Large Mammal Advisory Committee

Range Expansion, Home Range, Composition and Movement Patterns of Elk in Plumas and Sierra Counties.

Proposed Start and Completion Date: September 1, 2012-June 30, 2017

Executive Summary

Sporadic sightings of elk (*Cervus elaphus*) have been reported in Plumas and Sierra counties for the last decade. A small number of elk have been repeatedly observed every year and one photograph sent by the public depicts a cow elk with a calf, indicating reproductive activity is taking place. It is presumed the elk originated in Lassen County and are expanding their range southward into Plumas and Sierra County.

There are no estimates of the number of elk that have taken up residence in this new territory, nor any data on reproductive status, home range or habitat use by these new comers. This study will seize the opportunity to define this herd as a distinct population by studying demographic characteristics. Once this information is obtained, specific management recommendations can be developed to maintain or increase this population for use and enjoyment by the general public be it wildlife viewing or consumptive uses.

This study proposes to deploy up to six satellite collars on adult elk in Plumas County and Sierra County. At least one bull elk in each county will be collared to determine differential home range and habitat preferences.

Statement of Need

Elk arriving into Plumas and Sierra Counties has generated a lot of public interest. There is a lack of basic information regarding herd size, movements, reproductive status or habitat use of these individuals. Currently, public land management agencies have not recognized a need to accommodate these elk in forest or range management activities. The first step in determining if a viable and sustainable elk population can flourish here is to identify current conditions, potential for expansion and existing limiting factors.

Further, interaction between incoming elk and other species may create conflict. Elk and cattle generally coexist peacefully (Nelson 1982) but bull elk in the rut can act aggressively towards cattle. Mule deer and elk have similar habitat requirements with elk having a broader food habits (Mackie, 1981). Early investigations into elk movements into this area will help develop management goals for both species and plan for potential conflicts between elk and the agricultural communities.

There are no current management plans or priorities developed for this new population as they are not recognized as a distinct population and are new to this region.

Introduction

Elk range over large landscapes. Elk often make seasonal movements in response to forage or severe weather conditions but not all elk migrate (Adams, 1982).

Migration behavior may induce elk to move to new areas if conditions on the previous range are no longer suitable due to overgrazing or other factors. Unusual circumstances, such as intense hunting pressure or unusually severe snow levels may provoke elk to establish in new territory (Adams, 1982).

Habitat preferences of elk are varied. Elk choose a wide range of cover types and plant communities (McConnell and Smith 1970). Special habitat requirements for calving areas and wallows need to be evaluated if this emerging elk population will be viable over the long term.

In order to properly manage any ungulate population, reliable information regarding population, sex and age compositions, forage conditions on seasonal ranges, habitat preferences and behavioral patterns are essential.

Objectives

- Determine herd composition; herd size, home range, movement patterns and habitat preferences for elk within Plumas and Sierra Counties

- Identify limiting factors that may inhibit population expansion

- Develop management plan for these elk that will identify specific recommendations that will benefit this herd

Methods

Study Area

In Plumas County, elk have been observed between Antelope Lake and Beckwourth Peak (Fig. 1). Consistent detections have occurred around Lake Davis and McReynolds Valley. In Sierra County, bull elk have been observed annually on private lands near Loyalton and near Haskell Peak. Cow elk have been observed at Babbit Peak.

Habitats range from wet meadows, coniferous forests, bitterbrush/sagebrush communities, juniper woodland and agriculture.

Sampling Design

Elk will be captured via free range darting according to CDFG Department policy on the use of pharmaceuticals in Wildlife. A detailed capture plan will be developed when funding is obtained. Blood will be collected and submitted to the WIL. Observational information on condition, parasite presence, reproductive status, age, weight estimation and morphometric measurements will be recorded.

We will place four satellite transmitters on adult elk in Plumas County and deploy two collars in Sierra County. At least one bull elk in each county will be fitted with an expandable satellite collar to determine seasonal movements, particularly during the rut. Final distribution of collars will depend upon opportunity.

Locations will be collected every six hours to maximize battery life and extend duration of the study. The number of locations can be increased post deployment during the rut to define movement patterns by adult males. Battery life will last up to five years with three locations per day and about 1.6 years at 12 locations per day. We anticipate the collars will last for approximately 48 months at the four locations per day rate.

Collars will be programmed to drop off prior to the end of battery life at approximately 48 months and will be retrieved.

Home Range and Movement

A geographic information systems (GIS) based modeling approach will be employed to evaluate home range and important habitat features such as calving areas, movement corridors and seasonal ranges. Google Earth (Google, Inc. v. 6.0) will be used to depict spatially explicit radio telemetry data.

Heuristic smoothing procedures or non-parametric maximum likelihood techniques will be utilized to estimate home range (Garton, E.O. 2007).

Mortality

Satellite collars will emit a mortality signal when the animal has not moved within a six hour period. This will allow quick response to locate the animal and determine a cause of death. Every effort will be made to investigate mortalities within 24 hours of receiving a mortality signal. For predator identification, an area search of 100 meter radius will be conducted around the dead animal (White et al. 2010).

Cause of mortality will be classified as predation, natural, human-caused (vehicle collision, etc) and "other" for calculations of mortality rates (Ballard et al., 2000). If possible, a necropsy and tissue samples will be collected to determine disease factors.

Herd Composition

Satellite collars will relay locations of collared elk via internet data download. Elk will be located on the ground three times per year to obtain visual herd composition information. Ground confirmation of the number of cows, calves and bulls will occur in the spring, summer and fall months.

Habitat Selection

Male and female elk have displayed differential habitat selection (Wallace and Krausman 1998). Elk locations will be over laid onto vegetation cover maps. Elk habitat models will be used to predict elk occurrence prior to capture activity. The habitats used by elk within the study area will be compared to existing elk habitat models.

Digitally available aerial photographs and Google earth will be used to confirm habitat classifications of observed elk locations. Habitats will also be classified when visual observations of elk are made.

Age Determination (Optional)

In order to determine age class of the captured elk that have expanded into Plumas and Sierra Counties, an incisor will be extracted from each individual. The teeth will be sent to Matson's Laboratory for more precise aging estimates.

- Equipment

Equipment needed to carry out these tasks includes:

Six satellite transmitters
Receiver/antenna
Chemical immobilizing equipment (dart guns, drugs, darts, syringes, etc)
Capture gear consisting of eye covers, hobbles, prophylactics, darts etc.
Ear tags
Necropsy tools

Airtime and web access will also be necessary to obtain location data and receive mortality signals via email.

Study Duration
The study will begin in the fall of 2012. Elk will be more vulnerable to detect during rutting activity. Elk will be monitored for at least 4 years (or as long as battery life lasts in the collars). The final report will be submitted no later than June 30, 2017.

- Data management and anticipated databases
  A geographic information systems (GIS) based modeling approach will be employed to evaluate home range and important habitat features such as calving areas and migration or movement corridors. The webserver depicts location data onto Google Earth (Google, Inc ver. 5.0), thereby depicting spatially explicit telemetry data.

  Data will be maintained on Excel spreadsheets that include unique identifiers (collar frequency and ear tag numbers); date of captures; date of mortalities and coordinates for each location.
  - Summary of elk captured with associated data (condition, age, parasites, reproductive status etc)

Products (and estimated dates of completion)
Annual progress reports that summarize data will be submitted on September 30 of 2013, 2014 and 2015.
The final report which will include data summaries, statistical results, maps depicting elk locations, movement patterns, habitat and home ranges. The final report will also contain a management plan that contains specific management recommendations to maintain a viable elk population in Plumas/Sierra Counties.

Collaborators

Project lead is Terri Weist of the North Central Region. Additional NCR unit biologists will participate in the initial capture activity. The elk coordinator, Joe Hobbs will participate if desired.
Subsequent elk monitoring will be done by the project leader and volunteers from the local RMEF chapter.
Other collaborators include the Plumas and Sierra County Fish and Game Commissions
USFS biologists for the Plumas and Tahoe National Forests.

Program Planning
No program meetings will be required as only one person is conducting the study.

Issues to be Resolved
- Administrative approval
  Service contracts for the airtime and monthly service fees may be problematic

- Funding commitments outside of CDFG
  Both the Sierra and Plumas County Fish and Game commissions have voted to dedicate $5,000 each of which have dedicated towards the study for a total of $10,000.
- Agency or public scoping meetings: NONE

Required Products

- Annual Progress Reports _ Expected Dates: 9/30/2013; 9/30/2014 and 9/30/2015
- Final Report –Expected Date : No later than June 30, 2017
- Data delivery date: No later than June 30, 2017

Personnel Requirements and commitments from CDFG

Regional staff consists of the project leader and additional regional personnel as needed for the initial capture effort. Once all animals are captured and collared, monitoring, report writing and other duties will be conducted by project leader.

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

Equipment	
Satellite Collars (N=6)	$15,000.00
less $10,000 from Sierra and Plumas County Fish and Game Commissions	(-10,000)
Total DFG costs for Satellite Collars	$5,000.00
Receiver	$1,900.00
antenna	$120.00
drop off mechanisms	$1,800.00
monthly service fee (48 months)	$8,640.00
location fee (@ 4/day)	$1,500.00
Lab fees	
(drugs/prophylactics etc)	$650.00
Capture costs	
(darts, charges, kits)	$500.00
Miscellaneous (bait/panel traps)	$600.00
Travel (for other than unit biologist)	$1,000.00
Personnel	
One Associate WB	$0.00
O&E for AWB	$500.00
Teeth aging at Matson's Lab**	$150.00
TOTAL COSTS	$22,360.00

References

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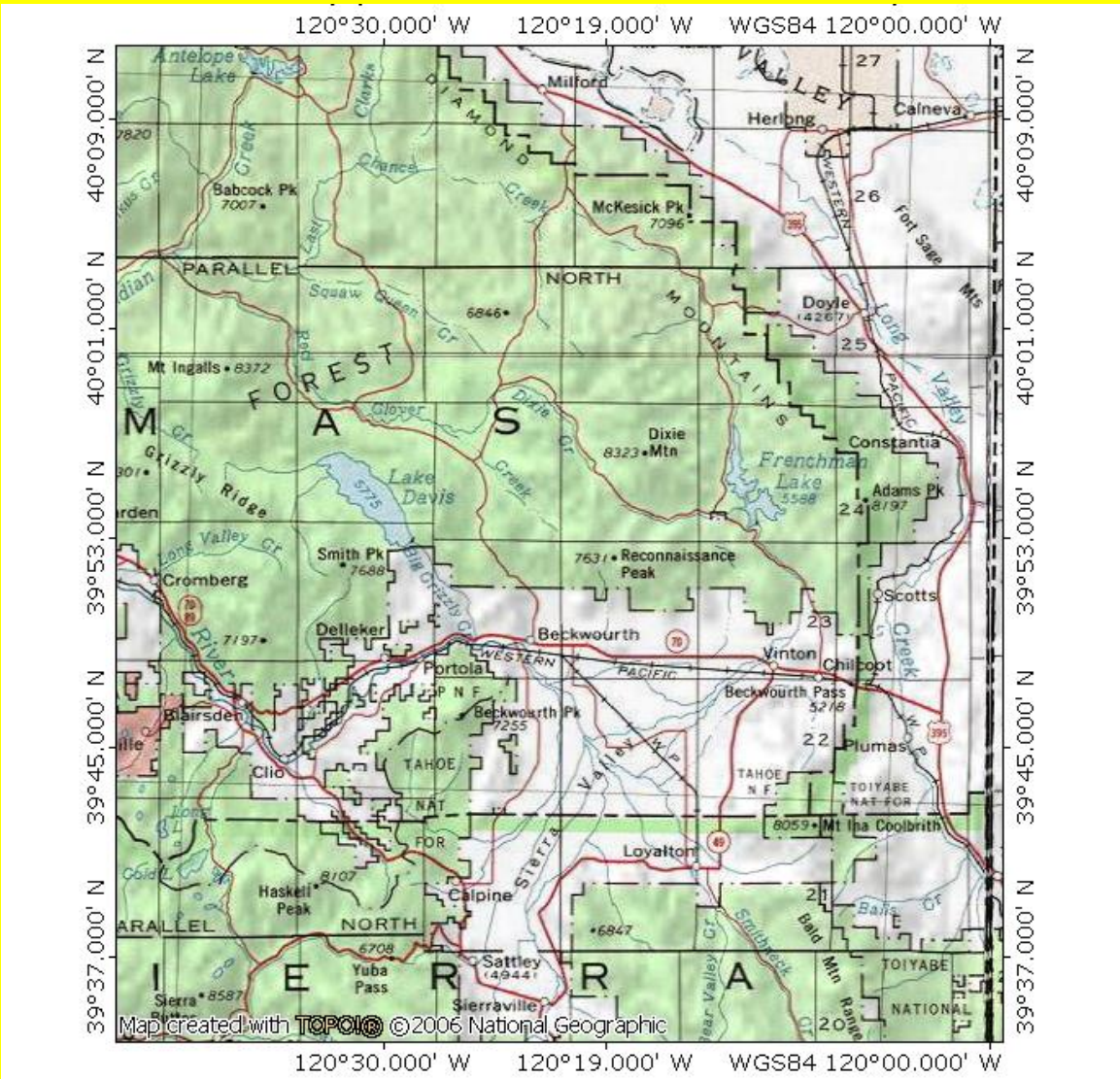

Figure 1. Plumas-Sierra County elk expansion study proposed for 2012-2017.