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BALD EAGLE BEHAVIOR AND PRODUCTIVITY RESPONSES TO CLIMBING TO NESTS[1]

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Abstract: Several persons have recently investigated the effects of various types of human disturbance, including research methods, on the productivity of bald eagles (*Haliaeetus leucocephalus*). This paper presents data on the behavior and productivity of bald eagles in response to climbing to nests to band nestlings in northwestern Ontario during 1966–68. Nests in 24 territories in 1966, and nests in an additional 12 territories in 1967, were climbed to. Subsequent productivity (1967–68) of these territories did not differ significantly ($P > 0.05$) from that of 54 territories in 1967 and 64 territories in 1968 which were censused only from a distance with the aid of binoculars. The percentage of territories with young during 1966–68 varied between 53 and 74, and the number of young per nest with young ranged from 1.4 to 1.7.

Declines in bald eagle populations have caused concern for the future of particular populations and, in fact, for this species (Robbins 1960, Sprunt 1963). In attempting to assess the causes of the declines, several persons have investigated the potential effects of various human activities on the eagle's life cycle (Stickel et al. 1966, Mathisen 1968, Hickey and Anderson 1968). Hancock (1966:91) suggested that some research methods, particularly climbing to nests, may seriously interfere with the eagles' productivity in subsequent years. If Hancock is correct, such a disturbance could cause serious problems for research based upon climbing to nests; consequently many persons became greatly concerned.

The purpose of this paper is to present data on behavior and subsequent productivity of bald eagles during an ecological study involving climbing to nests in northwestern Ontario during 1966–68.

I would like to thank the following persons for valuable criticisms during the project and the writing of this paper: J. J. Hickey, A. Sprunt, IV, C. R. Sindelar, S. Postupalsky, H. C. Mueller, D. D. Berger, Frances and F. N. Hamerstrom, Jr., Joyce Grier, and my brother, J. B. Grier, assisted with fieldwork. In addition, the Ontario Department of Lands and Forests, Canadian Wildlife Service, U. S. Fish and Wildlife Service, and well over a hundred individuals gave further aid.

STUDY AREA

The study area (Fig. 1) in northwestern Ontario is located between lat 49°–53° N and long 92°–95° W and encompasses approximately 40,000 square miles. Topographically this area is generally flat (elevation 1,000–1,300 ft) and contains numerous lakes and rivers with irregular-shaped shore lines and many islands. Water drainage is toward Hudson Bay through the English, Winnipeg, Berens, and Severn Rivers.

The vegetation is of a boreal forest type with black spruce (*Picea mariana*), jack pine (*Pinus banksiana*), and trembling aspen (*Populus tremuloides*) predominating. White pine (*Pinus strobus*) is limited in distribution to areas south of 50° lat.

The major uses of this area by man include commercial timber and pulp cutting and processing, mining, commercial fishing and fur-animal trapping, sport fishing, and big-game hunting. These activities were

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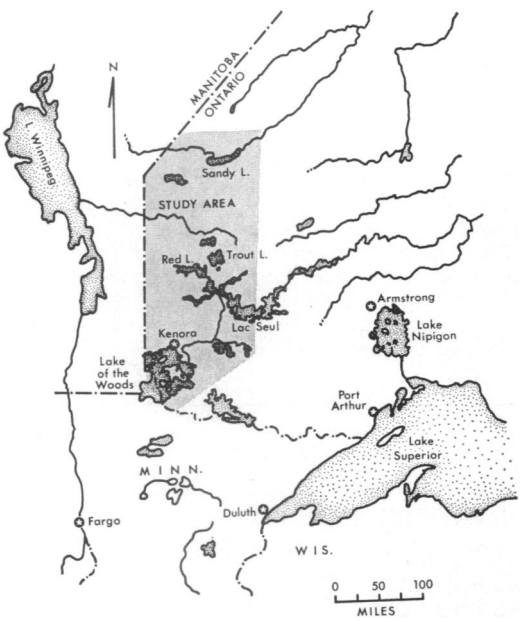

Fig. 1. Location of the study area.

formerly limited, with little impact on the habitat. Mining and recreational activities have been rapidly increasing, however, during the past 5 years.

Approximately 150 bald eagle nests were located during the course of this project. These nests are often inconspicuous against the forest background and thus difficult to locate. In view of the size of the study area, the nests that were found are believed to represent only a fraction of those actually present.

METHODS

Nests were initially located by contacting persons living or working throughout the area. During the course of the study, these persons reported newly-found nests and I located several additional nests while traveling to those already known.

Productivity figures for eagles are generally based on the number of young produced per number of nests or pairs of eagles present in an area. Because the eagles are apparently territorial and pairs often build variable numbers of supernumerary nests (McGahan 1968) within their territory (Broley 1947, Hensel and Troyer 1964, Howell 1937, 1954), most workers have based productivity figures on the number of pairs of eagles present during the incubation period, as assessed by counting the adults observed on or near the nests (that is, "active" nests, Sprunt 1963; "occupied" nests, Mathisen 1968). During the present study, however, nests were not censused during the incubation period, and thus the number of "active" nests could not be determined. Instead, an index of the number of eagle territories was determined by the presence of supernumerary nests. During 1966–68, the minimum distance between simultaneously used nests was 1 mile; the maximum distance between alternatively used nests was about 0.5 mile. On this basis, nests within 0.5 mile of each other (a maximum of three nests, in two instances) were considered to be part of a single territory. Territories in which the only nest or all nests fell down and no new nests were located were believed to represent abandoned territories; these were subsequently eliminated from the counts. In addition, eagle nests used by osprey (*Pandion haliaetus*) during a given year (one in 1967 and two in 1968) were not counted as representing an eagle territory that year.

Based on initial estimates that about 90 eagle nest territories would be available for this study, 45 territories were selected for climbing and the remainder were to be left unclimbed. Territories with nests to be climbed to were randomly selected from locations reported by others before my first visit to the nests. To test the possibility that the eagles would either become used to, or

more disturbed by, repeated climbings, 30 of the territories were to be climbed in during both 1966 and 1967, while 15 of the nests to be climbed were left in the unclimbed group during 1966 and were climbed for the first time in 1967. Nine of the 45 territories with nests initially selected for climbing, and 10 in the control group were eliminated by 1968 (because nests fell down, were taken over by osprey, or considered too dangerous to climb). Unclimbed nests were censused from at least 100 m with binoculars from below, in a boat or on a nearby island, and were watched until the number of young was determined.

During 1966, I traveled mainly in an 18-ft aluminum canoe with a 5 hp outboard motor. During 1967 and 1968, 16-ft aluminum boats with outboard motors (various sizes) and pontoon-equipped aircraft were used. To prevent the possible introduction of an additional disturbance, aircraft were used solely as a means of travel during 1967. Boats were used for the actual census after arriving at the lakes by air. In 1967 and 1968, each known nest was checked at least once when most young were between 2 and 11 weeks old (10 June through 5 August); however, during 1966, because of limited travel facilities, the census was primarily limited to nests to be climbed.

A 16-ft aluminum extension ladder was generally used to begin climbs. I then drove a single row of 8-inch common nails, projecting about 3 inches, for hand- and footholds, until the tree's lowest branches were reached. A safety belt was used when necessary. The nails, as opposed to climbing spurs, were used and left in place. This method provided greater speed and convenience and less damage to the trees in subsequent climbs. The ladder was used to save nails and to discourage climbs by other persons who might find the nest tree. Climbing required a mean of 22 (5–66) minutes initially when driving the nails; later climbs required a mean of only 9 (1–30) minutes.

Although some nests were observed several times a season from a distance, the nests to be climbed to were visited only once a year. Time spent in the vicinity of each nest was recorded from the time I arrived within sight of the nest (about 0.25 mile away) until I left this area. During 50 climbs that were timed, a mean of 23 (4–55) minutes was spent at the nests with 69 (35–130) minutes total time spent in their vicinities.

Chi-square tests were used for all tests of statistical significance.

EAGLE BEHAVIOR

In Ontario, bald eagle reactions to a person at the nest were varied but essentially the same as those described by Broley (1947) for bald eagles in Florida.

Both adults were either present or appeared during 42 of 58 recorded climbs; one adult was present in 15 cases; and neither adult was seen on only 1 occasion. They generally circled overhead at about 200 to 500 ft and called intermittently. During 4 climbs, one or both of the adults dove at the nest, hitting branches of the nest tree and coming within 20 ft of me. During 15 climbs the adults became noticeably quiet after a few minutes. In 33 cases they eventually left the area and were not seen again while I was at the nest. In two cases the only adult present left the area before climbing began.

The behavior of the adults at a particular nest was not consistent; during the 1966–68 period, adults were aggressive 1 year, not the next, and vice versa. No differences in behavior consistently related to the age of the young, were shown.

Table 1. Bald eagle productivity in northwestern Ontario, 1966–68.

	1966	1967	1968
Total nests	46	92	125
Supernumerary nests	3	13	23
Used by osprey	0	1	2
Nest territories	43	78	100
Number with young	32	41	56
Number young	54	57	89
Percent territories with young	74	53	56
Young per nest with young	1.7	1.4	1.6
Nests with 1 young	14(44%)	25(61%)	27(48%)
Nests with 2 young	14(44%)	16(39%)	25(45%)
Nests with 3 young	4(12%)	0	4 (7%)

Table 2. Productivity of bald eagle nest territories: previously climbed vs. not previously climbed.[a]

	1967		1968	
	Prev. Climbed	Prev. Unclimbed	Prev. Climbed	Prev. Unclimbed
Nest territories	24	54	36	64
Number with young	14	27	21	35
Number young	21	36	34	55
Percent territories with young	58	50	58	55
Young per nest with young	1.5	1.3	1.6	1.6

[a] Previously climbed vs. previously unclimbed, $P > 0.05$ (both years).

Nestling reactions to climbing also varied but passed through four fairly distinct stages. Nestlings less than 4 or 5 weeks old either ignored the intrusion or responded as to an adult eagle by approaching with food-begging behavior or as if seeking brooding. Nestlings 5 or 6 weeks old reacted by calling and raising their bodies, followed by a return to the resting posture. Nestlings in the third stage (6 to 9 weeks old) reacted more vociferously by facing the intruder, erecting feathers, and flapping their wings. A few nestlings at this age became quite aggressive and leaped toward the investigator, often striking out clumsily with their feet. Finally, nestlings 9 to 11 weeks old, attempted to escape by moving to the opposite side of the nest or onto a limb, facing away, and looking about as if for a place to jump. If excited further, these birds left the nest and glided to the ground (or water). A J-shaped rod was used to secure the foot of any bird that appeared ready to jump, or other birds situated beyond reach. Of 132 nestlings banded, 5 jumped from the nest before being caught. All were recovered without apparent injury.

After I left the nests' immediate vicinity, the adults generally returned to the nest or perched within a few meters of it. When checked later (in over 30 cases, usually 2 hours to 1 day or more later), the adults had returned to the nest and all activities appeared normal.

When watched from below from a distance, neither adults nor young eagles showed much response except an occasional glance at the observer. Sometimes, however, the adults would leave the nest or perch, circle briefly, and call. The birds are occasionally disturbed similarly by fishermen but this apparently poses no serious problem (Mathisen 1968).

PRODUCTIVITY RESULTS AND DISCUSSION

The productivity data obtained during these studies have been summarized in Tables 1–4. These results clearly show that censusing nesting bald eagles when the young were between 2 and 11 weeks old, whether by actually climbing to the nest (Tables 2, 3) or by observing from a distance (Table 4), caused no significant reduction in subsequent productivity in northwestern Ontario. C. R. Sindelar (Personal communication) who climbed to 20 nests in northern Wisconsin (1966–68) and S.

Table 3. 1968 productivity of bald eagle nest territories previously climbed once vs. those climbed twice.[a]

	CLIMBED IN 1967 ONLY	CLIMBED IN 1966 AND 1967
Nest territories	14	17
Number with young	8	10
Number young	12	16
Percent territories with young	57	59
Young per nest with young	1.5	1.6

[a] In 5 territories, climbing occurred only in 1966 due to inclement weather or other conditions which prevented climbing at the time of the 1967 census. Productivity figures for these 5 nests are included in the 1968 results in Table 2 but excluded from this table. Climbed 1967 vs. climbed both years, $P > 0.05$.

Table 4. 1968 productivity of unclimbed bald eagle territories censused previously vs. those censused for the first time in 1968.[a]

	CENSUSED PRIOR TO 1968	CENSUSED FOR FIRST TIME DURING 1968
Nest territories	31	33
Number with young	17	18
Number young	27	28
Percent territories with young	55	54
Young per nest with young	1.6	1.6

[a] Censused for the first time (1968) vs. previously censused, $P > 0.05$.

Postupalsky (Personal communication) who climbed to 18 in Michigan (1964–68) both obtained similar results in their areas. Broley (1947) mentions no reduction in productivity following his climbing to nests in Florida. However, he may have overlooked such effects and it is difficult for others to evaluate his data because he does not describe the basis for selecting the limited number of nests he reports. Hancock (1966) discussing bald eagles in British Columbia, presented no actual data and did not adequately describe either his research or the statistical methods, if any, that he used; it is difficult to evaluate his conclusions.

As mentioned above, bald eagles commonly have supernumerary nests. Only one nest is used per season but different nests may be used in different years. Hancock (1966) proposed that, in addition to lowering the productivity, climbing may cause an increased rate of nest changing. Twenty-three of the eagle territories in northwestern Ontario had supernumerary nests but only 9 (7 in the climbed category) of these territories were *known* to produce young at least twice during the 1966–68 period; only these 9 can be evaluated: different nests were used in 5 of the 9 possible territories with 4 of the 5 changes occurring the year following the first climb. Climbing may have caused an increased rate of nest changing, but these data are too few for a statistical comparison.

Finally, one might ask whether other types of human activity near nests affect the degree of disturbance caused by climbing. Birds accustomed to other human activities, such as fishing, might be less disturbed by climbing than those having little contact with people. Conversely, with much human activity near the nests, climbing might be a sufficient additional disturbance to cause the birds to desert. Mathisen (1968) showed that bald eagle productivity apparently was not affected by the current recreational and timber-cutting activities existing in the Chippewa National Forest in northcentral Minnesota, an area similar to northwestern Ontario. In northwestern Ontario, the degree of other human activity near nests is highly variable. However, this is difficult to assess objectively because the study area is large and relatively little time could be spent at each nest to determine such factors as, for example, the amount of fishing nearby. Both climbed and unclimbed nests were distributed over the entire study area in regions of varying human

activity; nest climbing appeared to have little effect on subsequent productivity regardless of other human activity in the area.

In conclusion, I am unable to find any measurable effect on subsequent bald eagle productivity resulting from single climbs to nests when the young are from 2 to 11 weeks old. It appears that nestling censusing and banding can be done without jeopardy to the bald eagle population.

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