2011 ANNUAL REPORT

Anthro Mountain Greater Sage-grouse Population

Photo Courtesy of Orrin Duvuvuei

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Cooperators

Utah Division of Wildlife Resources

U.S. Forest Service - Ashley National Forest

Utah State University Extension

Jack H. Berryman Institute

Uintah Basin Adaptive Resource Management Local Working Group

Berry Petroleum Company

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The cover photo is a view from Anthro Mountain looking north toward the Uintah Basin from Wire Fence Ridge. The foreground in this photograph depicts habitat used by the Anthro Mountain Greater Sage-grouse population during the spring and summer. While a few grouse have been located during the winter months after leaving Anthro, this population's seasonal movements and wintering areas are unknown.

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Introduction

Greater sage-grouse (*Centrocercus urophasianus*; hereafter sage-grouse), the largest of all grouse species in North America, are dependent on sagebrush (*Artemisia* spp.) communities throughout their range for annual food and cover (Wallestad 1975, Wallestad and Eng 1975). Sage-grouse were once abundant across 12 western states and 3 Canadian provinces (Schroeder et al. 2004). Habitat loss and alteration have been identified as the primary cause for observed range wide sage-grouse population declines in the past century (Schroeder et al. 2004, Connelly et al. 2004). Beck et al. (2003) similarly reported that sage-grouse currently represent 41.3% of their historical distribution in Utah. Concern about sage-grouse population declines resulted in petitions to the U.S. Fish and Wildlife Service (USFWS) to list the species under the Endangered Species Act of 1973. In December 2005, the USFWS announced its finding that listing sage-grouse was unwarranted. A lawsuit was filed following the decision alleging that the finding was incorrect and arbitrary. The lawsuit resulted in a U.S. District Court ruling that the USFWS must reconsider its previous decision. In March 2010, after reviewing new information, USFWS concluded that listing the sage-grouse was warranted but precluded.

Uintah Basin Adaptive Resource Management Sage-grouse Local Working Group

The Uintah Basin Adaptive Resource Management (UBARM) Sage-grouse Local Working Group (LWG) organized in 2003. UBARM is comprised of representatives of state and federal agencies, non-governmental organizations, private industry, and private landowners. This partnership was formed to provide a mechanism for maintaining and improving the abundance of sage-grouse and their habitat in the Uintah Basin including Anthro Mountain in Duchesne County.

UBARM developed a Strategic Management Plan with sage-grouse conservation and management strategies designed to meet guidelines set by the USFWS in their Policy for Evaluation of Conservation Efforts (PECE). This Strategic Management Plan blends sage-grouse conservation with regional socio-economic sustainability while addressing threats specific to sage-grouse in the Uintah Basin. This plan can be found on the UBARM website at http://utahcbcp.org/files/uploads/uintah/ubarmsagrplan.pdf. Threats specific to the Anthro Mountain sage-grouse population include: development and human infrastructure, energy development, drought and weather, fire, incompatible livestock grazing, incompatible OHV recreation, invasive/noxious weeds, parasites and disease, predation, and incompatible vegetation management.

Energy Development and Sage-grouse

Energy development and exploration typically requires extensive road networks and large infrastructure such as well pads, holding tanks, pipelines and powerlines. In addition, increased traffic along the road network is required to service the wells. Large scale development can potentially impact the wildlife using the landscape where the development occurs.

Concerns have been raised about the negative effects of oil and gas development on sage-grouse. Lyon and Anderson (2003) reported nest initiation rates at disturbed leks (energy development within 3km of a lek) were lower than initiation rates at undisturbed leks. In addition, habitat fragmentation and loss, infrastructure avoidance, and direct mortality associated with these activities were associated with declining sage-grouse populations (Lyon and Anderson 2003, Holloran 2005, Aldridge and Boyce 2007, Doherty et al. 2008, Walker et al. 2007).

Sage-grouse and Anthro Mountain

Researchers have monitored sage-grouse on Anthro Mountain for several years to define the species ecology. The U.S. Forest Service (USFS) - Ashley National Forest regional biologists began monitoring the population in 2002. Several grouse were fitted with radio-collars and the movements of the marked grouse were tracked. Their objective was to gather baseline information and observe population trends. Data gathered included: location, habitat use, seasonal movements and survivorship, breeding, nesting and brood information.

In 2007, 10 sites on Anthro Mountain were selected by the Ashley NF biologists for a small scale (<100 acres) prescribed burn experiment. The purpose of the experiment was to evaluate the effect of fire on increasing forb diversity as a means of enhancing sage-grouse brooding habitat. The burns were in mountain big sagebrush (*A. tridentata vasayana*) communities with >20% canopy cover where the shrub height exceeded 61cm and had a slope of <15%. Controlled burns were conducted in the fall to achieve a low intensity fire and were designed to yield a mosaic pattern across the landscape. Several methods were used to evaluate sage-grouse response including tracking radio-marked grouse, bird dog surveys, and pellet density estimates in both treated and untreated areas.

Several other habitat and management treatments have been conducted on Anthro Mountain in recent years. In 2009, lop and scatter techniques were used to remove pinyon pine (*Pinus* spp.) and juniper (*Juniperus* spp.) that had encroached on sagebrush habitat. That same year, Utah State University (USU) and the USFS initiated a study to examine if intensive cattle grazing on selected areas could be used to improve brood rearing habitat.

In recent years male lek attendance on Anthro Mountain has been in decline (B. Maxfield, UDWR personal communication). Concerned about a declining sage-grouse population on Anthro Mountain, USU, UDWR, and USFS initiated a sage-grouse translocation project in 2009. The project was based on a previous translocation research conducted in Strawberry Valley, Utah (Baxter et al. 2008). The Strawberry Valley translocation was conducted in a closed basin under an extensive predation management program. In addition to the goal of augmenting the population, the biologists were interested in determining how the topography of Anthro Mountain combined with no predation management may affect the success of translocation (B. Maxfield, UDWR, personal communication). Thirty female sage-grouse were radio-collared and translocated from Parker Mountain, Utah to Anthro Mountain in each spring of 2009 and 2010. Resident sage-grouse were also radio-collared each spring. The movements, survival, reproduction, and habitat use of resident grouse was monitored and compared to the translocated grouse. This is the first range-wide study to actually compare vital rates and habitat use of resident and translocated sage-grouse.

Study Purpose

In 2011, we continued to monitor resident and translocated sage-grouse to determine if the translocations of sage-grouse to Anthro Mountain were successful at augmenting the population. Previous research has documented brood and adult hen survival of sage-grouse in translocated populations but little research has focused on estimating juvenile sage-grouse survival in these populations. The research will focus on determining the survival of Anthro Mountain's adult and juvenile sage-grouse. In addition, we will attempt to determine this population's seasonal movements and wintering areas. Although nest success and survival have been monitored on Anthro Mountain, the

correlation of predator abundance to these estimates has not been documented. We will attempt to determine how predator abundance affects nest success and sage-grouse survival.

Specific Research Questions Addressed:

1. Was the translocation of sage-grouse to Anthro Mountain successful at augmenting the population?
2. What is the annual survival of juvenile sage-grouse on Anthro Mountain?
3. Is the annual survival of juvenile sage-grouse a limiting factor to population increase on Anthro Mountain?
4. Where are the grouse wintering areas?
5. What habitat and landscape features does this population utilize in the winter?
6. How does predator abundance affect nest success and survival of this population?

Study Area

Anthro Mountain is located in Duchesne County, Utah on Ashley National Forest and is located about 29km southeast of Duchesne, Utah. The study area is high elevation (2400 - 2800m) and is managed by the USFS – Ashley National Forest. Anthro Mountain is predominately mountain sagebrush community with several pockets of quaking aspen (*Populus tremuloides*) and Douglas-fir (*Pseudotsuga menziesii*) on the north facing slopes. Black sagebrush (*A. nova*) is found on the tops of ridges across the mountain. Two-needle pinyon (*P. edulis*) and juniper can be found at lower elevation on the ridges and is encroaching on the sagebrush community.

Anthro Mountain receives an average of 49cm of precipitation annually with the majority of the precipitation in the form of heavy winter snow and monsoonal rains during July and August. The mean daily maximum temperature is 13^{o}C and the mean daily minimum temperature is 1.7^{o}C (Utah Climate Center).

Smooth brome (*Bromus inermis*) was introduced in the 1950's and is currently the dominant herbaceous species in the areas where it was seeded. Areas not dominated by smooth brome have blue bunch wheatgrass (*Pseudoregeneria spicata*). Native forbs can be found across the entire study area in both native grass and smooth brome sites. Several habitat improvement projects have been implemented on Anthro Mountain including: lop and scatter, chaining, and controlled burns.

Status of Energy Development

There is currently existing oil and gas development within the Anthro Mountain management area. There are currently five oil and gas well pads that are not in production in the areas where the sage-grouse are located during the breeding and summer seasons. Each of these well pads has an access road.

Berry Petroleum Company (Berry) is proposing to drill up to 400 oil and gas wells within their existing federal mineral leases. Their lease covers approximately 25,900 acres on the South Unit of Ashley National Forest, including the Anthro Mountain management area. The proposal calls for all the wells to be constructed and drilled through 2027 or 2028. Wells will be drilled at 40 acre spacing. Well pads will be formed using standard cut and fill methods out of native soil and rock and the wells will be drilled from these constructed pads. Each pad requires approximately 2.5 acres of disturbance around the well pad. An estimated 100 miles of additional access roads will be constructed and 21 miles of

existing roads will be upgraded. The northern portion of Anthro Mountain is more likely to have larger quantities of oil and gas resources and therefore will be more heavily developed. Exploratory drilling will be conducted on the southern portion of the mountain where it is believed to have lower quantities of oil and gas resources.

Methods

Sage-grouse Ecology

Lek Survey and Count

In March 2010, we began trying to reach established leks to document the number of sage-grouse using the leks. If no grouse were documented on or near the lek, we conducted a search of the general area looking for tracks or other evidence that sage-grouse have been using the area. We continued checking each accessible lek through mid-May.

We conducted informal lek searches by driving the few accessible roads at dawn, stopping every half mile and scanning suitable sage-grouse habitat with binoculars and listening for displaying grouse. We hiked to the ridges that were inaccessible due to snow pack and scan the area for signs of displaying grouse.

On April 27, 2011, we accompanied the UDWR on a helicopter flight to search for leks on Anthro using methods similar to those used by Schroeder et al. (1992). During this search, the pilot flew north and south transects along each ridge top at approximately 50-100m off the ground. Three additional observers watched for displaying activity or flushed sage-grouse around the helicopter. If grouse were observed, the point was marked with a GPS and we went to the area in the following days to conduct a more thorough ground search for lekking activity.

Capture and Tracking

Grouse were captured by spotlighting roost sites in the study area and capturing with hoop nets. After capture, each bird was held firmly by a researcher while a second researcher fitted it with an ATS necklace mounted radio-transmitter. The sex and age of each grouse caught was determined using plumage characteristics outlined by Beck et al. (1975).

For each grouse captured we recorded the time and location of capture, sex, age, weight, habitat, distance to nearest well, distance to nearest lek, release condition, and release time. We also collected blood samples from each grouse by clipping the nail of the hallux. The bleeding was stopped by applying silver nitrate to the clipped area. We noted any injuries or other comments about the bird's condition upon release.

Each collared sage-grouse was located at least once a week from April to the end of August using a 3-element Yagi antenna. We attempted to locate nesting hens and those with broods three times a week. A hen was known to be nesting if it was located under the same shrub for two consecutive days. We attempted to locate males and hens without broods at least twice a week. To locate the sage-grouse, we followed the strongest signal until we were within 50m. Once close to the sage-grouse we made a complete circle around the strongest signal to ensure that it was in that location. If a grouse flushed, we

marked its exact location; otherwise we estimated the location by standing at a cardinal direction from the strongest signal, estimating the distance to the sage-grouse and adjusting the UTMs accordingly. At each location we recorded the date, time, location type, UTMs (in NAD 83), the primary habitat type, secondary habitat type and distance, altitude, slope, aspect, and distances to nearest lek, well, two-track, fence, and road. We also recorded whether the nearest well was visible. If the sage-grouse flushed, we noted that as well as the flock size. The location type was recorded based on the sex of the sage-grouse and the various stages of a hen's reproductive cycle.

When a radio-collared sage-grouse dies, the transmitter will switch to mortality mode after lying motionless for a set period of time. If we picked up a mortality signal, the researcher would follow the signal to the radio-collar. The researcher would conduct a thorough search of the area checking for any sign indicating the cause of mortality. The appearance of feathers and body parts were recorded. We noted whether predator tracks, scat, or perch sites were nearby. Mammalian predation was distinguished from avian predation based on the appearance of the remains. If the feathers, remaining body parts, and collar appeared crunched and chewed we documented that it was likely a mammalian predator. Feathers that were plucked from the carcass indicated that the predator was avian. Any tracks, scat, or whitewash in the immediate area were used to assist in identifying the predator.

Habitat Assessment

We conducted vegetation surveys at each nest site and at one location a week for every brood until the brood fledged at 50 days of age (Schroeder 1997) or the brood was lost. The plots were centered as close as possible to the brood's former location. We attempted to complete the brood plot surveys within a week of locating the brood. This was to ensure that the measured vegetation resembled what the brood was actually utilizing.

Shrub canopy cover was estimated at all vegetation survey plots using the line intercept method (Connelly et al. 2003). We used 15m transects at nest sites and 10m transects at brood sites. The first transect of the plot followed a random bearing and remaining transects were placed at ninety degree intervals. The intervals of live shrub canopy that intersected an imaginary plane created by the tape's edge were measured. Gaps of shrub canopy exceeding 5cm or greater were excluded from measurement. The canopy cover will be estimated by summing the intervals of live shrub along the plane and dividing by the total length of the measuring tape.

We obtained herbaceous cover measurements using a 20cm x 50cm Daubenmire frame (Daubenmire 1959, Connelly et al. 2003). We performed Daubenmire frame measurements along each transect at 3m intervals for the nest sites and 2.5m intervals for the brood sites. At each interval we recorded the estimate percentage and maximum height of grasses and forbs within the Daubenmire frame. We also estimated the percent of litter, rock, and bareground. Visual obstruction into and out of each site was estimated using a variation of the Robel Pole method (Robel et al. 1970).

Predator Surveys

Although no single predator focuses solely on sage-grouse as their primary food source, sage-grouse face a suite a predators across their range. Sage-grouse are susceptible to predation from various predators from egg through adulthood and predation may be a limiting factor in fragmented landscapes (Hagen 2011). Predator surveys were conducted to gather knowledge and develop an index of

abundance for predator species on Anthro Mountain. We wanted to document all predators sighted that are known to depredate a nest, predate a brood, or predate adult sage-grouse.

A day and night survey was conducted weekly until all broods fledged or were lost. Daytime surveys were conducted between 0600 and 1200 hours and involved driving along each ridge, stopping at fixed 800m intervals for three minutes (USGS Breeding Bird Survey), and recording any predators sighted while driving and stopped. We tried to minimize double counting by keeping track of previously spotted predators as we moved on to the next point. Night-time surveys began at dusk and typically ended between 0230 and 0300. Night-time predator surveys involved using a truck mounted spotlight and spotlighting along each ridge while searching for animal eye-shine. When eye-shine was observed, binoculars were used to determine the species. During each survey, the observed predator species and quantities were recorded. We also kept track of the amount of each prey species observed during the survey period.

Preliminary Results

Sage-grouse Ecology

Lek Survey and Count

No sage-grouse were observed using established leks on Anthro Mountain. Searching the immediate area around established leks provided no evidence of lekking activity or lek use during the breeding season.

On 15 April 2011, a new lek was located on Jeep Trail ridge on a well pad that is not in production. This lek was counted every few days until mid-May. The maximum male count occurred on 03 May when there were 8 males on the lek. The maximum female count was 9 females on 20 April. The last count for this lek occurred on 09 May and no grouse were observed on the lek.

During the helicopter survey, no sage-grouse were observed on or near established leks. Although we did see sage-grouse on the newly located Jeep Trail Lek as well as random sage-grouse on other ridges, the search was unsuccessful at finding unknown leks on Anthro Mountain.

Capture and Tracking

We began spring trapping on 30 March and captured four male and ten female grouse. Of these grouse, one male and one female were adults and the rest were juveniles at the time of capture.

We began searching suspected wintering areas for collared sage-grouse from the previous study on 22 March. The first sage-grouse to be located on Anthro Mountain was on 25 March. As of 26 September, there have been 8 mortalities due to mammalian and avian predators. Of the 31 sage-grouse that were located this field season there are currently 22 sage-grouse with collars on the air but 3 are missing and 4 are believed to have dead or dying collars. Sixteen sage-grouse that were alive at the end last summer have not been located this field season and their fates are unknown.

The first nest initiation occurred on 2 May and all but one hen initiated a nest. Of the twenty-three initiated nests, nine were depredated and fourteen hatched. Two hens initiated a second nest after their first nests depredated. One hen re-nested within approximately 300m of her first nest and was again

depredated. The other re-nester successfully hatched out on 1 July after relocating the second nest approximately 2km from her first nest. The clutch size was determined by counting the number of hatched and un-hatched eggs in successful nests. The average clutch size for 2011 was 7.33 eggs per nest. Of the fourteen successful nests, at least one chick from eight broods fledged (Schroeder 1997). One hen was known to have a brood three days before fledging but disappeared and we have been unsuccessful at locating her since that time.

Habitat Assessment

We conducted vegetation plots at 21 nest sites and 87 brood sites. The sage-grouse were found to nest under Mountain big sagebrush, pinyon (live and cut), and rabbit brush (*Chrysothamnus viscidiflorus*). Thirteen nests were located under sagebrush, seven nests were located under either pinyon or cut pinyon, and one nest had rabbit brush as its main nest shrub although sagebrush was directly adjacent to the rabbit brush. Broods were located and vegetation surveys were conducted in various dominant habitats ranging from Mountain big sagebrush, Black sagebrush, pinyon/juniper, Aspen, and introduced grasses. The locations also varied from ridge tops, side hills, and drainage bottoms.

Predator Surveys

Both avian and mammalian predators were recorded during the predator surveys. Documented avian predators on Anthro Mountain include: Common Raven (*Corvus corax*), Pinyon Jay (*Gymnorhinus cyanocephalus*), Clark's Nutcracker (*Nucifraga columbiana*), Golden Eagle (*Aquila chrysaetos*), Red-tailed Hawk (*Buteo jamaicensis*), Cooper's Hawk (*Accipiter cooperii*), American Kestrel (*Falco sparverius*), Great Horned Owl (*Bubo virginianus*), and Short-eared Owl (*Asio flammeus*). Mammalian predators recorded during the surveys include: coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and Long-tailed weasel (*Mustela frenata*).

A wide variety of prey species were sighted during the surveys. These prey species include: Black-tailed jackrabbit (*Lepus californicus*), White-tailed Jackrabbit (*Lepus townsendii*), ground squirrel (*Sciuridae spp*), Mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), pronghorn (*Antilocapra americana*), and Dusky Grouse (*Dendragapus obscurus*).

Future Plan of Work

2011 Work Plan

We plan to capture and radio-collar twenty juvenile hens this autumn. We will locate each grouse as often as possible via ground telemetry from September until we are no longer able to access Anthro Mountain due to snow-pack. We plan to determine seasonal movements, wintering areas, and winter habitat use by locating each grouse via aerial telemetry twice a month from December through March.

2012 Work Plan

In 2012, we will continue searching for the sage-grouse and locating the seasonal movements, wintering areas, and winter habitat use through March using aerial telemetry. During the spring and summer, we will continue the same research surveys and procedures that were conducted during the 2011 field season. We will also begin data analysis and expect to complete all analyses in the spring of 2013.

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