The effects of livestock grazing and large scale renewable energy developments on tule elk in eastern San Luis Obispo and Kern Counties

Proposed Start and Completion Date: February 1, 2015 through June 30, 2020

Executive Summary

Over the past four years, there have been significant changes in land use patterns in and around the Carrizo Plain San Luis Obispo County) which currently has an estimated population of 500 tule elk. Land use changes include construction of almost 7,000 acres of solar plants and the conversion of another 6,000 acres of dryland barley to mitigation lands to be managed for endangered species. In addition, approximately 25% of the elk herd range which was previously ungrazed by livestock, will now be grazed as Conservation Reserve Program (CRP) contracts are cancelled on private lands. Prior studies of tule elk in this area indicated that elk selected grasslands which had not been grazed by livestock for at least three years so land use changes at this scale are potentially significant. The Department now owns ~60,000 acres and holds conservation easements on an additional 15,000 acres in the Carrizo region.

The proposed project will be to capture and place GPS collars on up to 20 elk from the three separate subherds in the study area to determine habitat use patterns in light of the recent landscape level changes in the study area. The collars will remain on the elk for 4 years or until a mortality occurs. Once established for this study, habitat use patterns will be compared to prior data obtained during the 2005-2010 elk study to determine if there are significant changes in use patterns. The information and analyses obtained during this study will be important for determining the new carrying capacity of the study area and directly influence land management practices on California Department of Fish and Wildlife (CDFW) and other adjacent conservation lands in the area. These data will also be used to determine harvest levels for the La Panza tule elk hunt as well as the Private Lands Management Program (PLM) lands in the area.

Statement of Need

The Department now owns ~60,000 acres and holds conservation easements on an additional 15,000 acres in the Carrizo region. In addition, 3 PLMs totaling ~53,000 acres are included in the study area. The elk in this area are actively hunted through both the La Panza public hunt zone as well as the aforementioned PLM's.

Given the size of the elk herd, the substantial changes in land uses, importance of the area towards long term conservation of tule elk, hunting opportunities, and the ability of CDFW to effect on the ground management, a study of this nature will be especially pertinent.

The Department is seeking information on elk responses to changes in their environment. The Department has previous GPS collar data for the project area that has had landscape level changes since the original collar data was collected. These include the construction of large scale solar arrays, conversion of agriculture lands (heavily utilized by elk) into grasslands, and re-initiation of livestock grazing on previous ungrazed lands (Conservation Reserve Program). It is important to understand and identify how elk respond to these changes. The Department will evaluate home ranges, distribution, habitat use, and population levels. These types of information are important for direct management of the La Panza herd as well as provide a high quality data

set for directing tule elk management actions throughout the remainder of their range. All of this information will address a number of issues identified in both the elk management plan as well as the plan for the La Panza elk management unit (EMU). Specifically, this study will address the following objectives identified in the statewide and EMU elk plans; herd viability, population thresholds, habitat, recreation, depredation, population monitoring, reintroduction, and connectivity.

Introduction

Tule elk were reintroduced to the study area in the 1980's. Supplemental releases have occurred over the intervening 35 plus years since this is one of the only locations in the state with enough protected land to support large, free roaming herds of tule elk. These herds have been monitored annually through aerial surveys and these data have shown increasing population trends over much of the study area. In addition to herd composition surveys, radio telemetry collars were deployed on elk soon after their initial release to determine where the elk established their herds. A follow up telemetry study was conducted with GPS collars from 2005-2010 to determine habitat use patterns and home range sizes. Preliminary data derived from this latter study indicated that; tule elk avoided areas grazed by livestock, cow elk did not move between subherds, and cow elk very rarely, if ever, crossed paved roads. Bull elk did move between subherds but only two mature bulls were collared during the duration of the prior study. Initial habitat analyses were conducted on very coarse vegetation maps (GAPVEG). However, over the past three years, the Vegetation Classification and Mapping Program (VegCAMP) has been creating an accurate, fine scale GIS map of the entire range used by tule elk in the study area. The final map will be completed at the end of 2014. Once this is completed, habitat use patterns will be reanalyzed using the superior vegetation layer. This will allow us to develop the baseline habitat use patterns which occurred prior the landscape level habitat changes described above.

The proposed project will be to capture and place GPS collars on up to 20 elk from the three separate subherds in the study area to determine habitat use patterns in light of the recent landscape level changes in the study area. The collars will remain on the elk for 4 years or until a mortality occurs. Once established for this study, habitat use patterns will be compared to prior data obtained during the 2005-2010 study to determine if there are significant changes in use patterns. The information and analyses obtained during this study will be important for determining the new carrying capacity of the study area and directly influence land management practices on CDFW and other adjacent conservation lands in the area. These data will also be used to determine harvest levels for the La Panza tule elk hunt as well as the PLM lands in the area.

Very little work has been conducted on free ranging tule elk and there is no published work on habitat use in central California. Williams et al (2004) examined the genetic variation in tule elk herds throughout the state and assessed the impacts of small herd sizes. Stafford and Hobbs presented preliminary results from the 2005 study at the TWS Western Section meeting in 2013. Final analyses of the prior data and associated publications will occur after the vegetation mapping project is completed at the end of 2014.

Objectives

The objectives of the study are to;

1. Determine if the re-initiation of livestock grazing on CRP lands (ungrazed by livestock) results in significant changes in tule elk use patterns.
2. Determine if and to what extent tule elk utilize the converted agricultural lands which will be managed for endangered species preferring low structured grasslands.
3. Determine the new habitat use patterns for the tule elk which have been displaced by construction of the solar plants.
4. Evaluate overall distribution, habitat use and population levels.

Methods

The study will occur in and around the Carrizo Plain in eastern San Luis Obispo and western Kern Counties (Figure 1). Based upon prior studies in the area, three subherds (American, Cal Valley, and Cedar Canyon) will be studied (Figure 2).

The American subherd occupies public lands and one large private ranch in low relief open grasslands. Most of the private ranch was under the CRP program during the prior study and therefore not grazed by livestock. The new ranch owner is no longer in CRP program and the entire ranch is now grazed by livestock. Five cow elk and 2 subadult bull elk were collared in this area during the 2005 study.

The California Valley subherd lies approximately 10 miles north of the American subherd. This area was privately owned during the prior study and large portions of the study area were dryfarmed for barley or winter wheat. Two large solar developments have been or will be installed by the time this study commences. In addition, most of the farmed lands will no longer be cultivated. The Department now owns approximately 12,000 acres in this area and holds easements on an additional 15,000 acres. All of the mitigation lands will be managed for kit foxes and other endangered species requiring low vegetative structure. Two PLMs which hunt tule elk are present within the range of this subherd. In general, this portion of the study area is now low relief annual grassland surrounding the two large solar plants. Two cow elk from this subherd were collared during the 2005 study.

The Cedar Canyon subherd is located approximately 8 miles east of the California Valley subherd. Terrain is much more rugged and vegetation is characterized by juniper woodland, annual grassland, and desert scrub. The land in this area is entirely held by private entities and there are two active PLM's. Data was only obtained for a single cow elk from this subherd during the prior 2005 study.

Up to 20 tule elk will be captured and collared via a helicopter netgunning operation. At least 6 elk (3 bulls, 3 cows) will be collared in each of the three separate subherds. The radio collars to be used will include GPS units which record two locations per day and are intended to last 4 years. The collars will then transmit the data to the Department on a daily basis.

Objective 1: Impact of livestock grazing. Determine if the re-initiation of livestock grazing on CRP lands (ungrazed by livestock) results in significant changes in tule elk use patterns. After data collection is completed, the Department will use the program MAXENT or a similar modelling program. The Department will analyze livestock grazing history and current livestock grazing activities and compare them with data from the 2005 study.

Objective 2: Agricultural land conversion. Determine if and to what extent tule elk utilize the converted agricultural lands which will be managed for endangered species preferring low structured grasslands. After data collection is completed, the Department will use the program MAXENT or a similar modelling program. The Department will analyze areas of agriculture lands previously utilized by elk but now converted to low structured grasslands. The Department will compare the new data with the data from the 2005 study.

Objective 3: Impact of solar arrays on tule elk distribution and land use. Determine habitat use patterns for tule elk which have been displaced by construction of the solar plants. After data collection is completed, the Department will use the program MAXENT or a similar modelling program. The Department will compare previous home ranges and habitat use prior to the construction of solar arrays to post solar array construction.

Objective 4: Evaluate overall distribution, habitat use and potential population levels. After data collection is completed, we will use program MAXENT or a similar modelling program to determine the best model explaining tule elk habitat use patterns. Variables to be included in this analysis include vegetation type

(based on VegCAMP dataset), terrain ruggedness, distance to water (when available), livestock grazing history, and current livestock grazing activities. A similar analysis will be conducted on data from the 2005 study after the vegetation data becomes available. We will then compare the results from the 2005 study with those from the 2015 study to determine if there are differences in home range sizes, elk movement between subherds, and habitat use patterns before and after the landscape changes described above.

Ultimately, all of this information will be used to determine the carrying capacity for tule elk in the study area. This information will directly affect management strategies (CDFW owns ~60,000 acres and holds conservation easements on another 15,000 acres), will be used to determine if new elk hunting opportunities are available/feasible, and will be used to help determine harvest rates on the PLM lands.

The study will last up to 5 years, depending upon the battery life of the radio collars. A preliminary schedule is as follows;

2015 – Capture and collar up to 20 tule elk; monitor collared elk; develop database for locational data derived from new collars; enter locational data into database; analyze data from 2005 study utilizing new vegetation data

2016 – Monitor collared elk; enter locational data into database; write up final report/publication summarizing results from 2005 study

2017 – Monitor collared elk; enter locational data into database

2018 - Monitor collared elk; remove collars as necessary; enter locational data into database;

2019 – Analyze data from 2015 study

2020 – Complete final report; prepare publications

Twenty GPS radio collars will be needed. Regional personnel currently have all of the supplies necessary for conducting telemetry. A contract helicopter capture team will be needed to do the initial capture.

The elk location database will be stored at the Central Region GIS lab, the elk program computer, and the regional biologist's computer. The entire database of elk locations will be provided to WADAB at the end of the study.

Products (and estimated dates of completion)

Progress reports will be provided at the end of each calendar year.
A final report/publication for this study will be submitted at the end of CY 2020

The elk location database will be stored at the Central Region GIS lab, the elk program computer, and the regional biologist computer. The entire database will be provided to WADAB at the end of the study.

Potential publications include;

Habitat use and home range sizes of tule elk in central California
Responses of tule elk to large scale solar developments
Responses of tule elk to livestock grazing

Collaborators

Project leads: Joe Hobbs, Elk Program; Bob Stafford, Central Region

- WIL will be the lead on helicopter captures
- Charlotte Peters, Central Region GIS coordinator, will be the primary repository of the database
- Scott Butterfield, Phd. with TNC will provide expertise on habitat use modelling and statistical analyses

Program Planning

- Annual Meetings revisiting project progress

Other Resources requested from CDFW

- VegCAMP vegetation data set

Issues to be Resolved

- Administrative approval
- Helicopter contract and capture plan

Required Products

- Quarterly Progress Reports
- Annual Progress Reports – end of each calendar year
- Final Report – 12/31/2020
- Potential Publications – 12/31/2021
- Data delivery date – 12/31/2017

Personnel Requirements and commitments from CDFW

2 regional staff (1 environmental scientist, 1 scientific aid) - ES will average 10% of their time for the duration of the study on project planning, report writing, and occasional fixed wing telemetry flights as needed.

WIL personnel may be utilized during capture operations for animal health and welfare. One Wildlife Veterinarian and one program employee for approximately three days during capture operations. Additional time may be utilized in preparation of the capture.

Budget Detail -

Carrizo Tule Elk - LMAC

Item	**(14/15)**	**(15/16)**	**(16/17)**	**(17/18)**	**(18/19)**	**(19/20)**	**Total**
Internal Staff Time							
1. Sci Aide Time	2000	1,500	1,500	1,500	3,000	1,500	9,000
2. Regional Bio/Env Sci/	5,000	3,000	3,000	3,000	3,000	5,000	22,000
3 HQ. Biologist (other funding)*	3%	3%	3%	3%	3%	3%	
4. WIL (2) staff with per diem	5,000						5,000
Operating							
Helicopter capture	30,000						30,000
GPS Collars (x20)	60,000						60,000
Capture Supplies	3,000						3,000
Misc. equipment/batteries	2,000						2,000
Totals	**65,000**	**4,500**	**4,500**	**4,500**	**6,000**	**6,500**	**131,000**
Funding Sources							
75% PR Grant 25% LMAC							

Rocky Mountain Elk Foundation†	GPS collars (x10)			30,000

*Other funding source

† Potential additional funding

References

Stafford, R. and J. Hobbs. 2013. Habitat use and home range estimates for tule elk in eastern San Luis Obispo County. Oral presentation at the annual meeting of the Western Section of the Wildlife Society, January 31, 2013. Sacramento, CA.

Williams C., B. Lundrigan and O. Rhodes, Jr.. 2004. Microsatellite DNA variation in tule elk. Journal of Wildlife Management. 68(1):109-119.

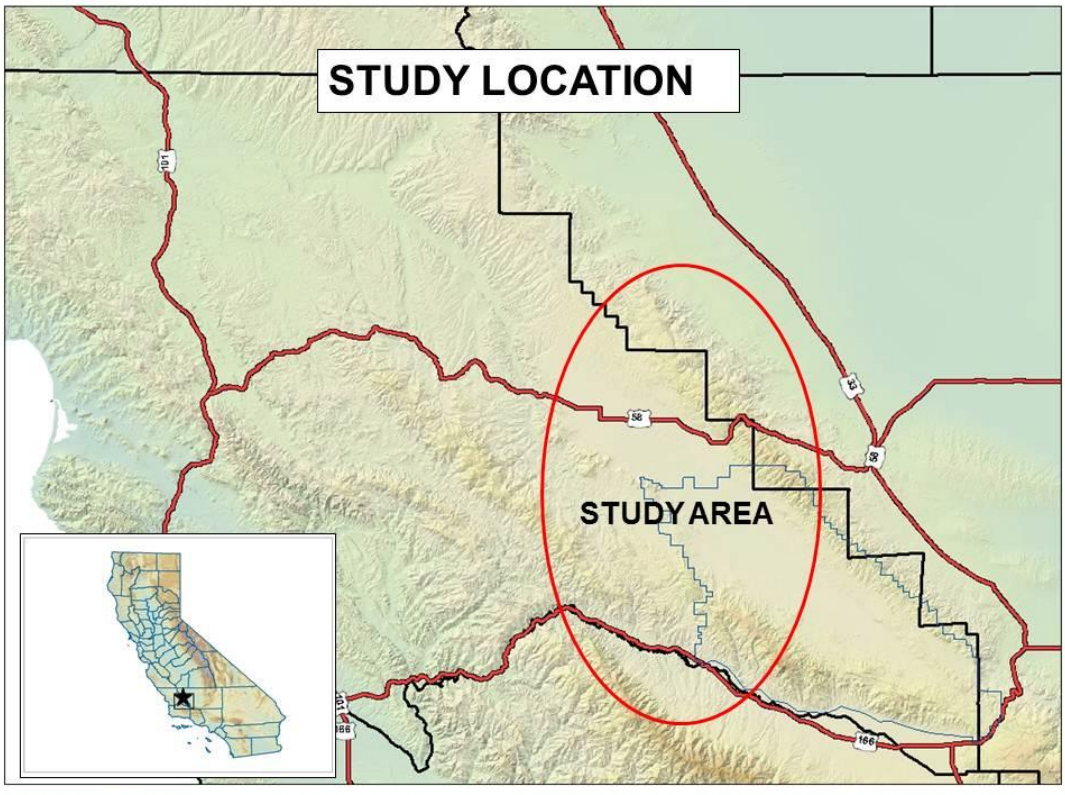

Figure 1. Regional location of study area.

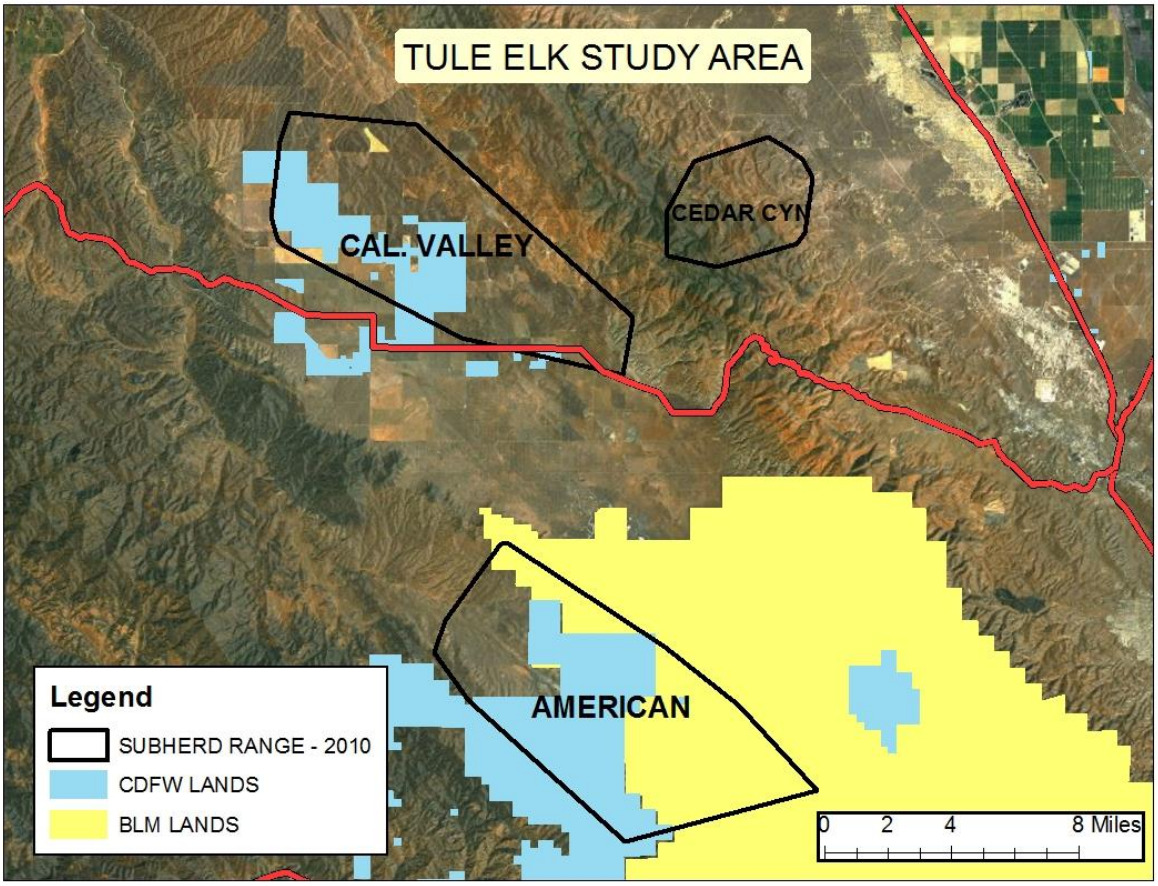

Figure 2. Location of subherds in the study area.