Migration, Seasonal Ranges, Health, and Survival of the Eastern Tehama Deer Herd

Proposed Start and Completion Date:

This projected is planned to begin on July 1, 2012 and end on December 31, 2016.

Executive Summary

The Eastern Tehama Deer Herd is the State's largest migratory deer herd and has declined substantially in recent decades. Previous studies conducted to identify migration routes and seasonal ranges used deer fitted with VHF telemetry collars. Although useful, this information lacks the resolution and accuracy possible with GPS telemetry collars available today. Contemporary data identifying the locations of important seasonal habitats and pathways used to reach them are needed to effectively manage and conserve the Eastern Tehama Deer Herd.

We propose to capture a total of 25 adult female black-tailed deer by free range darting and clover trapping in the summers of 2012-2014. All deer will be assessed for physical condition and standard weights and measurements will be taken. Blood will be drawn for disease analysis and collection of ectoparasites will be conducted. Each deer will have a timed release GPS collar and identifying ear tags affixed. GPS collars will be programmed to release after one year and monthly telemetry monitoring will take place to check survival of individuals. Annual summaries will be submitted by June 30 of each year and a final report, suitable for publication, will be submitted by December 31, 2016. All reports will be prepared by Northern Region.

Statement of Need

The Eastern Tehama Deer Herd is the largest migratory herd in the State and has experienced population declines in the past several decades. These declines have resulted in the substantial loss of recreational activities, declines in revenues to local economies associated with deer hunting or viewing, and public concerns over the effectiveness of the Department's management strategy for this herd. Contemporary data identifying important habitat use areas (seasonal ranges and migration routes) are lacking and are needed to effectively manage and conserve the Eastern Tehama deer herd. This information will also be used to update the Deer Assessment Unit (DAU) 4 plan, which includes the Eastern Tehama deer herd as well as other herds with in the C Zones in northern California.

The seasonal ranges of the herd are under several threats including urban development resulting in degraded habitat quality and fragmentation of habitats in the winter range and wild fire suppression and timber harvest practices (herbicide suppression of shrubs and forbs) which result in degraded habitats on the summer range. Much of the winter range has been designated by the Department for conservation actions in the form of conservation easements, however; only a small portion has been protected. Data collected from this study will assist the Department in prioritizing areas for conservation on the winter range and management actions by the USFS on the summer range.

Introduction

The Eastern Tehama Deer Herd (ETDH) in northern California has suffered substantial population declines over the past 20 years (CDFG unpublished data) resulting in significant loss of recreational opportunities (hunting and wildlife viewing), declining contributions to local economies, and mounting concerns from the public. The ETDH is the largest migratory deer herd in California and is highly valued by the public for recreational uses. The herd migrates approximately 40 miles from wintering areas in the eastern foothills of the northern Sacramento Valley to summering areas in the vicinity of Mount Lassen in the southern Cascade Range. In general, they winter on low elevation private lands and summer on public lands administered by the USDA Forest Service Lassen National Forest and large industrial timber companies including Collins Pine Company and Sierra Pacific Industries.

Three studies using radio-collared deer have been conducted on the ETDH (1977, 1982, and 1986) to identify migration routes and summer and winter areas. However, those deer were fitted with standard VHF transmitters and the data obtained lacked the accuracy, resolution, and sample sizes to accurately depict migration routes and important seasonal habitats used by the ETDH. GPS technology available for use with telemetry collars was unavailable when initial studies were conducted on this deer herd and can provide critical information needed to manage and conserve this population.

Department personnel in the Northern Region, currently monitor the ETDH using infra-red triggered cameras set on eight known migration trails, summer spotlight counts, and road transect surveys conducted in the spring and fall. Helicopter transect surveys have been conducted infrequently in the past. Migration trail monitoring began in 1998, and appears to indicate a decline in the number of events logged in 7 of the 14 years (Appendix 1).

We propose to identify migration routes and the location of seasonal habitats important to the health and persistence of the ETDH using GPS telemetry. This information will facilitate refining techniques to monitor this population by identifying new migration trails where camera surveys can be conducted and more accurately describing winter range polygons for aerial surveys. We will also describe the health and disease status of captured animals through analysis of blood samples taken and collection of ectoparasites.

Information collected during this project will assist the Department and other land managers (Federal, State and counties) to identify areas important to the herd and to prioritize areas of habitat conservation and improvement (e.g. conservation easements, fee title purchase, management recommendations for both public and private lands and county land use plans). These data will also be used to update current deer range use maps in the ETDH plan, the State Deer Herd Plan and the Deer Assessment Unit plans.

Objectives

1. To identify migration routes and the location of seasonal habitats important to the health and persistence of the ETDH

2. Collect information on physical condition and disease which may effect survival and productivity in the ETDH

3. Monitor annual patterns of survival, causes of mortality, and factors that influence survival of adult female deer.

Working Hypotheses

1. Additional migration corridors and seasonal ranges remain to be discovered that are critical to the persistence of traditional migratory behavior in the ETDH.

2. Survival and reproduction of deer within the ETDH is low and is evidenced by individuals in poor physical condition which experience high rates of disease.

Methods

Capture

Deer will be captured via chemical immobilization (free range darting) on their summer range in 2012 through 2014 (Figure 1). Additional deer may also be captured with clover traps or by chemical immobilization from ground blinds during the winter to achieve capture objectives. Helicopters will not be used to capture deer for this project as other feasible means are available. All captured deer will be immobilized and antagonized by personnel with advanced training in chemical immobilization and in consultation with the Wildlife Investigations Lab (WIL). Immobilization drug protocols will be followed as set forth by the Department in the Department Policy on the Use of Pharmaceuticals in Wildlife. An *Immobilization Data Sheet* will be completed at the time of each immobilization attempt and provided to the WIL. In addition, the project leader will compile and submit a quarterly drug inventory reports to WIL.

Up to 12 adult female deer will be captured annually and fitted with GPS collars. Capture activities are planned to be distributed over 2-3 years to obtain data that are more likely to represent the range of variation in seasonal habitats used by the ETDH.

Data and Biological Sample Collection

Data collected from each deer will be recorded on individual data sheets and will include at least the following:

1. Location of capture – descriptive and GPS coordinates
2. Sex
3. Age – an incisiform canine extracted for aging (Swift et al. 2002)
4. General body condition – body fat, parasite load, abnormalities.
5. Neck circumferences (base, mid, and top).
6. Weight – estimated with torso tape.
7. Blood – Approximately 35-60 cc of blood will be collected from each animal and placed into red-top and lavender top tubes. Blood collected in red-top tubes will be centrifuged and serum will be frozen for submittal to the WIL. Purple top tubes will be frozen for submittal to WIL.
8. Ectoparasite collection for Hair Loss Syndrome monitoring.
9. Ear tag types and numbers
10. Radio collar information (type, serial number, frequency)

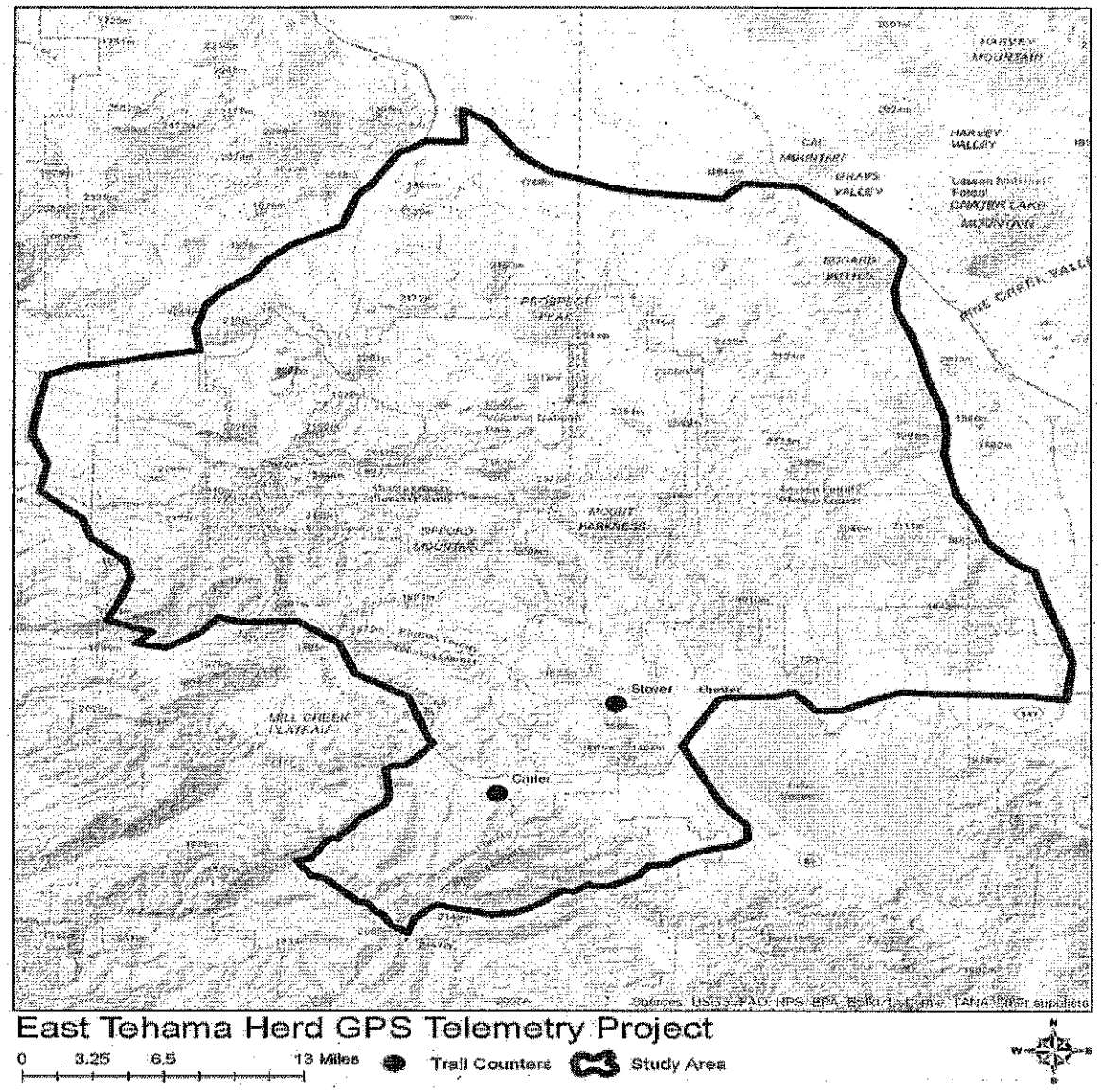

Figure 1. Almanor Basin capture area for the Eastern Tehama deer herd .

Blood and ecotoparasite samples will be submitted to WIL and analyzed for species identification for ectoparasites and disease prevalence for blood samples. Although the number of samples collected will be relatively small, these data will added to the body of information regarding the health of deer populations compiled by the Department and will be cost effective to collect when deer are captured.

The capture area will primarily be the summer range of the ETDH. The specific area is in the Almanor Basin and Deer and Mill Creek drainages south of Mount Lassen. Typical habitat types for the areas are Sierran Mixed Conifer and lodgepole pine forest (Mayer and Laudenslayer 1988). Primary landowners are USDA Lassen National Forest and Collins Pine Company.

VHF Telemetry

The following radio-telemetry methods are adapted for the objectives of this study from Samuel and Fuller (1994). An attempt will be made to locate each deer monthly by fixed-wing aircraft or from the ground to determine if the individual animals are still alive, monitor their general movements, and to assess the status of their GPS collars. The

GPS collars will automatically release from the deer if their batteries fail prematurely and, transmit a VHF beacon for several weeks. If a mortality signal is received the animal will be located as soon as possible to attempt to determine cause of death.

The following data will be recorded for each radio-location, when possible:

1. Radio frequency
2. Date/time
3. Location radio-transmitter mode (mortality signal)
4. Herd composition and size
5. Vegetation cover type/structure (ocular assessment from air)

GPS Data

GPS collars will be programmed to collect a location every 2 hours and are programmed to drop off after 1 year. GPS location data will be analyzed using GIS software to estimate home ranges, depict winter and summer ranges, map migration routes and staging areas, and assess habitat use. Home ranges and seasonal ranges will be analyzed for individual deer using the adaptive kernel utilization home range and Brownian bridge movement methods.

Products (and estimated dates of completion)

GPS data will be maintained in a MS Excel database and analyzed using GIS (Arc GIS v10, Esri). Locations will be classified by season as summer, winter and migration (including staging areas). Home ranges will be analyzed for individual deer and as composite seasonal home ranges using the adaptive kernel home range method (Worton 1989). Additionally, migration corridors and staging areas will also be analyzed using the Brownian bridge movement method (Horne 2007) which can predict use level for individual migration trails and apply that to a population-level migration route. Traditional location analysis uses a "connect the dots" approach but reveals no level of importance (use) of each individual trail and staging area or no associated area of the trail (e.g. is the route 10 m or 1 km wide). The Brownian bridge movement model can predict level of use similarly to kernel analysis to home ranges by analyzing time specific location data and estimating a utilization distribution. Sawyer et al. (2009) used the Brownian bridge movement method to estimate the relative use along a number of migration routes to prioritize which route should be targeted for conservation management.

Radio-telemetry data will be archived in the Department's Bio-geographical Observation and Information System (BIOS), which is an internet based spatial data program. All data will be on a secure server, requiring a password to access which will be provided to all partners.

Analysis of data collected during this project, annual summary reports (completed by June 30) and completion of a final report (December 31, 2016) suitable for publication will be the responsibility of the Northern Region Wildlife Program personnel.

Collaborators

- Project Supervision: Richard Callas, Senior Environmental Scientist
- Project Lead: Scott Hill, Environmental Scientist - capture coordination, telemetry monitoring, data analysis, report preparation
- Robert Schaefer, Environmental Scientist - assistance with data analysis and review of draft reports
- Brett Furnas, Environmental Scientist – assistance with statistical design and data analysis
- Dr. Pam Swift – WIL, Wildlife Veterinarian
- Craig Stowers , Senior Environmental Scientist, Wildlife Programs Branch
- USFS Lassen National Forest
- Collins Pine Company – Collins Almanor Forest

Program Planning

- Annual Meetings will be conducted to assess project progress and address any unforeseen issues

Other Resources requested from CDFG

- Data will be entered into BIOS
- Archived Specimens of blood and ectoparasites will be delivered to WIL

Issues to be Resolved

- Administrative approval and commitment of Department of Fish and Game funds

Required Products

- Annual Progress Reports will be submitted by June 30
- Final Report will be completed by December 31, 2016

Personnel Requirements and commitments from CDFG

- 3 Regional staff for 1 week per year, capture activities will take place over 3 years
- No WIL staff time will be required for capture activities
- 1 Regional staff for monthly telemetry flights (12 days per year) for 3 years
- 1 Regional staff for 2 months to complete annual summaries, analyze GPS data and complete final report

Budget Detail - per year budget detail by activity/task and broken down by:

The total project cost is estimated at $75,210. The GPS collars ($43,000) have already been purchased brining the cost to $32,210. Those costs include per diem and vehicle mileage for personnel participating in the capture, subsequent monitoring of radio collared animals and capture supplies.

Capture Personnel (3 wks @3300/wk) - $9,900
Capture Supplies (drugs and darts) - $710
Telemetry Monitoring - $21,600

References

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Appendix 1. Eastern Tehama Deer Herd Trail Monitoring Results, 1998-2011.

California Department of Fish and Game – Northern Region

Eastern Tehama Deer Herd Migration Trail Monitoring

by
Scott Hill
December 19, 2011

Summary of Methods:

- Trail counters were placed on eight deer migration trails on public land in Tehama and Plumas counties from 1998-2011.
- Trails are located primarily in transitional areas (between summer and winter ranges) to minimize multiple counts of deer.
- Trails were selected using local knowledge of deer migration.
- Trail counters provide an index of deer numbers over time; no herd composition data are estimated from the trail counters.
- Trail counters are active infrared units consisting of a transmitter and receiver (not a camera) that record events with time and date.
    - Something must "break" the beam between the transmitter and receiver to record an "event".
    - Units are placed approximately 2 feet off the ground to exclude most small mammals.
    - Transmitters and receivers are placed no more than 60 feet apart.
    - Trail counters were tested with trail cameras to determine the rate of non-deer events and false triggers.
    - Correction factors have been added to account for non-deer species that were recorded.
    - Species other than deer that may trigger cameras (e.g., bear, mountain lion) are low in number compared to deer and represent a minor proportion of the total events recorded.