EFFICACY OF USING RADIO MARKED PREY TO LOCATE ACTIVE NORTHERN GOSHAWK NESTS

Prepared For:

South Dakota Dept. Game, Fish and Parks
523 E. Capitol-Foss Building
Pierre, SD 57501
(605) 773 4345

Big Sky Wildlife Consultants
PO Box 1553
Miles City, MT 59301
(406)232-8918

Introduction

The Northern Goshawk (*Accipiter gentilis*) is the largest of the three accipiter species that inhabit North America. Their secretive nature and challenging forested habitat make this species difficult to research and survey. The Northern Goshawk is identified as a Management Indicator Species for mature forest by the United States Forest Service (USFS). The goshawk is also a USFS Region 2 sensitive species.

The nest of this elusive accipiter is extremely difficult to locate in dense forested areas. A few goshawk nest survey methods exist and the most accepted are, walking transects in prime habitats and broadcasting goshawk vocalizations or a combination thereof. Both of these survey methods have limitations and raptor field biologists are constantly in search of more efficient survey methods for locating accipiter nests

In June of 2006 Big Sky Wildlife Consultant's raptor research team, with over 20 years of accipiter nest survey experience conducted an experiment on an alternative survey method for locating goshawk nests. This idea came about from knowledge of falconers and pigeon fanciers having goshawks constantly attacking the pigeons at their homing lofts. One falconer presented a homing pigeon, with a transmitter attached, to a goshawk that came in and took it to its nest located approximately two miles behind his house in a canyon. The Peregrine Fund reported a wild female peregrine visiting one of their hack release towers daily, during the breeding season taking the released falcon's food (quail). Peregrine Fund biologists put a transmitter on a quail and the female peregrine came in and took it back to her nest 6 miles away. These events combined with the idea of utilizing the goshawks movement to do the work, spawned the ideas for this research.

Study Area

The research took place on the central portion of the Black Hills National Forest in western South Dakota. The Black Hills National Forest is approximately 30 miles wide and 60 miles long encompassing about a million acres. This forest has 72 historical goshawk nesting territories and currently has a viable population of nesting northern goshawks. Goshawks in The Black Hills prefer to nest in old growth forests predominately in ponderosa pine (*Pinus ponderosa*). The Black Hills are intensively managed for timber production and numerous logging roads exist for access. This made it a highly suitable area for this experiment.

Methods

One active goshawk nest (tigerville goshawk nest territory) with one chick was selected for this research. Eight prey station tables were assembled at different distances but none greater than two miles from this active nest (see table 1). Each prey station was marked with a GPS and distance to the nest was calculated. The tables were placed three feet above the ground on cut off stumps or constructed legs, which makes them easier to visually detect by the hunting parent goshawks and prevents predation by terrestrial predators. The tables were made of four feet square sheets of half inch plywood. The 8 prey stations were set up for 10 days in natural hunting corridors for the goshawks, which consisted of edges of openings, logging roads and open flight corridors within large mature stands of timber (old growth).

A live wild rock dove (common pigeon) with a radio transmitter attached to its leg was placed on each table and tethered with a break-a-way leash. The radio transmitter selected for the project was a Merlin

Systems 1/3N FMV. This transmitter is light weight weighing only 9 grams, has a 30 day battery life and 14 mile line of sight range. Wild rock doves were selected for bait because they are wild acting and smaller size than homing pigeons which makes them easier for the goshawks to carry to the nest. Rock doves sit motionless a large percentage of the time, suggesting that this behavior makes it more difficult for the hunting goshawk to detect them. In response to this concern a pheasant wing on a swivel was suspended from a pole and placed by each pigeon station as a visual attractant. A slight breeze rotated the wing for visual detection. Ten extra pigeons were kept at camp in a covered 3'x 2'cage with food and water for replacement of pigeons taken or escaped.

The break away leash (see photo) was a six inch piece of 3/16 inch diameter bungee cord tied to a screw eye mounted in the center of the table. The other end had a size 2/0 brass barrel fishing swivel attached to a one inch diameter solid steel ring. A leather leg strap (jess) was attached to each leg of the rock doves and a spring clip was threaded through the end of the leather jesses and clipped over the steel ring. This setup allowed for the secure tether of the bait bird, but when a larger bird grabbed the bait and pulled the system would break away. Considerable research and development resulted in the selection of this break away system.

It was hoped that the parent goshawks would attack the rock doves and carry them back to the active nest to feed the chick, allowing researchers to follow the telemetry signal to the nest. The rock doves were given food (wheat and corn) and water in small cups that were screwed to the tables to prevent them from being knocked over. To prevent nocturnal great-horned owl predation on the rock doves and minimize the handling of them, plastic buckets with breather holes were placed over the rock doves at dusk and removed in the early morning. A soft ball size rock was placed on the buckets to secure them. Signs were constructed and placed at each table station warning the public to not disturb this location.

The time period selected for this research was between June 23 and July 2, 2006 starting when the goshawk chick was approximately 14 days old. From this age up to fledging the chick's demand for food is the greatest. Also, during this time period the goshawk chick was able to thermally regulate its body temperature. At this point the female parent goshawk reduced brooding efforts and started assisting the male hunting for prey to the feed the chick. With two parent goshawks hunting rather than one, it dramatically increases the statistical odds of the prey station tables being discovered.

Results and Discussion

During this experiment 7 prey station tables were in operation for 10 days and the 8th table (PS8) was in operation for only 0.5 of an hour. The total 8 tables were hit 4 times by the parent goshawks. The prey station table hit farthest from the nest was PS2 located 0.71 miles from the nest. Total table hours were 700.5 with 4 hits giving a hit frequency of 1 hit every 175.1 table hours. Total table hours were calculated by multiplying the number of tables (7) by the number of hours they were in operation per day (10) by the number of days in operation (10). We also added the half hour that PS8 was in operation (0.5). A likely method to increase hit frequency would be to increase number of prey station tables and days in operations. During our experiment predation of the pigeon by species other than goshawks was not observed. Below are brief narratives and a table of data about each prey station.

PS1 was located next to a logging road and was not hit by the adult goshawks during the 10 day experiment.

PS2 was located in a power line corridor in the timber 200 yards from a county road. This pigeon was killed on 6-25-06 and taken .71 miles to the nest**.** That same day another pigeon with a transmitter was put on this table.

PS3 was located on a winding logging road against a small tree trunk and was not hit by the parent goshawks during the 10 day experiment.

PS4 was located on the edge of the logging road. On 6-27-06 we approached the prey station in the evening and found an adult male goshawk sitting on the prey table eating the pigeon. He was observed from a vehicle approximately 80 yards away for about 1 hour until dark. He ate the entire pigeon on the table and flew away. It was speculated that this was the male from the study nest, but it wasn't verified. It was noteworthy that he did not take a portion of the pigeon to the chick in the active nest. A large casting pellet was left on the table presumably by the male goshawk prior to him eating the pigeon.

PS5 was located in a 3-way corridor opening in the forest. This station was never hit.

PS6 was located in a 5-way opening in the forest and was not hit. There were cattle in the area which disturbed this table.

PS7 was set up on the opposite side of the large meadow from where the active goshawk nest was located. It was placed 40 yards back in the timber in an open corridor. On 6-25-06 we found that the pigeon had been taken. The back half of the pigeon, with the transmitter attached, was located 50 feet from the prey table. The front half of the pigeon was never found and could have been taken to the nest. This event suggests that an improvement in transmitter attachment should be considered. There was also a casting pellet left on this table.

PS8 was placed very close to the nest approximately 50 feet for 100 percent visual detection in order to observe what the reaction of the parent goshawks would be at this close distance. The female goshawk attached this pigeon within 10 minutes of its placement, carried it 100 yards away from the nest and dropped it in the forest. We speculated that her attack was nest defense rather predation. This was a very interesting observation. No more pigeons were placed at this station.

Table 1

Table Station #	Distance From Active Nest	Location Type	Hits
PS1	0.97 miles	Logging Rd. edge	none
PS2	0.71 miles	Powerline Cooridor	1 hit
PS3	0.38 miles	Logging Rd. edge	none
PS4	0.56 miles	Logging Rd. edge	1hit
PS5	1 mile	Forest Opening	none
PS6	0.98 miles	5 cororidor clearing	none
PS7	0.15 miles	Meadow Edge	1 hit
PS8	50 feet (0.0095 miles)	Forest by nest	1 hit

Conclusion and Recommendations

This exploratory research project was conducted with a small sample size of prey station tables for a short time period. While only one tagged pigeon was carried back to the nest, 50% of the pigeon stations were utilized by the parent goshawks. The project success suggests a higher level of effectiveness would be seen if it was conducted with more prey stations and for a longer duration. Several issues were discovered that would make this project more effective. Below is a list of suggestions to increase the efficacy.

- Increase number of prey station tables
- Increase time period of operation (20 days)
- Streamline setup time by making folding tables
- Place a bait cage with live wild house sparrows and or starlings in it adjacent to the tethered pigeon as a more effective visual attractant
- Keep prey tables away from livestock.
- Consider alternative prey species (quail, starlings, etc)
- Consider alternative transmitter mount (backpack and leg attachments)

This survey technique warrants more exploration implementing the above refinements on a larger project scale. This technique can also be used to locate the two smaller species of accipiters, the cooper's hawk and sharp-shinned hawk, and potentially other raptor species.

An alternative method we considered, but did not explore, involved trapping the breeding adult goshawks with stationary accipiter traps set in the forest, and attaching a radio transmitter to them and following the radio signal to the nest. This would be very effective but requires handling the breeding adults and accidental catching of nonbreeding adults could be encountered. Exploration of alternative goshawk survey methods and conduction of base line nest surveys should continue in conjunction with monitoring known nest territories to document nest sites and habitat use. Advancements in research and survey techniques for this magnificent forest raptor will only enhance our ability to properly manage its habitat for long term population stability.

Photos

PS3-With pheasant wing on a pole for a visual attractant

PS2-Note the warning sign under the table

PS4-With an adult male goshawk present eating the pigeon

PS4-After the male goshawk left the station, note the hawk mute and transmitter

The break away leash system