

Behaviors of *Haliaeetus leucocephalus*, *Ceryle alcyon*, and *Bonasa umbellus* in Northern Wisconsin and Michigan

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August 2000

ABSTRACT

An observational study of avian species was conducted at the University of Notre Dame's Environmental Research Center on the border between northern Wisconsin and Michigan's Upper Peninsula from May 22 through July 26, 2000. An overall survey of species diversity was obtained and three species—bald eagles, belted kingfishers, and ruffed grouse—were studied in detail. Birds were observed in their natural habitat and relevant behaviors were recorded. Particularly, their nesting behaviors, territorial defenses, auditory and visual displays, feeding behaviors, and family interactions were studied. Overall, all species showed similar behaviors to those reported in previous studies. Further hours of research and observation are needed in order to extend our knowledge of these species.

INTRODUCTION

Michigan's Upper Peninsula is home for more than 300 species of migrating or breeding birds (Devore, 1999). The University of Notre Dame's Environmental Research Center, located on the Upper Peninsula, provides an ideal location to observe birds in their natural environment. Through careful observation and documentation of birds' behaviors, our knowledge of a particular species can be increased. Also, by closely monitoring changes in morphology or behavior, birds may be used as bio-indicators of other problems in the ecosystem. Three diverse species of birds were observed—bald eagles, belted kingfishers, and ruffed grouse.

Haliaeetus leucocephalus, the American bald eagle, is the national bird of the United States of America. It is a diurnal raptor species that generally nests in areas

adjacent to bodies of water. The bald eagle has some of the strongest wings of any avian species. Its bones represent only 4% of its total body weight, making it an efficient flyer (Grambo, 1997). Bald eagles are usually monogamous for life and generally have a clutch size of 2 eggs. Eagle pairs often return to the same nest every year (Stokes, 1985).

In 1967, the bald eagle was placed on the Endangered Species List as a result of hunting and the effects of pesticides such as DDT. Numbers of bald eagles have been steadily increasing ever since (Wong, et. al, 1999). Currently, the bald eagle has been downgraded from an endangered species to a threatened species in most areas. Continued monitoring of eagles will be necessary in order to sustain and increase the current populations.

Ceryle alcyon, the belted kingfisher, is a piscivorous species that has drawn interest for its unique fishing style. There are approximately 90 species of kingfishers, but only the belted kingfisher is found throughout much of North America. Belted kingfishers usually nest in vegetation-free banks along rivers or streams and are generally solitary except for the breeding season (Scott, 1987). They have a clutch size of 5-7 eggs. Though it is a migratory species, in mild northern winters the male may stay behind to protect its breeding territory (Line, 1996).

Bonasa umbellus, the ruffed grouse, is one of the most revered of America's gamebirds (Fischer, 1994). It is a member of the family Phasianidae, which includes both grouse and pheasants, and is considered monogamous or near-monogamous. Hens have an annual clutch size of 9-14 eggs. Ruffed grouse prefer an annual habitat of brushy mixed-age woodlands. They can also be considered a bio-indicator of certain forest

types, since their presence geographically corresponds to the presence of trees such as the quaking aspen and the balsam poplar (Atwater and Schnell, 1989).

The objective of this study was to spend significant time observing these species and then interpreting the behaviors observed in order to gain a greater understanding of each species.

MATERIALS AND METHODS

Observation of Aves species was performed at the University of Notre Dame's Environmental Research Center (UNDERC) located on the border between Northern Wisconsin and the Upper Peninsula of Michigan. UNDERC encompasses approximately 7500 acres and includes 30 lakes and bogs. An overall survey of species diversity was executed throughout the UNDERC property. Every species that was seen was recorded, along with the location and date of the sighting.

Intense behavioral studies of three species were also conducted. These species were *Haliaeetus Leucocephalus* (Bald Eagle), *Ceryle alcyon* (Belted Kingfisher), and *Bonasa umbellus* (Ruffed Grouse). Birds were observed for 1-4 hour time periods from May through July of 2000. The bald eagles were observed on 40 different days, while the ruffed grouse and kingfishers were observed on 20 different days. Research was conducted from land or by boat or canoe. The bald eagles were predominantly observed at Tenderfoot Lake and occasionally on Bay Lake. The kingfishers were observed along Tenderfoot Creek, and the ruffed grouse were observed in various locations throughout the UNDERC property. In order to observe the ruffed grouse on a more consistent basis, apple slices were planted as bait. Also, live fish were placed on a rock along the shore to attract the bald eagles on two occasions. The observation time periods represented a

variety of different times of day and weather conditions in order to obtain the widest reflection of the birds' behaviors. The birds were observed using binoculars and were also documented with photography. The major types of behaviors that the observation focused on were nesting, territoriality, feeding, and visual and auditory displays.

RESULTS

Survey of UNDERC bird species

A total of 43 different avian species were positively identified on the UNDERC property (Table 1).

Haliaeetus Leucocephalus

Territoriality and Nesting

There are two known nests present on the UNDERC property. These nests are located less than one mile apart on Tenderfoot Lake, one along the east shore and one along the west shore (Figure 1). Both nests are located near the top of large pine trees. Neither nest produced a successful clutch this year.

Since neither nest was active, it was difficult to determine the exact territory of any of the eagles that were observed. Other eagles that do not nest on Tenderfoot also regularly visit the lake to fish. In all observation periods, from one to four eagles were observed in any given area. The sex of the eagles was unable to be determined; however, both adults and juveniles were seen. Minimal, if any, antagonistic behavior was observed among these eagles. Also, the presence of other birds, particularly hawks and crows, did not seem to alter or affect the eagles' behaviors.

Visual and Auditory Displays

Several behaviors were observed visually. In 70% of the observation periods, the eagle was first seen perched in a tree, versus soaring (20%) and actively fishing (10%). While the bird was perched it usually rotated its head and appeared to be watching the water. There were three specific trees that seemed to be preferentially chosen by the eagles for perching. These trees were tall, dead-top, pine trees. In 40% of the observation periods, preening by one or more birds was seen. During the times that a bird was first seen in the perched position, it remained there for an average time of 15 minutes between the time observation started and the time the bird began flight. Soaring was also observed. Eagles were seen soaring both over the shoreline trees and the water at a variety of heights.

Auditory displays were less commonly observed. The only auditory display observed was a piercing scream-like call, repeated 5-10 times. This call was heard during only three of the forty observation periods.

Feeding

Eagle feeding behaviors were observed on Tenderfoot Lake. The eagles would be seen perched in a high tree, scanning the water. Then suddenly the eagle would fly towards the water and capture a fish. Feeding was only observed from 12-2 P.M. and from 5-8 P.M. and was not seen during the other times of day. Also, the fish that were caught by humans and left ashore did not attract the eagle during the hour following the presentation of the food. However, the fish did disappear by the next day.

Family Behavior

No family behaviors were observed because there were no nesting pairs.

Ceryle Alcyon

Territoriality and Nesting

The belted kingfishers made their nests by a gravel pit along the shore of Tenderfoot Creek on the north end of the UNDERC property (Figure 2). Two active nests are present there, located on a steep bank that is free from vegetation. The soil is a combination of clay and sand. One nest is located 1 m. from the top of the bank and the other is 0.5 m. from the top of the bank. The nests are approximately 20 meters apart.

The kingfishers appeared to be very territorial. When an observer arrived at the nesting site, almost immediately a kingfisher or kingfishers would be seen and heard, circling the area and emitting the rattle call.

Visual and Auditory Displays

Two major visual displays were observed. The first was a wag or bob of the tail. This was observed in 60 % of the observation periods and seemed to be used for a variety of purposes. However, it most commonly occurred when the two adult males were in close proximity to one another.

The second visual display observed was a raise of the crest. This behavior occurred often and in a number of different situations while the kingfisher was perched in nearby trees. This behavior was seen in both males and females.

The only major auditory display that was heard was a rattle-like call. This call was heard almost constantly during the observation periods. Usually the call was heard before any of the kingfishers were seen.

Feeding

The adult kingfishers appeared to receive most of their food by fishing in Tenderfoot Creek, near their nests. Feeding was most commonly observed during the morning hours; however, it was also infrequently observed throughout the day. The species of fish they consumed was unable to be determined from the observational distance.

Family Behavior

Two families of kingfishers were found to be nesting at the observational area. One family had four chicks while the other appeared to have five. The young began to emerge from the nests during the last days of this study. The male, female, and the young all remained in a close vicinity of one another. It appeared that the adults were teaching the young how to fish. Both males and female kingfisher adults were observed, distinguishable by the rust-colored band across the belly of the female. Seventy percent of the adult birds seen were male. The sex of the chicks was undeterminable.

Bonasa umbellus

Territoriality and Nesting

Ruffed grouse were observed throughout the UNDERC property. The most frequent sightings occurred by student housing, by the road to Plum Lake, and by Cranberry Lake (Figure 2). No grouse nests were found.

Visual and Auditory Displays

The major auditory display that was heard was drumming. This sound was heard frequently in May and early June and less frequently throughout the rest of the summer.

It was most commonly heard in the early mornings or at dusk and more frequently on cooler days than on warmer days.

The major visual display that was observed was the “charge” of a hen. On the four occasions when a hen, not necessarily the same one, was approached, she always charged towards the observer. Her ruff would be erect and her tail fanned, making her appear as large as possible.

Feeding

Feeding was difficult to observe because human presence seemed to scare and unnerve the grouse. However, the grouse were observed eating plants, most notably wild berries. The observational distance was not close enough to observe a hen feeding her chicks.

Family Behavior

It is believed that several families were observed in this study, though it is impossible to be sure. Hens were often seen with 5-10 chicks, following closely to the hen. Single grouse, presumably male, were also sighted. Two adult grouse were never seen together.

DISCUSSION

Haliaeetus Lecocephalus

The reasons that neither of the eagle pairs that had previously nested on the UNDERC property did not produce viable young there this year are unknown. It is possible that the eagles selected new nesting sites due to damage to their nests from severe weather or they were affected by human presence on Tenderfoot Lake. Based on observations by the UNDERC property manager, there is another possibility for the west

nest. In late April of 2000, one or more baby eagles were believed to have been heard in the area near the nest. Approximately two weeks later, an adult bald eagle, covered in muck, was found along shore on the UNDERC property. This female eagle was treated by a veterinarian, but did not survive. One June 23, 2000, an employee of the Department of Natural Resources searched the nest and found no eagle chicks. The presence of defecation on the vegetation surrounding the nest suggested that there had been a chick or chicks in the nest at one time. A possible theory is that the young died because they were not able to obtain enough food without their mother.

The lack of antagonistic behavior among eagles is unexpected because eagles are known to be very territorial (Stokes, 1989). However, it can be explained by the fact that the eagles were not defending a nesting area while they were on Tenderfoot Lake. Also, little hostile behavior was observed at Tenderfoot Lake last year (Valanis, 1999).

It is not surprising that the eagles were most commonly found perching. Several observational studies have shown that bald eagles spend most of their day perching (Steenholf et. al 1980, Biosystems Analysis 1985, Stalmaster 1987). In a study of bald eagles during the nesting season in Glacier National Park, it was found that the birds spent 98% of their time perching. They also found that eagles preferred tall dead-top or broken-top live trees that were close to shore (Caton et. al 1992). These results are very consistent with the perching behaviors observed in this study.

Eagles lack a well-developed syrinx which limits their range of vocalizations (Grambo, 1997). This is most likely why eagles were rarely heard in this study. The reason that feeding was only observed during early afternoon and early evening hours may suggest a trend; however, more observation needs to be conducted during other

times of the day in order to further validate this data. The reason that the fish planted along the shore did not attract the eagle is unknown; however, it may be due to the presence of observers in close proximity to the fish. The fish did disappear by the following day, but this may have been due to other scavengers, such as raccoons.

Ceryle Alcyon

The propinquity of the kingfisher nests was surprising. Kingfishers are known to be very territorial (Stokes, 1985) and it is unexpected that they would nest so close together. However, the gravel pit where the kingfishers nested is an ideal nesting site because of the terrain and its close proximity to a fishing area. A study of food supplementation to belted kingfishers' diets found that food availability does seem to be an important factor in determining the location of reproduction (Kelly and Horne, 1997). Therefore, it appears in this case that feeding needs were a more significant factor in selection of nesting location than the birds' desire for their own territory.

However, because the two families were living so close together, there were almost constant territoriality disputes. When the two adult males were near each other, the tail bobbing that often occurred was most likely a display of aggression towards the other male. The almost constant rattle-like call was also probably a display of territoriality (Stokes, 1985). The fact that males were more commonly observed than females is consistent with research that has suggested that male kingfishers are the predominant caregivers (Line, 1996).

Bonasa Umbellus

Because the syrinx is not well developed in ruffed grouse, it is not surprising that no vocalizations were heard in this study (Atwater and Schnell, 1989). Some researchers

have documented some vocalizations of ruffed grouse, including nasal calls, hisses, chirps, and peeps (Bump et. al. 1947). These sounds are considered uncommon, though. Several interesting conclusions can be drawn from the non-vocalized sound produced by ruffed grouse—drumming. The drumming sound is produced by a male grouse rapidly beating its wings while on a log. The actual sound is from the vacuum that is created by the rapid rotation of the wings (Atwater and Schnell, 1989). Based on qualitative observations of drumming, there appeared to be a steady decrease in the drumming heard as the summer progressed. A study of ruffed grouse in northern Minnesota found that the peak of the drumming season occurs within three days of April 29 each year and the least common months for drumming are June and July (Gullion, 1966). This is logical because drumming is possibly a courtship ritual in addition to a territorial defense mechanism and, therefore, not as necessary because the hens are raising the young during this time.

It is not surprising that the morning and evening were the times when the grouse were most commonly heard. Preference for these times has been documented in several studies (Atwater and Schnell, 1989). One study of grouse in Canada related the timing of the drumming to the light intensity that is present (Sumanik, 1966). The peak temperature for drumming is reported to be -10.8 to 7.2 ° C (Atwater and Schnell, 1989). Rarely was the temperature that low during this summer study; however, it is reasonable to conclude that the grouse seemed to drum more during cooler weather because this was closer to their ideal drumming conditions.

Ruffed grouse are considered omnivorous (Gullion and Martinson, 1989). One early study that examined the stomachs of 1000 adult ruffed grouse found that only 1 percent of their diet consisted of insects, however (Bump, 1946). It is reasonable to

assume that the grouse were also eating insects on a minimal basis, even though only herbivorous behavior was observed. It is reasonable that charging of the hen only occurred when she was with her chicks because this is a protective mechanism for her young (Bump, 1947). Because grouse are territorial and the male grouse are not caregivers for their young, it is understandable that adult grouse were not seen together.

The study of these three species provided further clues into their behaviors and the reasoning behind their actions. Each species showed very different behavioral patterns. By extending this study over a longer time period and increasing the observation periods, the trends seen in this study can be further substantiated. Also by using more sophisticated equipment such as spotting scopes to observe subtle behaviors, more could be learned about these species.

ACKNOWLEDGMENTS

I would like to thank Dr. Alan Johnson for his guidance and support on this project and Dr. Jeffrey Runde and the 2000 UNDERC class for their research assistance. I would also like to thank the Bernard Hank family for the funding that made this project possible.

LITERATURE CITED

- Atwater, Sally and Judith Schnell, Ed. 1989. Ruffed Grouse. Harrisburg, PA: Stackpole Books.
- BioSystems Analysis, Inc. 1985. Pit 3, 4, and 5 Project Bald Eagle and Fish Study. Pacific Gas and Electric Co. Final Report. University of California, Davis, CA.

- Bump, G. 1946. "Food of Maine Ruffed Grouse by Seasons and Cover Types." Journal of Wildlife Management. 10:17-28.
- Bump, G. R.W. Darrow, F.C. Edminster, and W.F. Crissey. 1947. The Ruffed Grouse: Life History, Propagation, Management. Albany: New York State Conservation Department.
- Caton, Elaine L. B. Riley McClelland, David A. Patterson, and Richard E. Yates. 1992. "Characteristics of Foraging Perches Used by Breeding Bald Eagles in Montana" Wilson Bulletin 104: 136-137.
- DeVore, Sheryl. 1999. Northern Flights—Tracking the Birds and Birders in Michigan's Upper Peninsula. Missoula: Mountain Press Publishing Company.
- Fischer, Richard B. 1994. "King of the American Gamebirds: The Ruffed Grouse." Conservationist. Dec 1994 v49. p2.
- Grambo, Rebecca L., Ed. 1997. Eagles—Masters of the Sky. Stillwater, MN: Voyager Press.
- Gullion, Gordon and Tom Martinson. 1989. Ruffed Grouse. Minocqua, WI: NorthWood Press, Inc.
- Guillon, G.W. 1966. "The Use of Drumming Behavior in Ruffed Grouse Population Studies." Journal of Wildlife Management. 29: 109-116.
- Kelly, Jeffrey F. and Beatrice Van Horn. 1997. "Effects of Food Supplementation on the Timing of Nest Initiation in Belted Kingfishers." Ecology. 78:2504-2508.
- Line, Les. 1996. "The Fisher King" National Wildlife. June-July v.34 p.28
- Scott, Shirley L., Ed. 1987. Field Guide to Birds of North America, Second Ed. Washington, D.C.: National Geographic Society.
- Stalmaster, M.V. 1987. The Bald Eagle. New York: Universe Books.

- Steenhof, K., S.S. Berlinger, and L.H. Fredrickson. 1980. Habitat Use By Wintering Bald Eagles in South Dakota. Journal of Wildlife Management. 43: 798-805.
- Stokes, Donald W. and Lillian Q. Stokes. 1985. A Guide to Bird Behavior., Vol. 2. Little Brown and Company.
- Stokes, Donald W. and Lillian Q. Stokes. 1989. A Guide to Bird Behavior., Vol. 3. Little Brown and Company
- Sumanik, K.M. 1966. "The Drumming Sites and Drumming Activity of Territorial Ruffed Grouse in Southwestern Alberta." Master's Thesis. University of Alberta.
- Valanis, John. 1999. Behavior and Habitat of a Family of Bald Eagles in Northern Wisconsin. Unpublished.
- Wong, Kathleen, Marianne Lavelle, Josh Fischman, and Major Garrett. 1999. "Bald Eagles Will Soar on July 4." U.S. News and World Report. 5 July 1999
v.127 p.12

Table 1**Survey of Species Diversity at UNDERC****Waterfowl**

Scientific Name	Common Name	Habitat	Frequency
<i>Anas discors</i>	Blue-Winged Teal	Aquatic	Occasional
<i>Gavia immer</i>	Common Loon	Aquatic	Frequent
<i>Anas platyrhynchos</i>	Mallard	Aquatic	Frequent
<i>Lophodytes cucullatus</i>	Hooded Merganser	Aquatic	Occasional
<i>Mergus serrator</i>	Red-Breasted Merganser	Aquatic	Rare

Hérons

Scientific Name	Common Name	Habitat	Frequency
<i>Ardea herodias</i>	Great Blue Heron	Along Shore	Rare
<i>Botarus lentiginosus</i>	American Bittern	Along Shore	Rare

Raptors

Scientific Name	Common Name	Habitat	Frequency
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Along Shore	Frequent
<i>Buteo platypterus</i>	Broad-winged Hawk	Along Shore	Frequent
<i>Pandion haliaetus</i>	Osprey	Along Shore	Rare
<i>Buteo jamaicensis</i>	Red-Tailed Hawk	Along Shore	Rare

Gamebirds

Scientific Name	Common Name	Habitat	Frequency
<i>Bonasa umbellus</i>	Ruffed Grouse	Heavily Wooded Area	Frequent

Kingfishers

Scientific Name	Common Name	Habitat	Frequency
<i>Ceryle alcyon</i>	Belted Kingfisher	Along Shore	Frequent

Woodpeckers

Scientific Name	Common Name	Habitat	Frequency
<i>Picoides pubescens</i>	Downy Woodpecker	Heavily Wooded Area	Occasional
<i>Picoides villosus</i>	Hairy Woodpecker	Heavily Wooded Area	Occasional
<i>Dryocopus pileatus</i>	Pileated Woodpecker	Along Shore	Rare
<i>Sphyrapicus varius</i>	Yellow-Bellied Sapsucker	Along Shore	Frequent

Tyrant Flycatchers

Scientific Name	Common Name	Habitat	Frequency
<i>Tyrannus tyrannus</i>	Eastern Kingbird	Open Field	Frequent
<i>Sayornis poebe</i>	Eastern Phoebe	Open Field	Rare

Swallows

Scientific Name	Common Name	Habitat	Frequency
<i>Tachycineta bicolor</i>	Tree Swallow	Open Field	Occasional
<i>Hirundo rustica</i>	Barn Swallow	Along Shore	Occasional

Jays and Crows

Scientific Name	Common Name	Habitat	Frequency
<i>Cyanocitta cristata</i>	Blue Jay	Along Shore	Occasional
<i>Perisoreus canadensis</i>	Canada Jay	Along Shore	Occasional
<i>Corvus brachyrhynchos</i>	Common Crow	Open Field	Frequent

Titmice and Chickadees

Scientific Name	Common Name	Habitat	Frequency
<i>Parus atricapillus</i>	Black Capped Chickadee	Along Shore	Occasional

Nuthatches

Scientific Name	Common Name	Habitat	Frequency
<i>Sitta canadensis</i>	White-breasted Nuthatch	Heavily Wooded Area	Occasional

Thrushes

Scientific Name	Common Name	Habitat	Frequency
<i>Turdus migertorius</i>	Robin	Open Field	Frequent
<i>Catharus fuscescens</i>	Veery	Along Shore	Occasional

Waxwings

Scientific Name	Common Name	Habitat	Frequency
<i>Bombocilla cedrorum</i>	Cedar Waxwing	Along Shore	Occasional

Warblers and Sparrows

Scientific Name	Common Name	Habitat	Frequency
<i>Setophaga ruticilla</i>	American Redstart	Open Field	Rare
<i>Icterus galbula</i>	Baltimore Oriole	Along Shore	Occasional
<i>Dendroica virens</i>	Black-Throated Green Warbler	Heavily Wooded Area	Rare
<i>Dendroica pensylvanica</i>	Chestnut-sided Warbler	Along Shore	Rare
<i>Spizella passerina</i>	Chipping Sparrow	Along Shore	Occasional
<i>Quiscalus quiscula</i>	Common Grackle	Along Shore	Frequent
<i>Passerina cyanea</i>	Indigo Bunting	Along Shore	Rare
<i>Agelaius phoeniceus</i>	Red-Winged Blackbird	Open Field	Frequent
<i>Pheucticus ludovicianus</i>	Rose-Breasted Grosbeak	Heavily Wooded Area	Occasional
<i>Melospiza melodia</i>	Song Sparrow	Along Shore	Occasional
<i>Zonotrichia albicollis</i>	White-throated Sparrow	Heavily Wooded Area	Rare

Finches

Scientific Name	Common Name	Habitat	Frequency
<i>Carduelis tristis</i>	Goldfinch	Open Field	Frequent

Table 1: Species diversity at UNDERC. All species listed were observed on the UNDERC property from May 22-July 26, 2000. Habitat is the most frequent habitat of observation for a particular species. Frequency is determined by 0-3 sightings = rare, 4-10 sightings = occasional, >10 sightings = frequent.

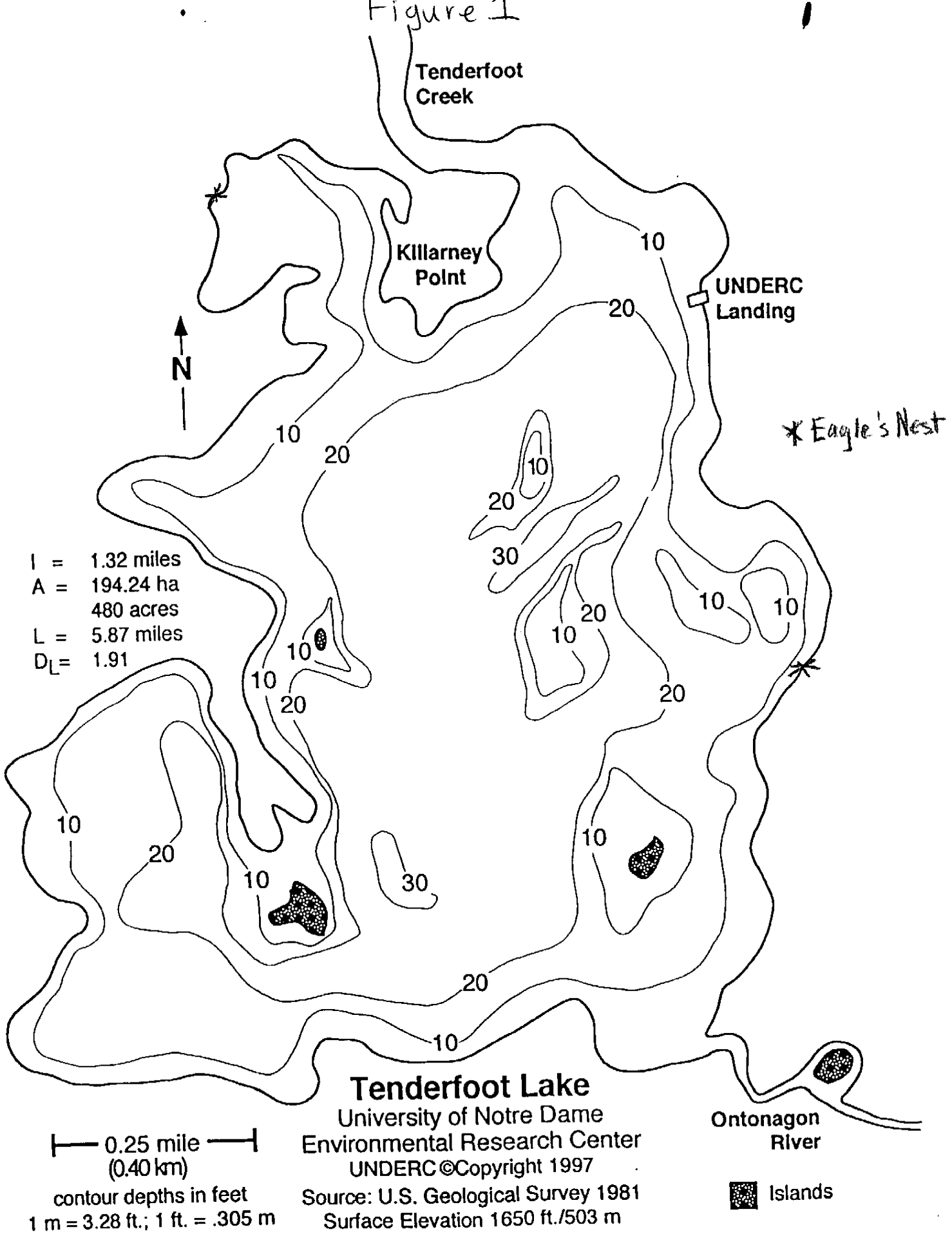


Figure 1. Known Bald Eagles' Nests on Tenderfoot Lake.

Figure 2

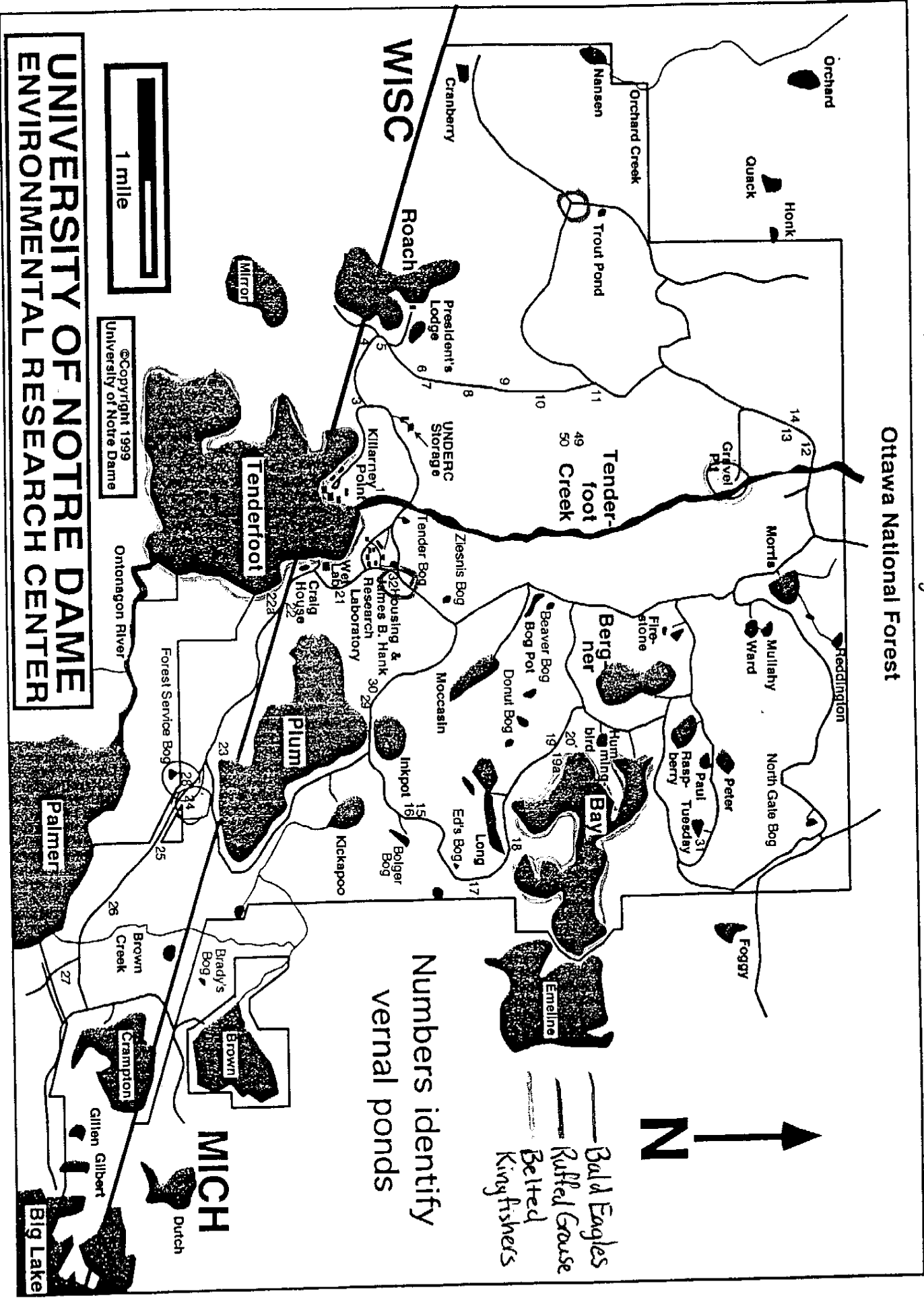


Figure 2. Predominant Observation Sites of Bald Eagles, Ruffed Grouse and Belted Kingfishers on the UNDERC Property.