BUREAU OF LAND MANAGEMENT
LAS VEGAS FIELD OFFICE

FINAL REPORT

TO
CLARK COUNTY DESERT CONSERVATION PROGRAM
FOR THE BIENNIUM
JULY 1 2003 TO JUNE 30, 2005

CBE NUMBER 1957-03

Photo: C. Ronning, BLM Wildlife Biologist

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Restoration of Fragmented Upland Habitats on Federal Lands

Introduction:

Description of the Project: The MSHCP – BLM restoration crew continued restoration and monitoring activities in fragmented upland habitat outside desert tortoise Areas of Critical Environmental Concern (ACECs). In particular this funded project focused on mesquite/acacia communities as well as gypsum badlands that support Las Vegas bearpoppy and sticky ringstem.

Background and Need for the Project: Fragmented habitats such as mesquite/acacia woodlands, gypsum badlands, and sand dunes are often the site of intense recreational use and, subsequently, habitat degradation for sensitive species. Mesquite/acacia woodlands provide habitat for 11 MSHCP Covered Species and 5 High Priority Evaluation Species. Threats to mesquite/acacia habitat are dispersed recreation activities, off-highway vehicle (OHV) activities, illegal woodcutting, urbanization, and lowered water tables due to intense ground pumping. Although population trends for the sticky ringstem are unknown, Las Vegas bearpoppy populations may be declining. Threats to gypsum badland habitat that support these species include dispersed recreation activities, OHV activity, urbanization, and fragmentation due to urbanization.

Restoration of these habitats can prevent habitat degradation by decreasing the recurrence of disturbances, speeding up recovery times, and de-fragmenting populations on a small-scale. The degradation of essential upland habitats for covered and/or evaluation species, outside of critical desert tortoise habitat (Section 7 funds), is a priority issue for the Southern Nevada Restoration Team (SNRT). SNRT is a joint effort among the National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Refuges, and U.S. Forest Service. SNRT members cooperate to share and improve restoration techniques and resources such as native, local seed and live plants which were used for this funded project.

Management Action Addressed: This project, restoring critical habitat for sensitive species, satisfies the following objectives of the *Record of Decision for the Approved BLM Las Vegas Resource Management Plan and Final EIS (1998).*

- SL-1 Reduce erosion and sedimentation while maintaining or where possible enhancing soil productivity through the maintenance and improvement of watershed conditions.
- VG-2 Restore plant productivity on disturbed areas of the public lands.
- VS-1 Limit future impacts on the visual and aesthetic character of public lands.
- FW-3 Support viable and diverse native wildlife populations by providing and maintaining sufficient quality and quantity of food, water, cover, and space to satisfy needs of wildlife species using habitats on public land.
- RC-4 Manage 37,620 acres of the Sunrise/Frenchman Mountain/ Rainbow Gardens Special Recreation Management Area for recreation opportunities in concert with sensitive plant, scenic, cultural, and geologic values of the concurrent ACEC.

Additionally, the project addresses the following actions recommended in the MSHCP:

- BLM(19) Inventory and monitor mesquite and acacia habitats...
- BLM(34) Monitor road and trail proliferation in Las Vegas bearpoppy management areas…
- BLM(123) Within Las Vegas bearpoppy habitat and other important habitats for covered and evaluation species, reclamation of activities which result in loss or degradation of habitat, with habitat to be reclaimed so that pre-disturbance condition can be reached within a reasonable time frame.
- BLM(143) Rehabilitate, reclaim or revegetate areas subjected to surface-disturbing activities where feasible. When rehabilitating disturbed areas, first manage for optimum species diversity by seeding native species, except where non-native species are appropriate.
- BLM(137) Cooperate with NPS, FS, USFWS, Clark County and others on a reclamation program which will include maintaining a seed bank and live plants for rehabilitation of disturbed or burned areas in necessary.
- BLM(221) Limit vehicular use to designated roads and trails in and around mesquite woodlands.
- BLM(302) Protect important resting/nesting habitat such as mesquite/acacia woodlands.
- BLM(304) Maintain and/or improve 45,750 acres of Las Vegas bearpoppy habitat in four bearpoppy management areas...

Goals and Objectives of the Project:

- Decrease habitat fragmentation and provide greater connectivity of habitat;
- Improve the physical and ecological properties of habitat for MSHCP species by restoring ecological attributes, such as water infiltration, forage production, surface hydrology, vegetative cover, dominant diversity of major vegetation components, and surface crusts; and
- Prevent further spread of exotic plant species.

These goals can be accomplished by over the long-term by meeting short-term restoration objectives. Project objectives were to complete restoration on 90 disturbed sites that fragment or degrade essential habitat for sensitive species, and to monitor restoration sites to determine effectiveness of restoration treatments.

What measurable goals did you set for this project and what indicators did you use to measure your performance? To what extent has your project achieved these goals and levels of performance?

Methods and Materials:

Ninety disturbances were evaluated for restoration needs using the following criteria

- Disturbance intensity
- Disturbance frequency
- Importance of the habitat to sensitive species
- Accessibility for applying restoration techniques

Restoration techniques were employed which included: removal of trash and large debris; planting vertical and horizontal mulch; raking delicate soils; placing rocks; posting signs; planting native perennials; and preparing sites for seed entrapment and seedling recruitment. Post-restoration, monitoring techniques were employed which included: logging restoration sites into a main database to relocate and track site characteristics; photo-documenting restoration sites for long-term changes; revisiting sites to qualifying their social and biological success; and measuring plant cover, density, and diversity at some restoration sites.

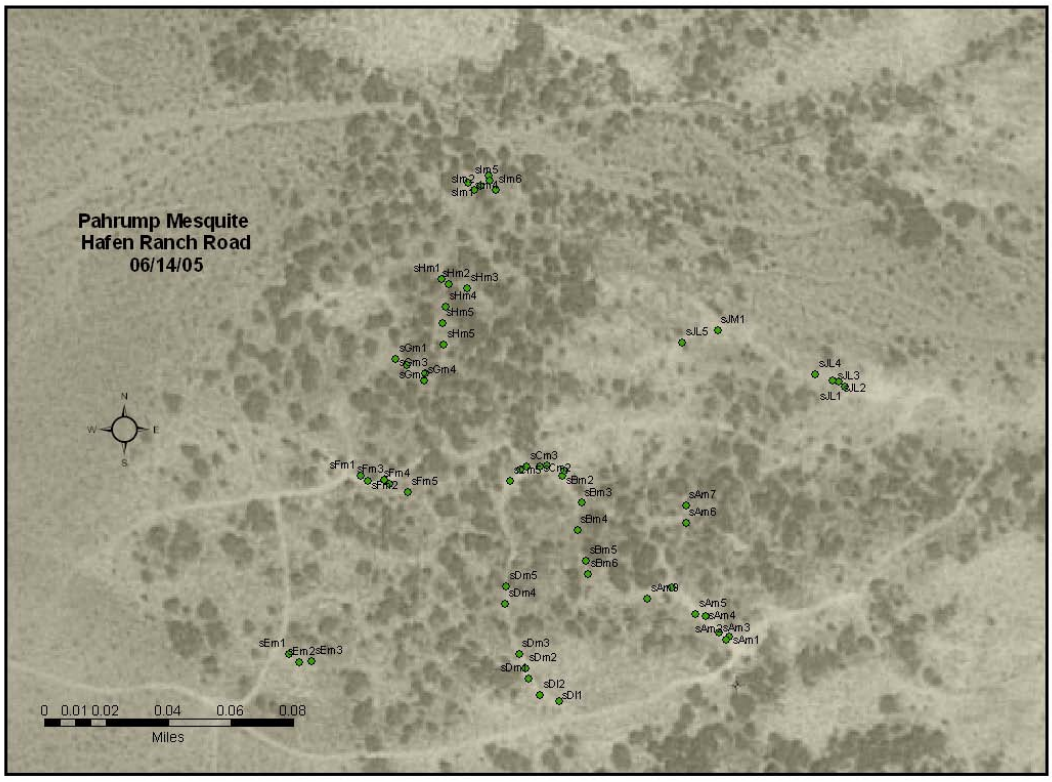
Results and Evidence of Results:

Objective 1 Completed: Thirty restoration sites and over 300 mesquite plantings, in effect, improved over 48 acres of mesquite/acacia woodlands. Sixty restoration sites, in effect, improved over 30 acres of gypsum badlands in the Rainbow Gardens ACEC.

The project funded a restoration team of three, full-time, crew members. The restoration team completed restoration on a total 90 disturbed sites,1 at Cactus Spring, 4 outside of Moapa, 25 outside of Pahrump, and 60 sites in Rainbow Gardens ACEC (see Table 1).

Evidence of Objectives/Needs Were Met/Fulfilled: See photos and table below.

Mesquite/Acacia Woodlands



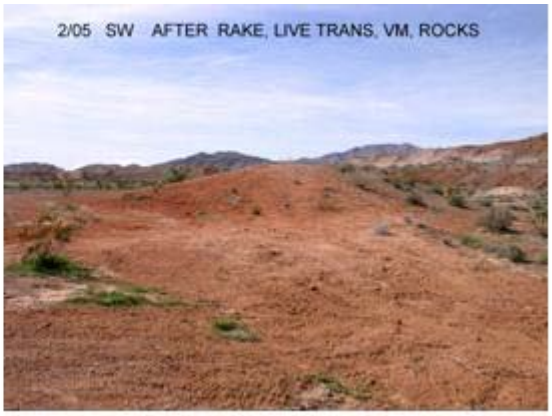
Aerial view of mesquite planted to decrease OHV incursions into a mesquite habitat with a dense population of breeding phainopepla.

Road incurring into mesquite habitat before and after plantings.

The Kern River Gas Transmission pipeline at the time of mesquite planting and 3 months post-restoration.

Gypsum Badlands, Rainbow Gardens ACEC

Incursion into habitat with hundreds of bearpoppies, on the south end of Kodachrome Rd.



Excessive OHV use in management area for the Las Vegas bearpoppy.

Excessive OHV use in management area for the Las Vegas bearpoppy.

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Table 1: Restoration Database of Sites Restored 2003-2005 Biennium. Eighty-nine independent GIS points represent restoration sites. One restoration site at Cactus Spring, north of Indian Springs had not been GPSed.

Region	Project_co	Type_	Size_	Plant_comm	ripped	seeded	vertical_m	live_trans	rock_place	signed	other_sign	barrier	YearRest	Northing	Easting	Monitor1
Moapa	MOkrn0304s3	Scrape		Mesquite/Acacia	no	yes	no	yes	no	Restore in Progress	No Motor Vehicles	yes	2004	4061875	717026	redisturbed, recovering
Moapa	MOkrn0304s1	Scrape		Mesquite/Acacia	no	yes	no	yes	no	Restore in Progress	No Motor Vehicles	yes	2004	4061675	716088	redisturbed, recovering
Moapa	MOkrn0304s2	Scrape		Mesquite/Acacia	no	yes	no	yes	no	Restore in Progress	No Motor Vehicles	yes	2004	4061781	716546	redisturbed, recovering
Moapa	MOkrn0304s4	Scrape		Mesquite/Acacia	no	yes	no	yes	no	Restore in Progress	No Motor Vehicles	yes	2004	4061914	717249	redisturbed, recovering
Pahrump	PAhrr0405J	Incursion	.25 mile	Creosote/Bursage	no	no	yes	yes	no		None	no	2005	3995876	600163	no traffic
Pahrump	PAhrr0405I	Incursion	40 x7 ft	Mesquite/Acacia	no	no	no	yes	no		No Motor Vehicles	no	2005	3995979	599969	no traffic
Pahrump	PAhrr0405H	Incursion	.25 acre	Mesquite/Acacia	no	no	no	yes	no		None	no	2005	3995939	599950	no traffic
Pahrump	PAhrr0405G	Incursion	20x6 ft	Mesquite/Acacia	no	no	no	yes	no		None	no	2005	3995891	599924	no traffic
Pahrump	PAhrr0405J	Incursion	.1 acre	Mesquite/Acacia	no	no	yes	yes	no		None	no	2005	3995879	600163	no traffic
Pahrump	PAhrr0405D	Incursion	80 x 3 m	Mesquite/Acacia	no	no	yes	yes	no		No Dumping	no	2005	3995709	600018	no traffic
Pahrump	PAhrr0405B	Incursion	30 x 3 m	Mesquite/Acacia	no	no	yes	yes	no		No Motor Vehicles	no	2005	3995831	600014	no traffic
Pahrump	PAgam1104A	Incursion	.05 acre	Mesquite/Acacia	no	no	no	yes	no	Restore in Progress	Bird Habitat	no	2004	4002070	588774	no traffic
Pahrump	PAgam0504A	Incursion	20x5 ft	Mesquite/Acacia	no	no	no	yes	no	Bird Habitat	No Dumping	no	2004	4002200	589543	no traffic, recovering
Pahrump	PAgam0504E	Incursion	30x8 ft	Mesquite/Acacia	no	no	no	no	no	Restore in Progress	None	no	2004	4002114	589181	no traffic, recovering
Pahrump	PAgam0504F	Incursion	40x15 ft	Mesquite/Acacia	no	no	no	yes	no	Restore in Progress	Other	no	2004	4002091	589129	no traffic, recovering
Pahrump	PAgam0504G	Incursion	20x8 ft	Mesquite/Acacia	no	no	no	yes	no	Restore in Progress	None	no	2004	4002087	589119	no traffic, recovering
Pahrump	PAgam0504H	Incursion	40x10 ft	Mesquite/Acacia	no	no	no	yes	no	Restore in Progress	None	no	2004	4002072	589077	no traffic, recovering
Pahrump	PAgam0504I	Incursion	.1 acre	Mesquite/Acacia	no	no	no	yes	no	Restore in Progress	None	no	2004	4002078	588996	no traffic, recovering
Pahrump	PAgam0504J	Incursion	30x5 ft	Mesquite/Acacia	no	no	no	yes	no	Bird Habitat	None	no	2004	4002124	588950	no traffic, recovering
Pahrump	PAgam0504K	Incursion	30x4 ft +20x10 ft	Mesquite/Acacia	no	no	no	yes	no	Bird Habitat	No Dumping	no	2004	4002134	588908	no traffic, recovering
Pahrump	PAgam0504L	Incursion	20x5 ft	Mesquite/Acacia	no	no	no	yes	no	Bird Habitat	None	no	2004	4002095	588853	no traffic, recovering
Pahrump	PAgam0504M	Incursion	25x8 ft	Mesquite/Acacia	no	no	no	yes	no	Restore in Progress	None	no	2004	4002082	588805	no traffic, recovering
Pahrump	PAhrr0405F	Incursion	50 ft x 7ft	Mesquite/Acacia	no	no	no	yes	no		No Motor Vehicles	no	2005	3995830	599906	redisturbed
Pahrump	PAhrr0405C	Incursion	30 x 3 m	Mesquite/Acacia	no	no	yes	yes	no		No Motor Vehicles	no	2005	3995832	600005	redisturbed
Pahrump	PAhrr0405A	Incursion	20 x 3 m	Mesquite/Acacia	no	no	yes	yes	no		No Motor Vehicles	no	2005	3995746	600101	redisturbed
Pahrump	PAhrr0405E	Dumpsite	20x20 ft	Mesquite/Acacia	no	no	no	yes	no		No Dumping	no	2005	3995735	599871	redisturbed
Pahrump	PAgam1104B	Dumpsite	1 acre	Mesquite/Acacia	no	no	no	yes	no	Restore in Progress	No Dumping	no	2004	4002026	588738	redisturbed
Pahrump	PAgam0504B	Incursion	25x10 + 20x25 ft	Mesquite/Acacia	no	no	no	yes	no	Restore in Progress	No Dumping	no	2004	4002180	589463	redisturbed, recovering
Pahrump	PAgam0504C	Incursion	20x10 ft	Mesquite/Acacia	no	no	no	yes	no	Bird Habitat	No Dumping	no	2004	4002152	589320	redisturbed, recovering
Pahrump	PAgam0504D	Incursion	25x6 ft	Mesquite/Acacia	no	no	no	yes	no	Restore in Progress	None	no	2004	4002129	589208	redisturbed, recovering

Region	Project_co	Type_	Size_	Plant_comm	ripped	seeded	vertical_m	live_trans	rock_place	signed	other_sign	barrier	YearRest	Northing	Easting	Monitor1
Sunrise MA	SMrgr0205S1	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006627	687063	no traffic
Sunrise MA	SMrgr0205S10	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006565	686935	no traffic
Sunrise MA	SMrgr0305ES9	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006518	687017	no traffic
Sunrise MA	SMrgr0305ES8	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006359	686793	no traffic
Sunrise MA	SMkod0404NE4	Incursion		Other	no	no	no	no	yes	Restore in Progress	None	yes	2004	3998450	680599	no traffic, recovering
Sunrise MA	SMrgr0205S2	Incursion	.5 acre	Creosote/Bursage	no	no	no	yes	yes		None	no	2005	4006621	687044	redisturbed
Sunrise MA	SMrgr0205S3	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006759	687070	redisturbed
Sunrise MA	SMrgr0205S4	Incursion	.5 acre	Creosote/Bursage	no	no	yes	no	yes		None	no	2005	4006708	686952	redisturbed
Sunrise MA	SMrgr0205S5	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006690	686944	redisturbed
Sunrise MA	SMrgr0205S6	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006565	686841	redisturbed
Sunrise MA	SMrgr0205S7	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006456	686758	redisturbed
Sunrise MA	SMrgr0205S8	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006451	686724	redisturbed
Sunrise MA	SMrgr0205S9	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006511	686817	redisturbed
Sunrise MA	SMrgr0205S11	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006698	687068	redisturbed
Sunrise MA	SMrgr0205S12	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006769	687029	redisturbed
Sunrise MA	SMrgr0205S13	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006797	687060	redisturbed
Sunrise MA	SMrgr0205S14	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006728	687003	redisturbed
Sunrise MA	SMrgr0205S15	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006638	686911	redisturbed
Sunrise MA	SMrgr0205S16	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006578	686878	redisturbed
Sunrise MA	SMrgr0205S17	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006605	686915	redisturbed
Sunrise MA	SMrgr0205S18	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006495	686775	redisturbed
Sunrise MA	SMrgr0205S19	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006522	686926	redisturbed
Sunrise MA	SMrgr0205S20	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006557	686975	redisturbed
Sunrise MA	SMrgr0205S21	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006549	687037	redisturbed
Sunrise MA	SMrgr0305ES3	Incursion	.5 acre	Creosote/Bursage	no	no	yes	no	yes		None	no	2005	4006419	687133	redisturbed
Sunrise MA	SMrgr0305ES4	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006468	687127	redisturbed

Region	Project_co	Type_	Size_	Plant_comm	ripped	seeded	vertical_m	live_trans	rock_place	signed	other_sign	barrier	YearRest	Northing	Easting	Monitor1
Sunrise MA	SMrgr0305ES5	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	no		None	no	2005	4006462	687073	redisturbed
Sunrise MA	SMrgr0305ES6	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006475	687019	redisturbed
Sunrise MA	SMrgr0305ES7	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006433	686887	redisturbed
Sunrise MA	SMrgr0305SS13	Incursion	.25 acre	Creosote/Bursage	no	no	no	yes	yes		None	no	2005	3998538	681604	redisturbed
Sunrise MA	SMrgr0305SS14	Incursion	.25 acre	Creosote/Bursage	no	no	no	yes	yes		None	no	2005	3996643	681357	redisturbed
Sunrise MA	SMlab0305SS15	Scrape	.25 acre	Creosote/Bursage	no	no	no	yes	yes		None	no	2005	3996658	681920	redisturbed
Sunrise MA	SMkod0404N3	Incursion		Other	no	no	no	no	yes	Restore in Progress	None	yes	2004	3998152	680599	redisturbed, not recovering
Sunrise MA	SMkod0404N4	Incursion		Other	no	no	no	no	yes	Restore in Progress	None	yes	2004	3998457	680579	redisturbed, not recovering
Sunrise MA	SMkod0404N5	Incursion		Creosote/other	no	no	no	no	yes	Restore in Progress	None	yes	2004	3998466	680572	redisturbed, not recovering
Sunrise MA	SMkod0404NE3	Incursion		Other	no	no	no	no	no	Restore in Progress	None	yes	2004	3998170	680607	redisturbed, not recovering
Sunrise MA	SMkod0404NE2	Incursion		Creosote/other	no	no	no	no	yes	Restore in Progress	None	yes	2004	3998150	680616	redisturbed, not recovering
Sunrise MA	SMkod0404NE5	Incursion		Other	no	no	no	no	yes	Restore in Progress	None	yes	2004	3998508	680579	redisturbed, not recovering
Sunrise MA	SMkod0404s4	Incursion		Creosote/other	no	no	no	no	yes	Restore in Progress	None	yes	2004	3997510	680710	redisturbed, not recovering
Sunrise MA	SMkod0404s3	Incursion		Creosote/other	no	no	no	no	yes	Restore in Progress	None	yes	2004	3997519	680702	redisturbed, not recovering
Sunrise MA	SMkod0404s1	Incursion		Other	no	no	no	no	yes	Restore in Progress	None	yes	2004	3997879	680613	redisturbed, not recovering
Sunrise MA	SMkod0404n2	Incursion		Creosote/other	no	no	no	no	yes	None	None	yes	2004	3998070	680645	redisturbed, not recovering
Sunrise MA	SMkod0404ne1	Incursion		Creosote/other	no	no	no	no	yes	None	None	yes	2004	3998118	680633	redisturbed, not recovering
Sunrise MA	SMkod0404n6	Incursion		Creosote/other	no	no	no	no	yes	None	None	no	2004	3998496	680561	redisturbed, not recovering
Sunrise MA	SMkod0404n7	Incursion		Creosote/other	no	no	no	no	no	Restore in Progress	None	yes	2004	3998796	680507	redisturbed, not recovering
Sunrise MA	SMkod0404n8	Incursion		Creosote/other	no	no	no	no	no	Restore in Progress	None	yes	2004	3998854	680520	redisturbed, not recovering
Sunrise MA	SMkod0404n9	Incursion		Other	no	no	no	no	yes	None	None	yes	2004	3998869	680529	redisturbed, not recovering
Sunrise MA	SMrgr0305ES1	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		No Motor Vehicles	yes	2005	4006461	687189	reopened
Sunrise MA	SMrgr0305ES2	Incursion	.5 acre	Creosote/Bursage	no	no	no	no	no		None	no	2005	4006425	687168	reopened
Sunrise MA	SMrgr0305ES10	Incursion	.5 acre	Creosote/Bursage	no	no	yes	yes	yes		None	no	2005	4006401	686836	reopened
Sunrise MA	SMrgr0305SS11	Incursion	.25 acre	Creosote/Bursage	no	no	no	yes	yes		None	no	2005	3998531	681613	reopened
Sunrise MA	SMrgr0305SS12	Incursion	.25 acre	Creosote/Bursage	no	no	no	yes	yes		None	no	2005	3998717	681599	reopened

Region	Project_co	Type_	Size_	Plant_comm	ripped	seeded	vertical_m	live_trans	rock_place	signed	other_sign	barrier	YearRest	Northing	Easting	Monitor1
Sunrise MA	SMkod0305SS16	Incursion	.5 acre	Creosote/Bursage	no	no	no	yes	yes		None	no	2005	3998125	680637	reopened
Sunrise MA	SMkod0404S2	Incursion		Other	no	no	no	no	yes		None	yes	2004	3997602	680707	reopened, not recovering
Sunrise MA	SMkod0404N1	Incursion		Other	no	no	no	no	yes	Restore in Progress	None	yes	2004	3997900	680614	reopened, not recovering
Sunrise MA	SMkod0404NE6	Incursion		Creosote/other	no	no	no	no	yes	Restore in Progress	None	yes	2004	3998570	680549	reopened, not recovering
Sunrise MA	SMkod0404NE7	Incursion		Creosote/other	no	no	no	no	yes	None	None	yes	2004	3998750	680518	reopened, not recovering
Sunrise MA	SMkod0404NE8	Incursion		Creosote/other	no	no	no	no	no	None	None	no	2004	3998789	680530	reopened, not recovering
Sunrise MA	SMkod0404NE9	Incursion		Creosote/other	no	no	no	no	yes	Restore in Progress	None	yes	2004	3998801	680530	reopened, not recovering

Long-term Monitoring: Four sites restored during 2003-2004 were established as long term monitoring sites. Baseline monitoring data for these sites was measured two months post-restoration in May 2004. Baseline results were as follows:

Germination of *Atriplex lentiformis* (a seed mix species) throughout the corridor was evident on the sides of the pipeline centerline and these juvenile shrubs comprised up to 2% of the plant cover in the disturbed habitat. Mass germination of *Suaeda moquinii* was also evident and these juveniles comprised the major portion of plant cover in the disturbed habitat as well as the under story cover of undisturbed habitat. Occasional *Ambrosia dumosa* (a seed mix species) germinants were also found in the corridor. Disturbed habitat had little to no vertical stratification of plant cover. Invasive species comprised up to 4% of the under story cover when lower layers were present in the undisturbed habitats. After two months, portions of the pipeline which received no OHV use regained up to 25% plant cover. Although much of this cover consists of invasive species, overall invasive cover did not differ from the undisturbed habitat. Continued motor vehicle damage, especially along the centerline, is the greatest limit to plant community recovery along the utility corridor.

Short-term Monitoring:
Cactus Spring: Twenty–two mesquite were planted in April 2004. Sapling survival was 73% 5 months post-planting; however, in October 2004, 6 dead saplings were replaced. Current survival is 100% 15 months post-restoration.

Moapa: One hundred and forty-three mesquite saplings were planted along a pipeline right-of-way in a joint effort with Kern River Gas Transmission. Sapling survival was 53% 5 months post-planting; however, in September 2004, 67 dead saplings were replaced. Current survival is 78% 16 months post-restoration.

Pahrump: One hundred and two mesquite saplings were planted at a mesquite stand off Gamebird Ave. in Pahrump. Currently, survival is 58% 15 months post-restoration. Additionally, of the 15 incursions into the Gamebird stand that were restored, 77% received no subsequent traffic and 23% have been redisturbed. Fifty mesquite and six creosote were planted at a mesquite stand off Kellogg Ave. in Pahrump. Currently, survival is 100% 3 months post-restoration.

Rainbow Gardens ACEC: All 60 restoration sites were revisited in May 2005. For sites that were restored in 2003-2004, 5% of the restoration sites received no traffic and are slowly recovering, 68% have been redisturbed and are not recovering, and 27% have been reopened and are not recovering. For sites that were restored in 2004-2005, 11% have received no traffic, 73% have been redisturbed, and 16% have been reopened. Thus, 92% of the 2003-2005 restoration sites in this area have failed due to continuing disturbance by OHVs.

Did the project encounter internal or external challenges? How were they addressed? Was there something Clark County could have done to assist you?
The primary external challenge encountered during the course of this project was human disturbance of restoration sites with vehicles. This greatly affected restoration success. Continued funding of law enforcement, restoration efforts, and public education by Clark County may help reduce future fragmentation of sensitive species habitat and restoration success.

What lessons did you learn from undertaking this project?
Thirty restoration sites and over 300 mesquite plantings, in effect, improved over 48 acres of mesquite/acacia woodlands. Over 75-80% of these restoration sites have, to date, been successful in decreasing the reoccurrence of disturbances caused by recreational activities. Sixty restoration sites, in effect, improved over 30 acres of gypsum badlands in the Rainbow Gardens ACEC; however, only 8% of these sites have been successful in decreasing the recurrence of OHV disturbance.

Restoration success can not be achieved without public compliance. Mesquite/acacia woodlands showed restoration success except the 15-20% of the locations where vehicle incursions continue.

The lack of success at our restoration sites in Rainbow Gardens ACEC is attributed to the fact that the area is an urban-interface environment with physical characteristics that make restoration a challenge. We have identified that restoration work in this area is very problematic because gypsum badlands are open rolling hills that are difficult places to block OHV use and these areas are also preferred OHV recreational areas. The area receives over 200 individual OHV riders each weekend between October and May and recreational OHV users are very familiar with this area. BLM has delineated the designated routes and closed routes with signs throughout the ACEC in an attempt to reduce the widespread and dispersed OHV use. Yet, some users do not follow the use restrictions and create new trails and reopen restored trails and hillclimbs. In addition, vandals have destroyed informational kiosks and route designation signs; there is considerable lack of public awareness regarding the ACEC's resources that require protection; and the area receives a large amount of criminal activity. Maintaining public compliance is a continuing challenge for the BLM law enforcement officer who patrols the Sunrise/Frenchman Mountain area.

Given the funds used to administer, implement, and manage this project ($235,400), the cost of effectively improving habitat for sensitive species is $4,708 per acre and the cost per acre of restoration work (effective and unsuccessful) was $3,018 per acre.

What lessons does the success or shortfall of the project have for others attempting similar efforts? What would you recommend to others to emulate and/or avoid?

- The majority of our efforts went into performing restoration work and very little was invested in public outreach. We believe that unless the amount of investment in public outreach matches or exceeds the investment in performing the restoration work, the benefits of restoration efforts will be outweighed by the magnitude of future disturbances created by the public.
- Restoration sites that were previously used for recreation are far less successful than restoration sites that were disturbed by non-recreational activities, such as mining and mining roads. Thus, when reaching out to the public, outdoor recreationists should be the target audience.
- All nursery grown transplants must be fitted with a cage, to prevent herbivores from destroying the plant, and must be maintained by a regular watering schedule. The cost of the plant is very minimal compared to the cost to ensure the successful establishment of that plant. But, these additional efforts are highly successful.
- Planting mesquite in early winter is extremely unsuccessful. Best planting times are February to March and September to October.
- Intra-agency cooperation is very important in prioritizing disturbances so that the most critical sites are restored as soon as possible.
- Adaptive management recommendations for Rainbow Gardens include: using Conservation Initiative funding (Rounds 4 and 5) to implement fewer, larger-scale, restoration projects that cannot be easily destroyed by recreational OHV use; using Capital Improvement funding (Round 6) to install fencing in the ACEC and demarcate acceptable OHV routes; and securing funding to increase law enforcement patrols in the area, particularly at restoration sites.
- For mesquite/acacia restoration projects, all redisturbed restoration sites should be closely monitored to determine if additional restoration work must be performed to prevent sites from further degradation. All reopened restoration sites should be reprioritized with other documented disturbances in order to determine if they should be re-restored.

What impact do you think the project has had to date?

Mesquite mortality increases with an increasing depth to the ground water (Stromberg et al., 1992). Establishing juvenile trees in mesquite woodlands conserves these woodlands by ensuring that the community has new recruits to replace trees lost to increased tree mortality as well as illegal woodcutting. The mesquites were planted to reduce incursions; thus access to the stand for illegal woodcutting or dumping was also reduced. Additionally, mesquite plantings defragment these woodlands. Although some wildlife show little differences in habitat use between undisturbed and disturbed mesquite stands, stands that are completely cleared of mesquite have significantly less wildlife abundance (Germano et al. 1983). Therefore, the impact of our mesquite woodlands restoration projects is minimizing the loss or degradation of mesquite woodlands on public lands.

The impact of this project on Las Vegas bearpoppy populations was that it provided valuable information for adaptive management of this species' habitat. Although bearpoppies have been observed on recent disturbances, the species may require intermediate, not excessive, disturbance (Mistretta et al. 1996); thus, excessive uncontrolled OHV use is a significant threat to bearpoppy populations. Based on this information and the results of our restoration efforts, we have been able to identify that future restoration work in gypsum badland habitat should be large-scale efforts that enclose habitat to prevent OHV access followed by restoration of the areas receiving the OHV damage.

Is there additional research or efforts that would complement or add to your project that could be conducted?

- Very little is known about the natural recruitment of mesquite and acacia in the Mojave Desert. It has been suggested that recruitment is more limited by seed dispersal than rainfall (Brown and Archer, 1999) and many animals are known to consume honey mesquite seeds.
- Restoration research that focuses on the most cost-effective way to restore disturbances in the Mojave Desert is severely lacking.

Literature Cited

Brown, J.R., and S. Archer, 1999. Shrub invasion of grassland: Recruitment is continuous and not regulated by herbaceous biomass or density. *Ecology,* **80**, 2385-2396.

Germano, D.J., R. Hungerford, and S.C. Martin. 1983 Responses of selected wildlife species to the removal of mesquite from desert grassland. *Journal of Range Management*: 36(3) 309-311.

Mistretta, O., R. Pant, T. S. Ross, and J. M. Porter. 1996. Current Knowledge and Conservation Status of *Arctomecon californica* (Papaveraceae), the Las Vegas bearpoppy. *Status Reports for Nevada Natural Heritage Program*.

Stromberg, J.C., J.A. Tress, S.D. Wilkins, and S.D. Clark. 1992. Response of velvet mesquite to groundwater decline. *Journal of Arid Environments* 23:45-58.

Law Enforcement

Introduction:

Description of the Project: The project supported four full-time BLM law enforcement (LE) rangers to patrol the four Desert Tortoise Areas of Critical Environmental Concern (ACECs) and other high value habitats consistent with MSHCP goals.

Background and Need for the Project: A critical component of conservation is the public's compliance with BLM's policies, regulations, and land use constraints. Resource protection through full-time LE is identified in the Desert Tortoise Recovery Plan as well as the MSHCP. The BLM Las Vegas Field Office's position is that traditional LE provides the mechanism to enforce land use compliance and protect natural resources, which will ultimately assist in recovery of listed species and preclude federal listing of species at risk of listing. BLM has maintained LE coverage on the most environmentally sensitive areas of Clark County, Nevada for over 10 years. LE rangers coordinate with the BLM resource staff and with other volunteer groups (Wilderness Society, Archeo Nevada, etc.) that inform the LE staff if resource damage is occurring (see Jones and Stokes, 2002).

Dumping along Rainbow Gardens Road.

Management Action Addressed:

- BLM(98) Provide adequate LE presence to ensure that management actions and restrictions are implemented for the conservation of covered and/or evaluation species.
- BLM(71) Limit motorized uses in the Piute/Eldorado "Conserved Habitat" to designated roads and trails.

Goals and Objectives of the Project: Goals of the LE rangers will be to: 1) promote "respect, protect, and enjoy" message of the Clark County MSHCP; 2) discourage irresponsible use of the desert; and 3) to take appropriate enforcement actions when necessary. These actions will greatly assist in reducing illegal activities such as illegal dumping of trash, arson, illegal collection of plants and plant material, and traveling across country.

What measurable goals did you set for this project and what indicators did you use to measure your performance? To what extent has your project achieved these goals and levels of performance?

Methods and Materials: Under the direction of the BLM Supervisory Ranger and with input from resource specialists, the rangers patrolled four critical desert tortoise ACECs: Coyote Springs, Gold Butte, Mormon Mesa, and Piute/Eldorado. In addition, Rainbow

Gardens ACEC, Logandale, wilderness areas, and the mesquite habitat around Moapa were more intensively patrolled.

Each patrol area is much larger than the ACECs within it. The rangers always patrolled the ACECs when on duty, and then if there was no activity within the ACEC, they patrolled their remaining patrol area. Rangers produced weekly patrol reports that included information such as number of patrol days, the roads patrolled, number of public contacts made, number of citations issued, and issues and concerns of the area. As often as possible, photos documenting the use (and abuses) of the areas were taken. Patrol areas are shown in Maps 1 through 4.

Results and Evidence of Results:

Objectives Completed: For the majority of the biennium, four full-time LE rangers were maintained on staff. For nine months, one of the positions was vacant and the area was partially covered (at least 25 percent of the time) by the existing non-MSHCP ranger staff. A total of $56,640 was not invoiced to Clark County for that gap in ranger coverage. A total of $614,360 was spent.

Patrol Vehicle on the Gold Butte Back Country Byway

LE rangers regularly attended MSHCP Working Group meetings to increase coordination between agency LE efforts and information sharing with MSHCP stakeholders.

Evidence of Objectives/Needs Were Met/Fulfilled: A summary of all LE reports indicated that over 9,603 public contacts were made, 443 citations were issued, 225 abandoned or stolen cars were recovered, scores of dumpsites were identified and removed, and numerous signs were installed as needed. LE activities in this biennium have resulted in a 74 percent increase in public contacts and 94 percent increase in citations issued for unauthorized activities occurring on public lands over the 2001-2003 biennium. As there are no designated roads in the Coyote Springs, Gold Butte, and Mormon Mesa ACECs, the public are often given education (during a public contact) or a warning for activities that would be citable if vehicle routes were marked. It is our hope that road designations will help the public comply with the vehicle use restrictions in the Resource Management Plan. Unauthorized vehicle activities will then be citable.

Patrol Summaries:

A summary of patrol activities for each area is briefly summarized below.

Gold Butte ACEC: Roads and trails have not been designated, so the ranger has been limited in his ability to issue citations for off-road use except cross country travel. The ranger for this area continues to reside in Mesquite and continues to interact with locals and interest groups, and attend Town Board meetings. Issues in Gold Butte include dumping, cross country vehicle use, vandalism of directional signs and vehicular trespass into the Lime Canyon Wilderness. Heavy use (camping and off-road vehicle tracks) is occurring in the Whitney Pockets area along with trash dumping Camping, OHV use, sightseeing and hiking continue to increase in this area. New hills climbs were recorded and are a continuing problem.


Burned mattress in Gold Butte ACEC

Table 1. Gold Butte Patrol Summary for 2003-2005

Total Patrol Days	# Contacts	# Citations	# Roads Driven	Issues, Concerns & Opportunities
271	4343	10	Gold Butte Backcountry Byway, Road into Arizona south of Virgin Mtns., Whitney Pockets Road, Cabin Canyon Road, White Rock Spring Road, Toquop Wash, Halfway Wash, Mud Wash near Byway, Roads near Virgin River, Devil's Cove, Cataract Spring.	Off-road travel; dumping trespass; flood damage to roads; sign damage; more directional signs needed to aid visitors; and wildland fires.

Piute/Eldorado ACEC:

Ranger reports continue to indicate that heavier use occurs in Eldorado Valley than Piute Valley. The major issue continues to be unauthorized use of vehicles in the ACEC. Cross-country travel through vegetation and undesignated washes, and driving on closed roads occurs on a regular basis. In some instances, vehicle operators are driving through closed routes that have been manually restored and signed closed by BLM's restoration team. Dumping is occurring along the railroad grade road and near CalNevAri, Nelson Pass and Searchlight. During the biennium, two large dump sites were cleaned up including an abandoned motorhome and a large trash site near CalNevAri. Additionally, 13 barrels of possible hazardous materials were discovered and turned over to the BLM specialist. Rangers report that signs and kiosks have been vandalized and that some signs are missing from the area. A cactus theft was also investigated.


Dumping in Piute Valley near CalNevAri

Table 2. Piute/Eldorado Patrol Summary for 2003-2005

Total Patrol Days	# Contacts	# Citations	# Roads Driven	Issues, Concerns & Opportunities
362	2804	12	US95; numerous roads on northern end of Piute Valley; southwest side of Piute Valley, Railroad Grade Road, Nipton Road, powerline roads on both sides of US95, Homestead Road	OHV cross-country travel in vegetation and closed washes; driving on closed roads and through restoration sites; signs missing or damaged; two large dump sites cleaned up; 13 barrels of possible hazardous materials; ACEC trespass in the Crescent Peak extension; and cactus theft under investigation.

Sunrise Management Area/Rainbow Gardens ACEC: The urban interface with the Sunrise Management area continues to challenge the BLM. Sunrise receives a large amount of visitor use and the highest incidents of unauthorized activities per square mile of the MSHCP funded patrol areas. A great deal of OHV damage is occurring and is hard to control with only one full-time officer for the area. Signs are being vandalized as well as interpretive kiosks. Dumping and illegal shooting still regularly occur. During the biennium, a 5-acre trespass was discovered and the responsible party identified. The responsible party will be charged with a civil action and compensation will be sought to repair environmental damage. The estimates of the restoration total approximately $180,000. The ranger reported at the end of June 2004 that the restoration and road signing is making a difference. This has been the first good news in quite a while for this area! BLM has supplemented patrols in this area with non-MSHCP funded rangers to provide adequate back-up for investigations.

Table 3. Sunrise Management Area Patrol Summary for 2003-2005

Total Patrol Days	# Contacts	# Citations	# Roads Driven	Issues, Concerns & Opportunities
338	1817	576	Lava Butte, Kodachrome, Rainbow Gardens, Lake Mead Blvd., PabCo Road, Gypsum Wash, numerous connecting routes.	Cross-country travel by dirt bikes and ATVs; driving on closed roads; signs are continually vandalized or removed; 155 stolen or abandoned vehicles recovered; dumping; illegal shooting; gang activity is rampant with graffiti everywhere; oil dumping reported to Hazmat Specialist; a 5-acre trespass was discovered and the responsible party identified; and more ranger support needed.

Mormon Mesa ACEC: This area historically has had the lowest visitor use of all desert tortoise ACECs in Clark County, but use increased in the spring of 2005, surpassing the use of the Coyote Springs ACEC. BLM is uncertain if this was due to this year's wildflower display or a trend that will continue. This ACEC has not had roads and trails designated; therefore, the rangers have been limited in their ability to issue citations for off-road use, unless they observe cross-country travel. A desert tortoise mortality was documented on the road to Jacks Pockets in April and was attributed to casual use of the road. Some trash dumping occurs, but is minor at this time. There was significant mesquite woodcutting in Moapa that was investigated. There has also been damage to mesquite restorations sites by off-road vehicle use. Encroachment of motorized travel into the Arrow Canyon Wilderness Area was noted as well.

Desert tortoise struck by vehicle

Table 4. Mormon Mesa Patrol Summary for 2003-2005

Total Patrol Days	# Contacts	# Citations	# Roads Driven	Issues, Concerns & Opportunities
252	402	2	Carp Elgin, various dirt roads	Mesquite woodcutting; abandoned vehicles; vandalism of signs near the Warm Springs Refuge; some vandalism to the "No Woodcutting" signs to protect the Phainopepla; new trail incursions ongoing in the Arrow Canyon Wilderness; off-road activity in the mesquite restoration area; two wilderness boundary signs stolen; possible cultural resource theft/vandalism being investigated; OHV damage; tortoise mortality on a dirt road, and highway tortoise fence damaged.

Coyote Springs ACEC: This area has the lowest visitor use of all desert tortoise ACECs in Clark County. The visitor use in this area continues to increase with more dumping related to target shooting and OHV use. The ranger posted 14 "Pack it in – Pack it out' carsonsite signs along the access roads to deter dumping. Over 25 dumpsites were recorded and added to the desert clean-up project list. New hill climbs were recorded. As in all ACECs, vandalism of signs and abandoned vehicles is a continuing problem.

Table 4. Coyote Springs Patrol Summary for 2003-2005

Total Patrol Days	# Contacts	# Citations	# Roads Driven	Issues, Concerns & Opportunities
250	152	1	US95; SR168 and numerous side roads	the ranger GPSed a number of dumpsites in the ACEC and brought information back to the GIS division so these sites can be cleaned up; some signs vandalized, dumping of landscaping materials; dumping, abandoned vehicles; New hill climbs noted; shooting violations

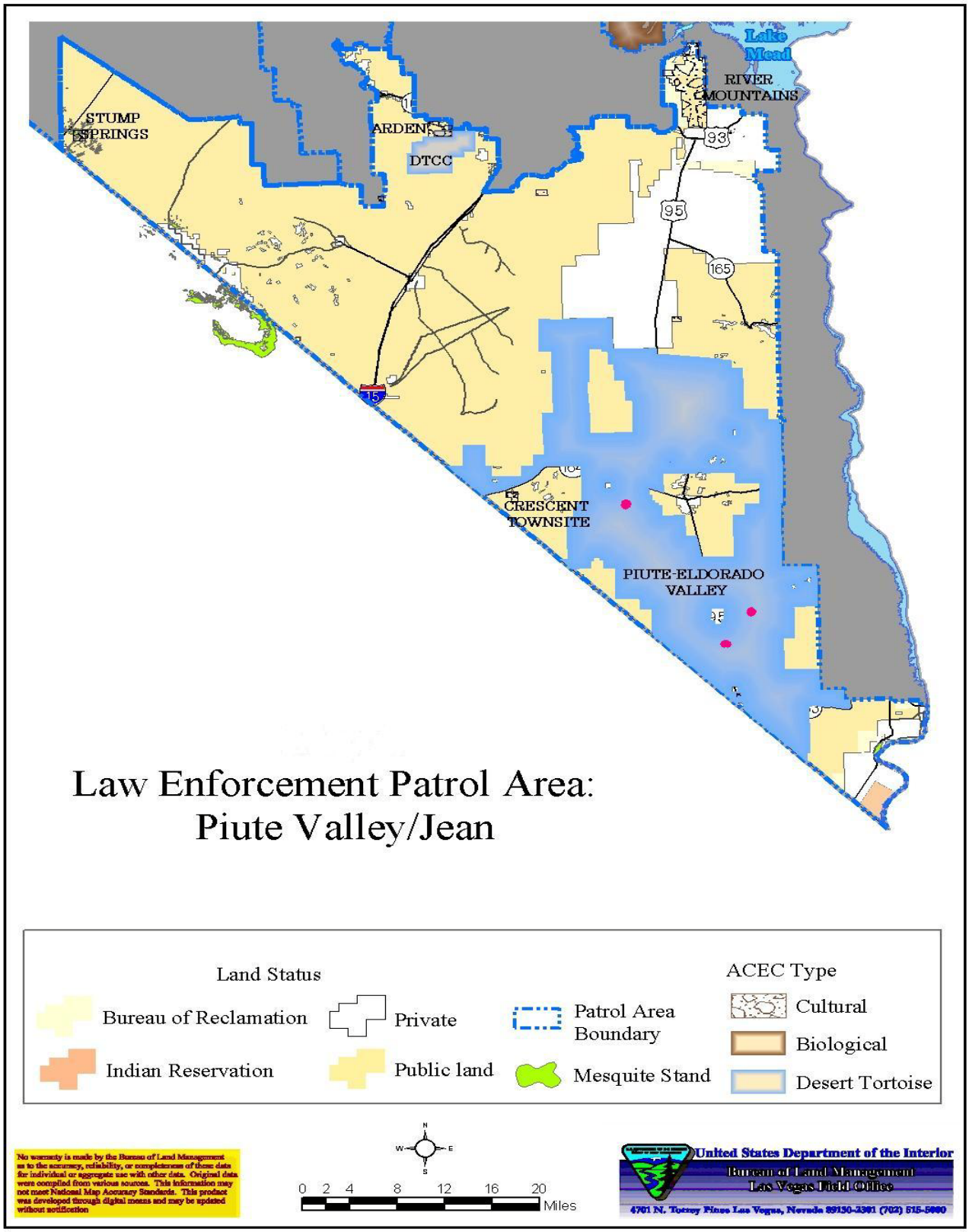
Monitoring Sites:
Activities at the monitoring sites are summarized below. A map of monitoring sites that each ranger tracked for condition is displayed in the attached maps. The tracking sites are marked in pink.

Piute Valley

- Kiosks along US 95 and Christmas Tree Pass Road. The kiosks were intact at the start of the third quarter, but during the forth quarter there was shotgun damage to the kiosk near Nelson Road (see photo). There was no change to condition until quarters 6 and 7 when further damage to the Nelson Road Kiosk was observed. New damage was noted again in quarter 8.

Vandalism at the Nelson Road kiosk

- Rail Road Grade Road –Dumping was noted along this road throughout the biennium.
- Loran Station Road – Some new trails were observed off this road. ATV/motorcycle use was observed throughout the biennium.



Map 1. LE patrol area for Piute/Eldorado ACEC

Gold Butte:

- Whitney Pockets – Most of the camping and day use in Gold Butte occurs in the Whitney Pockets area. Off-road travel, dumping, and resource damage continue on a regular basis.

Hill climbs at Whitney Pockets

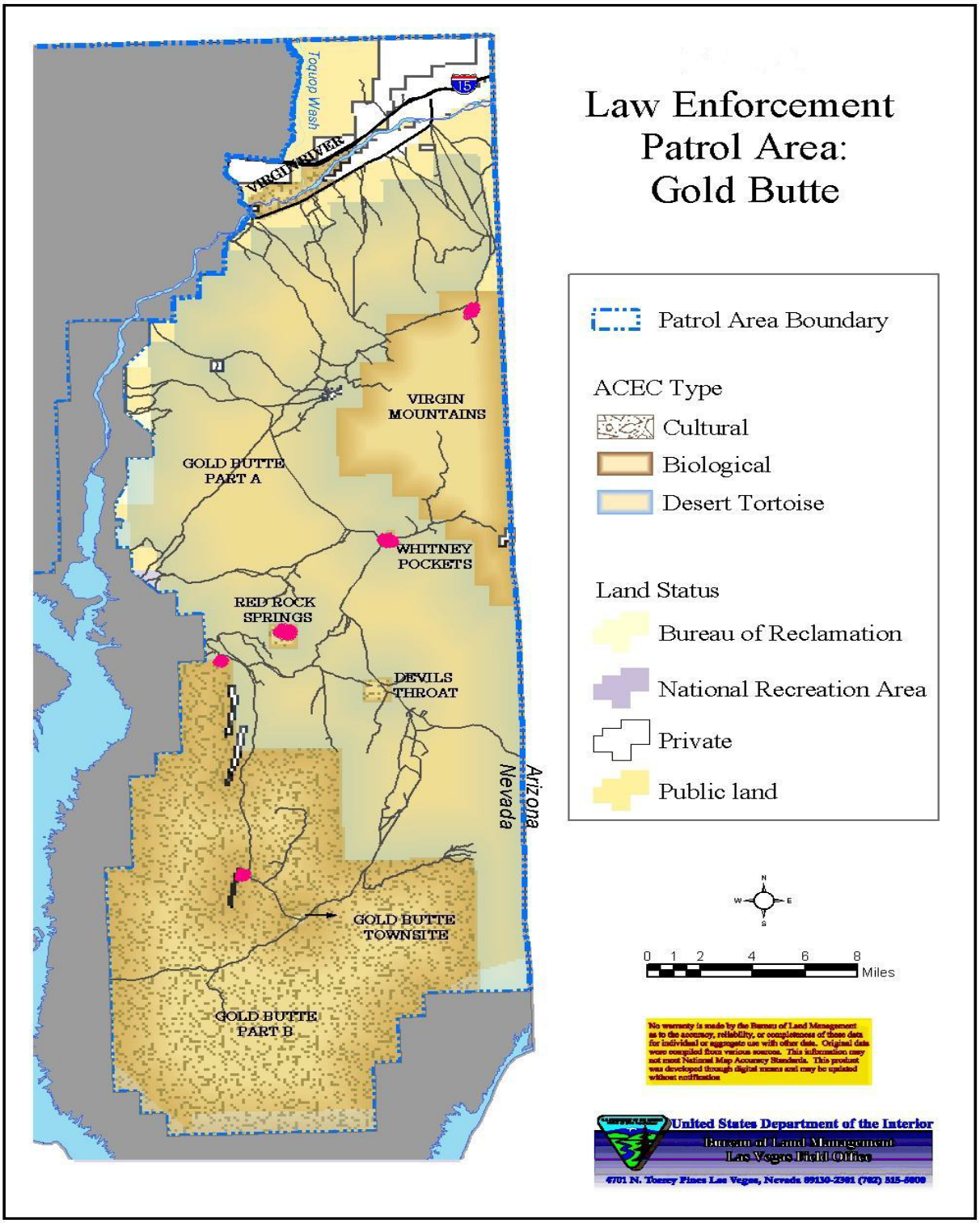
- Red Rock Springs – A lot of vehicle traffic into the spring was noted throughout the biennium. Specifically, a new road incursion from the spring toward the north was observed that continues to be used.

Road incursion above Red Rock Springs

- Lime Canyon Wilderness – Lime Canyon Wilderness continues to have incursions by ATVs and motorcycles. The ranger put a boulder and a gate in the path to keep ATVs out of the wilderness area at the end of the cherry-stem. Someone ripped the gate down and removed the boulder. A post and cable fence or other barricade is needed. The ranger will continue to work with the wilderness program to resolve this issue.

Fence and gate damage at Lime Canyon Wilderness boundary

- White Rock Campground – In quarter 3, new graffiti was observed at this site. In quarter 4, the hill climb near the campsites was getting further use and more “burned in”. The hill climb appears to get continued use.



Map 2. LE patrol area for Gold Butte ACEC

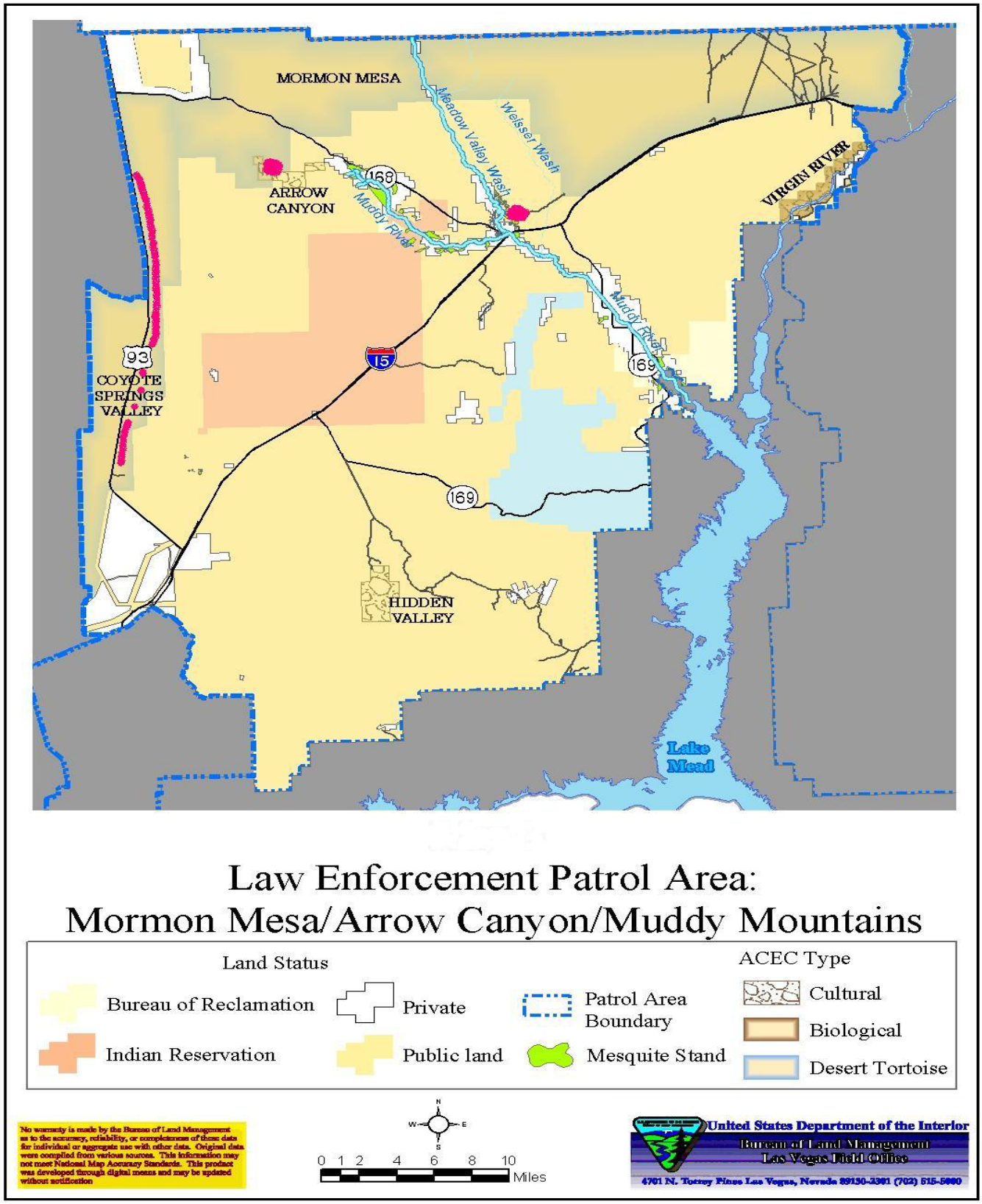
Coyote Spring ACEC:

- US93 border of the Coyote Spring ACEC – Several access roads along US93 are regularly used by shooters; ranger has made contact with several groups. In quarter 8, noted some new hill climbs were observed. No change was noted after that, though use of the area by shooters and use of the hill climbs continues.

Hill climb observed off US93

Mormon Mesa ACEC/Mesquite Woodlands:

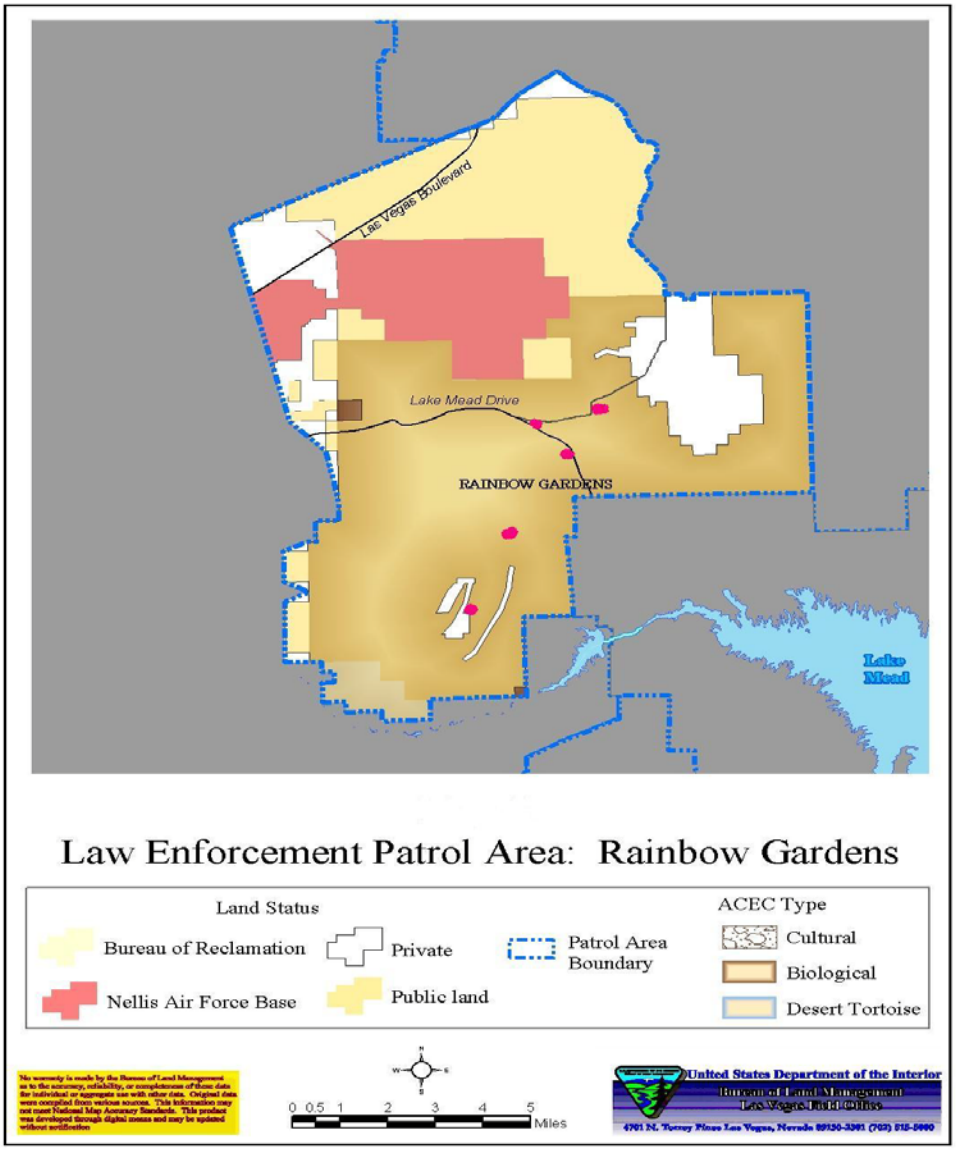
- Mesquite area near Glendale – The ranger observed new mesquite cutting near the Kern River pipeline where the restoration project was completed. One “Bird Habitat” sign was stolen. During quarter 5, the ranger documented that the restoration signs and barricades by the mesquite planting areas appear to be working. One or two young trees were run over, but overall the site looks good. The signs stating, "Please No Wood Cutting", continue to be stolen/vandalized. Only three of the original seven remain standing. Wood removal and dumping also occur infrequently in the area but there is no pattern. Following that, no new damage to this area was noted.
- Arrow Canyon Wilderness boundary – ATV tracks near and over the Arrow Canyon Wilderness boundary were observed in all but quarter 7. Unauthorized use of the area resumed in quarter 8. Signs are needed to delineate the exact boundary where the trails exist and to keep traffic out of the wilderness.



Map 3. LE patrol area for Coyote Springs and Mormon Mesa ACECs

Sunrise Management Area/Rainbow Gardens ACEC:

- Kiosk near Lake Mead Blvd. – The kiosk was severely vandalized with graffiti in quarters 3 and 4. No further damage was noted in subsequent quarters. All directional signs have been similarly vandalized. Damage to signs continued throughout the biennium, including non-gang related painting of all the signs with brown paint to obscure the message. The ranger replaced 11 signs in quarter 4 and more again in quarter 7.
- Post and cable fence along Rainbow Garden Road – The fence is intact, but in quarter 3, the southern gap fence was cut and needed repair. No further incursions were noted.
- Gypsum Spring – No incursions
- Bearpoppy Hill Restoration Area – No incursions.



Map 4. LE patrol area for Sunrise Management Area/Rainbow Gardens ACEC

Did the project encounter internal or external challenges? How were they addressed? Was there something Clark County could have done to assist you?
One LE position was vacant for 9 months. During the hiring process, the BLM used LE staff from other non-MSHCP funded patrol areas to cover approximately 25% of the vacant LE's patrol hours to reduce the impact of the diminished staff. The position was filled during the last quarter of the biennium.

What lessons did you learn from undertaking this project?
Illegal activities, such as vandalism of kiosks and signs and off-road vehicle use are random in nature. Therefore, it is hard to ascertain how effective four LE rangers are in curbing damage to sensitive habitat, resources and structures, and restoration sites over hundreds of thousands of acres of public lands. Increased LE activity, particularly in Gold Butte ACEC and the Rainbow Garden ACEC, has resulted in: an increased awareness of locations where more intense public use is occurring; increased public contact and education on correct use of public lands; as well as indicating levels of seasonal use. Their presence provides for public safety and reminds the public that rules and regulations exist. The ability of LE rangers to cite persons conducting illegal activities is an important deterrent for reducing repeat offenses.

What lessons does the success or shortfall of the project have for others attempting similar efforts? What would you recommend to others to emulate and/or avoid?

- Use of a resident ranger in Mesquite, Nevada has increased LE visibility and public contacts in Gold Butte and Mormon Mesa. BLM recommends use of resident rangers to increase contact with local residents and law enforcement.
- Monitoring effectiveness of law enforcement activities in the ACECs is very difficult due to the large patrol area, limited personnel resources, and an adjacent growing human population that exceeds 1 million residents and 30 million visitors a year. Public contacts and citations may stop repeat offenses, but only at the individual level.
- Based on the projected population growth in Clark County and increase in visitation, the current law enforcement strategy will require a substantial increase in law enforcement officers and equipment in order to maintain the existing level of natural resource protection (Jones and Stokes, 2003).

What impact do you think the project has had to date?

- Through the use of MSHCP funds, the BLM has been able to attract and maintain high quality, committed officers to the Las Vegas Field Office. Except for 9 months where one position remained vacant, the BLM was successful in maintaining four LE rangers over the biennium.
- LE activities in this biennium have resulted in a 74 percent increase in public contacts and 94 percent increase in citations issued for unauthorized activities occurring on public lands over the 2001-2003 biennium.
- As stated previously in this report, LE staff made over 9,600 public contacts. These efforts provided the public with information about appropriate use of the ACECs; areas where there are no controlled access points where the BLM can disseminate information.

- Increased LE visibility in the ACECs, issuance of citations, and arrests send a message to violators that illegal activities will be penalized.
- Regular reports of any illegal dumping in the ACECs have enabled the BLM to prioritize limited resources for desert cleanup efforts.

Is there additional research or efforts that would complement or add to your project that could be conducted?

BLM will continue to work toward designation of roads and trails within the desert tortoise ACECs to inform the public of appropriate access routes and enable rangers to cite noncompliant users.

The MSHCP needs to continue supporting a minimum of four full-time rangers. BLM should continue to have one LE ranger residing in Mesquite, Nevada, one in Overton/Logandale, Nevada, and one in Laughlin, Nevada.

Literature Cited:

Jones and Stokes. 2003. *Final Clark County Multiple Species Habitat Conservation Plan Law Enforcement Needs Assessment*.