

GEOHERMAL EXPANSION PROJECT

MAMMOTH LAKES, CALIFORNIA

DEER TRACK-COUNT SURVEY RESULTS

MACTEC PROJECT NO. 4306080009

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1.0 Introduction

The purpose of this report is to summarize the movement of the Round Valley mule deer (*Odocoileus hemionus*) herd through the area of the Casa Diablo 4 Geothermal Expansion Project. The area is considered a herd summer range and migration corridor. The California Department of Fish and Game (CDFG) deer surveys and other authorities indicate that a portion of the Round Valley deer herd migrate through the proposed Project area in late April through the third week of May, depending on snow conditions.

There have been several deer surveys/studies performed in the Project area over the years, including track counts, pellet counts, radio collar, and other methods. The most recent deer study (1997-2000) estimates the Round Valley herd at 2,200 to 2,300 individuals (Quad Knof 2004). Associate Biologist Mr. Tim Taylor of the CDFG recommended that deer track-count surveys be conducted in the area of the Casa Diablo C4 Geothermal Project. The track-count methodology is described in Section 3.0 below. Data collected during May 2011 track-count surveys was used to summarize the results described in this report.

2.0 Setting

2.1 Location/Project Area

The Project is located on the Old Mammoth, 7.5' USGS Quad (1994) in portions of Sections 25, and 36 of T3S, R27E and Sections 30, 31, and 32 of T3S, R28E, Mount Diablo Baseline & Meridian (MDB&M), east and west of the intersection of U.S. Highway 395 (U.S. 395) and State Route 203 in Mono County, California (Figure 1). The western portion of the project is located east of Mammoth Lakes, California at Shady Rest Park. Elevation ranges from 2237 (7339 feet) to 2376 meters (7795 feet) above mean sea level (amsl). The majority of the Project area is open space with well pads and pipelines located in selected areas.

2.2 Weather Conditions

The winter snow fall of 2010-2011 stayed well into spring with snow fall continuing during the survey period. Portions of the survey routes, in the Jeffrey pine forest, were covered in snow and could not be surveyed during the early part of the survey period. The deep snow pack at higher elevations also remained through the month of May.

2.3 Biological Habitat

The habitat/vegetation in the Project area consists of sagebrush (*Artemisia tridentata*) and Jeffrey pine (*Pinus jeffreyi*) components, as described in the California Wildlife Habitat Relationships System. The most abundant is the Jeffrey pine. The dominant species found in the canopy is Jeffrey pine, forming a pure stand. Where a shrub component exists under the canopy it is dominated by sagebrush. The sagebrush community is dominated by dense sagebrush with other shrubs, perennials, and grasses.

3.0 Methodology

Consistent with CDFG recommendations, deer track-count surveys were conducted Between May 4 and June 1, 2011 by MACTEC Engineering and Consulting, Inc. (MACTEC) biologists Nancy Santos and Carter Schleicher. Survey dates included: May 4-5, 9-10, 12-13, 16-17, 18-19, 23-24, 26-27, and 31-June 1.

Roads originally selected to be surveyed were located on both sides of U.S. 395 (Figure 2 below). A reconnaissance of the roads was conducted prior to the actual surveys to determine the conditions of the roads. The roads to the east of U.S. 395 were determined to be in poor condition (ditched like a gully or overgrown with vegetation) and could not be dragged. The road to the east of Shady Rest Park was not surveyed as originally intended. Due to a long winter and cold spring all the snow had not melted off portions of the roads in the Jeffrey pine habitat. This prevented the dragging of the last section of Sawmill, Poleline, the 4WD Road off Poleline Road, and the east road adjacent to Shady Rest Park. This only lasted until the snow melted at which time all portions of the three main roads were part of the survey route. The 4WD Road adjacent to U.S. 395 was also part of the survey route.

On the evening of day one, the selected survey roads were dragged with a metal mesh-like net behind the vehicle. The drag was done as late as possible before dark, to clear the roads of existing tracks including vehicle, human, dog and deer. The morning of day two, deer track-count surveys were conducted, by vehicle and on foot, on all sections of roads dragged the previous night. It was not uncommon to find vehicle tracks and footprints (human and dog) already on top of the freshly dragged areas from the night before. Visual observations of deer were noted both during the drag and deer track-count survey periods.

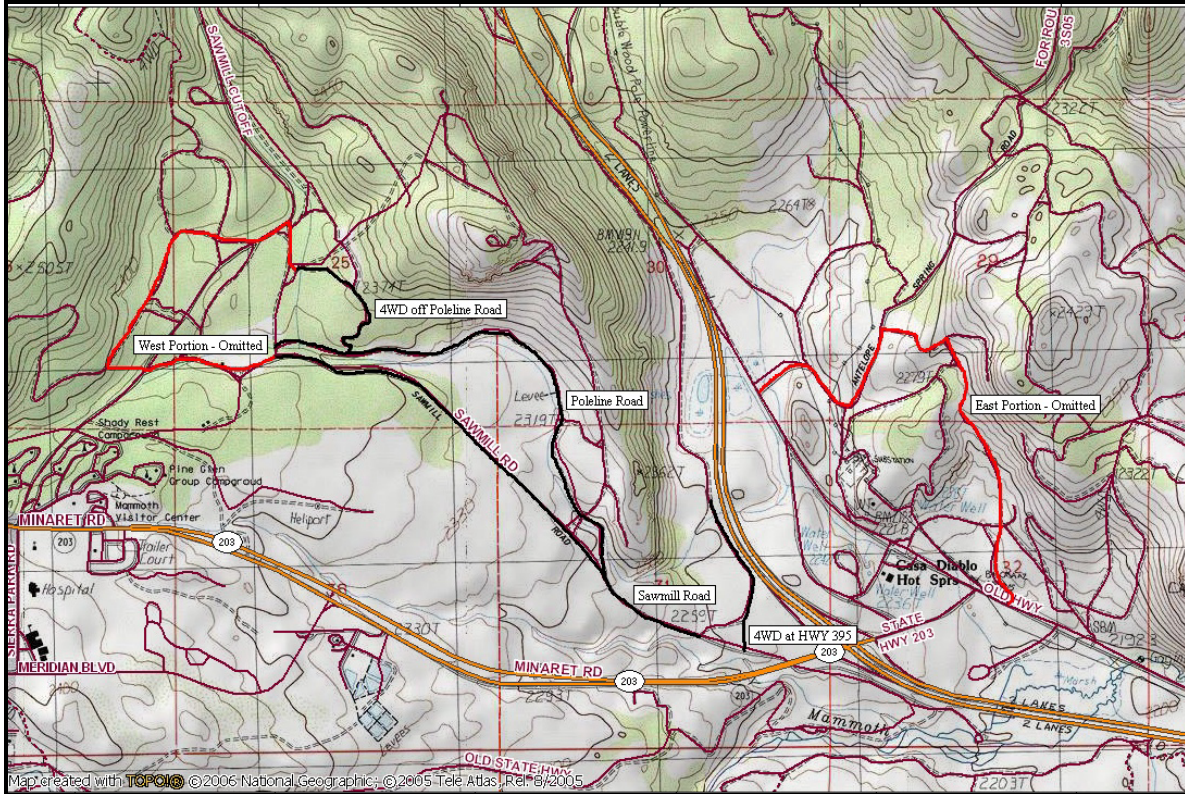


Figure 2. Original Survey Routes (red and black) and Omitted Survey Routes (red)

Deer track-count surveys included the collection of GPS data on the location of deer and deer tracks, where the deer entered the road, where the deer exited the road, and what direction the deer were coming from and going to. The data was collected and compiled into a spreadsheet (Appendix A) and used to determine the area of use by the deer, quantity of deer passing through the area, and direction of the deer.

Deer track-count survey methodologies were based on personal communications and review of previous studies, and are listed below:

- Assessment of Deer Utilization of the Mammoth Pacific, L.P., Geothermal Exploration Areas: Basalt Canyon, Upper Basalt, and Rhyolite Plateau
- Casa Diablo Geothermal Development Project: Deer Study Final Report, 1987,
- Personal communications with Tim Taylor CDFG (2011)
- Personal communications with Richard Perloff, US Forest Service, Mammoth Lakes RD (2011)

4.0 Track-Count Survey Results

Deer from the Round Valley herd are said to move through the Project area during spring migration and are assumed to move in a northerly direction towards summer range and fawning grounds. The results of the track-count surveys are summarized in Table 1 below.

Table 1. Deer Observations and Track-Counts s Detected Moving in Each Direction

Date	North	South	East	West	Total
May 4*	0	0	0	0	0
May 5	1	5	0	0	6
May 9*	0	0	0	0	0
May 10	10	2	0	0	12
May 12*	0	0	0	0	0
May 13	13	10	1	9	34
May 16*	0	0	0	0	0
May 17	2	5	5	1	13
May 18*	0	0	0	0	0
May 19	0	3	0	4	7
May 23*	0	0	0	0	0
May 24	6	5	0	2	13
May 26*	0	0	0	0	0
May 27	22	11	3	5	41
May 31*	3	4	0	0	7
June 1	10	4	3	1	17
Total	67	49	12	22	170

Note: * = drag days only where deer observations were recorded. Totals do not include deer where direction of movement was not known.

The greatest period of deer use in the Project area was the week of May 27, followed closely by the week of May 13. The total number of deer tracks observed moving through the Project area during those two time periods was 43 and 34, respectively.

A total of 170 deer or tracks were observed during the entire survey period, May 4 through June 1. This is the maximum number of deer that could have used the area. It is more likely the actual number of deer is lower due to the possibility that tracks of the same deer could have been counted more than once. At most .07 percent (170/2300) of the Round Valley herd used the Project area over a period of eight days in May 2001.

The number of deer moving (migrating or foraging) in a northerly direction (N, NW, NE, NNW, and NNE) was limited to 67 deer or .04 percent (87/2300) of the 2,300 animals that migrate out of Round Valley. The remainder of the deer, more than one-half the total, was observed

traveling to the south, east and west. Figure 3 illustrates the location of each deer visual or track-count observation for the duration of the survey period.

Sawmill Road was the most heavily deer tracked during the survey period (approximately 60 deer) and the deer tended to parallel or cross the road in the sagebrush portion of the habitat. The majority of the traffic on Sawmill Road was deer crossing the road in a direct manner or walking along the road for a time and then crossing the road to the other side.

Nearby and almost parallel to Sawmill Road is Poleline Road, which was utilized by deer but to a lesser degree than Sawmill Road. Approximately 35 deer were identified as having used Poleline Road during the survey period and the majority of them were heading northwest along the road.

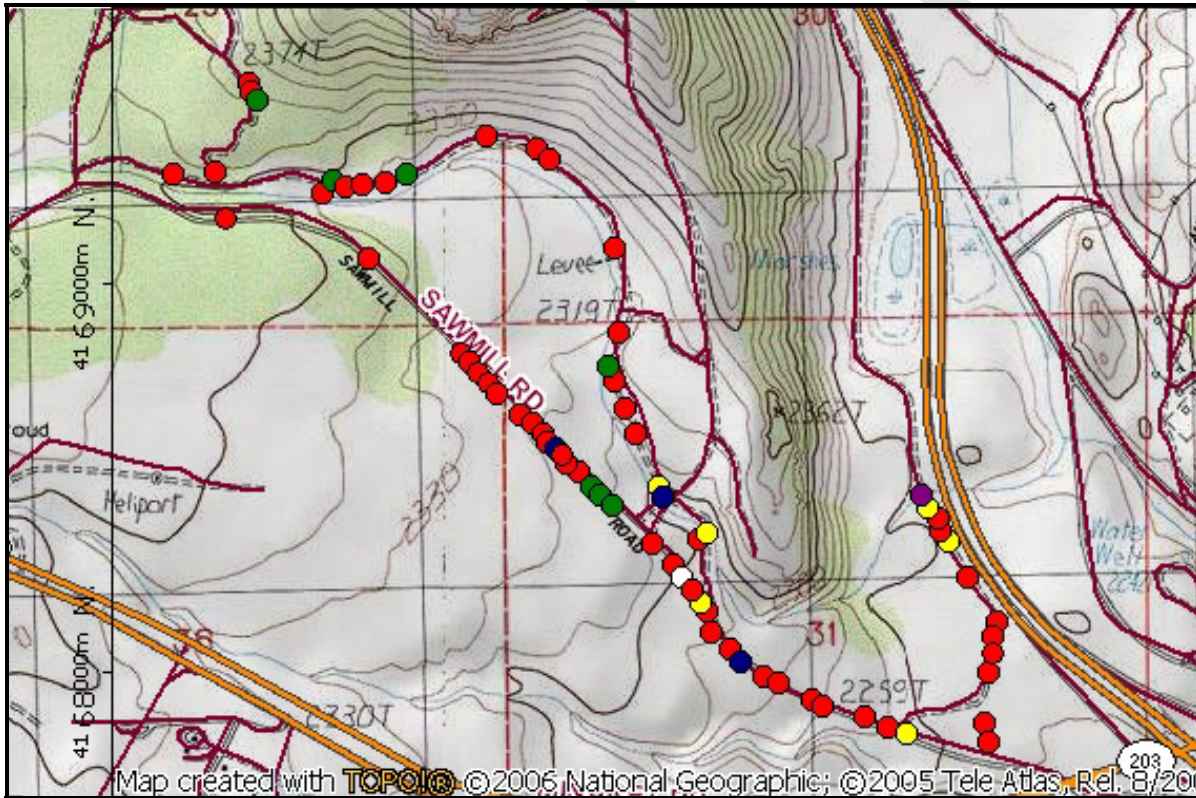


Figure 3. Deer Locations along All Survey Routes

Color key: Red = 1 deer, yellow = 2 deer, Green = 3 deer, blue = 4 deer, purple = 5 deer and white = 7 deer.

The 4WD Road off Poleline Road was traveled little by the deer. It appears the deer moved through the area to the east of the 4WD Road or turned around and went south or east again when they realized the snow pack was still too deep to traverse.

The 4WD Road off U.S. 395 was also travelled by the deer and the majority of those deer were traveling to the north or northwest, taking another road west towards Poleline and Sawmill Roads.

5.0 Conclusions and Recommendations

5.1 Conclusions

Based on literature review, data collection, and communication with Mr. Tim Taylor, the following conclusions have been made.

The Round Valley mule deer herd utilizes the habitat in the area of the Casa Diablo CD4 Geothermal Expansion Project site. The mule deer use the area for migration, foraging and cover, including both the sagebrush and Jeffrey pine habitats. It is unclear from this study, how much of the deer use was migration and how much was a resident population foraging back and forth.

Evidence shows that all roads included in the study were used by the deer during the survey period to access or leave the Project area. Sawmill Road was used most often by the deer in the open sagebrush country.

The results of the track-count data show that the deer were milling about in the Project area waiting for snow at higher elevations to clear, foraging as a resident population, or a combination of both.

5.2 Recommendations

Due to the late winter and cold spring the deer appear to have delayed their departure for the higher elevations of their summer range and fawning grounds. Therefore, should the Project be approved and operational, Mono County may wish to revisit mule deer mitigation measures and request additional data collection on deer use in the area of the Casa Diablo 4 Geothermal Expansion Project.

6.0 Summary

In summary, the foregoing survey indicates that a minimal number (.07 percent) of individuals from the Round Valley deer herd used the Project area for foraging or migration over a period of eight days in May, 2011.

7.0 References

Perloff, Richard, 2011. USDA Forest Service, Mammoth Lakes Ranger District, Inyo National Forest. Pers. Com.

Quad Knopf. 2004. Revised Environmental Impact Report, Pine Creek Communities Development Project. (SCH #1998041020) Prepared for Inyo County Board of Supervisors, Inyo County, CA.

Taylor, Tim, 2011. California Department of Fish and Wildlife, Bishop, CA. Pers. com.

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APPENDIX A

Deer Track-Count Survey Results

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