Northern Goshawk Habitat Use and Selection in the Greater Yellowstone Ecosystem

2020 ANNUAL REPORT

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Introduction

Many animal populations are at risk across Wyoming and in the Greater Yellowstone Ecosystem. While agencies are tasked with managing sensitive species, there is often a significant lack of data needed to adequately manage these animals. Northern Goshawks are an uncommon, secretive forest-dwelling raptor currently classified as a Species of Greatest Conservation Need in Wyoming and a sensitive species by the US Forest Service (USFS) because of their reliance on mature, older contiguous forest stands, which are at risk due to issues such as logging, burning, insect infestations, and climate change. Since the early 1990's, several studies have documented goshawk occupancy declines across the intermountain West (Bechard et al 2006, Patla 2005). Many factors may be driving these declines including geographical shifts of nesting pairs, weather and climate, prey availability, and changes in forest structure and age.

In Jackson Hole, we have been investigating the density and occurrence of breeding goshawks for the past four years with the support of organizations such as the Meg and Bert Raynes Wildlife Fund, the US Forest Service, and Teton Conservation District. Through these efforts, we have identified 15 occupied territories within and adjacent to the valley and determined more effective survey techniques to monitor breeding birds. Still, we know very little about the population trends, habitat needs, sensitivity to disturbance, and aspects of population dynamics in Jackson Hole.

Many management actions rely on site visits to document animals, spatial occurrence data, predictions of occurrence. Following a pilot study tracking one breeding male goshawk in 2019, we developed this project with the objective of gathering critical movement data from breeding goshawks to understand habitat use, movement patterns, and to create predictive maps of critical habitat. Understanding and being able to predict seasonal habitats in the Greater Yellowstone Ecosystem will help state, federal, and county managers sustain these sensitive raptors in Jackson Hole by having a decision support tool for current and future changes to critical goshawk habitat.

Methods

We first surveyed previously known territories using Autonomous Recording Units (ARU) with methodologies we previously developed to determine occupancy of each. This involved placing multiple ARUs within existing territories for at least 6 consecutive days with continuous recording. Following deployment, each territory was searched on the ground several times until a nest was located or we determined that birds were not present (typically with ≥ 3 territory visits). We processed recordings through Kaleidoscope acoustic software with a custom detector we built for goshawks through previous studies. We considered the territory as "occupied" when at least one goshawk was documented during either site visits or with the ARUs.

When an active nest was located, we monitored the nest weekly to document nesting success and timing. Once nests had nestlings at least 50% of fledging age, we attempted to capture one or more of the breeding adults using a stuffed, mechanical Great Horned Owl lure and dho-gaza nests placed near the nest. We were targeting males to receive transmitters because they are more likely to delineate home ranges and habitat use. Females generally remain near the nest site to protect young. However, in the even we could not capture the males, we outfitted females with a transmitter. During the first few captures, we deployed the decoy immediately upon set up and generally captured the female quickly. We temporarily held the female while waiting for the male to return but released her within an hour if he did not. We subsequently set the lure up but did not uncover it until the male returned to increase our chances for capturing him. In the event we only captured the female, we fitted her with a transmitter. If the pair was captured, we only fit the male with a transmitter. All birds were banded, measured, and extracted a blood sample for DNA banking.

We used two types of GPS/GSM transmitters in 2020. We purchased 4 UHF/GSM/GPS transmitters manufactured by Milsar and 4 GSM/GPS transmitters manufactured by Ecotone. We purchased the two types because the Ecotone transmitter purchase price was lower than initially estimated and that allowed us to increase sample size. The limitation of the Ecotone units are they only upload data via the GSM (cell phone) network. If a goshawk does not fly within cell coverage during the specific times the communication link is turned on, then we cannot access the GPS data. The UHF link in the Milsar units gave the added security of being able to download the GPS data via a handheld downloader in the event the GSM link did not connect but was additional cost. We therefore, purchased some of each and deployed the Milasr units in territories that did not have cell coverage. All units were tested for several weeks prior to deployment.

Results

We were able to gather data from 14 nesting territories in 2020. We documented 79% of territories were occupied (n = 11) and eight active nests. We are confident that two territories were unoccupied and did not locate nests in three occupied territories where we cannot eliminate the possibility of an active nest that was not found during ground surveys. Of the active nests, 88% were successful (n = 7) with mean productivity of 1.57 fledgling/active nest (range = 1-3).

We continued to gather data from one male goshawk outfitted with an Ecotone transmitter in 2019 during the 2020 breeding season. We began our trapping efforts July 1 during the 2020 field season. We captured a total of eight goshawks in 2020 and deployed seven transmitters (Figures 1-2). At only one territory did we capture the pair during the same trapping session and released the female without a transmitter. Four males and three females received GPS transmitters. Three males received Ecotone units and the remainder were Milsar units.

Figure 1,2. Pair of goshawks captured in 2020 (male left and female right) and tagged goshawk on prey.

Unfortunately, all Milsar transmitters failed within a few days to weeks, post-deployment. The transmitters functioned well during pre-deployment testing but then all stopped gathering GPS fixes after being attached to the birds. The transmitters continued to connect to the GSM network, showed full voltage, and were able to be remotely rescheduled. We worked with the manufacturer in an attempt to re-set the units remotely, but all efforts were unsuccessful. We attempted to recapture two of the hawks to remove the units without success. The harnesses have breakaway stitching which will eventually allow the units to fall off, but likely after 1-3 years. The distributor has agreed to replace these units under warranty with Ecotone transmitters.

We have been gathering data from the remaining Ecotone deployments and the 2019 unit (Figure 3). Of the units deployed in 2020, we have gathered between ca. 300-400 locations/bird and >2,300 from the unit deployed in 2019. All units connected to the GSM network during the study

and uploaded all stored data. Differences in solar charging capacity and GPS acquisition scheduling varied among units and season, but all units worked well during the breeding season. Charging abilities quickly declined in the fall and is intermittent during the winter. One of the four goshawks was migratory, and is currently wintering in the Bear River drainage at the Wyoming/Utah border (Figure 4).

The transmitter on the 2019 male has not checked in since September but has been visually confirmed to be alive as of December. It is likely that the unit is not charging well this winter with fewer daylight hours and the north-facing aspect of this individual's territory (solar panels need direct sunlight to charge, not just indirect light). We were able to send a lower-power GPS acquisition schedule on the last GSM connection and the units are designed to store any gathered GPS fixes until there is enough power to transmit to the GSM network, at which time all stored locations are transferred. The other three units have also been struggling to charge adequately this winter, but the focus of this project is habitat use during breeding, so there is currently little concern about winter charging issues.

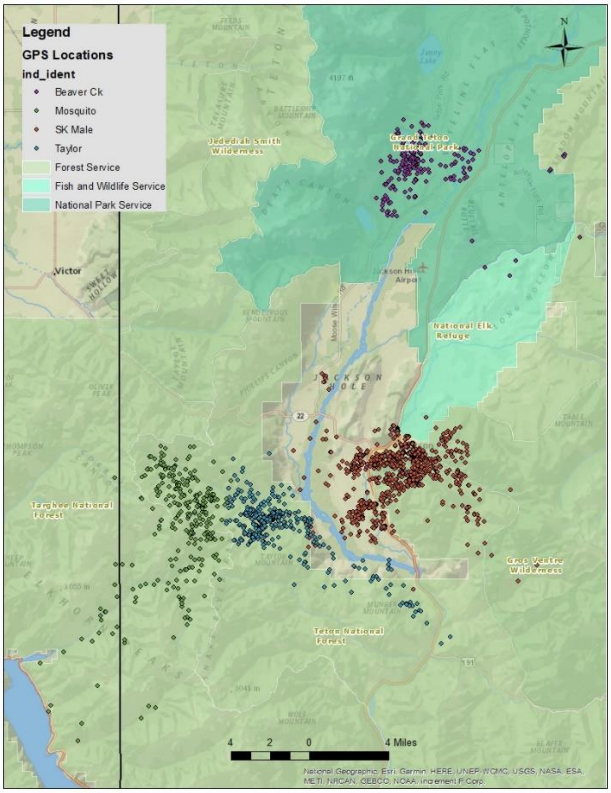

Figure 3. GPS locations of breeding Northern Goshawks tagged in Jackson Hole, Wyoming

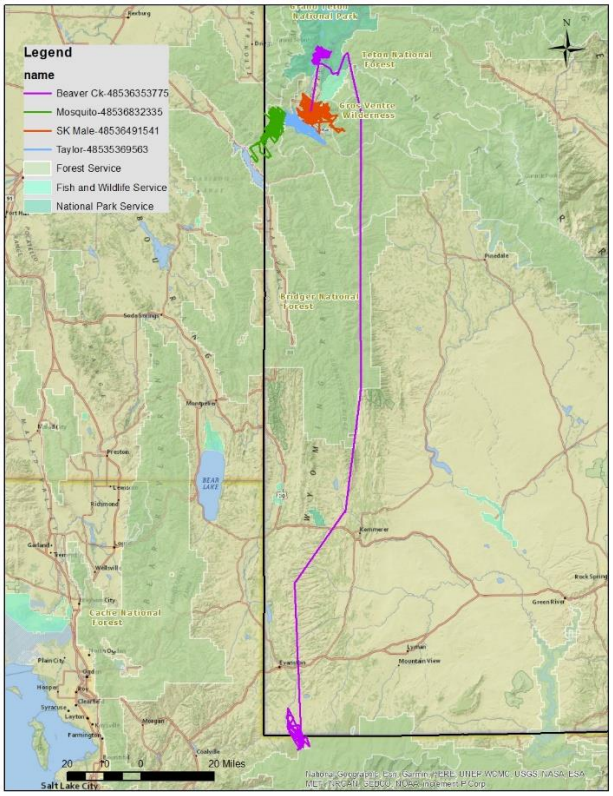

Figure 4. Tracks of breeding Northern Goshawks tagged in Jackson Hole, Wyoming

Discussion and Future Work

The failure of four deployed transmitters on breeding goshawks is beyond frustrating. All units tested well prior to deployment and the manufacturer has yet to determine the cause of failure. We will receive free replacements for those units to deploy in 2021 but the field costs associated with those efforts are not secured yet. We have insisted the distributor replace the failed Milsar transmitters with Ecotone units and they have agreed. We are hopeful that we may be able to recapture birds with failed transmitters to remove or replace them but that is predicated on the birds having a successful nest in 2021.

We quickly learned that we needed to adjust our field methods to target breeding male goshawks. In the first two territories we attempted captures (one in 2019 and the first in 2020), we were able to capture both individuals of the pair within 10 minutes. However, the male did not return quickly in the subsequent two territories, so we tagged the female with a transmitter and released her so we did not hold her too long. We then changed our approach by setting up the trap but not