailed Hawk and Great Horned Owl diets on LNWR were similar to those noted in south-central North Dakota² except that Red-tailed Hawks on LNWR relied more on bird prey, and ducks were more important to both the hawk and owl on LNWR.

Acknowledgments John Ensign and Karen Smith lent expert help in the field, and R.L. Eng and Alan B. Sargeant commented on a manuscript draft.

1. ERRINGTON, P.L., F. HAMERSTROM and F.N. HAMERSTROM, Jr. 1940. The Great Horned Owl and its prey in north-central United States. *Iowa Agric. Exp. Stn. Res. Bull.* 227:758-850.
2. GILMER, D.S., P.M. KONRAD and R.E. STEWART. 1983. Nesting ecology of Red-tailed Hawks and Great Horned Owls in central North Dakota and their interactions with other large raptors. *Prairie Nat.* 15:133-143.

3. HOUSTON, C.S. 1987. Nearly synchronous cycles of the Great Horned Owl and Snowshoe Hare in Saskatchewan. *U.S. For. Serv. Gen. Tech. Rep.* RM-142:56-58.
4. MARTI, C.D. and M.N. KOCHERT. 1995. Are red-tailed hawks and great horned owls diurnal-nocturnal dietary counterparts? *Wilson Bull.* 107:615-628.
5. MURPHY, R.K. 1990. Vertebrate fauna of Lostwood National Wildlife Refuge: an annotated checklist. U.S. Fish Wildl. Serv. refuge leaflet publ.
6. ——. 1993. History, nesting biology, and predation ecology of raptors in the Missouri Coteau of northwestern North Dakota. Ph.D. thesis, Montana State Univ., Bozeman. 212 pp.
7. ——. 1996. Raptor nesting chronology in northwestern North Dakota. *Prairie Nat.* 28: In Press.
8. ——. 1997. Importance of prairie wetlands and avian prey to breeding Great Horned Owls (*Bubo virginianus*) in northwestern North Dakota. In Proceedings of a symposium, Biology and Conservation of Owls of the Northern Hemisphere. *U.S. For. Serv. Gen. Tech. Rep.*: In Press.
9. PALMER, R.S., ed. 1988. Handbook of North American birds, Vol. 5. Yale Univ. Press, New Haven, CT. 465 pp.
10. PETERSEN, L. 1979. Ecology of Great Horned Owls and Red-tailed Hawks in southeastern Wisconsin. *Wis. Dep. Nat. Resour. Tech. Bull.* 111:1-63.
11. SCHMUTZ, J.K., S.M. SCHMUTZ and D.A. BOAG. 1980. Coexistence of three species of hawks (*Buteo* spp.) in the prairie-parkland ecotone. *Can. J. Zool.* 58:1075-1079.



Boreal Chorus Frog

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