Lockheed Martin Corporation

2009 Annual Monitoring Report for Incidental Take Permit (TE 110582-0) and Low-Effect Habitat Conservation Plan for the Federally-Endangered Stephens' Kangaroo Rat (SKR) Beaumont Sites 1 (Potrero Creek) and 2 (Laborde Canyon) Riverside County, California

January 2010

Prepared for:

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February 1, 2010

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Subject: Submittal of the *2009 Annual Monitoring Report for the Incidental Take Permit (TE110582-0) and Low-Effect Habitat Conservation Plan for the Federally-Endangered Stephens' Kangaroo Rat on Beaumont Potrero Creek and Beaumont Laborde Canyon Properties, Riverside County, California*

Dear Mr. Pavelka:

Enclosed is the 2009 Annual Monitoring Report for the Incidental Take Permit (ITP) TE110582-0 issued to Lockheed Martin Corporation (LMC) for Potrero Creek (Site 1) and Laborde Canyon (Site 2) located in the City of Beaumont, Riverside County, California. The ITP and associated Low-Effect Habitat Conservation Plan (LE HCP) were completed under Section 10(a)(1)(B) of the federal Endangered Species Act. This Annual Report meets the requirements of Section 3.4 of the LE HCP.

The ITP was issued on October 14, 2005 and the Consistency Determination was issued on November 18, 2005. This report documents activities conducted under the permit between January 1, 2009 and December 31, 2009. Since the duration of the permit is five (5) years from the date of issuance, the permit is valid until October 14, 2010.

As described in the report, there was a single take of a Stephen's Kangaroo Rat, but no violations of the permit occurred during the reporting period. Immediate actions were taken to correct the circumstances that resulted in this take in order to prevent additional take of SKR.

Additional mapping studies in 2009 allowed for a cumulative amount of mapping data sufficient for statistical analysis to be completed. This preliminary analysis is included in this and preliminary results appear to show no statistical differences in areas of LMC activities (primary plots) versus control plots. This analysis will be continued in subsequent mapping studies for the remainder of the permit period.

If you have any questions regarding this report, please contact me at 408.756.9595 or denise.kato@lmco.com.

Sincerely,

Denise Kato

Denise Kato
Remediation Analyst Senior Staff

Enclosure

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APPENDICES

1.0 INTRODUCTION

This 2009 Annual Monitoring Report corresponds to Incidental Take Permit (ITP) TE110582-0 issued to Lockheed Martin Corporation (LMC) for activities carried out at two project sites: Potrero Creek (Site 1) located in the City of Beaumont, Riverside County, California and Laborde Canyon (Site 2) located in an unincorporated area of Riverside County, California. These activities are covered under an associated Low-Effect Habitat Conservation Plan (LE HCP) completed under Section 10(a)(1)(B) of the federal Endangered Species Act. This report meets the requirements of Section 3.4 of the LE HCP. The ITP was issued on October 14, 2005 and the Consistency Determination was issued on November 18, 2005. This report includes activities conducted under these permits between January 1, 2009 and December 31, 2009. Since the duration of the permit is five (5) years from the date of issuance, the permit is valid until October 14, 2010.

LMC is conducting hazardous waste investigations on Sites 1 and 2 (Areas of Operations shown on Figures 1 and 2), known to be occupied by the federally endangered Stephens' kangaroo rat (*Dipodomys stephensi*; SKR). These actions are in response to a consent order (No. 88/89-034) issued by the California Department of Toxic Substances Control (DTSC) to characterize the presence of contamination in groundwater and soils at Sites 1 and 2. LMC sought an ITP for SKR for direct take (by injury or death) and take of habitat that may occur in the course of contaminant investigations. These activities are currently avoiding and minimizing the take of this species assisted by the implementation of the minimization and mitigation terms of the LE HCP.

The LE HCP specifies that Annual Monitoring Reports will be submitted to USFWS and CDFG each year for the duration of the permit. This 2009 Annual Monitoring Report documents the following:

- Biological Monitoring of investigation activities conducted during 2009, and other activities and events affecting this permit in 2009,
- LE HCP compliance during the reporting period, including
    - Incidental take,
    - Permanent and Temporary effects to SKR habitat,
    - Beneficial and Offsetting effects
- SKR impact assessment program
    - Summary of impact assessment program
    - Results for 2009 activities
    - Discussion of these results
- Compliance with the avoidance, minimization, and mitigation activities covered by this five-year permit.

X:\GIS\Lockheed 22288-0401\Site 1 Op Areas.mxd

Soil Conservation Service Berm
Revetments for Avanti Motor Storage
Old Rocket Motor Casings
Storage Revetments
Backstop Berm
Impact Target Area

Area A
Eastern Aerojet Range (Avanti)

Gun Placement
Buildings
Concrete Target Wall
Instrumentation Building
Tank

Area I
Western Aerojet Range

Area B
Rocket Motor Production Area

Area F
LPC Test Services Area

Conservation Easement
Chemical Storage Quonset
Tank
Fuel Slurry Station
Mix Station Control
300 Gallon Propellant Mix Station
Blue Motor Burn Pit
Motor Washout Area

Temporary Segment Storage T-4
25 MEV Betatron Building
Boneyard
Temporary Segment Storage T-3
Test Motors Conditioning Ovens
Storage Magazine

Area C
Burn Pit Area

Airstrip
Observation Station
Test Area for Incediary Bomb

Test Instrument Bunker
E.B.E.S. Test Facilities
Test Personnel Bunker
Large Motor Test Bay
Small Motor Horizontal Test Bay
Conditioning Chambers
Small Motor Vertical Test Bay
Concrete Pad Washout Area
Well
Beryllium Waste Storage
Igniter Magazine
Maintenance and Storage
Observation Station
Heliport
Landing Pad
30mm Gun
Wash
Tower - Mobile Target
Tower
Upper Extent of Impact Area
Observation Station

Area H
Sanitary Landfill
Sanitary Landfill

Area G
Helicopter Weapons Test Area

Canyon 4
Canyon 3
Canyon 2
Canyon 1

Area E
Radioactive Waste Disposal Site

Pit Orientation
Final Burn Area
Existing Mounds
Burn Pit Bunker
Ballistic Tunnel
Berm
Magazine
Temporary Waste Storage
Gun Mount
Berm
Control Trailers
Storage Buildings
Terraced Projectile Landing Zone
Class A Storage
Small Test Area
Dissolved TNT (out of bombs)

Area D
LPC Ballistics Test Range

N

0 1,000 2,000 Feet

Adapted from: March 2007 aerial photograph.

LEGEND

- Beaumont Site 1 Property Boundary
- Historical Operational Area Boundary
- Conservation Easement

Notes: Beaumont Site 1 property boundary is approximate.

Beaumont Site 1

Figure 1
Historical Operational Areas, Site Features, and Conservation Easement

TETRA TECH

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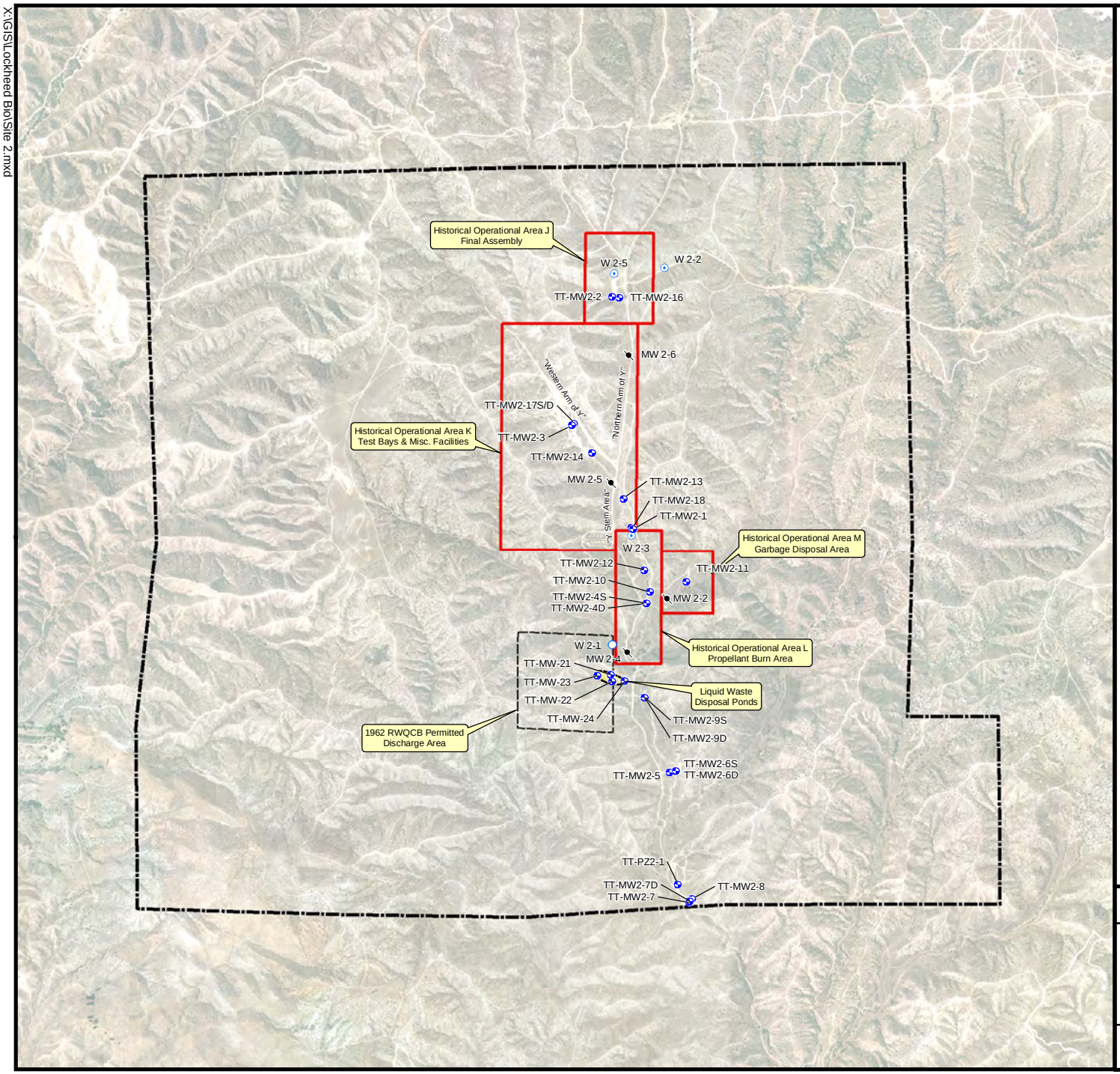

0 1,000 2,000
Feet

Adapted from: March 2007 aerial photograph.

LEGEND

- Groundwater Monitoring Well Location
- Inactive Production Well Location
- Reported Production Well Location
- Destroyed Monitoring Well Location
- Beaumont Site 2 Property Boundary
- Historical Operational Area Boundary
- RWQCB Permitted Discharge Area

Note: Beaumont Site 2 property boundary from Hillwig-Goodrow survey, May 2004.

Beaumont Site 2

Figure 2

Site Map

TETRA TECH

2.0 BIOLOGICAL MONITORING

2.1 INVESTIGATION ACTIVITIES

Between January 1, 2009 and December 31, 2009, soil and groundwater investigation activities were performed at the two Sites. Table 1 summarizes the activities monitored at Site 1, and Table 2 summarizes the activities monitored at Site 2. These tables include the investigation activity, the corresponding activity number listed in the LE HCP (page 7 and 8), the dates the activity took place, and the USFWS-approved biological monitor supervising the activity.

2.2 OTHER ACTIVITIES AND EVENTS AFFECTING THIS PERMIT IN 2009

Security guards often remained on or near idle large drilling equipment throughout the night due to a continuing threat from previous thefts and vandalism on both sites. To avoid road kills, no driving was permitted between sunset and sunrise. Other activities affecting this permit in 2009 were:

- Formal training sessions (requiring worker signatures),
- Night-time security personnel protocol (checking mileage, etc.), and
- Additional borehole backfilling protocol for drillers.

Table 1
Activities at the Potrero Site (1) During 2009

Activity	Activity # in the LE HCP	Dates	Biological Monitor
Well Installation and Development	2	1/3	Anthony Mann
		1/3-1/4	Jennifer Howard
		1/6, 2/9, 11/2-11/6, 11/9	Brad Haley
		1/6, 1/31	Anthony Mann
Abandon Wells	3	10/7	Brad Haley
Routine Maintenance	4	9/18	Alfredo Aguirre
		2/9	Brad Haley
Road Maintenance	5	10/27	Brad Haley
Mowing	10	9/29, 10/1	Brad Haley
Survey Locations/Boundaries	11	1/3-1/4	Jennifer Howard
		1/5, 1/16, 1/26, 9/29-9/30, 10/9, 10/27, 11/2-11/6, 11/9	Brad Haley
		1/7, 1/26, 9/30	Alfredo Aguirre
Subterranean UXO Surveys	12	9/30	Alfredo Aguirre
		9/29-10/2, 10/5-10/7, 10/9	Brad Haley

Table 2
Activities at Laborde Canyon (Site 2) During 2009

Activity	Activity # in the LE HCP	Dates	Biological Monitor
Well Installation and Development	2	1/2, 1/5, 1/8-1/9, 1/13, 1/15, 1/21, 2/19-1/20, 2/22-2/23, 2/25-2/27, 3/2-2/25, 2/27-2/31, 4/1, 4/10, 9/19-9/20, 9/23-9/25	Alfredo Aguirre
		1/10-1/15, 1/17, 2/17-2/19, 2/21, 2/27-2/28, 3/1, 3/9, 3/10, 3/14, 3/25, 3/26, 3/30, 9/14-9/18, 10/12-10/13, 10/15-10/16, 10/22, 11/10	Brad Haley
		2/20-2/21	Scott Taylor
		2/22	Jennifer Howard
		2/23, 2/24, 3/13, 3/17, 3/20, 3/23-3/24, 3/27	Freddie Olmos
		2/26, 3/8, 3/10-3/12, 9/18, 9/21-9/22, 9/28-9/29	Blaine Schoolfield
		2/27	Ryan Gilmore
		3/2-3/7, 4/6	Anthony Mann
Abandon Wells	3	9/25	Alfredo Aguirre
Routine Maintenance	4	1/26, 2/17, 2/19, 3/10	Brad Haley
		3/12	Blaine Schoolfield
		1/26, 3/11, 3/18, 3/25	Alfredo Aguirre
Road Maintenance	5	5/12, 5/14-5/15, 9/11	Alfredo Aguirre
		2/20, 9/11, 9/14, 11/19	Brad Haley
Survey Locations/Boundaries	11	1/6-1/8, 1/26, 3/2, 3/4, 3/9, 3/13, 3/31, 5/12, 9/11, 9/23	Alfredo Aguirre
		1/16, 1/20, 1/26, 2/10-2/11, 3/15, 3/26, 9/11, 9/15, 10/12	Brad Haley
		2/10	Blaine Schoolfield
		3/2	Anthony Mann

3.0 LE HCP COMPLIANCE DURING THE REPORTING PERIOD

3.1 INCIDENTAL TAKE

One of the objectives under the LE HCP was to avoid and minimize the potential for direct take (injury or death) of the SKR. Prior to 2009, the ITP allowed for the take of 3 individuals and exclusion trapping of 20 individuals throughout the 5-year duration of the LE HCP.

The take of a single SKR occurred on January 3, 2009. It was found at Site 1 in a collapsed (previously drilled and backfilled) hole in the landfill at approximately 0945 hours. The on biological monitor discovered the fatality and immediately checked all nearby holes for entrapped animals. He then notified the lead biologist at Tetra Tech, the lead biological monitor and Steve Montgomery (permitted SKR biologist for the project) of the fatality. The kangaroo rat was identified by Steve Montgomery as an SKR on the afternoon of January 7. The following corrective actions were taken immediately on January 3, 2009 to prevent further incidents at the Sites:

- LMC shut down work at both sites pending review and modification of work practices.
- Tetra Tech employees immediately searched all boreholes at both sites for signs of cave-ins following this discovery of the collapsed hole.
- Any depressed and sunken holes found were immediately backfilled with additional bentonite.
- Signs posting speed limits and prohibiting night driving were installed at both Sites.

The SKR take that occurred on January 3, 2009 was the second direct take that occurred during the prior 3 years [see the *2008 Annual Monitoring Report for the Incidental Take Permit (TE 110582-0) and Low Effect Habitat Conservation Plan*]. On January 9, 2009, LMC and USFWS met to discuss LMC's concern that it may exceed the existing take allocation of 3 SKR during the remaining 21 months of the existing ITP. Recent surveys indicated the SKR population had approximately tripled in density at Site 1 since the ITP was issued, largely due to the opening up of additional habitat areas by the 2007 Esperanza Fire that burned approximately 80 percent of Site 1. In light of the SKR population density increase at Site 1, USFWS re-analyzed the anticipated impacts of this project and concluded that the anticipated take of individual SKR resulting from groundwater and soil remediation activities, as described in the LE HCP, is expected to increase proportional to the increase in population density. On March 6, 2009 the USFWS increased the permit take limit to 9 individuals. The number of SKR that may be taken during exclusion trapping remains unchanged at 20 individuals.

Table 3 shows the current maximum limits of incidental take for the project and the cumulative take since the beginning of the permit.

Table 3
Cumulative Take

Type of Impact	LE HCP Incidental Take - Maximum Allowed	Take During 2005	Take During 2006	Take During 2007	Take During 2008	Take During 2009	Take Remaining
Direct Take	9	0	0	0	1	1	7
Exclusion Trapping	20	0	0	1	0	0	19

3.2 PERMANENT AND TEMPORARY EFFECTS TO SKR HABITAT

One objective under the LE HCP is to leave untouched approximately 99.90 percent of the SKR habitat within plan area by limiting effects to less than 3 total acres of the property. The ITP allows for 0.267 acres of permanent effects and 2.40 acres of temporary effects over the 5-year duration of the LE HCP.

3.2.1 Permanent Adverse Effects

Permanent effects in 2009 resulted from the installation of wells and associated concrete monuments and guard posts. These effects were calculated as shown in Table 4.

Table 4
2009 Permanent Adverse Effects Calculation

Facility	#	Diameter of each facility (in)	Surface area of each facility (sq ft)	Area of Impacts (sq ft)	Area of Impacts (acres)
Well casings	12	12	0.79	9.48	0.00021763
Monuments	12	24	4.00	48.00	0.00110193
Guard posts	24	4	0.09	2.16	0.00004959
Total 2009 Permanent Effects					**0.00136915**

This 0.00136915 acres of permanent effects represents approximately 0.51 percent of the total area of permanent effects allowed under the LE HCP (0.267 acres). No other activities were conducted under the LE HCP during 2009 that resulted in permanent effects.

3.2.2 Temporary Adverse Impacts

Temporary adverse effects occurred in 2009 in areas where temporary soil compaction occurred from heavy equipment activity. These activities were test pits, road repair, and grading. These effects were calculated as shown in Table 5.

Table 5
2009 Temporary Adverse Effects Calculation

Activity	Load spreading measures used?	Area of Impacts (sq ft)	Area of Impacts (acres)
Well Abandonment	Yes	8	0.00018366
Landfill Test Pits	Yes	154	0.00353393
Total 2009 Temporary Effects			**0.00371758**

This 0.0371758 acres of temporary effects represents approximately 1.55 percent of the total area of incidental take allowed under the LE HCP (2.40 acres). No other activities were conducted under the LE HCP during the 2009 that created temporary effects.

3.2.3 Cumulative Adverse Effects

Permanent and temporary adverse effects are considered cumulative over the 5-year duration of the LE HCP. The LE HCP was approved and activities were initiated in 2005. Table 6 presents a summary of the cumulative adverse effects under the LE HCP and the effects from 2009.

Table 6
Cumulative Effects

Type of Adverse Effect	LE HCP Allowable Incidental Take (acres)	Impacts During 2005 (acres)	Impacts During 2006 (acres)	Impacts During 2007 (acres)	Impacts During 2008 (acres)	Impacts During 2009 (acres)	Remaining Allowable Acreage
Permanent	0.267	0.000052	0.00034	0.00284	0.002756	0.001369	0.26
Temporary	2.40	0.291619	0.00691	0.11157	0.037603	0.003718	1.95

3.2.4 Beneficial and Offsetting Effects

Beneficial and offsetting effects are those effects of LMC activities which provide either only beneficial effects to the SKR and its habitat at the sites, or have offsetting effects where the effects may be temporarily adverse to one aspect of SKR habitat, but beneficial to another.

Beneficial Effects

Because the SKR prefers areas of sparse grassland habitats with high percentages of bare soil, beneficial effects at the sites in 2009 resulted from the careful driving of light vehicles in dense grassland areas of the sites. This provided potential movement corridors for SKR in areas where they may not otherwise have had access. Mowing of vegetation along road edges and in other areas of dense grasslands at the sites also resulted in beneficial effects.

Offsetting Effects

Offsetting effects resulted in areas where heavier drill rigs were brought in for well construction in 2009. For a more detailed description of offsetting effects refer to the 2007 SKR Permit Report, which has a full description of those effects. A brief summary of those effects follows. Heavier drill rigs, water trucks and increased disturbance of the drilling areas and access pathways would have initially negatively affect SKR burrow excavation because of soil compaction. However, this impact appears to be transient, and SKR thrive in disturbed areas because such open habitat conditions allow this species to easily move through its habitat areas during its daily activity cycles. In contrast, foraging by SKR is rare in dense grassland patches because movement through grasslands is severely impeded by the obstructions presented by dense grass, and the sounds created by kangaroo rats moving through this vegetation type may attract aerial predators (e.g., owls, coyotes, bobcats). Therefore, vegetation disturbance by machinery can increase SKR activity in affected areas in excess of what was present before these areas were disturbed. Also, it has been observed that over time, the natural forces of weathering decompacts soils initially compacted by heavy machinery, and SKR are then able to excavate burrows more easily in such decompacted soils.

3.3 SKR HABITAT IMPACT ASSESSMENT PROGRAM

3.3.1 Summary of Habitat Impact Assessment Program

The LE HCP required that the effect on the SKR from activities at Potrero and Laborde be assessed by mapping occupied habitat before and after investigation activities, thereby measuring changes in SKR

density. However, because of the relative coarseness of the habitat mapping methodologies and because drilling activities encompass such small areas, there was concern that large-scale habitat mapping would not effectively detect any changes in SKR presence due specifically to investigation activities. As a result, a more detailed statistically confident method of measuring the effect of characterization activities on SKR was developed for this project in 2006, using simultaneous burrow counts at standardized activity site plots and at associated (paired) control plots (Appendix B) as the metric for assessing impacts. Burrow counts recorded at both the standardized activity site plots and their paired control plots at standardized time intervals following site disturbances are used to determine the effect different characterization activities have on the SKR use of the respective sites. With a goal of maximizing the effectiveness of this approach to assessing impacts, recommendations to correct minor problems that have been encountered while using the methodology over time are included in Appendix B.

This methodology uses counts of active kangaroo rat burrows as an index of SKR abundance/activity at each sample location. Burrow counts occur approximately 1 week prior to each activity, and then at approximately 1-week, 6-week and 6-month intervals following the activity completion date. All burrow counts in 2009 were conducted by Brad Haley (ECORP Consulting, Inc.). Mr. Haley was trained in this method by Stephen J. Montgomery – a biologist permitted by the U.S. Fish and Wildlife Service (TE745541-10) and California Department of Fish and Game (CDFG) (MOU) to trap/handle SKR, who also developed the mapping methodology. The assessment was divided into time periods based on the year when the investigation activity occurred, although many of the pre- or post-activity surveys ultimately were conducted in two different calendar years. In this annual report, results of mapping surveys that began in 2008 were completed in 2009, and the burrow count surveys for activities conducted in 2009 were nearly completed in 2009. Surveys that were not fully completed in 2009 will be completed in 2010 and fully reported in a subsequent annual reports.

3.3.2 Survey Results for 2009 Activities

Mapping Strategies

Mapping strategy #3 (25 percent minimum sampling of work areas when numerous small excavations will be clustered in a particular area) was primarily used for drilling activities that began between August and December 2008, January and February 2009, and October and November 2009. Within each Operational Area the boreholes were mostly clustered together, making this strategy more appropriate than one using a hole-by-hole approach. Using this method (1 plot per 4 boreholes) also made the end of activity day easier to determine, since most times the clustered drilling areas were not drilled within the same week.

Excavation in the landfill in July 2008 required that a new mapping strategy be developed (see new mapping strategy #5 in Appendix B). Multiple areas throughout the landfill were identified as locations for characterizing the underground extent of the trash that began in July 2008 and continued until January 2009. Because these sites were spread throughout the landfill, all of the burrows within the landfill were mapped.

Results - Mapping

Pre-activity, 1-week, 6-week, and 6-month post-activity surveys were completed for 29 locations (four with the 6-month survey planned for 2010) at Site 1 (Figure 3), and 22 locations (one with the 6-month

survey planned for 2010) at Site 2 (Figure 11). The following pages contain more detailed figures for mapping locations in the Operational Areas for both sites. Figures 4-10 and 12-14 each contain a graph that presents the data collected during each of the burrow surveys on the primary and control monitoring plots, conducted from August 2008 to December 2009.

Following each of those figures is a table of the results of each burrow count (Tables 7-17). Areas on tables left blank are post-activity surveys yet to be completed (e.g., 6-month post-activity surveys scheduled in 2010). The text located at the bottom of each table suggests trends in the data for that specific location and further explains what factors may have contributed to the data collected at the associated plots.

Results - Analysis

Table 7 below is a summary of increases and decreases at plots and analysis of these data. Plots listed as Data Plots contain only those plots that had one or more burrows in the primary plot during the pre-activity and/or 6-month survey. Primary plots are those where the investigation activity took place.

Table 7
Burrow Count Changes

Burrow Count	All Plots		Data Plots		Site 1 Data Plots		Site 2 Data Plots	
	Primary	Control	Primary	Control	Primary	Control	Primary	Control
more	13	14	12	12	8	9	4	3
less	12	17	12	8	8	7	4	1
unchanged	20	14	3	7	3	3		4
Total	45	45	27	27	19	19	8	8
% more or unchanged	73%	62%	56%	70%	58%	63%	50%	88%
% less	27%	38%	44%	30%	42%	37%	50%	13%

73 percent (33 of 45 plots) of the plots showed either a positive change or no change at all in SKR activity within the primary plots among both sites. 62 percent (28 of 45 plots) of the control plots showed either a positive change or no change at all at both sites. Overall, more control plots showed a decrease in active burrows (11 percent, or 5 plots) than did the primary plots.

Eighteen (out of the 45) primary plots showed no change between the pre-activity survey and the 6-month post-activity survey because there were no burrows present at either survey. These 18 plots (along with their paired control plots) were considered ineffective in the data analysis section and taken out of the data base (even when the control plot contained burrows). The data base was thereby reduced to only include those primary plots that contained one or more burrows in the pre-activity survey or no burrows at the pre-activity survey with one or more burrows at the 6-month post-activity survey (data plots).

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501500 502000 502500 503000 503500 504000 504500 505000 505500 506000 506500 507000

3749500 3749000 3748500 3748000 3747500 3747000 3746500 3746000 3745500

Area A
Eastern Aerojet Range (Avanti)

Area I
Western Aerojet Range

Area H
Sanitary Landfill

Area F
LPC Test Services Area

Area E
Radioactive Waste
Disposal Site

Area G
Helicopter Weapons Test Area

Area B
Rocket Motor Production Area

Area D
LPC Ballistics Test Range

Area C
Burn Pit Area

N

0 750 1,500
Feet

Adapted from: March 2007 aerial photograph.

LEGEND

- Primary SKR Monitoring Plot Location
- Control SKR Monitoring Plot Location
- Beaumont Site 1 Property Boundary
- Historical Operational Area Boundary
- Conservation Easement Boundary

Notes: Beaumont Site 1 property boundary is approximate.

Coordinates in UTM, Zone 11N, NAD83.

Beaumont Site 1

Figure 3

SKR Monitoring Plot Locations

TETRA TECH

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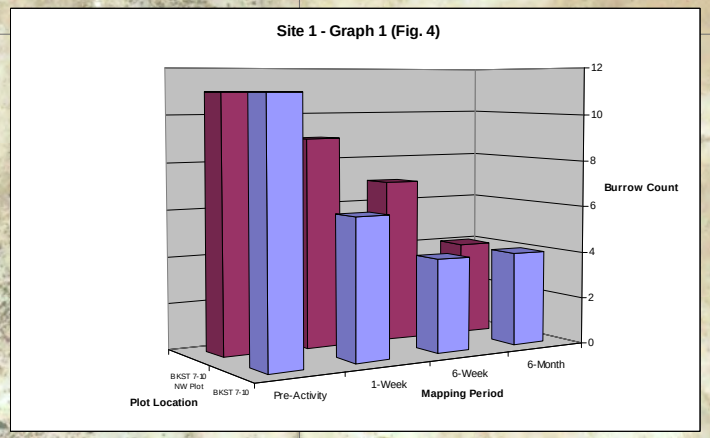

505800 506000 506200

3749800 3749600 3749400 3749200

BKST 7-10 Northwest Plot

BKST 7-10

0 150 300 Feet

Adapted from: March 2007 aerial photograph.

LEGEND

- Primary Monitoring Plot Location
- Control Monitoring Plot Location

Note: Coordinates in UTM, Zone 11N, NAD83, meters

Beaumont Site 1

Figure 4
Area A
Eastern Aerojet Range
SKR Monitoring Plot Locations

TETRA TECH

Table 8
2008 and 2009 Pre-and Post-Activity SKR Schedule and Sign
Site 1, Area A

Drilling Borehole Name(s)	# Active Burrows				Survey Dates			
	Pre-Activity	1 Week	6 Week	6 Month	Pre-Activity	1 Week	6 Week	6 Month
BKST 7-10 Primary	11	6	4	4	9/8/2008	9/17/2008	10/22/2008	3/10/2009
BKST 7-10 NW Control	11	9	7	4				

Of the data plots, 15 out of 27 (56 percent) either contained more or equal numbers of burrows in the 6-month survey. Twelve plots out of 27 contained more burrows overall. Four additional control plots had unchanged numbers of burrows between the pre-activity or 6-month post-activity survey. Twelve primary plots (44 percent) had decreased burrow numbers, four more than at the control plots.

Results - Statistics

In addition to the above analysis, statistical models using various multivariate analytic methods were used to determine whether any statistically significant results were found from the data collected in 2008 and 2009. The full results of this analysis are found in Appendix C and summarized here. Analysis was conducted for several variables such as seasonality of burrow counts over the period of all mapping surveys.

The various statistical tests illustrated the lack of differentiation in burrow counts over time between primary (disturbed) and control (undisturbed) plots. These results indicate that disturbances at the various investigation activity sites had little to no effect on SKR activity over time when compared to nearby paired control sites. One interesting result was the finding that there were consistently higher burrow counts at control sites versus primary sites.

The number of active burrows decreased for both the primary plot and the control plot, each from 11 at the pre-activity survey down to four at the 6-month post-activity survey. All burrows located within the primary plot were covered or avoided during drilling activities and did not appear to be affected by the equipment after drilling equipment left the plot.

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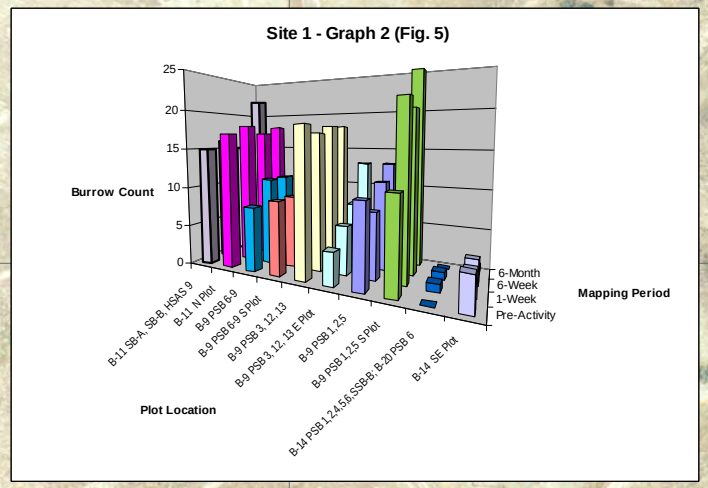

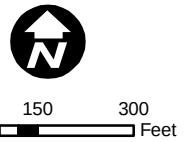

Adapted from: March 2007 aerial photograph.

LEGEND

- Primary Monitoring Plot Location
- Control Monitoring Plot Location
- Historical Operational Area Boundary

Note: Coordinates in UTM, Zone 11N, NAD83, meters

Beaumont Site 1

Figure 5
Area B
Rocket Motor Production Area
SKR Monitoring Plot Locations

TETRA TECH

Table 9
2008 and 2009 Pre-and Post-Activity SKR Burrows
Site 1, Area B

Drilling Borehole Name(s)	# Active Burrows				Survey Dates			
	Pre-Activity	1 Week	6 Week	6 Month	Pre-Activity	1 Week	6 Week	6 Month
B-9 PSB 1,2,5 Primary	10	8	11	13	9/23/2008	10/1/2008	10/31/2008	3/25/2009
B-9 PSB 1,2,5 S Control	11	21	20	25				
B-9 PSB 3, 12, 13 Primary	18	17	18	18	9/22/2008	10/1/2008	11/3/2008	3/25/2009
B-9 PSB 3, 12, 13 E Control	4	6	8	13				
B-9 PSB 6-9 Primary	8	11	11	6	9/23/2008	10/1/2008	11/3/2008	3/25/2009
B-9 PSB 6-9 S Control	9	9	9	11				
B-11 SB-A, SB-B, HSAS 9 Primary	15	16	15	22	12/12/2008	12/21/2008	1/26/2009	6/8/2009
B-11 SB-A, SB-B, HSAS 9 N Control	17	18	17	18				
B-14 PSB 1,2,4,5,6,SSB-B; B-20 PSB 6 Primary	0	1	1	0	11/12/2008	1/16/2009	2/20/2009	6/26/2009
B-14 PSB 1,2,4,5,6,SSB-B; B-20 PSB 6 SE Control	4	3	3	1				

Overall, four of the five primary plots either increased in burrow counts or stayed the same. Four of the five control plots showed an increase in active burrows. B-9 PSB 6-9 primary plot decreased by two active burrows between the pre-activity and the 6-month post-activity surveys, but the 1-week and 6-week post-activity surveys revealed an increase by three burrows. While that plot increased in active burrows, then later decreased at the 6-month post-activity survey, the others decreased slightly within the 1-week survey, then later increased either during the 6-week or 6-month post-activity surveys, or both.

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506200 506400 506600 506800 507000 507200 507400

3746800 3746600 3746400 3746200 3746000 3745800

MW-21

B-11 SB-A, SB-B, HSAS 9 North Plot

Area B
Rocket Motor
Production Area

B-11 SB-A, SB-B, HSAS 9

MW-21 S Plot

C-22 PSB 1-3 Northeast Plot

MW-24 North Plot

C-22 PSB 1-3

MW-24

C-22 PSB 4-6 East Plot

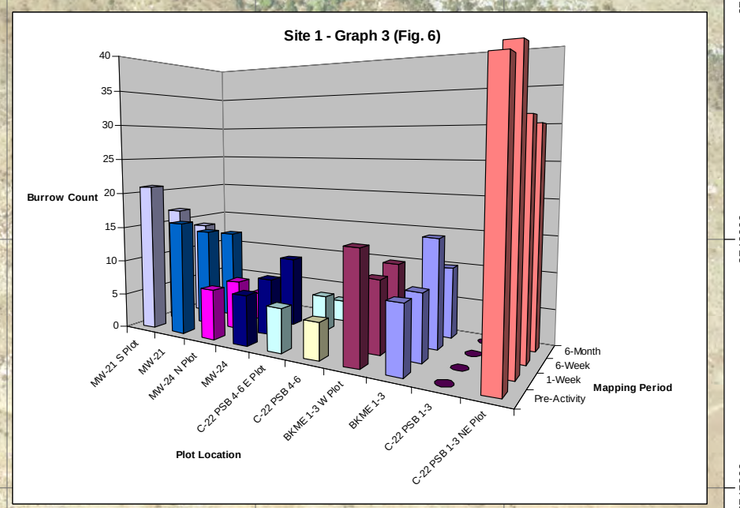
C-22 PSB 4-6

Area C
Burn Pit Area

Area D
LPC Ballistics Test Range

BKME 1-3

BKME 1-3 West Plot



N

0 200 400
Feet

Adapted from: March 2007 aerial photograph.

LEGEND

- Primary Monitoring Plot Location
- Control Monitoring Plot Location
- Beaumont Site 1 Property Boundary
- Historical Operational Area Boundary
- Conservation Easement Boundary

Notes: Beaumont Site 1 property boundary is approximate.

Coordinates in UTM, Zone 11N, NAD83.

Beaumont Site 1

Figure 6
Area C
Burn Pit Area
SKR Monitoring Plot Locations

TETRA TECH

Table 10
2008 and 2009 Pre-and Post-Activity SKR Burrows,
Site 1, Area C

Drilling Borehole Name(s)	# Active Burrows				Survey Dates			
	Pre-Activity	1 Week	6 Week	6 Month	Pre-Activity	1 Week	6 Week	6 Month
BKME 1-3 Primary	9	9	15	10	9/10/2008	9/17/2008	10/23/2008	3/10/2009
BKME 1-3 W Control	15	10	11	2				
C-22 PSB 1-3 Primary	0	0	0	0	11/3/2009	11/14/2009	12/13/2009	5/8/2009
C-22 PSB 1-3 NE Control	37	39	31	30				
C-22 PSB 4-6 Primary	5	**	4	4	9/19/2008	**	11/3/2008	3/25/2009
C-22 PSB 4-6 E Control	6	**	5	3				
MW-21 Primary	16	14	13	-	11/3/2009	11/16/2009	12/21/2009	-
MW-21 S Control	21	17	14	-				
MW-24 Primary	7	8	10	-	11/6/2009	11/16/2009	12/21/2009	-
MW-24 N Control	7	7	4	-				

Notes: **This survey was missed because of pending MEC investigation

BKME 1-3 primary plot showed an increase of one active burrow at the 6-month post-activity survey, where its associated control plot lost 13 burrows within the same time period and was not affected by any activities associated with this Incidental Take Permit. All of the other control plots had the active burrow counts declined as well, even MW-21 and -24, which will have the 6-month post-activity survey conducted in 2010.

While several active kangaroo rat burrows were within 10 feet of the C-22 1-3 primary plot, no burrows formed six months after the activities were completed within the plot. Half of the plot is within mowed, dense buckwheat scrub habitat. This plot's associated control plot gained two active burrows one week after activities were completed, then lost seven burrows six months after activities were completed. Note that between the one week and six week mapping periods, the Riverside County Multiple Species Habitat Conservation Plan (MSHCP) crews had several nights of trapping for SKR within and around the control plot. This activity may have caused burrow counts to decrease.

The C-22 4-6 plots have incomplete data because of a pending Munitions and Explosives of Concern (MEC) investigation in that area. No personnel were allowed within the area until the investigation was complete. Once the investigation was complete, the 6-week post-activity survey was conducted, which and revealed that both the primary and control plots decreased by one burrow. While the primary plot remained the same at the 6-month post-activity survey, the control plot decreased by an additional two burrows.

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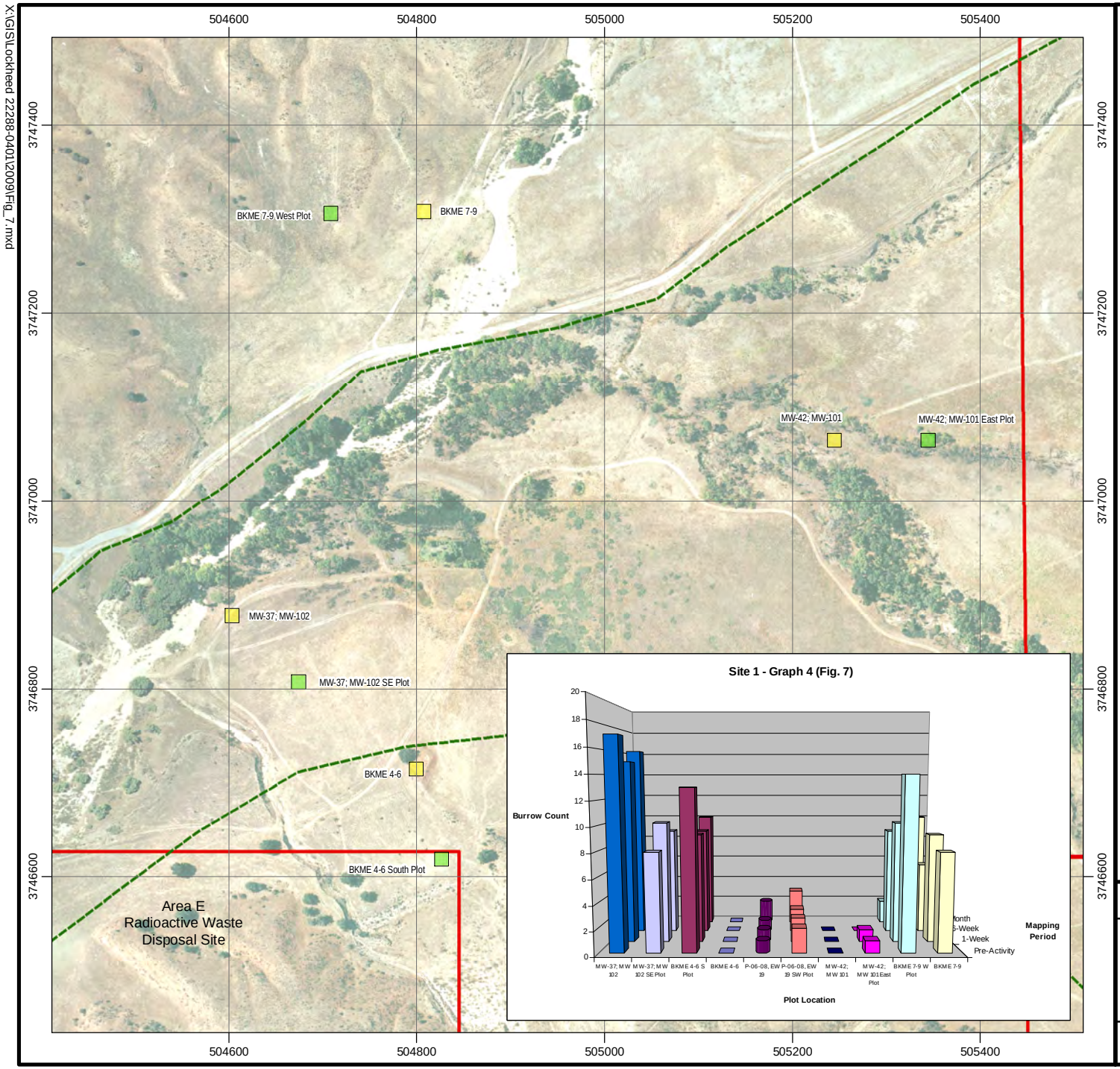

N

0 250 500 Feet

Adapted from: March 2007 aerial photograph.

LEGEND

- Primary Monitoring Plot Location
- Control Monitoring Plot Location
- Historical Operational Area Boundary
- Conservation Easement Boundary

Note: Coordinates in UTM, Zone 11N, NAD83, meters

Beaumont Site 1

Figure 7

Middle Potrero Creek SKR Monitoring Plot Locations

TETRA TECH

Table 11
2008 and 2009 Pre-and Post-Activity SKR Burrows
Site 1, Middle Potrero Creek

Drilling Borehole Name(s)	# Active Burrows				Survey Dates			
	Pre-Activity	1 Week	6 Week	6 Month	Pre-Activity	1 Week	6 Week	6 Month
BKME 4-6 Primary	0	0	0	0	9/11/2008	9/18/2008	10/27/2008	3/10/2009
BKME 4-6 S Control	13	9	9	10				
BKME 7-9 Primary	8	9	6	10	9/9/2008	9/17/2008	10/22/2008	3/6/2009
BKME 7-9 W Control	14	10	9	2				
P-06-08, EW 19 Primary	1	1	1	2	10/27/2008	12/11/2008	1/16/2009	6/8/2009
P-06-08, EW 19 SW Control	2	2	2	3				
MW-37; MW-102 Primary	17	15	16	-	10/27/2009	11/16/2009	12/21/2009	-
MW-37; MW 102 SE Control	8	10	9	-				
MW-42; MW-101 Primary	0	0	0	-	11/4/2009	11/16/2009	12/21/2009	-
MW-42; MW-101 E Control	1	1	0	-				

Of the three plots that were completed through the 6-month post-activity survey, two of the primary plots increased in active burrows while the other stayed the same. Two of the control plots had fewer burrows, with the BKME 7-9 plot decreasing by 12 burrows at the 6-month post-activity survey. This is an example of how kangaroo rat burrow density can fluctuate naturally over time, without the influence of any outside factors. For the P-06-08 primary plot, the field observations noted that two new burrows formed within 7 days of finishing drilling activities. These burrows were outside of the mapping plot, but were within the disturbance area where the drilling-related equipment was operating. Also noted were the dates that well drilling finished (11/18/08) and the date that all activities were completed with the plot (12/2/08).

The two plots that have been completed through the 6-week post-activity survey are revealing minimal changes. The 6-month post- activity survey will be completed in 2010.

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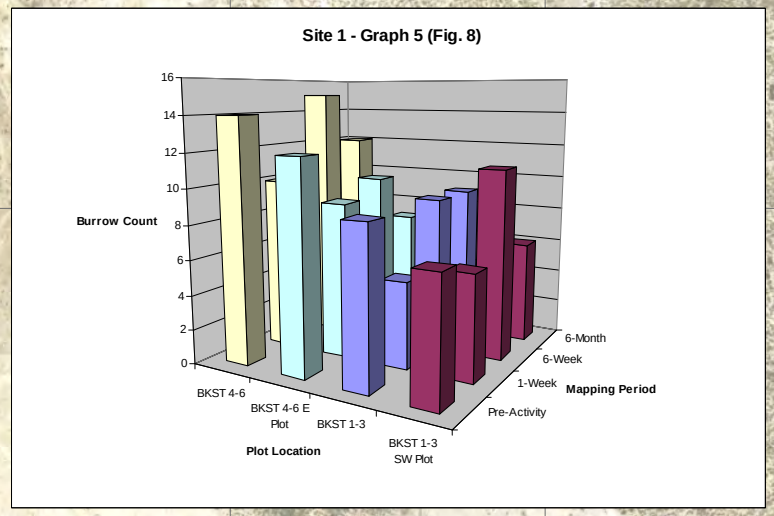

503400 503600 503800 504000

3748600 3748400 3748200 3748000

BKST 4-6

BKST 4-6 East Plot

BKST 1-3

BKST 1-3 Southwest Plot

0 200 400 Feet

Adapted from: March 2007 aerial photograph.

LEGEND

- Primary Monitoring Plot Location
- Control Monitoring Plot Location
- Beaumont Site 1 Property Boundary

Note: Coordinates in UTM, Zone 11N, NAD83, meters

Beaumont Site 1

Figure 8

Northern Property Area SKR Monitoring Plot Locations

TETRA TECH

Table 12
2008 and 2009 Pre-and Post-Activity SKR Burrows
Site 1, Northern Property Area

Drilling Borehole Name(s)	# Active Burrows				Survey Dates			
	Pre-Activity	1 Week	6 Week	6 Month	Pre-Activity	1 Week	6 Week	6 Month
BKST 1-3 Primary	9	5	9	9	9/9/2008	9/16/2008	10/22/2008	3/6/2009
BKST 1-3 SW Control	7	6	11	6				
BKST 4-6 Primary	14	10	15	12	9/9/2008	9/16/2008	10/22/2008	3/6/2009
BKST 4-6 E Control	12	9	10	7				

The primary plots for BKST 1-3 and 4-6 both lost four burrows one week after activities were completed, but the 6-week post-activity survey revealed that those plots recovered to the same level (BKST 1-3) or increased (BKST 4-6) in active burrows. After six months, however, BKST 4-6 decreased by two burrows overall. The number of burrows at the control plots also decreased.

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502200 502400 502600 502800 503000 503200 503400 503600

3746400 3746200 3746000 3745800 3745600

Area F
LPC Test Services Area

F-39 PSB 5,7,A,F,H,+1 unk

F-34 SSB 6,8,9,10

F-39 PSB 5,7,A,F,H,+1 unk Southwest Plot

F-34 SSB 6,8,9,10 Southeast Plot

PMW-83 Northwest Plot

PMW-82 North Plot

PMW-83

PMW-82

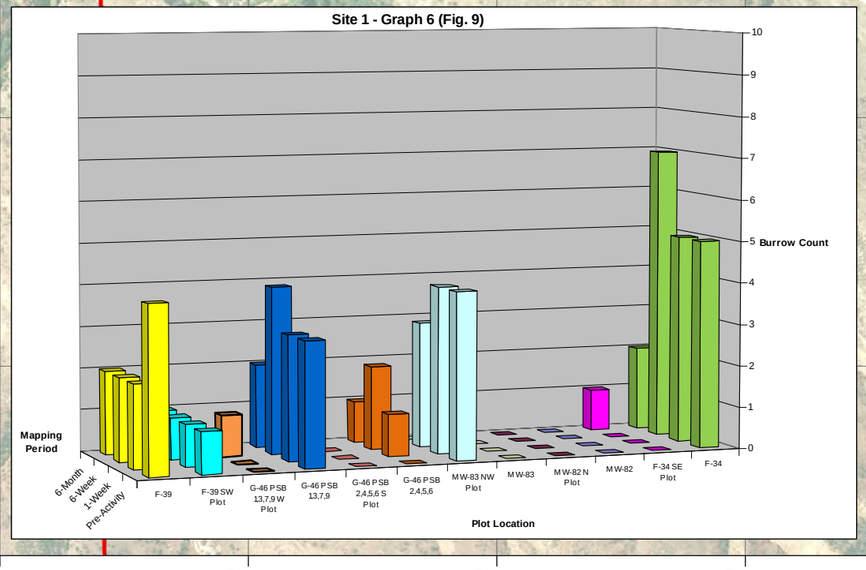
G-46 PSB 2, 4, 5, 6

G-46 PSB 1, 3, 7, 9

G-46 PSB 1, 3, 7, 9 West Plot

G-46 PSB 2, 4, 5, 6 South Plot

Area G
Helicopter Weapons Test Area



N

0 200 400 Feet

Adapted from: March 2007 aerial photograph.

LEGEND

- Primary Monitoring Plot Location
- Control Monitoring Plot Location
- Historical Operational Area Boundary
- Conservation Easement Boundary

Note: Coordinates in UTM, Zone 11N, NAD83.

Beaumont Site 1

Figure 9
LPC Test Services Area and Helicopter Weapons Test Area SKR Monitoring Plot Locations

TETRA TECH

Table 13
2008 and 2009 Pre-and Post-Activity SKR Burrows
Site 1, LPC Test Services Area and Helicopter Weapons Test Area

Drilling Borehole Names	# Active Burrows				Survey Dates			
	Pre-Activity	1 Week	6 Week	6 Month	Pre-Activity	1 Week	6 Week	6 Month
MW-82 -Primary	0	0	0	0	7/18/2008	8/2/2008	9/9/2008	1/26/2009
MW-82 N Control	0	0	0	0				
MW-83 Primary	0	0	0	0	7/18/2008	8/2/2008	9/9/2008	1/26/2009
MW-83 NW Control	4	4	3	3				
F-34 SSB 6,8,9,10 Primary	5	5	7	2	10/21/2008	12/20/2008	1/26/2009	6/8/2009
F-34 SSB 6,8,9,10 SE Control	0	0	0	1				
F-39 SSB 5,7,A,F,H,+1 unk Primary	4	2	2	2	10/6/2008	12/13/2008	1/16/2009	6/8/2009
F-39 SSB 5,7,A,F,H,+1 unk SW Control	1	1	1	1				
G-46 PSB 1,3,7,9 Primary	3	3	4	2	9/16/2008	10/1/2008	10/30/2008	3/25/2009
G-46 PSB 1,3,7,9 W Control	0	0	1	0				
G-46 PSB 2,4,5,6 Primary	0	1	2	1	9/16/2008	10/1/2008	10/30/2008	3/25/2009
G-46 PSB 2,4,5,6 S Control	0	0	0	0				

Three of the six primary plots showed no change or a slight increase in active burrows while four of the six control plots also showed no changes. Although F-34 decreased by three burrows overall, it increased by two burrows at the 6-week post-activity survey, then by the 6-month post-activity survey it had decreased by five burrows.

The primary plot for F-39 had two less active burrows during the 6-month post-activity survey than it did in the pre-activity survey. Boundaries were placed next to the burrows so that drilling-related equipment did not adversely affect them. This decrease could be attributed to a heavy rain event that occurred in this area and many burrows located along a road where water could flow when it rained.

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501200 501400 501600 501800 502000 502200

3746800 3746600 3746400 3746200

Area I
Western Aerojet Range

BKME 10-12

BKME 10-12 West Plot

Area H
Sanitary Landfill

H-49 PSB 1A, 3, 4, SSB B,F East Plot

H-49 PSB 1-4

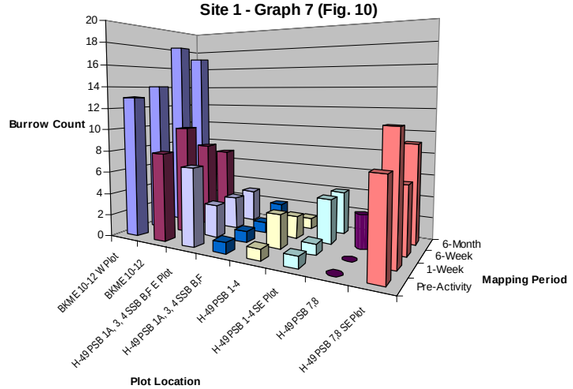
H-49 PSB 1A, 3, 4, SSB B,F

H-49 PSB 7-8

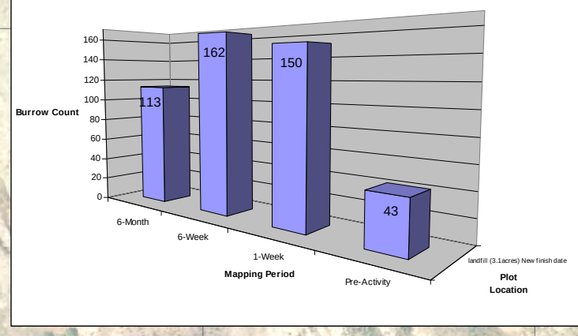
H-49 PSB 1-4 Southeast Plot

H-49 PSB 7-8 Southeast Plot

Site 1 - Graph 7 (Fig. 10)



Site 1 - Graph 8 (Fig. 10) landfill (3.1 acres)



0 150 300 Feet

Adapted from: March 2007 aerial photograph.

LEGEND

- Primary Monitoring Plot Location
- Control Monitoring Plot Location
- Former Landfill Boundary
- Historical Operational Area Boundary

Note:

Coordinates in UTM, Zone 11N, NAD83, meters

Beaumont Site 1

Figure 10
Area H
Sanitary Landfill
SKR Monitoring Plot Locations

TETRA TECH

Table 14
2008 and 2009 Pre-and Post-Activity SKR Burrows
Site 1, Area H

Drilling Borehole Names	# Active Burrows				Survey Dates			
	Pre-Activity	1 Week	6 Week	6 Month	Pre-Activity	1 Week	6 Week	6 Month
BKME 10-12 Primary	8	10	8	7	9/10/2008	9/18/2008	10/22/2008	3/6/2009
BKME 10-12 W Control	13	14	18	17				
H-49 PSB 1-4 Primary	1	3	5	1	9/8/2008	9/26/2008	10/30/2008	6/26/2009
H-49 PSB 1-4 SE Control	1	1	2	4				
H-49 PSB 7,8 Primary	0	0	3	1	9/18/2008	9/26/2008	10/30/2008	3/25/2009
H-49 PSB 7,8 SE Control	8	11	6	9				
H-49 PSB 1A, 3, 4 SSB B,F Primary	1	1	1	2	11/14/2008	1/12/2009	2/11/2009	6/26/2009
H-49 PSB 1A, 3, 4 SSB B,F E Control	7	3	3	3				

Overall, three of the four primary plots showed an increase in active burrows or remained the same, and three of the control plots showed an increase. H-49 PSB-1-4 primary plot showed an increase in four burrows during the 6-week post-activity survey, but after six months the number of burrows decreased to pre-activity levels. The BKME and H-49 PSB 1-4 control plots each increased by four and three burrows, respectfully, since the pre-activity surveys, while the H-49 PSB 1A, 3, 4 control decreased by four burrows naturally over that same time period.

Table 15
2008 and 2009 Pre-and Post-Activity SKR Burrows, Site 1, H-49 (Landfill)

Drilling Area	# Active Burrows				Survey Dates			
	Pre-Activity	1 Week	6 Week	6 Month	Pre-Activity	1 Week	6 Week	6 Month
landfill (3.1 acres) (old finish date)	43	68	76	n/a	7/11/2008	8/8/2008	8/27/2008	n/a
landfill (3.1 acres) (new finish date)	43	150	162	113	7/11/2008	1/12/2009	2/12/2009	6/26/2009

This mapping strategy (#5) was recently added to the SKR burrow mapping methodology. This strategy has no control plots associated with primary mapping plots. The number of active burrows within the landfill increased approximately 263 percent since the pre-activity survey. This was likely due to activities completed at the landfill involving multiple subsurface soil investigations that softened up the soil in multiple locations throughout the landfill, making it easier for kangaroo rats to create burrows. The subsurface soil investigations adhered to the Incidental Take Permit guidelines, and did not disturb areas that had existing burrows.

The H-49 activities listed in Table 13 occurred between the 6-week and 6-month post-activity surveys of the "old finish date". The mapping schedule for the entire landfill was adjusted ("new finish date") to incorporate the ending date of those activities. The 7/11/08 pre-activity survey burrow count was used for both the old and new finish date because the activities within the landfill were still considered one activity, despite there being a four-month gap in activity.

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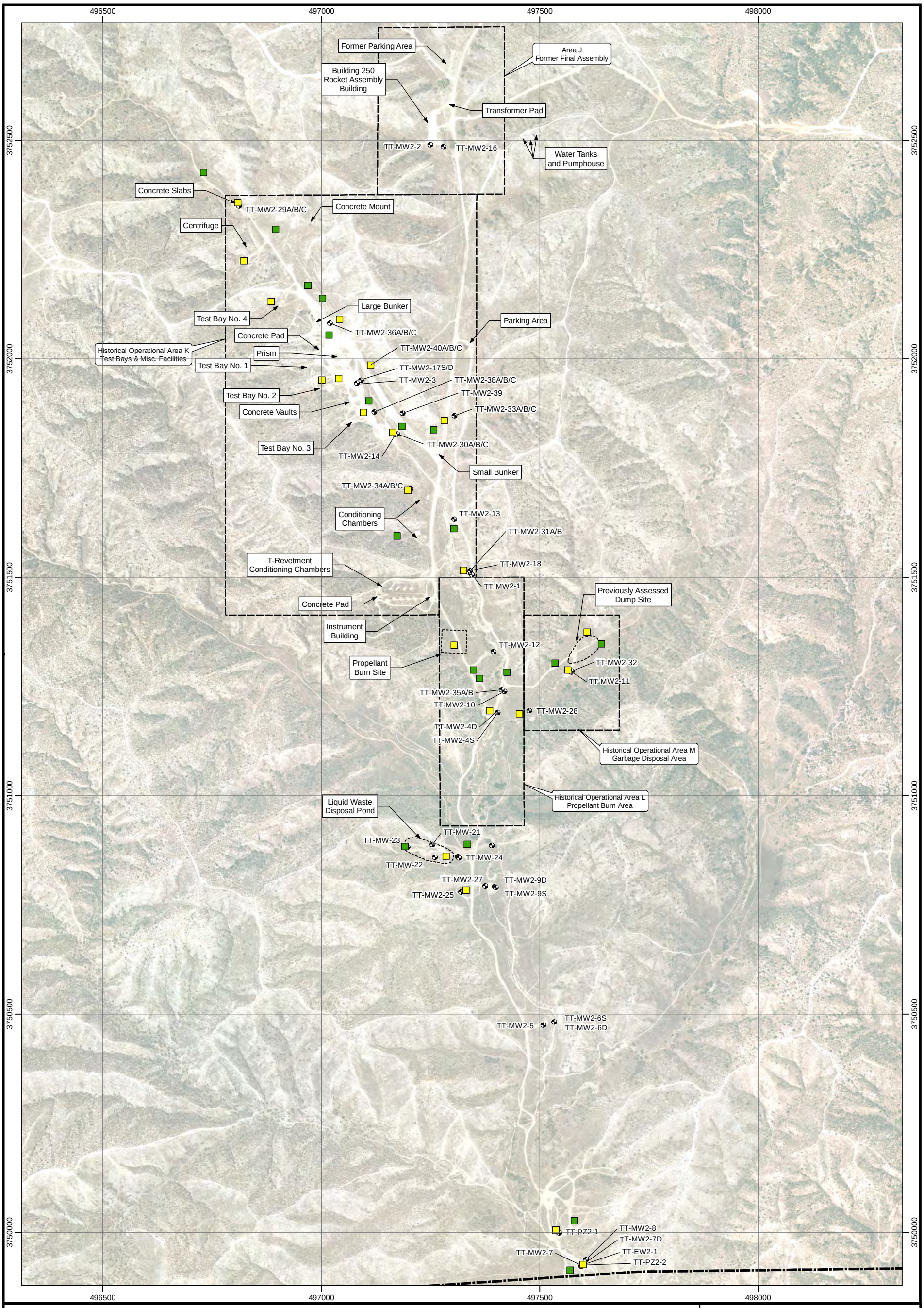

LEGEND

- Primary Monitoring Plot Location
- Control Monitoring Plot Location
- Monitoring Well Location
- Historical Operational Area Boundary
- Beaumont Site 2 Property Boundary

0 350 700 Feet

Adapted from: March 2007 aerial photograph.

Note: Beaumont Site 2 property boundary from Hillwig-Goodrow survey, May 2004.

Coordinates in UTM, Zone 11N, NAD83, meters

Beaumont Site 2

Figure 11

SKR Monitoring Plot Locations

TETRA TECH

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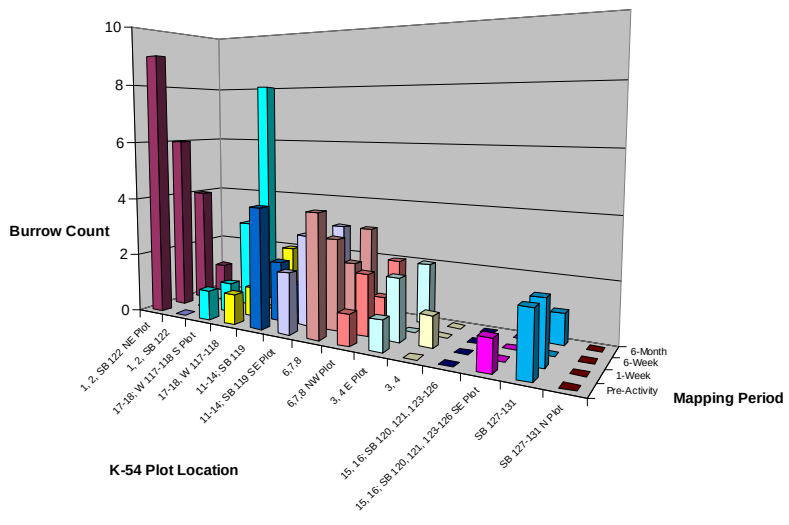
496800 497000 497200 497400

3752400 3752200 3752000 3751800 3751600 3751400

Building 250 Rocket Assembly Building
TT-MW2-2
TT-MW2-16
Water Tanks and Pumphouse
K-54 PWL-1 Northwest Plot
Concrete Slabs
K-54 PWL-1
TT-MW2-29A/B/C
Concrete Mount
K-54 PSSL 1-2, SB-122 Northeast Plot
Centrifuge
K-54 PSSL 1-2, SB-122
K-54 PSSL 6-8 Northwest Plot
K-54 PSSL 3-4 East Plot
K-54 PSSL 3-4
Large Bunker
Test Bay No. 4
K-54 PSSL 6-8
TT-MW2-36A/B/C
K-54 SB 127-131 North Plot
Parking Area
Prism
Concrete Pad
Historical Operational Area K Test Bays & Misc. Facilities
TT-MW2-40A/B/C
PSSL17-18, W 117-118, Primary
Test Bay No. 1
K-54 SB 127-131
K-54 PSSL 11-14, SB 119
TT-MW2-17S/D
TT-MW2-3
Test Bay No. 2
TT-MW2-38A/B/C
K-54 PSSL 11-14, SB 119 and PSSL 17-18, W 117-118 Southeast Plot
Concrete Vaults
TT-MW2-39
K-54 PWL-3 East Grid
TT-MW2-33A/B/C
K-54 PSSL 15-16, SB 120-121, 123-126
K-54 PWL-3
K-54 PSSL 15-16, SB 120-121, 123-126 Southeast Plot
K-54 PWL-2 East Plot
Test Bay No. 3
K-54 PWL-2
TT-MW2-14
TT-MW2-30A/B/C
Small Bunker
TT-MW2-34A/B/C
K-54 PWL-4
Conditioning Chambers
TT-MW2-13
K-54 PWL-5 North Plot
K-54 PWL-4 South Plot
T-Revetment Conditioning Chambers
TT-MW2-31A/B
K-54 PWL-5
TT-MW2-18
TT-MW2-1
Concrete Pad
Instrument Building
Propellant Burn Site
L-56 PSSL 1-5

Site 2 - Graph 9 (Fig. 12)



LEGEND

- Monitoring Well Location
- Primary Monitoring Plot Location
- Control Monitoring Plot Location
- Historical Operational Area Boundary

N

0 150 300 Feet

Adapted from: March 2007 aerial photograph.

Note: Coordinates in UTM, Zone 11N, NAD83, meters

Beaumont Site 2

Figure 12

Area K
Test Bays and Miscellaneous Facilities
SKR Monitoring Plot Locations

TETRA TECH

Table 16
2008 and 2009 Pre-and Post-Activity SKR Burrows
Site 2, Area K

Drilling Borehole Name(s)	# Active Burrows				Survey Dates			
	Pre-Activity	1 Week	6 Week	6 Month	Pre-Activity	1 Week	6 Week	6 Month
K-54 PWL 1 Primary	0	0	0	0	9/25/2008	2/27/2009	3/27/2009	8/13/2009
K-54 PWL 1 NW Control	2	0	0	0				
K-54 PWL 2 Primary	0	0	0	0	9/15/2008	2/27/2009	3/27/2009	8/13/2009
K-54 PWL 2 E Control	1	0	0	0				
K-54 PWL 3 Primary	0	0	0	1	11/14/2008	2/27/2009	3/27/2009	8/13/2009
K-54 PWL 3 E Control	0	0	0	0				
K-54 PWL 4 Primary	0	0	0	0	11/14/2008	2/27/2009	3/29/2009	8/13/2009
K-54 PWL 4 S Control	0	0	0	0				
K-54 PWL 5 Primary	0	2	3	1	11/10/2008	2/27/2009	3/27/2009	8/13/2009
K-54 PWL 5 N Control	6	0	0	0				
K-54 PSSL 1, 2, SB 122 Primary	0	0	0	0	9/25/2008	11/3/2008	12/9/2008	4/17/2009
K-54 PSSL 1, 2, SB 122 NE Control	9	6	4	1				
K-54 PSSL 3, 4 Primary	0	1	0	0	9/20/2008	10/3/2008	11/10/2008	3/26/2009
K-54 PSSL 3, 4 E Control	1	2	0	2				
K-54 PSSL 6-8 Primary	4	3	2	3	10/3/20088	10/8/2008	11/10/2008	3/27/2009
K-54 PSSL 6-8 NW Control	1	2	1	2				
K-54 PSSL 11-14; SB 119 Primary	4	2	1	1	9/17/2008	12/2/2008	1/10/2009	6/1/2009
K-54 PSSL 11-14; SB 119 SE Control	2	3	1	3				
K-54 PSSL 15, 16; SB 120, 121, 123-126 Primary	0	0	0	0	9/17/2008	11/3 + 12/11/08	1/16/2009	6/1/2009
K-54 PSSL 15, 16; SB 120, 121, 123-126 SE Control	1	0	0	0				
K-54 PSSL 17, 18 , W 107-109 Primary	1	1	0	2	2/16/2009	4/15/2009	6/1/2009	10/12/2009
K-54 PSSL 17, 18, W 107-109 S Control	1	1	3	8				
K-54 SB 127-131 Primary	2	2	0	1	11/10/2008	12/2/2008	1/10/2009	6/1/2009
K-54 SB 127-131 N Control	0	0	0	0				

Overall, nine of the twelve primary plots showed an increase in active burrows or stayed the same and seven of the control plots either increased or stayed the same. Three primary plots increased by one burrow throughout the mapping period. Three of the control plots also increased by one burrow, and one (17, 18, W-107-109) increased by seven active burrows. Borehole 11-14, SB 119 primary plot lost three burrows and another two lost one burrow each. Two control plots, PWL 5 and PSSL 1, 2, SB 122, decreased by six and eight burrows, respectively throughout the mapping period. Those two control plots were the most notable decreases in kangaroo rat burrows.

While mapping strategy #3 states that a minimum of 25 percent of the area to be disturbed be mapped, that was not always possible in this area. The geography of the Site (narrow canyons, creeks/drainages, and roads) limited the placement and number of control plots. In addition, burrow numbers at Site 2 are very low because the SKR population density is low at this Site.

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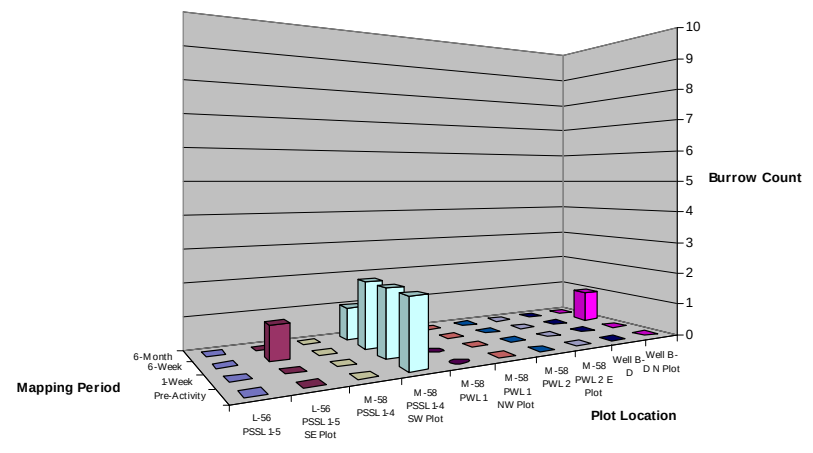
497000 497200 497400 497600 497800

3751600 3751400 3751200 3751000 3750800 3750600

K-54 PWL-4
TT-MW2-34A/B/C
Conditioning Chambers
TT-MW2-13
K-54 PWL-5 North Plot
K-54 PWL-4 South Grid
TT-MW2-31A/B
K-54 PWL-5
TT-MW2-18
TT-MW2-1
T-Revetment Conditioning Chambers
Concrete Pad
Instrument Building
Propellant Burn Site
L-56 PSSL 1-5
TT-MW2-12
M-58 PSSL-1-4
Previously Assessed Dump Site
M-58 PWL-2 East Plot
M-58 PSSL-1-4 Southwest Plot
TT-MW2-32
TT-MW2-11
M-58 PWL-2
L-56 PWL 1,2 Northwest Plot
M-58 PWL-1 Northwest Plot
L-56 PSSL 1-5 Southeast Plot
TT-MW2-35A/B
TT-MW2-10
L-56 PWL 1,2
TT-MW2-4S/D
TT-MW2-28
M-58 PWL-1
Historical Operational Area M Garbage Disposal Area
Historical Operational Area L Propellant Burn Area
Liquid Waste Disposal Pond
Well B-D North Plot
TT-MW2-21
TT-MW2-26
Well A West Plot
TT-MW2-24
TT-MW2-23
TT-MW2-22
Well A
TT-MW2-37A/B
TT-MW2-27
TT-MW2-9D
TT-MW2-9S
Well B-D
TT-MW2-25

Site 2 - Graph 10 (Fig. 13)



LEGEND

- Monitoring Well Location
- Primary Monitoring Plot Location
- Control Monitoring Plot Location
- Historical Operational Area Boundary

0 150 300 Feet

Adapted from: March 2007 aerial photograph.

Note: Coordinates in UTM, Zone 11N, NAD83, meters

Beaumont Site 2

Figure 13

Areas L and M
Propellant Burn Area and Landfill
SKR Monitoring Plot Locations

TETRA TECH

Table 17
2008 and 2009 Pre-and Post-Activity SKR Burrows
Site 2, Area L and M

Drilling Borehole Name(s)	# Active Burrows				Survey Dates			
	Pre-Activity	1 Week	6 Week	6 Month	Pre-Activity	1 Week	6 Week	6 Month
L-56 PSSL 1-5 Primary	0	0	0	0	9/15/2008	9/25/2008	11/3/2008	3/15/2009
L-56 PSSL 1-5 SE Control	0	0	1	0				
L-56 PWL 1,2 Primary	0	0	0	1	10/10/2008	2/27/2009	3/27/2009	8/13/2009
L-56 PWL 1,2 NW Control	0	0	0	0				
M-58 PSSL 1-4 Primary	0	0	0	0	10/3/2008	10/14/2008	11/18/2008	4/14/2009
M-58 PSSL 1-4 SW Control	2	2	2	1				
M-58 PWL 1 Primary	0	0	0	0	10/14/2008	12/11/2008	1/16/2009	6/1/2009
M-58 PWL 1 NW Control	0	0	0	0				
M-58 PWL 2 Primary	0	0	0	0	12/2/2008	12/11/2008	1/16/2009	6/1/2009
M-58 PWL 2 E Control	0	0	0	0				
Well A Primary	0	0	0	0	1/5/2009	2/27/2009	3/27/2009	8/13/2009
Well A W Control	0	0	0	0				
Well B-D Primary	0	0	0	0	10/8/2008	12/11/2008	1/15/2009	6/1/2009
Well B-D N Control	0	0	1	0				

Overall, six of the seven primary and control plots remained the same throughout the entire monitoring period. One primary plot increased by one burrow, and one control plot decreased by one burrow.

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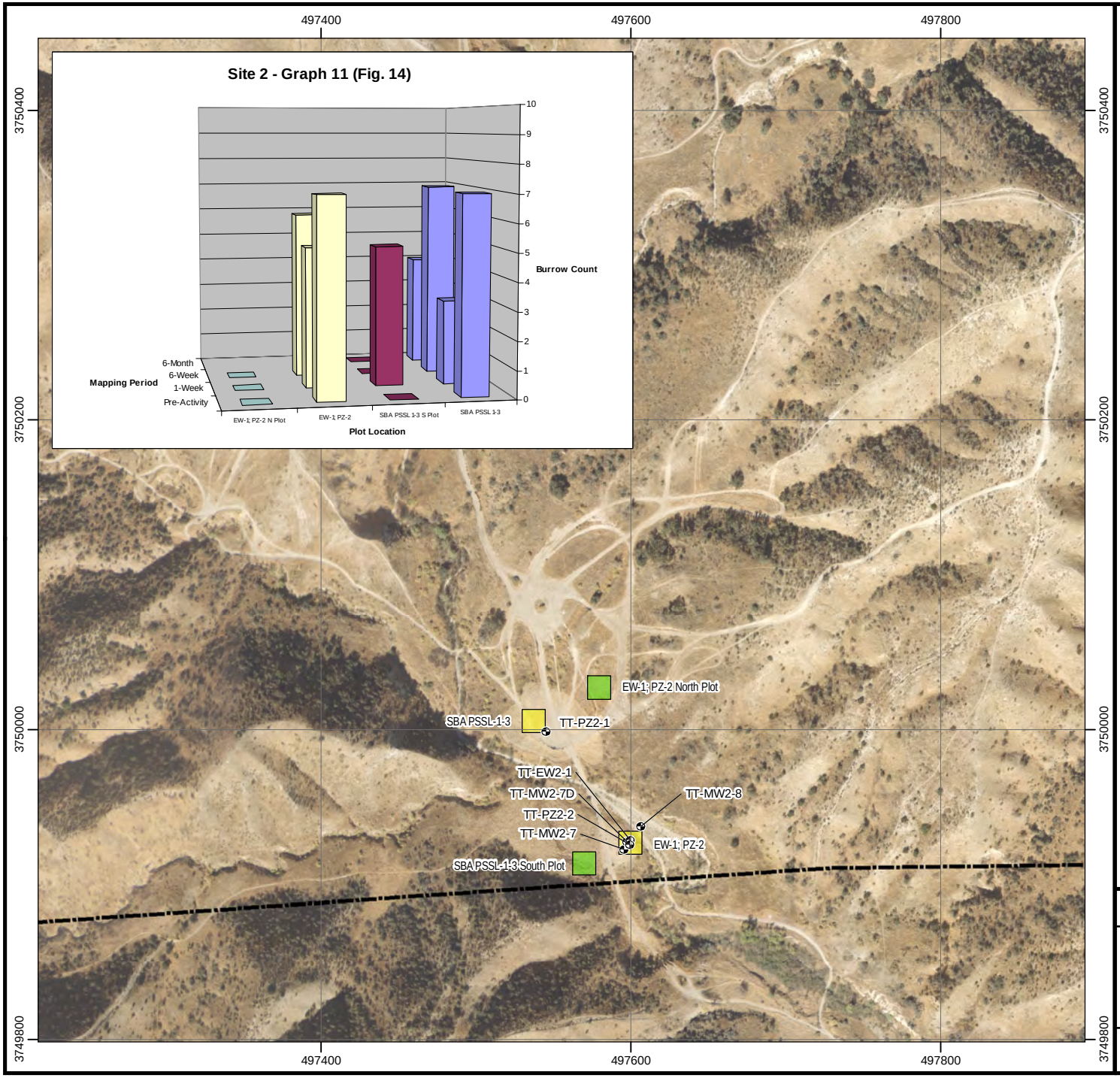


0 150 300 Feet

Adapted from: March 2007 aerial photograph.

LEGEND

- Monitoring Well Location
- Primary Monitoring Plot Location
- Control Monitoring Plot Location
- Historical Operational Area Boundary
- Beaumont Site 2 Property Boundary

Note: Beaumont Site 2 property boundary from Hillwig-Goodrow survey, May 2004.

Coordinates in UTM, Zone 11N, NAD83, meters

Beaumont Site 2

Figure 14
Southern Boundary Area SKR Monitoring Plot Locations

TETRA TECH

Table 18
2008 and 2009 Pre-and Post-Activity SKR Burrows
Site 2, Southern Boundary Area

Drilling Borehole Name(s)	# Active Burrows				Survey Dates			
	Pre-Activity	1 Week	6 Week	6 Month	Pre-Activity	1 Week	6 Week	6 Month
SBA PSSL 1-3 Primary	7	3	7	4	10/7/2008	10/14/2008	11/18/2008	4/15/2009
SBA PSSL 1-3 S Control	0	0	0	0				
EW-1; PZ-2 Primary	7	5	6	-	10/12/2009	11/10/2009	12/16/2009	-
EW-1; PZ-2 N Control	0	0	0	-				

Apparent adverse affects from drilling activities may have been due to extreme wind conditions at the Site that caused many kangaroo rat burrows to be filled in with sand and debris and these burrows would not have been recorded as active burrows during the 1-week post-activity survey.

Discussion

Mapping surveys conducted from 2008 to 2009 confirmed that 75 percent (33 of 45 plots) of the plots show either an increase or no change at all in SKR activity within the primary plots at both Site 1 and Site 2. In comparison, 68 percent (28 of 45 plots) of the control plots showed either a positive change or no change at all at both sites. Overall, more control plots showed a decrease in active burrows (11 percent, or 5 plots) than did the primary plots. Further analysis of the relationship between SKR activity and substrate/vegetation disturbance will be conducted as more sites are developed and added to the effect assessment during future years of the mapping program. The assessment program will continue to be conducted and re-evaluated at least annually to assess the program's effectiveness at meeting its goals and to make minor adjustments to adapt to changing conditions or unanticipated circumstances.

The effects of herbaceous vegetation mowing, and/or light vehicle use and drilling activities, may have played a role in expanding the range of SKR at Sites 1 and 2. These activities temporarily eliminated vegetation cover resulting in new areas with the type of reduced ground cover preferred by SKR.

The geography of Site 2 (creeks/drainages, roads, and narrow canyons with steep hills) limited the placement and number of monitoring plots created from August 2008 to December 2009. This is the basic nature of Laborde Canyon and the impact assessment method could only be applied to the degree allowed by the topography and general conditions present in this area.

Many environmental factors may influence the presence and number of active kangaroo rat burrows at a particular location. The goal of this effect assessment program is to determine whether the various investigation activities involving heavy equipment or vegetation removal adversely affect the population of SKR at either site. It is impossible to make all environmental factors a constant with heavy equipment activity as the only variable. The results of the 2008 and 2009 mapping program showed how factors other than heavy equipment can influence the number of kangaroo rat burrows present in an area. There were periods of heavy rain and high wind, each of which caused substrate erosion; thus, depending on the pre- and/or post-activity survey, the number of burrows recorded as active could have been affected by such factors. For example, burrows may have been filled in with water or soil, and fresh scat may have been washed or blown away from the entrance of the burrows. Also, in December 2008, following heavy rain events, thick grass was observed to have densely colonized some areas of bare soil where heavy equipment previously had been operating; and as mentioned, such dense grasslands are not preferred habitat for SKR. All of these factors could have led to inaccurate burrow counts during a particular burrow count survey.

The choice of activity area could also have influenced the number of active burrows counted because in many cases, the same individual mapping burrow locations influenced the location of investigation activities, often resulting in these activities taking place in areas with few or no active kangaroo rat burrows. The ultimate location of each drilling location was determined by the monitor in charge, and with few exceptions this monitor was the lead monitor who also conducted the burrow mapping surveys. The typical sequence of events was: the project geologist selected a proposed (preferred) general location for drilling, and the biological monitor then selected the final drill site (within a radius of 15-30 feet of the geologist's preferred location. This latitude in site selection enabled the monitor to choose a drilling area that would contain the fewest kangaroo rat burrows and follow the rules in the Incidental Take Permit. The Site 1 SKR population is much more wide spread and denser than the population at Site 2; thus, avoiding burrows at Site 2 is naturally much easier than at Site 1. Also, within the Operation Areas of Site

1, the SKR is the dominant kangaroo rat species, whereas Site 2 has only isolated populations of SKR at very low densities (S. Montgomery, personal communication, 2010). This explains why only five of the 24 plots present at Site 1 were removed from the data base (due to zero initial counts), compared to 13 of the 21 plots at Site 2; thus there are 11 more "data plots" overall at Site 1.

The disparity in SKR distribution and density at Site 1 also explains why the numbers of active burrows at Site 2 plots are generally so much lower than at Site 1 plots. In addition, the consistently lower number of active burrows at disturbance plots compared to control plots is obviously because the "best" monitor-chosen primary plots had the fewest number of burrows at start with.

The season of each mapping survey also may have affected the results of burrow counts, as shown in the statistical analysis in Appendix C. During the period analyzed for this report, most work activities and post-activity surveys were completed in fall and winter, with fewer occurring in the spring and summer. The analysis in Appendix C shows that mapping surveys conducted in spring and summer months mapped consistently fewer burrows than those conducted in winter months. However, a clear explanation for this trend, which seems to be the reverse of what would logically be expected (e.g. higher numbers and activity of SKR would be expected during the spring and summer months when young are dispersing and/or adults would be moving around in search of mates), is not available.

3.4 COMPLIANCE WITH THE AVOIDANCE, MINIMIZATION AND MITIGATION ACTIVITIES

Monitoring was conducted to measure any potential permanent and temporary effects from investigation activities. Service-approved biological monitors who supervised each activity are listed in Tables 1 and 2. The following actions were undertaken to ensure compliance with avoidance and minimization measures:

1. A Service-approved biologist (biological monitor) performed pre-activity surveys to identify the location of SKR habitat and active burrows and all activities were supervised by a Service-approved biologist;
2. All characterization activities were completed during daylight hours or personnel arrived on site during daylight hours and left after sunrise the following day;
3. Due to vandalism security was deployed to monitor the characterization equipment when it was idle. After the first direct take of an SKR in 2008, all driving at night was prohibited. Security guards are now escorted to their locations by biological monitors and their odometer readings are recorded to ensure they do not move at night, except in the case of an emergency.
4. An orientation program about SKR and avoidance and minimization measures was provided to project workers during tailgate safety meetings (a formal program was instituted in 2007);
5. Burrows were flagged to aid workers in burrow avoidance, and the flags were removed when the task is completed;
6. All heavy equipment was guided by the Service-approved biologist to avoid active SKR burrows as much as possible using the LE HCP route priority system;
7. All off road vehicle or equipment traffic was limited to the same path in and out, moved slowly, and turned in gentle arching motions to minimize effects to the ground surface;

8. Mower blades were elevated 4 to 6 inches above the ground surface and limited to the smallest area possible to protect burrow sites;
9. In establishing parking and staging areas, the Service-approved biologist selected the parking and/or staging areas using the LE HCP priority system;
10. If burrows were present in a parking or staging area, load spreading devices were placed under the vehicles and/or equipment and were removed following use;
11. Parking of vehicles and staging of equipment overnight were restricted to existing roads. (When drilling rigs could not be moved, they were placed, using load-spreading devices, in areas more than 15 meters from any active kangaroo rat burrow);
12. Drilling/boring was restricted, to the maximum extent possible, to 15 feet or more from active SKR burrows; and
13. If burrows could not be avoided, load-spreading measures were placed over the burrows for vehicles and/or equipment setup and movement;

These actions comply with those listed to minimize effects on pages 12 and 13 of the LE HCP. In addition, following mitigation as described on page 13 of the LE HCP, boreholes were backfilled and disturbed soils were smoothed during investigation activities.

4.0 SUMMARY

In summary, the activities carried out under the ITP, Biological Opinion, and LE HCP during the 2009 reporting period were conducted in accordance with the provisions of these documents. These activities resulted in minimal permanent and temporary effects to SKR habitat, as well as a take of one individual SKR. Corrective measures were implemented to avoid any additional take.

Appendix A

Revision to the Biological Opinion (1-5-F-872) and Clarification to the Terms and Conditions for Incidental Take Permit (TE-110582-0) for Groundwater and Soil remediation Investigation Activities for Lockheed Martin Corporation at Potrero Creek and Laborde Canyon Properties, Riverside County, California

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road
Carlsbad, California 92011

In Reply Refer To:
FWS-WRIV-09B0067-09F0429

MAR 06 2009

Memorandum

To: Chief, Division of Conservation Planning, Region 8, Sacramento, California

From: Field Supervisor, Carlsbad Fish and Wildlife Office, Carlsbad, California

Subject: Reinitiation of Intra-Service Section 7 Consultation for the Issuance of an Endangered Species Act Section 10(a)(1)(B) Permit for Groundwater and Soil Remediation Investigation Activities for Lockheed Martin Corporation at Potrero Creek and Laborde Canyon Properties, Riverside County, California (FWS-WRIV-09B0067-09F0429)

On November 16, 2005, we issued a biological opinion (1-5-F-872) based on the *Low-Effect Habitat Conservation Plan for the Issuance of an Incidental Take Permit Under Section 10(a)(1)(B) of the Endangered Species Act for the Federally Endangered Stephens' Kangaroo Rat on Beaumont Potrero Creek and Beaumont Laborde Canyon Properties, Riverside County, California* ("HCP") and its effects on the federally endangered Stephens' kangaroo rat (*Dipodomys stephensi*, "SKR"). On January 9, 2009, we met with representatives from the Lockheed Martin Corporation (LMC) and were informed that the biological conditions at the site had changed significantly since 2005. LMC expressed concern that as a result of these changes, completion of the project could result in the take of more than 3 individual SKR as authorized under the original incidental take permit. This amendment to the biological opinion assesses the impact of the change in biological conditions on the SKR and increases the number of individuals anticipated to be taken from three (3) to nine (9) individuals as a result of implementation of the HCP.

PROJECT DESCRIPTION

The project description has not changed from that provided in the original biological opinion. Although the HCP Plan Area covers approximately 11,785 acres, less than 3 acres of SKR habitat will be permanently (0.27 acre) or temporarily (2.4 acres) impacted by the project. As of December 31, 2008, the majority of habitat impacting activities had been completed, but the

project had permanently impacted only 0.00276 acre (1 percent of that anticipated) and temporarily impacted only 0.0376 (1.6 percent of that anticipated). Therefore, the extent of habitat impacts anticipated from implementation of the HCP were likely an overestimate. In our original biological opinion, incidental take for SKR was stated as "*A small but undeterminable number of SKR may be killed or injured within the project area during contamination investigation activities. Due to the fossorial nature of SKR, it is unlikely that take of SKR from contaminant investigation activities will be detected. Therefore, if three (3) SKR are found injured or killed, then the take threshold will be reached for such activities.*" As of January 9, 2009, two (2) SKR had been found killed as a result of implementation of the HCP. LMC continues to conduct all avoidance and minimization measures described in the HCP.

REVISED BASELINE

In reviewing the current SKR population data for the site, it appears the population of SKR has tripled in size since 2006. Between 1992 and 2000, a series of studies within the action area concluded that occupied habitat ranged from 332 acres to 2488 acres and that SKR density rarely exceeded 14-16 individuals per acre. It was estimated that 77 percent of the occupied habitat, on average, had a density of less than 4 SKR per acre. The take estimate of "*A small but undeterminable number of SKR*" in the original biological opinion was based, in part, on the expected low density of SKR throughout the majority of the HCP Plan Area.

Results of recent SKR surveys at Potrero Creek for the Riverside County Multiple Species Habitat Conservation Plan (MSHCP) Monitoring Program suggest that SKR populations now average 48 individuals per acre in the highest density areas, or nearly three times the highest density previously estimated. A reasonable explanation for this increase in SKR density is that the October 2006 Esperanza wildfire improved habitat quality for this species. The fire burned most of the valley floor at Potrero Creek and nearly eliminated vegetative cover in both occupied and unoccupied grassland habitats. Regrowth following the fire left expansive areas of the open ground and sparse grassland/forbland habitat preferred by SKR. The MSHCP surveys suggest, that by Spring of 2007, improved habitat conditions had resulted in an increase in the density of SKR within the action area. High SKR densities are likely to continue to occur until the density of vegetation returns to its previous state, which may take several years.

The MSHCP surveys also detected SKR in locations where they had not previously been detected. This would be expected as the fire improved habitat suitability in areas that were previously marginal or unsuitable due to dense vegetative cover. Thus, it appears that the SKR expanded their area of occupancy simultaneous with the increase in density. However, the MSHCP surveys did not map or estimate the total area occupied by SKR. Therefore, the estimate of 2,637 acres of SKR occupied habitat within the HCP Plan Area, as cited in the original biological opinion, remains the most current estimate.

The 2006 Esperanza wildfire did not affect the Laborde Canyon portion of the HCP Plan Area and we are not aware of any surveys for SKR that have been conducted since the original biological opinion. Absent any new information, we continue to believe that the habitat in Laborde Canyon that may be affected by the project is of poor quality for SKR, and that the density of animals remains at less than one (<1) SKR per acre.

REVISED EFFECTS OF THE ACTION

Because the project activities have not changed, we continue to expect that up to 3 acres of SKR habitat may be permanently (0.27 acres) or temporarily (2.4 acres) impacted by the project. The total acreage of SKR habitat that may be impacted by the project represents approximately 0.10 percent of the original estimate of 2,637 acres of SKR occupied habitat in the Plan Area, and less than 0.10 percent when the recent population expansion at Potrero Creek is considered. Although the population expansion at Potrero may increase the actual amount of "occupied" habitat that is impacted by the project, the majority of project activities have already been completed and resulted in impacts to only 0.04 acres of occupied habitat. Given that the entire project was estimated to impact no more than 2.67 acres of occupied habitat, we do not believe the population expansion will cause the project to exceed 3 acres of impacts to occupied habitat.

As stated in the original biological opinion, individual SKR within burrows could be crushed by vehicles and equipment operating in and around project areas. Any SKR within burrows could be injured or killed by these activities. Due to their burrowing and nocturnal habits, SKR will be underground during the project's activities; therefore, SKR killed or injured will probably not be detected. However, the likelihood of death or injury to SKR is expected to be low since conservation measures outlined in the project description, including the presence of a biomonitor, flagging burrows, and load spreading measures, which reduce the risk of injuring or killing SKR, will continue to be implemented. It is anticipated that direct injury or death from drilling/boring holes will be extremely low because of the implementation of the proposed conservation measures. While injuries and the loss of SKR due to these activities will be rare, they will occur three times more often than originally anticipated due to the increased density of SKR.

Since the permit was signed in November 2005, two (2) SKR have been reported killed as a result of project implementation. However, the approximate three-fold increase in SKR density also results in an approximate three-fold increase in SKR encounters and the subsequent potential for take. While we continue to believe that "*A small but undeterminable number of SKR may be killed or injured within the project area during contamination investigation activities*", and "*Due to the fossorial nature of SKR, it is unlikely that take of SKR from contaminant investigation activities will be detected.*", we anticipate the number will increase commensurate with the increase in population density and be approximately three times that previously estimated.

Pursuant to our original analysis, we determined that the effects of this project on SKR are "minor" and that the project as proposed qualified as a Low Effect HCP. We continue to believe the effects remain "minor" as defined and described in the original Screening Form for Low Effect HCP Determinations for this project based on:

1) The project description, including avoidance and minimization measures, has not changed;

2) The anticipated impacts to SKR habitat have not changed and remain at less than three (3) acres; and

3) The number of SKR that may be impacted relative to the overall population size remains the same.

CONCLUSION

After reviewing the current status of SKR, environmental baseline for the action area, effects of the proposed action, and cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of SKR. Our conclusion is based on the following reasons:

1. The loss or disturbance of less than three (3) acres of SKR habitat and the very low numbers of SKR likely to be killed or injured is not likely to reduce the SKR's overall numbers, distribution, or reproductive potential;

2. Conservation measures have been incorporated into the proposed action that will avoid and minimize impacts to SKR and its habitat; and

3. Any future actions in the area, including contaminant remediation, will require separate environmental review and approval.

INCIDENTAL TAKE STATEMENT

AMOUNT OR EXTENT OF TAKE

Based on the proposed *Low-Effect Habitat Conservation Plan for the Issuance of an Incidental Take Permit for the Federally Endangered Stephens' Kangaroo Rat on Beaumont Potrero Creek and Beaumont Laborde Canyon Properties* and on the analysis of the effects of the proposed action provided above, the Service anticipates that the following take may occur as a result of the proposed action:

We anticipate that up to three (3) acres of SKR habitat may be permanently (0.27 acres) or temporarily (2.4 acres) impacted by the proposed project.

A small number of SKR may be killed or injured within the project area during contamination investigation activities. Due to the fossorial nature of SKR, it is unlikely that take of SKR from contaminant investigation activities will be detected. Therefore, if 7 (seven) additional SKR (for a total of nine (9) SKR) are found injured or killed, then the take threshold will be reached for such activities.

REINITIATION NOTICE

This concludes formal consultation on the project outlined in the initiation request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Appendix B

Proposed Methodology for Mapping Stephens' Kangaroo Rat Habitat at Lockheed Martin Corporation at Potrero Creek (Site 1) and Laborde Canyon (Site 2) Properties, Riverside County, California

with

2010 Proposed Changes in Methodology

PROPOSED METHODOLOGY FOR MAPPING STEPHENS' KANGAROO RAT HABITAT AT SITES 1 AND 2

Prepared by
Stephen J. Montgomery
SJM Biological Consultants
November 2006

BACKGROUND

The Low-Effect Habitat Conservation Plan (HCP) calls for mapping of SKR habitat under the Monitoring, Management, and Reporting requirements in Section 3.4 on Page 14:

> "Mapping of SKR occupied habitat (with density categories) will be conducted by the biological monitor within 100 feet of the work area at both Sites and within the 565 acres of the applicant-owned property on Site 1 at the initiation of the Low-Effect HCP. At the completion of the contaminant investigation activities, the SKR mapping areas will be updated and will be compared with initial mapping performed to report any increase or decrease in SKR-occupied acreage or density levels."

There are several uncertainties with implementing the above mapping procedure, including:

- Whether this type of mapping (i.e. relatively coarse scale) would provide any useful measure of how and to what degree Lockheed Martin Corporation (LMC) activities on the Sites affect SKR and its habitat, because these activities affect such small areas compared to the overall area of SKR-occupied habitat.
- A lack of clarity on specific mapping requirements at work areas, such as timing of mapping pre- and post-activity, and the size of the mapping area.
- Whether post-activity mapping should occur following the full completion of all contaminant studies (after 5 years), or each year, or throughout each year. Updates for this mapping requirement are a specified element of the annual reports to be prepared for this Low-Effect HCP.

This memo presents an alternative protocol for habitat mapping that will:

1. Be measurable at a scale commensurate with LMC's activities;
2. Provide useful information to LMC in their on-going efforts to minimize adverse effects to this species while conducting contaminant investigation activities; and
3. Provide useful data to the U.S. Fish and Wildlife Service in determining on-going potential adverse effects to this species from these types of activities.

PROPOSED MAPPING METHODS

The proposed methodology will be based on burrow counts at study plots located in activity areas and at associated control plots, as described below.

Activities to Be Conducted

Activities to be conducted under the Low-Effect HCP are defined on pages 7 and 8 of the HCP, and include:

1. Conducting quarterly groundwater level measurements, sampling, and repair;
2. Installing groundwater wells;
3. Abandoning groundwater wells;
4. Maintaining structures and groundwater treatment systems;
5. Maintaining roads;
6. Marking, surveying and drilling soil assessment boreholes:
7. Installing and sampling soil gas probes;
8. Removing CatOx unit at Site 1 (completed in 2005);
9. Temporarily depositing soils and concrete from on-site activities;
10. Mowing work areas;
11. Surveying work locations;
12. Conducting unexploded ordinance (UXO) characterizations and treatment activities (see letter to USFWS dated August 3, 2006 for clarification of these activities);
13. Conducting seismic surveys.

Activities to Be Mapped vs. Not Mapped

In general, mapping will only be conducted in areas of suitable SKR habitat, including all areas of Sites 1 and 2 that support grassland habitats whether they are known to be occupied by SKR or not. Mapping will not be conducted in areas of non-suitable habitat, such as on steep hillsides, in dense sage scrub or chaparral habitat, or in very sandy washes. Of the 13 activities listed above, the proposed mapping methodology described below will only be used for those activities that (a) could result in adverse effects to occupied SKR habitat from direct soil or vegetation disturbance or removal (see letter to USFWS dated August 3, 2006 for clarification of these activities), and (b) encompass an area large enough for any effects on SKR to be measurable (defined as a work area of approximately 250 square meters; i.e. an approximately 15m x 15m square). Such activities include:

- Installation of groundwater wells;
- Drilling boreholes for soil assessment;
- Groundwater well abandonment at sites where heavy equipment use is required at the work area;
- Maintaining and repairing roads when this activity covers an area of at least 250 square meters.
- Extensive mowing of work areas when this activity covers at least 2 acres.

The following activities were determined to cover an area too small, and/or result in such minimal disturbances to the substrate or vegetation cover, to provide measurable data:

- Conducting quarterly groundwater level measurements, sampling, and repair;
- Abandoning groundwater wells at sites where heavy equipment can be parked on adjacent roads and not brought on the work area;
- Maintaining structures and groundwater treatment systems;
- Maintaining and repairing roads when this activity covers an area of less than 250 square meters;
- Marking and surveying soil assessment boreholes;

- Installing and sampling soil gas probes if done by truck mounted direct push methods;
- Temporarily depositing soils and concrete from on-site activities;
- Mowing work areas when this activity covers an area of less than 250 square meters;
- Surveying work locations;
- Conducting UXO and MEC characterization activities, including limited UXO searches using hand tools and large-scale "towed array" methods with lightweight vehicles;
- Conducting seismic surveys.

Mapping Strategies

Four different mapping strategies will be used in order to attempt to appropriately measure effects in a feasible manner from the above work activities. These include:

1. 100% mapping of small work areas (including well installations and well abandonment).
2. 25% minimum sampling of work areas for linear activities (road maintenance).
3. 25% minimum sampling of work areas when numerous extremely small excavations will be clustered in an area.
4. 25% minimum sampling of work areas where extensive blocks of habitat will be mowed .

100% Mapping of Small Work Areas (Figure 1)
The effects on SKR of work activities such as well installation that encompass relatively small areas (e.g. approx. 250m^2) will be determined using small square plots centered directly on the activity and paired plots located 100m from the activity area.

Each work area plot will be centered on the location of a work activity and will be designated "Plot A." A paired location designated "Plot B" will be located in a random direction and 100 meters from the activity area and will serve as a control plot for the associated Plot A (see figure below). All work area and control plots will be oriented in cardinal directions with the four corner points marked with a Global Positioning Systems (GPS) unit to an accuracy of less than 5 meters (UTM NAD 83). Plots will measure 15 x15 meters for all of these activities.

The direction to the center of Plot B from the center of Plot A will be determined randomly from one of 8 compass directions (N, S, E, W, NE, SE, SW, NW). If the initially selected control Plot B location does not fall in suitable and similar SKR habitat to Plot A, subsequent random directions will be progressively selected until the selected control plot falls in suitable and similar SKR habitat that does not overlap any other work area.

25% Minimum Mapping of Numerous Clustered Small Work Areas (Figure 2)
Numerous clustered small work areas, such as numerous soil brings in one area, will be assessed by sampling a series of small 15m x 15m square plots randomly selected within the activity area; control plots for such sample plots will be located in adjacent non-activity areas, either within 100m of the work area plot or as close as is feasible. A minimum of 25% of the work area will be sampled with this method. For activities involving numerous small disturbances to the substrate within a somewhat lager but still relatively small area (e.g. 500m^2), the effects on SKR will be determined by sampling a minimum of 25% of these areas using the same method as that described above for "100% Mapping of Small Work Areas."

25% Minimum Mapping of Linear Work Areas (Figure 3)
The effects on SKR of linear activities such as road maintenance will be determined using long-narrow plots. For road maintenance activities, work area and control plots will measure 5m x 22.5m and be established on directly opposing sides of the road; each plot will begin at the edge of the road and extend

5m into the surrounding undisturbed habitat. Appropriate plot size for additional linear activities will be determined at the time of the initiation of the activity.

25% Minimum Mapping of Larger Mowing Work Areas (Figure 4)

More expansive work areas, such as the large areas requiring mowing for MEC investigations, will be assessed by sampling a series of small 15m x 15m square plots randomly selected within the activity area; control plots for such sample plots will be located in adjacent non-activity areas, either within 100m of the work area plot or as close as is feasible. A minimum of 25% of the work area will be sampled with this method. Since the October 26, 2006 Esperanza fire burned all grasslands at Potrero Creek, this method of assessing the effects of widespread mowing on SKR will not be used at the current time. This method will be used if any future investigations require mowing of large blocks of grassland vegetation.

Frequency and Timing of Mapping

Pre-activity surveys would be conducted within 7 days prior to an activity. Post-activity surveys would be conducted within 7 days (±2 days), 6-weeks (±5 days) and 6-months (±7days) subsequent to each activity. These mapping surveys will provide data on immediate and long-term effects of each activity on localized populations of SKR in the immediate vicinity of the activity, and also may provide information regarding enhanced use of the activity area by this species.

Burrow Counts

All active kangaroo rat burrows inside the boundaries of each pair of plots (e.g. 1A and 1B, 2A and 2B, etc.) will be counted and their locations noted on standard plot forms during all pre- and post-activity surveys. The map and number of burrows counted at each plot will serve as records of SKR presence/absence and as an index of SKR activity and abundance at each plot.

Analysis and Reporting

The burrow counts and plot maps from all pre- and post-activity surveys at work areas and control plots will be compared over time to determine if particular activities produce any measurable difference in SKR presence and/or abundance compared to the associated control plots. Burrow count data will be analyzed using a paired-sample t- test or other appropriate paired sample statistical method. If plots of different sizes are required during the study, the burrow counts recorded for all sites will be standardized to number of burrows per square meter.

All burrow counts and plot maps from surveys conducted each year, and the associated analyses, will be compiled and presented in an annual monitoring report for the Low-Effect HCP. Any natural occurrences such as weather events or fires would be assumed to affect each study plot and its paired control site in a similar way. Such unavoidable occurrences are not expected to affect the validity of the study results because of the use of paired study and control plots, which will be similarly affected by natural phenomenon and can therefore be compared.

Figure 1

100% Sampling of Small Work Areas

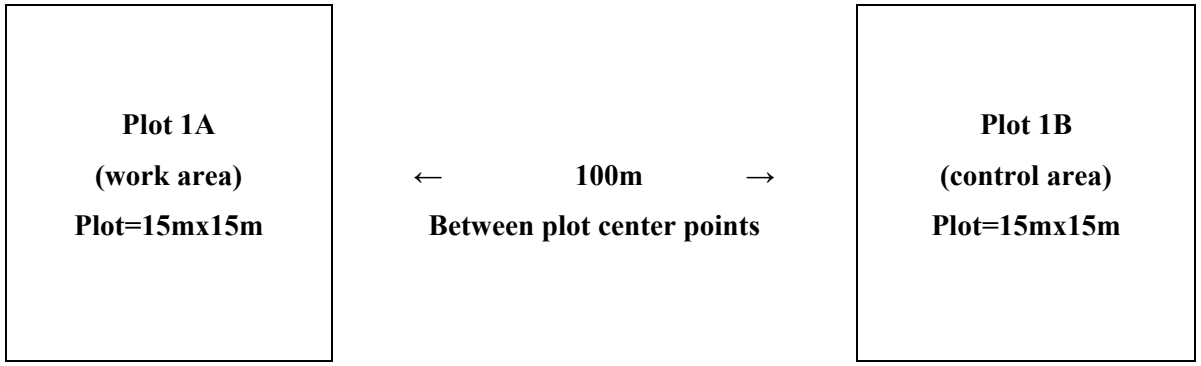


Figure 2

25% Minimum Sampling of Numerous Clustered Small Work Areas

(asterisks are work areas, heavy outline is e.g. 25% sample plot area)

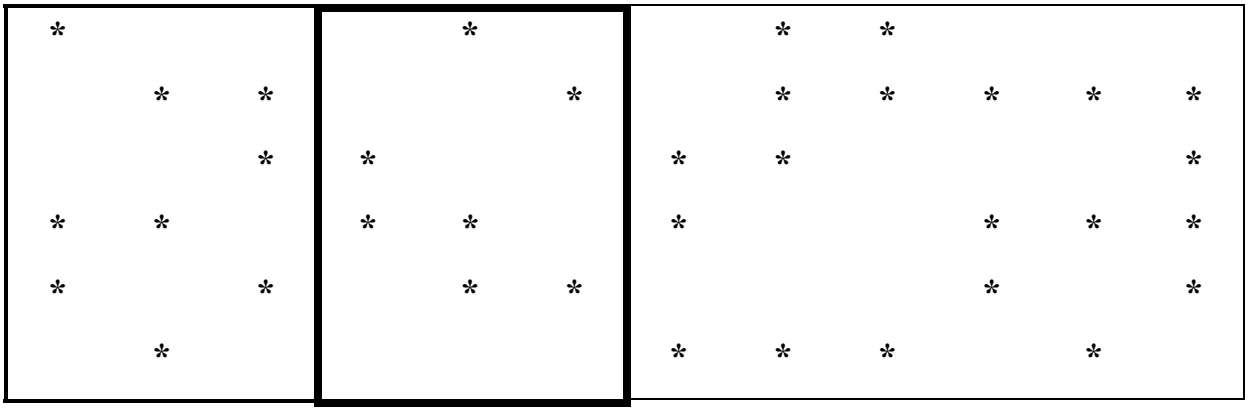


Figure 3

25% Minimum Sampling of Linear Work Areas

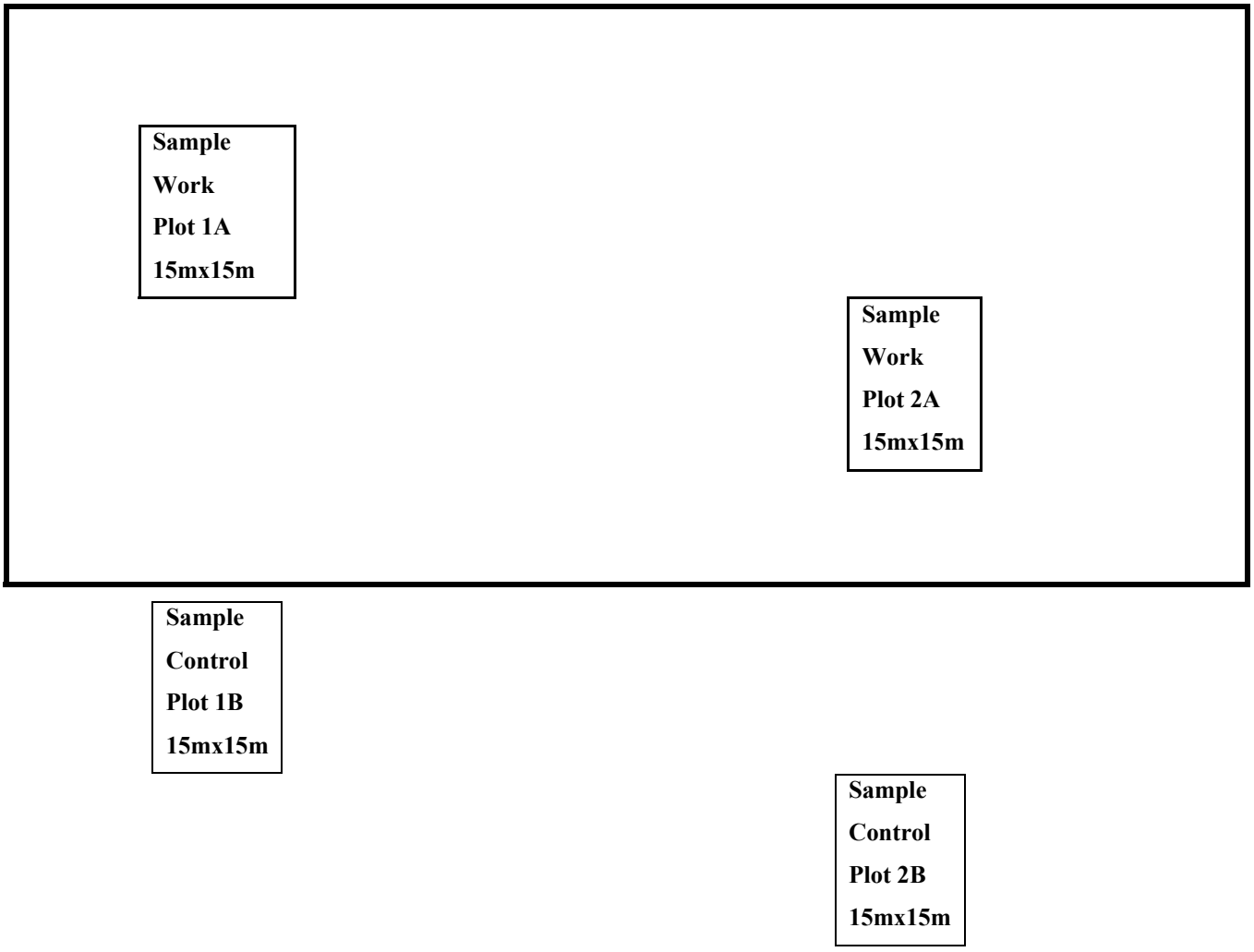
Plot 1A **(work area)** **Plot=5m x 22.5m**	**← 100m →** **between plot center points**	**Plot 1B** **(control area)** **Plot=5m x 22.5m**

←ROAD→

Plot 1A **(work area)** **Plot=5m x 22.5m**	**← 100m →** **between plot center points**	**Plot 1B** **(control area)** **Plot=5m x 22.5m**

Figure 4

25% Minimum Sampling of Larger Mowing Work Areas



2010 Proposed Changes in Methodology

1. Plot corners will be temporarily marked with wooden lathes to be installed during the pre-activity survey and removed after the 6-month post-activity survey.

2. Photos will be taken from the same corner of each plot (i.e. only from the northwest corner facing the southeast corner) during each survey to assist in recording and documenting conditions. A sign will be placed in the photo containing Site # (1 or 2), plot name, date, and orientation of photo.

3. Weather conditions will be checked prior to conducting each survey. The burrow mapper will check the Beaumont weather station for rainfall and wind daily summaries. If the summaries meet or exceed 0.25 inches of rainfall per day or maintain 25 mph winds for more than half the day, then burrow mapping will not be conducted within five (5) days of these "poor weather" conditions.

   The results of several surveys have been compromised because of recent rainfall or wind events. Sustained rainfall and wind events likely reduces the activity levels of SKR, but for mapping purposes, these poor weather events essentially "erase" active SKR sign, thus affecting the data set. Rainfall washes away sign (tracks and scat) and sometimes fills in otherwise active burrows with water and/or mud and sustained winds blows away sign and fill in otherwise active burrows with debris.

4. Data sheets will be updated to include additional fields to complete for each survey (i.e. current weather conditions, any poor weather within last 2-3 days, current vegetation conditions within plot, and photos taken).

Appendix C

Analysis of the Effects of Project Disturbance on SKR for Lockheed Martin Corporation at Potrero Creek (Site 1) and Laborde Canyon (Site 2) Properties, Riverside County, California

ANALYSIS OF THE EFFECTS OF PROJECT DISTURBANCE ON STEPHENS' KANGAROO RAT

Prepared by
Willson Linn Montgomery
SJM Biological Consultants
January 2010

Counts of burrows were conducted prior to drilling activity (Pre-activity) and at 1-week, 6-week and 6-month intervals after drilling activity ceased. Considerable variation existed in burrow counts among different disturbed (drilling, etc.) sites (**Primary** locations) and nearby undisturbed sites (**Control Grid** locations) that were matched as closely as possible to Primary location habitat characteristics (Table 1). Burrow count studies occurred at Potrero Creek (Site 1) and Laborde Canyon (Site 2).

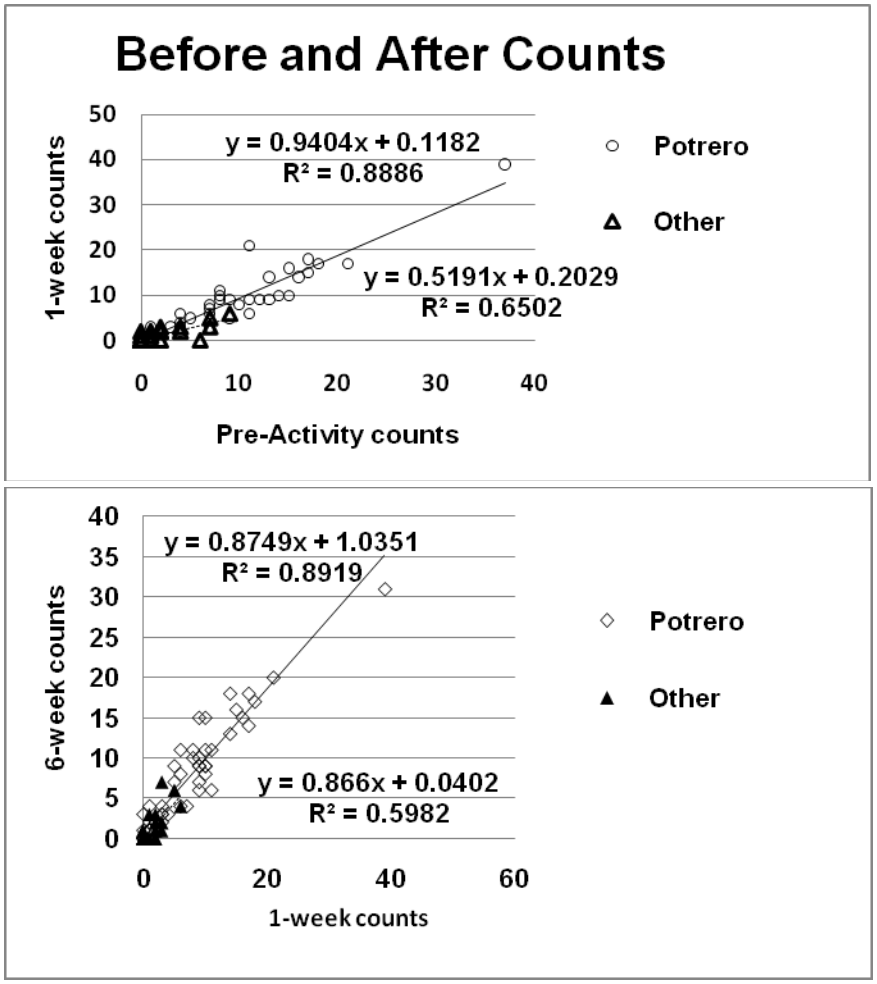
For the Potrero Creek site, Grid counts tended to be higher than those at Primary locations. This pattern may have been reversed (Primary > Grid) at the Laborde site, although small sample sizes and large ranges, standard deviations and standard errors weaken the likelihood that these patterns are statistically defensible. Reasons for the generally higher burrow counts at Control Grids than at Primary locations are not available and were not expected.

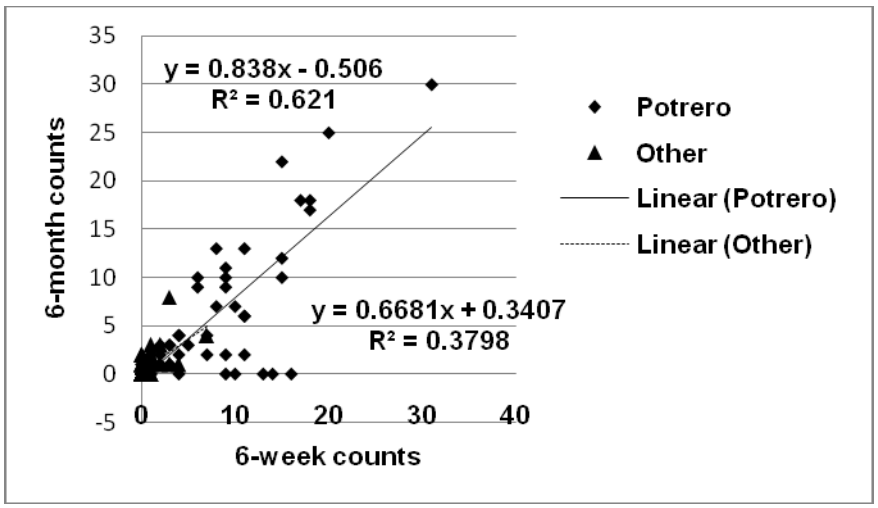
Table 1. Descriptive statistics for burrow counts at 2 sites, partitioned by Site, Primary (disturbed) vs. Grid (undisturbed) location, and sample period.

Site	Location	Sample	N	Minimum	Maximum	Mean	SE	SD
Potrero	Primary	Pre-Activity	21	1	21	7.95	1.22	5.59
		1-Week	20	1	17	7.55	1.15	5.14
		6-Week	21	0	18	7.62	1.20	5.49
		6-Month	17	1	22	7.41	1.49	6.16
	Grid	Pre-Activity	23	1	37	10.26	1.61	7.71
		1-Week	22	1	39	10.09	1.79	8.41
		6-Week	23	1	31	9.83	1.47	7.02
		6-Month	20	1	30	8.60	1.84	8.25
Laborde	Primary	Pre-Activity	6	1	7	4.17	1.01	2.48
		1-Week	6	1	5	2.67	0.56	1.37
		6-Week	6	0	7	2.67	1.26	3.08
		6-Month	5	1	4	2.20	0.58	1.30
	Grid	Pre-Activity	10	1	9	2.60	0.86	2.72
		1-Week	10	0	6	1.60	0.60	1.90
		6-Week	10	0	4	1.10	0.46	1.45
		6-Month	10	0	8	1.70	0.78	2.45

Examination of the original data suggests relative consistency of burrow counts across time for any Primary or Grid location. Scatter plots of counts during two subsequent survey periods demonstrate a strong correlation between the two sets of counts, particularly for Potrero Creek (Figure 1).

Figure 1. Scatter plots comparing burrow counts at one period with counts during a subsequent sampling. Linear best-fit regression equations and r^2 values for the Portrero Creek site are above points, those for the other site are below and to the right of the points.



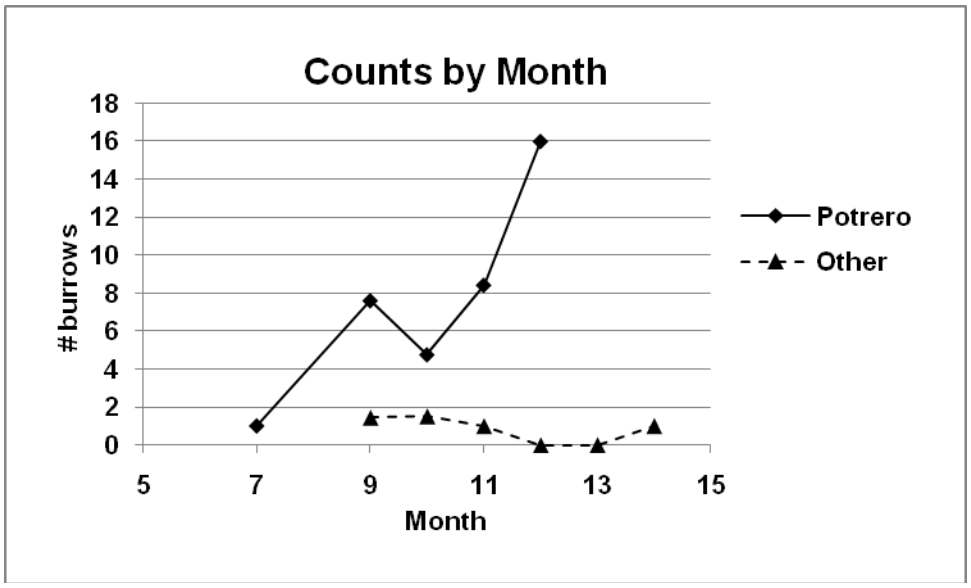


Three points emerge from plots in Figure 1. First, counts at the Potrero site cover a much broader range than those at the other site, which is due to the abundance of SKR across much of this site and the relative scarcity of SKR at the Laborde site. Second, there are strong correlations between the magnitudes of counts in subsequent periods across a wide range of values. For Potrero Creek, almost 90% of the variation in the data is accounted for by the regressions for the first two comparisons. This pattern is weaker for the Laborde site, whose values cluster near the origin and over a narrower range of values. These close relationships presage likely difficulty in teasing apart other factors that contribute to variation through time. Third, r^2 values for the third comparison, which spans roughly 4.5 months, are much lower than for the two shorter time periods, and this holds for both the Potrero (0.89 and 0.89 vs. 0.62) and Laborde (0..65, 0.60 vs. 0.38).

Were burrow counts influenced by month?

Mean burrow counts differed among months at the Potrero site, but not at the other site (Figure 2). At Potrero, 1-way analysis of variance and Games-Howell post-hoc tests distinguished low counts in July from September-November values, and both July and September-November counts differed from December ($p < 0.01$ for most significant comparisons).

Figure 2. Mean Pre-activity counts by month at the two sampling sites. Plots for different time periods are similar (available on request), due in large part to the high between-period correlations described above and in Figure 1. Sampling at Potrero Creek spanned July to December, sampling at the other site September to February. To maintain continuity of time on the abscissa, January and February were coded for analysis and plotted as months 13 and 14, respectively.



Counts through time

Initial attempts to detect effects of disturbance on burrow counts sought differences among means with 1-way ANOVA (Tables 2 and 3). Analyses were performed separately for the two sites (Portrero = 1, Laborde = 2). There were no detectable differences in counts between Primary and Grid locations at either site (Table 2).

Table 2. ANOVA for Primary vs. Grid counts at 2 sites.

Site			Sum of Squares	df	Mean Square	F	Sig.
1	Pre-Activity	Between Groups	85.018	1	85.018	1.702	.198
		Within Groups	2697.821	54	49.960		
		Total	2782.839	55			
	1Week	Between Groups	88.167	1	88.167	1.714	.196
		Within Groups	2674.667	52	51.436		
		Total	2762.833	53			
	6 Week	Between Groups	66.446	1	66.446	1.548	.219
		Within Groups	2318.536	54	42.936		
		Total	2384.982	55			
	6 Month	Between Groups	42.188	1	42.188	.814	.372
		Within Groups	2385.292	46	51.854		
		Total	2427.479	47			
2	Pre-Activity	Between Groups	.024	1	.024	.005	.946
		Within Groups	207.048	40	5.176		
		Total	207.071	41			
	1Week	Between Groups	.214	1	.214	.100	.753
		Within Groups	85.619	40	2.140		
		Total	85.833	41			
	6 Week	Between Groups	.857	1	.857	.321	.574
		Within Groups	106.762	40	2.669		
		Total	107.619	41			
	6 Month	Between Groups	.225	1	.225	.092	.763
		Within Groups	92.750	38	2.441		
		Total	92.975	39			

The same analysis was repeated after eliminating cases where burrow counts were zero at Pre-activity sampling. Again, there were no detectable effects for either site.

Table 3. ANOVA for Primary vs. Grid counts at 2 sites; cases deleted if Pre-activity count = 0.

Site			Sum of Squares	df	Mean Square	F	Sig.
1	Pre-Activity	Between Groups	58.499	1	58.499	1.271	.266
		Within Groups	1933.387	42	46.033		
		Total	1991.886	43			
	1Week	Between Groups	67.637	1	67.637	1.363	.250
		Within Groups	1984.768	40	49.619		
		Total	2052.405	41			
	6 Week	Between Groups	53.471	1	53.471	1.330	.255
		Within Groups	1688.257	42	40.197		
		Total	1741.727	43			
	6 Month	Between Groups	12.974	1	12.974	.239	.628
		Within Groups	1898.918	35	54.255		
		Total	1911.892	36			
2	Pre-Activity	Between Groups	9.204	1	9.204	1.325	.269
		Within Groups	97.233	14	6.945		
		Total	106.438	15			
	1Week	Between Groups	4.267	1	4.267	1.431	.251
		Within Groups	41.733	14	2.981		
		Total	46.000	15			
	6 Week	Between Groups	9.204	1	9.204	1.946	.185
		Within Groups	66.233	14	4.731		
		Total	75.437	15			
	6 Month	Between Groups	.833	1	.833	.178	.680
		Within Groups	60.900	13	4.685		
		Total	61.733	14			

In order to assess the effects of time and disturbance (Primary vs. Grid) on repeated burrow counts, we performed a repeated measures ANOVA (SPSS GLM Repeated Measures) on the Potrero and the other site separately. Consistent with previous assessments, the Potrero analysis detected neither an effect of time nor a time-disturbance interaction (Primary = disturbance, Grid = none; Table 4). Similarly, there were no significant within-subjects contrasts (Level 1 = Pre-activity, 2 = 1-week, 3 = 6-weeks, 4 = 6-months; Table 5).

Table 4. Multivariate Tests for repeated measures ANOVA.

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
time	Pillai's Trace	.037	.545[a]	3.000	42.000	.654	.037
	Wilks' Lambda	.963	.545[a]	3.000	42.000	.654	.037
	Hotelling's Trace	.039	.545[a]	3.000	42.000	.654	.037
	Roy's Largest Root	.039	.545[a]	3.000	42.000	.654	.037
time * disturbance	Pillai's Trace	.034	.490[a]	3.000	42.000	.691	.034
	Wilks' Lambda	.966	.490[a]	3.000	42.000	.691	.034
	Hotelling's Trace	.035	.490[a]	3.000	42.000	.691	.034
	Roy's Largest Root	.035	.490[a]	3.000	42.000	.691	.034

Table 5. Tests of Within-Subjects Contrasts

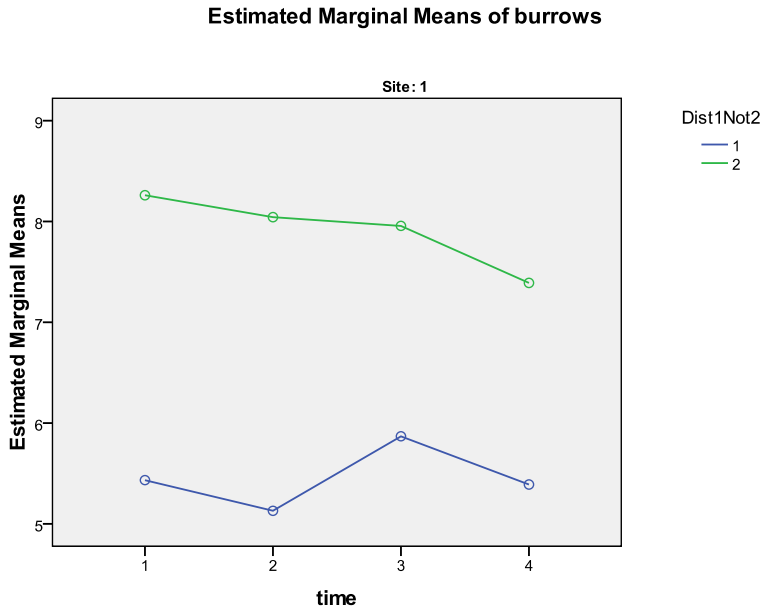
Source	time	Type IV Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Level 1 vs. Level 2	3.130	1	3.130	.474	.495	.011
	Level 2 vs. Level 3	4.891	1	4.891	.821	.370	.018
	Level 3 vs. Level 4	12.522	1	12.522	1.373	.248	.030
time * Dis1Notdis2	Level 1 vs. Level 2	.087	1	.087	.013	.909	.000
	Level 2 vs. Level 3	7.848	1	7.848	1.317	.257	.029
	Level 3 vs. Level 4	.087	1	.087	.010	.923	.000
Error(time)	Level 1 vs. Level 2	290.783	44	6.609			
	Level 2 vs. Level 3	262.261	44	5.960			
	Level 3 vs. Level 4	401.391	44	9.123			

Means based on the analysis (Table 6) reflect 2 patterns. First, within a treatment (Primary vs, Grid), means are similar across all time periods. Second, means for the undisturbed Grid counts are higher than for the disturbed Primary locations. This pattern is also clear in a profile plot of the means (Figure 3).

Table 6. Means for the model with factors of disturbance and time.

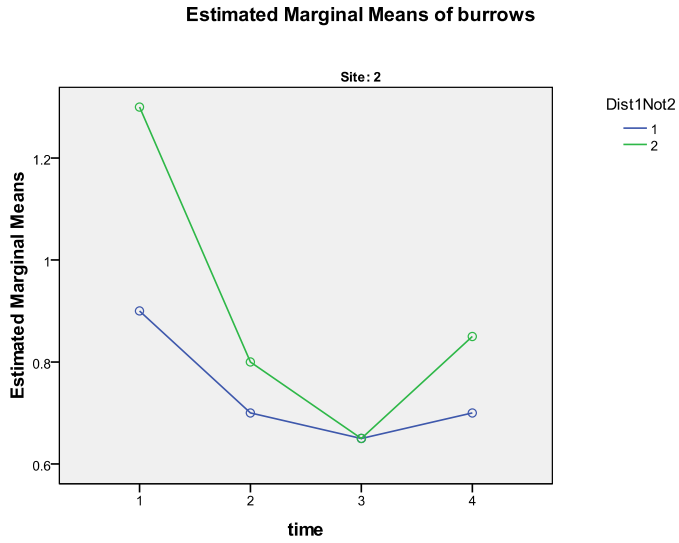
time		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Primary	1	5.435	1.482	2.447	8.423
	2	5.130	1.524	2.060	8.201
	3	5.870	1.418	3.011	8.728
	4	5.391	1.529	2.310	8.472
Grid	1	8.261	1.482	5.273	11.249
	2	8.043	1.524	4.973	11.114
	3	7.957	1.418	5.098	10.815
	4	7.391	1.529	4.310	10.472

Figure 3. Profile plot for means from Table 6. SPSS Code 'Dist1Not2': 'Dist' – Primary locations, 'Not' – Grid locations.



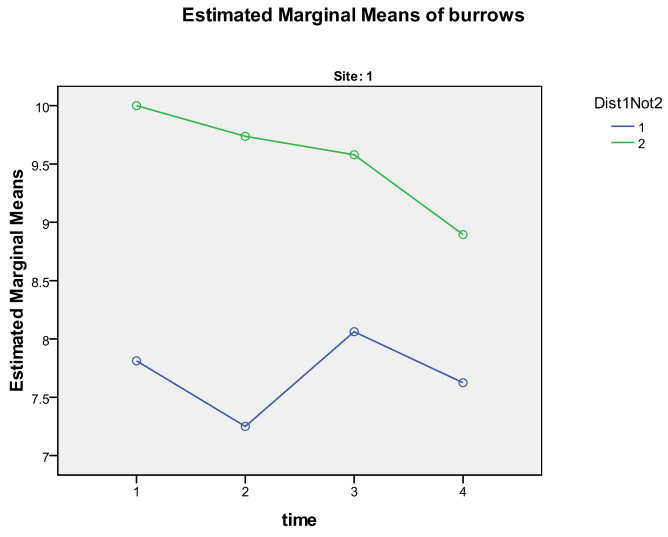
The same analysis was run for Laborde. Again, no statistically significant relationships were identified (analysis not shown), but the profile plot was quite different (Figure 4). Although means for Grid locations were greater than those for Primary locations, differences declined drastically for counts performed at 1 week and later.

Figure 4. Profile plot of marginal means for repeated measures analysis of data from the other site.



Repeated measures analyses were also run on data excluding cases where the Pre-activity surveys recorded no burrows. Again, the Potrero site yielded no significant effects or interactions, and the profile plot was similar to that for the all-data plot (Figure 5).

Figure 5. Profile plot of marginal means, Potrero site; cases with Pre-activity = 0 excluded.



Exclusion of Pre-activity = 0 cases had a much stronger effect on the analysis for the Laborde site. There was a clear effect of time, although no interaction with disturbance (Table 7), and the Pre-activity x 1-week counts generated a near-significant probability (0.053). The profile plot of marginal means for this analyses (Figure 6) exhibits the sharp decline in counts from Pre-activity to 1-week for both Primary and Grid data responsible for significant probabilities. In addition, this is the only analysis where marginal means for Primary locations exceeded those for Grid locations.

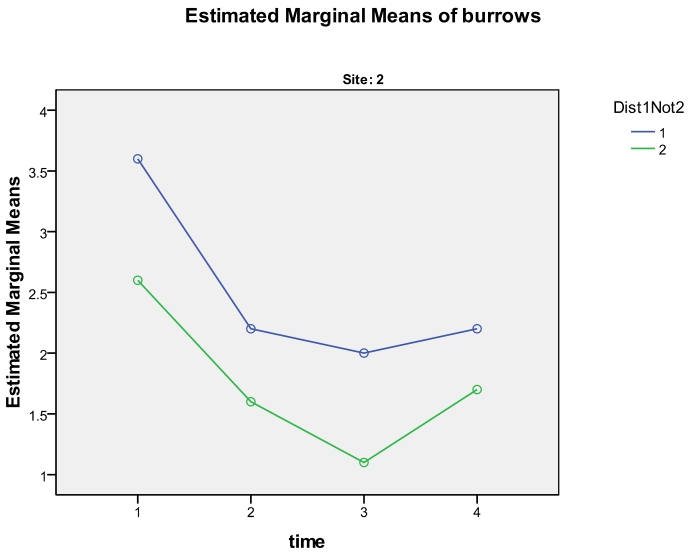
Table 7. Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
time	Pillai's Trace	0.53	4.133[a]	3	11	0.034	0.53
	Wilks' Lambda	0.47	4.133[a]	3	11	0.034	0.53
	Hotelling's Trace	1.127	4.133[a]	3	11	0.034	0.53
	Roy's Largest Root	1.127	4.133[a]	3	11	0.034	0.53
time * Dis1Notdis2	Pillai's Trace	0.016	.058[a]	3	11	0.981	0.016
	Wilks' Lambda	0.984	.058[a]	3	11	0.981	0.016
	Hotelling's Trace	0.016	.058[a]	3	11	0.981	0.016
	Roy's Largest Root	0.016	.058[a]	3	11	0.981	0.016

Table 8. Tests of Within-Subjects Contrasts

Source	time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Level 1 vs. Level 2	19.200	1	19.200	4.522	.053	.258
	Level 2 vs. Level 3	1.633	1	1.633	.569	.464	.042
	Level 3 vs. Level 4	2.133	1	2.133	.502	.491	.037
time * Dis1Notdis2	Level 1 vs. Level 2	.533	1	.533	.126	.729	.010
	Level 2 vs. Level 3	.300	1	.300	.105	.752	.008
	Level 3 vs. Level 4	.533	1	.533	.126	.729	.010
Error(time)	Level 1 vs. Level 2	55.200	13	4.246			
	Level 2 vs. Level 3	37.300	13	2.869			
	Level 3 vs. Level 4	55.200	13	4.246			

Figure 6. Profile plot of marginal means for analysis excluding cases where Pre-activity counts = 0.



The various statistical tests above clearly illustrate the lack of differentiation in burrow counts over time between primary (disturbed) and grid (undisturbed control) plots. These results indicate that disturbances at the various test (well, etc.) sites had little to no effect on SKR activity over time, when compared to nearby paired control sites. As stated previously, the consistently higher burrow counts at control sites versus disturbed sites was unexpected and no clear reason for this trend is available. The close correlation between the numbers of burrows at each plot during one time period and the subsequent time period (Figure 1) may indicate that SKR site use is strongly influenced by habitat conditions at the site.