

RED-SHOULDERED HAWK TERRITORIES IN SOUTHEASTERN INDIANA

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ABSTRACT: The red-shouldered hawk (*Buteo lineatus*) population of southeastern Indiana was studied by examining previously-known nesting territories in either March or April from 1984 to 1994. Forty-two territories were checked by imitating the calls of the great horned owl and the American crow. Over a 5-year span (for most territories), an average of approximately 18% of the nesting pairs were lost each year.

KEYWORDS: *Buteo lineatus*, red-shouldered hawk.

Whether a population is increasing, decreasing, or remaining stable is especially difficult to determine for a large, shy species like the red-shouldered hawk (*Buteo lineatus*). Census data on the red-shouldered hawk are scanty when compared with those for small birds. These hawks feed and nest primarily within the forest, where they are difficult to see after the trees have leafed out (Hands, *et al.*, 1989; Palmer, 1988). In addition, the red-shouldered hawk is partly migratory in Indiana with some individuals remaining overwinter and others wintering in the southern States (Palmer, 1988). The study most comparable to this one was that of Henny, *et al.* (1973) in which 21 Maryland territories were studied, intermittently, over 29 years. Nearly all studies of the red-shouldered hawk, by whatever method, show a population decline in eastern North America in this century (Brown, 1971; Henny, *et al.*, 1973; Kiltie, 1987; Palmer, 1988; Hands, *et al.*, 1989).

An attempt was made to measure population trends by visiting (during March and April) those territories where birds had been found in previous years. The forest stands studied were either frequently-ponded flatwoods, bottomland-riparian forests, or hillside forests within 100 m of a creek or river. At each visit, the call of the great horned owl (*Bubo virginianus*) and, normally, the assembly and other mobbing calls of the American crow (*Corvus brachyrhynchos*) were vocally imitated. If a pair of red-shouldered hawks was present, they usually responded within 10 minutes by flying near the sound source and screaming (see Fuller and Mosher (1981) for a review of the methods for locating nests). Kilham (1964) had previously recorded the attraction of red-shouldered hawks to American crow-great horned owl mobbing scenes.

At 40 of the 42 territories studied, the nest or a nest of a preceding year was seen. In April, the incubating bird frequently flushed from the nest. A territory was recorded as vacant, if no birds responded after 20 minutes of crow and owl calling.

Table 1. Territorial changes in the red-shouldered hawk in southern Indiana.

Duration (years) of Study	Beginning in Year	Number of Territories Occupied at the Start	Net Loss by the End of the Period	Loss (%)	Loss Per Year (%)
5	1989	6	5	83	21
5	1990	15	9	60	15
4	1990	15	8	53	18
4	1991	16	6	38	13
3	1990	17	7	41	20
3	1991	16	4	25	12
3	1992	19	8	42	21
any 2 consecutive years	1987-93	74	17	23	23

Chamberlain has successfully attracted red-shouldered hawks using this technique at the Myakka River State Park, Florida, throughout the calendar year for the last 10 years.

The authors' data (1984-1994) are based on the following site visits: 42 sites were examined at least once; 40 were visited for at least two years; 36 were examined over a 3 year span; 32 were examined for at least a 4 year span; 30 were visited over a 5 year span; 8 were visited over an 8 year span; 3 were visited over at least a 10 year span; and 1 site was visited in all 11 years. Once located, most territories were visited annually, but a few were occasionally omitted. Most of the data were obtained from 1990 through 1994. All the localities were in nine counties in southeastern Indiana and were located within 60 km of Hanover: Jefferson (13 territories), Jennings (9), Scott (7), Switzerland (4), Washington (3), Clark (2), Ripley (2), Ohio (1), and Jackson (1). The red-shouldered hawk territories were selected more or less at random, because they were located by happenstance during other ornithological work. The minimum recorded distance between occupied territories (nest to nest distance) was 1.1 km. In 30 cases between 1991 and 1994, a territory, which had apparently lost its nesting pair, was visited a second time in the same year. Hawks were present in 8 territories during the second visit, but 22 remained vacant. (This figure is somewhat misleading, because the territories that were visited a second time were sites where there had been inclement weather or where a new-looking nest with no attendant birds was found during the first visit.)

The results are presented in Table 1. Net loss is the number of territories which changed from positive to negative (vacant) less the number which changed from negative to positive (occupied). The data lines in the table overlap considerably. For example, in the 5-year-span lines, 4 territories from the 1989 line are also included in the 1990 line. Each line of the table includes **only** the

number (maximum 19) of territories that were occupied that year and for which there was annual data thereafter. The annual loss (last column) varied from 12% to 23% (averaging 18%) but was continuous and distinct.

Some data on mortality were recorded. One nest containing eggs was destroyed when the tree was cut down by a logger. Another nest containing eggs or small young was abandoned when the adjacent woods were knocked down and the land was plowed. One brood of 2 young was killed by a great horned owl just before or just after fledging.

Several biases exist in this method of estimating changes in numbers of red-shouldered hawks. All are unlikely, though possible:

1. The birds did not respond to the vocalized calls.
2. The birds had not yet returned from migration. (Not probable. In 1993, all the territories were checked between 15 March and 30 April; between 1984 and 1992 and in 1994, most of the territories were checked during that 6-weeks period, but some were checked in the first half of March (compare the migration dates in Palmer (1988).)
3. The nest site was moved in a subsequent year by more than 0.7 km, the longest move recorded in the study. (The map presented by Henny, *et al.* (1973) showed that 14 of 16 nests remained within 0.4 km of the same spot after 24 years.)
4. The birds had responded from another territory more than 0.7 km away.
5. After several years, subtle ecological changes, not evident to the observers, made the territory unattractive to the hawks.

All the nests identified (see Palmer, 1988) were in major crotches, built of large sticks and twigs, and lined with strips of bark (usually cedar). Often, the nests were decorated with pine, cedar, or broad-leaved twigs, feathers, or (once) with blossoming twigs of red maple (*Acer rubrum*). The height of the nests above the ground was 4-20 m.

Overall, these figures suggest a loss of about 18% of the nesting pairs each year. Whether this is a short-term or long-term trend is unknown. A longer-term study with individually-marked birds is needed.

ACKNOWLEDGMENTS

The authors thank numerous private landowners as well as Ken Knouf and other authorities of the U.S. Army Jefferson Proving Ground for permission to study the red-shouldered hawk on their land. Dennis McDonald helped with the manuscript.

LITERATURE CITED

- Brown, W.K. 1971. Winter population trends in the red-shouldered hawk. *Amer. Birds* 25: 813-817.
- Fuller, M.R. and J.A. Mosher. 1981. Methods of detecting and counting raptors: A review. In: C.J. Ralph and J.M. Scott (Eds.), *Estimating Numbers of Terrestrial Birds*, pp. 235-246, Cooper Ornithol. Soc., Lawrence, Kansas, 630 pp.
- Hands, H.M., R.D. Drobney, and M.R. Ryan. 1989. Status of the red-shouldered hawk in the north-central United States. U.S. Fish Wildlife Serv., Twin Cities, Minnesota, 21 pp.
- Henny, C.J., F.C. Schmid, E.M. Martin, and L.L. Hood. 1973. Territorial behavior, pesticides, and the population ecology of red-shouldered hawks in central Maryland, 1943-1971. *Ecology* 54: 545-554.
- Kilham, L. 1964. Interspecific relations of crows and red-shouldered hawks in mobbing behavior. *Condor* 66: 247-248.

- Kiltie, R.A. 1987. Winter abundances of red-tailed hawks and red-shouldered hawks in Florida; An analysis of Christmas bird count data, 1946-1983. *Florida Field Natur.* 15: 45-51.
- Palmer, R.S. 1988. *Handbook of North American birds*, vol. 4. Yale Univ. Press, New Haven, Connecticut, 433 pp.