
Memorandum

Wilderness Research Center
University of Idaho
Moscow, Idaho 83844
208-885-5779
FAX: 208-885-6226

DATE: December 8, 1993

TO: John Hendee, Director

FROM: Jeff Yeo, Scientist/Manager

SUBJECT: Wilderness Research Internship report

J.Y.

Please find attached Jason Karl's (Taylor Ranch Wilderness Research Intern for 1993) final report on nest site characteristics of sharp-shinned hawks in the Big Creek drainage. His research, originally suggested to me by Oz Garton, provides a preliminary study of an investigation on accipiters that, combined with the decade-long research by Oz and Greg Hayward on forest owls, would provide a comprehensive picture of forest avian predators in wilderness. Don Johnson and Kerry Reese both have expressed interest in continuing and expanding research on accipiters to include telemetry studies of activity budgets and food habits on all three accipiter species resident in the Frank.

cc: O. Garton, D. Johnson, K. Reese

NEST SITE CHARACTERISTICS OF SHARP-SHINNED HAWKS IN THE FRANK CHURCH-RIVER OF NO RETURN WILDERNESS

Jason W. Karl, Department of Fish and Wildlife Resources, University of Idaho. Moscow, Id 83843

Abstract-- Topographic and vegetative site characteristics were compared for 6 sharp-shinned hawk (*Accipiter striatus*) nests in the Big Creek area of the Frank Church-River of No Return Wilderness. Nesting birds were located by detection of responses to broadcasted sharp-shinned hawk alarm calls. Observed nests were built in live Douglas-fir (*Pseudotsuga menziesii*) trees within Douglas-fir/ninebark (*Physocarpus malvaceus*) plant communities. All nest trees were infected by dwarf mistletoe (*Arceuthobium douglasii*), a common parasite of Douglas-fir. Nests were commonly located in a tree that was of above average height or the tallest tree in the stand. All nests were within 50 m of the stand edge. In addition, riparian vegetation was within approximately 20 m of 4 of the 6 nests.

Several studies have indicated that sharp-shinned hawks frequently nest in sites with high percent canopy cover of a single layer (Hayward and Escano 1989, Moore and Henny 1983, Reynolds et al. 1982).

Furthermore, Moore and Henny (1983) reported that the majority of sharp-

shinned hawk nests in coniferous forests of northeastern Oregon were built in Douglas-fir trees. In a related study, Reynolds et al. (1982) observed that this accipiter generally used even-aged conifer stands for nesting habitat. These studies describe sharp-shinned hawk nesting habitat in Washington, Oregon and Northern Idaho. However, nesting habitat can change with geographic location (Reynolds et al. 1982).

Little is known about sharp-shinned hawk populations in central Idaho, nor is much known about sharp-shinned hawk ecology in wilderness. Thurow (1978) found that these birds were the second most common raptor in the Big Creek Drainage of the Frank Church-River of No Return Wilderness, but their habitat use patterns were not studied. The purpose of this study was to describe and analyze habitat characteristics of sharp-shinned hawk nest sites within the Frank Church-River of No Return Wilderness.

Dr. Donald Johnson offered his expertise in both the conception of this research and the editing of the report. Sushan Han, Guy Wagner, and Dr. Jeffrey Yeo helped gather nest site data. Dr. Yeo also served as a needed source of guidance and ideas while in the field as well as in the editing of the report.

Study Area

The study area was located along the Big Creek drainage of the Frank Church-River of No Return Wilderness. Search areas were determined by previous sightings and accessibility. Elevations ranged from 1090 to 2200 m, and relief was moderate to rugged. Habitats of the lower elevations were generally characterized by either Douglas-fir/ninebark communities or bunchgrass slopes interspersed with mountain mahogany (*Cercocarpus ledifolius*) and big sagebrush (*Artemisia tridentata*). Higher elevations mostly contained Engleman spruce (*Picea engelmannii*) /Douglas-fir.

Methods

Nest Searches

Sharp-shinned hawk alarm calls, recorded on 20-second loop tapes, were broadcasted using a cassette player and portable amplifier (Figure 1). Calls were broadcast at 100 m intervals along transects. At each interval, the calls were played at 60°, 180°, and 300° with respect to the transect line. A period of 1 minute was observed between each broadcast (Kennedy and Stahlecker 1993). Upon detection of a response, the call was played again to confirm the location of the nest (Rosenfield et al. 1985).

Once identified, the nest tree was marked for site description at a later time.

All tributaries of Big Creek from Beaver Creek to the Middle Fork of the Salmon River were sampled. Because of time constraints, the majority of searches were conducted in the lower drainages of Big Creek's tributary streams. All forest types and forest openings encountered were searched.

Nest Site Topography

Slope of the site was measured from the steepest portion of the plot. Distance to the nearest edge and riparian vegetation were estimated. Elevation of the site was found using topographic maps. Aspect of the site was recorded at the site with a compass.

Nest Site Vegetation

Vegetation description of the nest area followed that suggested by Noon (1983). Vegetation was sampled within a 0.04 ha circular plot (11.3 m radius) centered on the nest tree. All trees within the plot were recorded by species and grouped into diameter at breast height (DBH) classes. All woody plants over 3 m tall and 8 cm DBH were considered trees. All plants less than 0.3 m tall were considered ground cover. The five most prevalent shrub species and ground cover species were also

recorded. A dispersion index was then given to shrubs and ground cover. dispersion categories were: even cover, large clumps, small clumps, and irregular. Average, maximum, and minimum canopy height were also measured.

The plot was sub-divided into four quadrants corresponding to the cardinal directions. Percent ground and canopy cover was measured by individual samples taken along the transects that defined the quadrants (Noon 1983). The distance and DBH of the nearest tree and the distance, size and length of nearest log in each quadrant also were recorded.

Vertical foliar cover of vegetation was measured from the nest tree to the edge of the plot in each of the cardinal directions using a cover board. Vegetation was broken into 4 height zones: ground cover (0 to 0.3 m), low shrub layer (0.3 to 1 m), middle shrub layer (1 to 2 m), and high shrub layer (2 to 3 m). Cover was calculated as a percentage of the squares on the density board that were at least 50% covered with live vegetation.

Nest and Nest Tree Description

Nest measurements included the height of the nest above ground at the base of the nest tree, and nest aspect. Height of the nest tree, nest tree DBH, nest tree species, and nest tree condition (alive or dead) were

recorded.

All nests were recorded on 7.5' topographic quadrangle maps which are on file at the University of Idaho's Taylor Ranch Field Station.

Results

Responses to taped sharp-shinned hawk alarm call were detected in the following areas: Pioneer Creek, Cave Creek, Garden Creek, Coxey Creek, Canyon Creek, Soldier's Bar and on the ridge between Soldier's Bar and Pioneer Creek. There were no responses west of Coxey Creek. Plant communities shift from Douglas-fir stands and bunchgrass slopes east of Coxey Creek, to dense engleman spruce/subalpine fir (*Abies lasiocarpa*) stands west to Coxey Creek.

Between June 1 and August 10, 1993, 6 sharp-shinned hawk nests were discovered in the Big Creek drainage. Nests were found at Pioneer Creek, Cave Creek, Canyon Creek, Coxey Creek, and Soldier's Bar. Five of the nests were located by using the broadcast calls. One inactive nest, which was active in 1991 (Yeo pers. commun.), was also included.

Five nests were in even-aged stands (Figure 2). One nest was found in a mature to old-growth stand. The average canopy height for all sites was between 19.5 m and 27 m (Table 1). In addition to this, there was a

high incidence of the surrounding shrubs growing in large clumps. Percent ground cover was also generally high, but there was no distinct pattern found in percent canopy cover (Table 1).

The range of elevations for all identified nests was 1158 m to 1481 m (Table 1). Significant variation was found between the measured slope of each site. The majority of nests were on west and north facing slopes (Table 1). There was also a high coincidence of the nest facing into the slope of the site (Table 2). Distance to the edge of the stand from the nest tree was less than 50 m for all nests (Table 2). Likewise, distance to riparian vegetation was 20 m or less for 4 of the nests located.

Several strong relationships were observed between the sharp-shinned hawk nests and nest trees. All nests were built in live Douglas-fir within a Douglas-fir/ninebark plant community (Figure 2). Nests were also commonly positioned in the lower portion of either the tallest or one of the tallest trees in the stand (Table 2). With one exception, all nests were 6 m to 10 m from the forest floor (Table 2). There was, however, no apparent relationship between nest height and the height of the nest tree. In every case, nest trees were infected by mistletoe which causes irregular growth of the branches (Figure 3).

Discussion

It is very likely that there were more than five sharp-shinned hawk nests in the area searched. The lack of time and limited accessibility to certain regions of the Big Creek drainage certainly limited the number of nests located. I also detected several responses for which the nest was not found. These could be either non-nesting birds, or birds which were hunting for prey or defending territory. In order to accurately determine the number of sharp-shinned hawks nesting within the Big Creek area, an intense survey would need to be conducted.

Wilderness undoubtedly influenced the nesting habits of sharp-shinned hawks in the Big Creek drainage. Alteration or repeated disturbance of the nest site, which is uncommon in wilderness areas, may prompt changes in nesting behavior and prey selection, and possibly abandonment of the nest. Because there was little human impact, the birds were selecting nest sites in response to natural conditions.

The location of sharp-shinned hawk nests in Douglas-fir may have been related to the infection of these trees by mistletoe. All of the observed nest trees were infected by this common parasite. The characteristic clumps of branches may serve as platforms for nests. This irregular growth pattern sometimes made it difficult to determine actual

nest location. Hence, other infected trees may provide "decoy" nests to reduce predation.

There may be a relationship between the feeding habits of this raptor and the height of its nest in the nest tree. The majority of nests observed were located in the lower to middle portion of the nest tree. Assuming that sharp-shinned hawks take prey from the nesting area, the location of the nest in the nest tree could help hide the nest from potential predators while still allowing for flight under the canopy.

In addition, I believe the location of the nest site and the type of prey taken may have some connection. Sharp-shinned hawks feed primarily on small passerine birds. In these dry forest habitats, the greatest diversity and abundance of passerines are typically found in riparian zones and along edges. This may have led to the close association of the nest to riparian vegetation and the forest edge.

The data collected in this study mirrors data gathered elsewhere on accipiter nesting habits. Moore and Henny (1983) noted the tendency for goshawks to use trees infected with mistletoe for nesting. Reynolds et al. (1982) reported sharp-shinned hawk nests in the lower portion of nest trees. Both of these studies concluded that sharp-shinned hawks prefer nesting in even-aged conifer stands.

While there were interesting patterns observed in the data, 6 nests are insufficient for determining whether or not these habitat patterns are ecologically significant or mere coincidence. More nests should be identified and catalogued in Big Creek and other drainages in the Frank Church-River of No Return Wilderness. Studies of territory size and feeding habits of sharp-shinned hawks also are needed to adequately describe its ecological niche in a wilderness environment.

Literature

- Hayward, G.D., and R.E. Escano. 1991. Goshawk nest-site characteristics in western Montana and northern Idaho. *Condor* 476-479.
- Kennedy, P.L. and D.W. Stahlecker. 1993. Responsiveness of nesting northern goshawks to taped broadcasts of 3 conspecific calls. *J. Wildl. Manage.* 57:249-257.
- Moore, K.R., and C.J. Henny. 1983. Nest site characteristics of three coexisting accipiter hawks in northeastern Oregon. *Raptor Research* 17:65-76.
- Reynolds, R.T., C.E. Meslow, and H.M. Wight. 1982. Nesting habitat of coexisting accipiter in Oregon. *J. Wildl. Manage.* 46:124-138.
- Rosenfield, R.N., J. Bielefeldt, R.K. Anderson, W.A. Smith. 1985. Taped calls as an aid in locating cooper's hawk nests. *Wildl. Soc. Bull.* 13:62-63.
- Thurow, T.L., and S.R. Peterson. A preliminary survey of raptorial birds in the Idaho Primitive Area. *Station Notes.* University of Idaho Wilderness Research Center. No. 31.

Table 1. Measurements for sharp-shinned hawk nesting sites

	Pioneer Creek	Cave Creek	Coxey Creek	Canyon Creek	Soldier's Bar Active	Soldier's Bar Inactive
UTM Coordinates	4994460 N 669000 E	5004660 N 660450 E	5000500 N 654930 E	4998490 N 662280 E	4996720 N 672730 E	4997160 N 673100 E
Elevation (m)	1402	1481	1323	1317	1390	1158
Aspect	East	West	West	West	North	North
Slope (°)	29	41	16	35	32	37
Distance to Edge ¹	50	40	40	50	20	50
Distance to Water ¹	20	10	20	10	300	80
Tree Density (#/ha)	275	175	225	425	675	350
Snag Density (#/ha)	175	0	150	125	25	275
Shrub Density (#/ha)	6750	10750	4375	8375	8625	5125
Shrub Dispersion Index	Irregular	Large Clumps	Large Clumps	Large Clumps	Large Clumps	Large Clumps
Foliar Density ²	100-99-97-92	97-70-39-22	83-69-34-1	88-90-91-*	77-64-20-18	77-49-15-0
% Canopy Cover	60	25	55	80	55	70
Avg. Canopy Height (m)	22	26	27	22	24	19.5
Canopy Height Range (m)	11 to 22	2 to 29	5 to 30	17 to 31	2.2 to 29	2.4 to 41
# of Canopy Layers	1	2	1	1	1	1
% Ground Cover	70	80	75	55	60	70
Ground Cover Dispersion Index	Large Clumps	Even	Even	Irregular	Irregular	Even

¹Approximate measurement

²Foliar density is the percentage of vertical cover in each shrub layer (0-0.3m, 0.3-1m, 1-2m, 2-3m).

*Not measured

Table 2. Sharp-shinned hawk nest and nest tree measurements

	Pioneer Creek	Cave Creek	Coxey Creek	Canyon Creek	Soldier's Bar Active	Soldier's Bar Inactive
Nest Height (m)	7	6	9	16	10	7
Nest Aspect	South	East	East	West	South	South
Nest Tree Species	Douglas-fir	Douglas-fir	Douglas-fir	Douglas-fir	Douglas-fir	Douglas-fir
Nest Tree Height (m)	22	29	27	31	29	19.5
Nest Tree DBH (cm)	27	66	24	38	41	31

List of Figures

- Figure 1. Cassette tape player and amplified speaker used to broadcast sharp-shinned hawk alarm calls.
- Figure 2. Typical sharp-shinned hawk nesting habitat in Douglas-fir/ninebark habitat. Nest tree in left foreground with orange flagging.
- Figure 3. Sharp-shinned hawk nest on right side of tree trunk. Douglas-fir showing clumped branching pattern typical of mistletoe-infected trees.

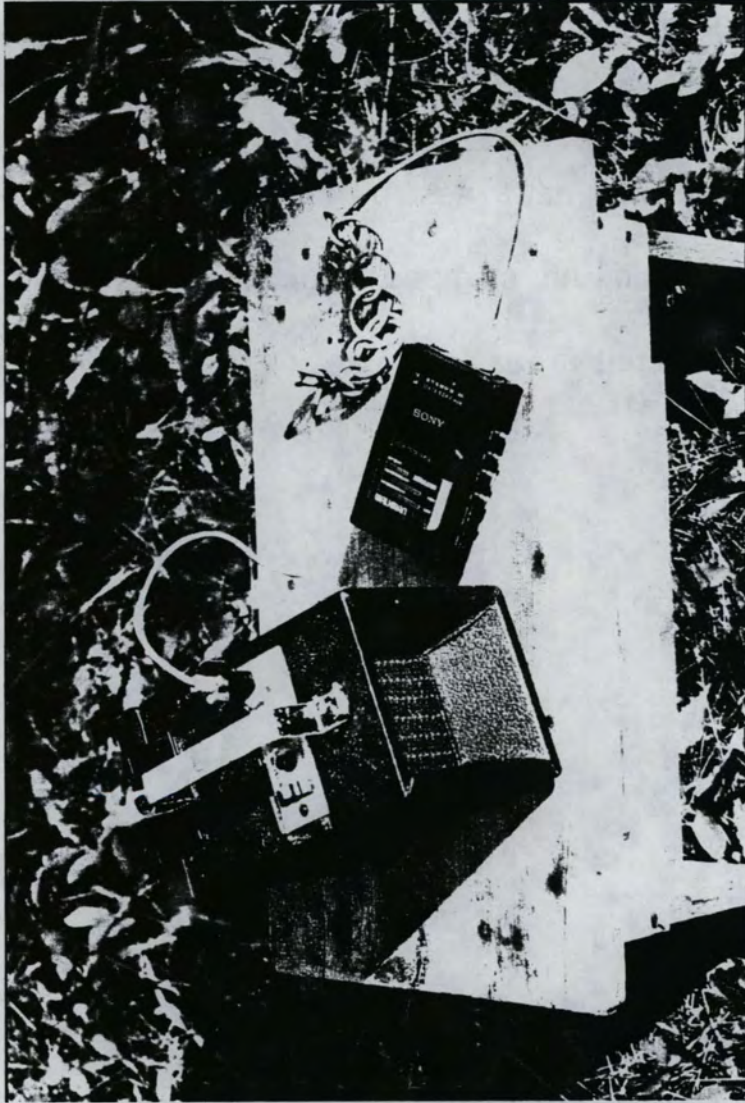


Figure 1



Figure 2

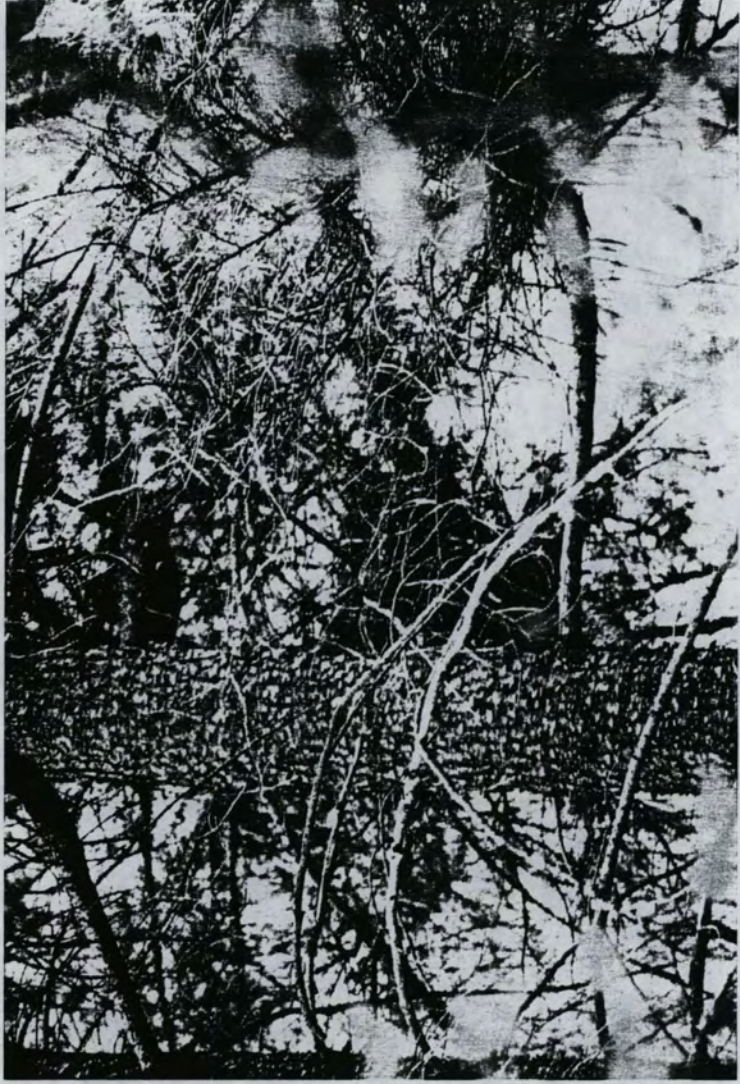


Figure 3