Tracking Fine-scale Movements and Behavior of Greater Sage-Grouse with Solar GPS PTTs

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Greater Sage-Grouse (*Centrocercus urophasianus*) populations across western North America have been declining for many years, leading to multiple ESA listing attempts. Several potential causes for decline have been infrastructure development, overgrazing and long-term drought conditions, among others. Sage-grouse have not only been declining in areas of high human use, such as the oil and gas fields of Wyoming and Montana, but also in pristine, protected areas such as Grand Teton National Park in northwestern Wyoming. The sage-grouse located in and around Grand Teton National Park make up a small (ca. 500 individuals), non-migratory, isolated, high-altitude population that is at high risk of extirpation in the near future. Several studies, including ours at Craighead Beringia South, have tried to obtain critical habitat use, landscape dynamics, predator-prey interactions, breeding ecology and survival of this population using

Photo by Bryan Bedrosian

Adult female Greater Sage-Grouse released with a 30g solar GPS/PTT.

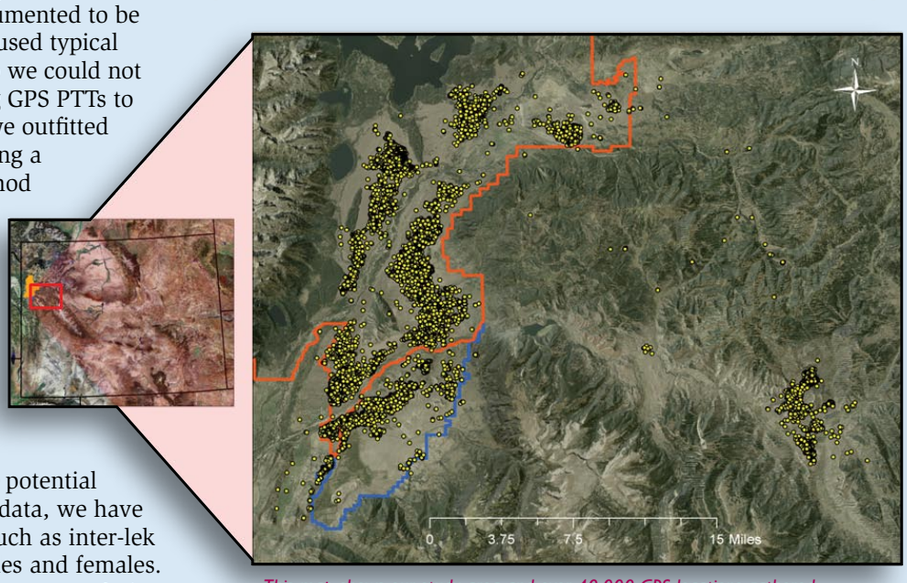
conventional VHF collars. However, it became clear that many of the questions addressed could not be adequately answered with only one re-location every day or every other day. It became increasingly apparent that all aspects of our study would be greatly enhanced by using GPS PTTs. To complicate things, survival in several species of grouse has been documented to be negatively impacted when researchers used typical "backpack" mounts for transmitters, so we could not use this traditional method of attaching GPS PTTs to sage-grouse. As a pilot study in 2007, we outfitted the first sage-grouse with GPS PTTs using a modified rump-mount attachment method that we developed. Following the successful deployment of four 30g solar GPS PTTs on breeding hens, we continued with the project and have currently outfitted 22 sage-grouse over the past two years with GPS PTTs.

By successfully obtaining hourly locations on each sage-grouse over the entire year, we quickly realized the potential analyses possible. Using the fine-scale data, we have been able to easily answer questions such as inter-lek (breeding site) movements of both males and females. This proves important because sage-grouse population estimates are almost always made based on the maximum male count at known leks. Our data has begun to show us that both sexes visit multiple leks over the course of the breeding season, which may artificially inflate population estimates. We have been able to gather detailed data on landscape use and clearly define used habitat with over 40,000 re-locations across our study area in just two years. We have been able to document clear seasonal habitat use and needs by gathering detailed habitat information at GPS re-locations for each individual. We have defined both daily and seasonal movement patterns based on gender. By setting the duty cycles to gather locations post-dusk, we have defined roosting site characteristics and measured the distance traveled to and from diurnal use areas. We have also been able to gather data on nest initiation, foraging activities while incubating, and habitat use after hatching. Further, by simultaneously outfitting both nesting sage-grouse and Common Ravens with hourly GPS PTTs, we have started investigating habitat overlap and differentiation of these two species. Such data are proving useful in areas with high predation pressure and in areas experiencing increasing raven densities.

Photo by Ross Crandall

Adult hen sage-grouse with a 30g solar GPS PTT.

The use of Microwave Telemetry's 30g solar GPS PTTs on sage-grouse has enabled us to gather more detailed, fine-scale data than ever before possible to help the management efforts with this sensitive species. While initial costs associated with GPS PTTs are higher than conventional VHF transmitters, we have found significant cost savings over the course of study and have gathered magnitudes more data than possible with VHF units and field technicians. We have been able to gather the most comprehensive and detailed movement data set currently available for a population of Greater Sage-Grouse with the use of these GPS PTTs. As such, our data set has already been used in management plans for habitat restoration efforts, fire planning, mitigation, and preservation efforts. Further, many sage-grouse re-location studies often utilize the technique of flushing marked individuals to gather accurate re-location data or travel near the individual or nest, potentially causing disturbance. GPS PTTs allow researchers to gather more re-location data than thought possible with absolutely no disturbance after outfitting with the transmitter. Such efforts will continue to be needed with this sensitive, declining species and others like it.



This map shows our study area and over 40,000 GPS locations gathered from the GPS PTTs over 2 years.