Inventory of Vascular Plants at Mojave National Preserve & Manzanar Historic Site

For

U.S. National Park Service
Inventory and Monitoring Program

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1.0 INTRODUCTION

1.1 National Inventory and Monitoring Program and Mojave Network

The Servicewide Inventory and Monitoring (I&M) Program, initiated by the National Park Service (NPS) in 1992, was created to "chart the course and provide the leadership and information resources needed by the NPS to preserve and protect the natural resources placed under its trust by the American people into the 21st Century and beyond" (National Park Service 1992). The national program coordinates systematic efforts to acquire 12 basic data sets for parks with significant natural resources including basic information on air and water quality; base cartography; weather data; geology; soil and vegetation maps; a natural resource bibliography; and information about the occurrence, relative abundance, and distribution of vertebrate and vascular plant species. In recognition of the need for good scientific information on resources in the NPS, Congress passed the National Parks Omnibus Management Act in 1998, and mandated a "program of inventory and monitoring of National Park System resources to establish baseline information and to provide information on the long-term trends in the condition of National Park System resources" (NPS 1999). Congress also provided funding to implement the I&M Program through the Natural Resource Challenge and Natural Resource Initiative. Numerous guidance documents and tools have been developed by the National I&M Program and provided to park managers to assist in the planning and development of standardized inventory and monitoring programs and facilitate information sharing. Continued funding and refinement of I&M protocols will assure the NPS moves toward its goal of science-based natural resource management.

In order to facilitate prioritization and resource sharing, minimize duplication of effort, and emphasize consistency and integration among data sets the Servicewide I&M Program organized 265 park units into Inventory and Monitoring Networks based on similarity of natural resource attributes. The Mojave Network consists of six NPS units in the Mojave and Great Basin biomes: Death Valley National Park (DEVA), Great Basin National Park (GRBA), Joshua Tree National Park (JOTR), Lake Mead National Recreation Area (LAME), Manzanar National Historic Site (MANZ) and Mojave National Preserve (MOJA).

This particular contract focuses on two of these NPS units, Manzanar National Historic Site and Mojave National Preserve. It was determined that the highest priority natural resource attribute for these two park units was inventory of botanical resources. In this proposal we outline the goals, methods and deliverables for this inventory. Unless otherwise specified here, this proposal follows the Mojave Network Inventory Biological Study Plan (October 1, 2001).

1.2 Program Overview

The inventory of vascular plant species at both Manzanar Historic Site (MANZ) and Mojave National Preserve (MOJA) was identified as the top inventory priority by the Mojave Inventory and Monitoring Network Biological Inventory Study Plan (2001). Little to no information on the occurrence of vascular plant species existed for MANZ. Prior to this study, a total of 831 species had been reported to occur in MOJA, yet significant regions of the park remained undocumented (André and Esque, 2001; Mojave Network Inventory Biological Study Plan).

This report summarizes the preliminary (BASE and OPTION YEAR) findings of vascular plant surveys conducted at Mojave National Preserve and Manzanar Historic Site, 2002-2004. In addition, we report the results of surveys (donated by our team) that extended into FY2004/2005 (taking advantage of the outstanding "one-in-fifty-years" bloom that year), as well as the relevant data obtained from the Hackberry Fire Complex BAER rare plant surveys in FY2005/2006 (Andre, 2006).

As outlined in this contract, the primary objective of botanical inventories at MANZ and MOJA is to document the occurrence of at least 90% of vascular plants within each park. At the onset of this study, it was estimated that the 831 known taxa in MOJA represented about 90% of the potential total number of taxa in the Preserve. To meet this objective at each park, we initiated the BASE and OPTION YEAR surveys at Priority Locations in combination with targeted surveys and opportunistic surveys. In addition, we conducted data mining efforts that involved evaluating and updating existing inventory records, as well as a comprehensive survey of vouchered herbarium collections. Finally, whenever possible we recorded information relating to the distribution and abundance of species of special concern and non-native alien species at MOJA.

1.3 Regional Context and Significance

1.3.1 Mojave National Preserve

The Mojave National Preserve was established pursuant to the California Desert Protection Act of 1994, to "preserve unrivaled scenic, geologic, and wildlife values" and "perpetuate in their natural state significant and diverse ecosystems of the California Desert" (PL 103-433). Located in southern California, the legislated park boundary encompasses 1.6 million acres (648,000 ha), including 700,000 acres (283,500 ha) of designated wilderness. Providence Mountain State Recreation Area (Mitchell Caverns), the University of California's Sweeney Granite Mountain Desert Research Center and California State University's Desert Studies Center also are located within the park boundaries. MOJA consists of a vast expanse of desert lands representing a combination of Great Basin, Sonoran, and Mojave Desert ecosystems within a land of mountain ranges, sand dunes, great mesas and extinct volcanoes (GMP 2000).

Numerous natural resources at MOJA have regional, national, or global significance and serve as the basis for management. An extensive variety of habitats, species and landforms unique to the Mojave Desert are present within MOJA and provide unique opportunities for visitors and scientists. Mojave National Preserve contains outstanding scenic resources, rich in visual diversity containing a varied landscape of sand dunes, mountain ranges, dry lake beds, lava flows, cinder cones, Joshua tree forests and far-reaching vistas. The Joshua tree forest of Cima Dome and Shadow Valley is the largest and densest population of Joshua trees (*Yucca brevifolia)* in the world. Internationally, MOJA is known as a place to conduct desert research and its lands are known for their geological features such as Cima Dome, the Cinder Cones and the Kelso Dunes. Additionally, approximately half the lands within the preserve have been designated Critical Habitat for the desert tortoise (GMP 2000), a federally threatened species.

The Mojave is characterized by isolated mountain ranges and ridges separated by alluvium-filled, irregularly large valleys. Dividing MOJA in half is an impressive interconnected chain of highlands that trend from southwest to northeast that includes the Mid Hills, and the Granite, Providence and New York Mountains. The principle valleys within the Preserve include Ivanpah Valley, Kelso/Cedar Wash, Lanfair Valley, Devils Playground, Piute Valley, and the northern area of Fenner Valley. Both Lanfair and Piute Valleys drain into the Colorado River. The remaining valleys have self-contained drainage systems as represented by playa lakes such as Soda and Ivanpah. Elevation at MOJA ranges from 900 ft (275 m) above sea level to nearly 8,000 ft (2,440 m). MOJA is located in a hot desert climate and summer temperatures range from 77-109 degrees F. Winter temperatures are mild, ranging from 34-61 degrees F. Precipitation occurs primarily in the form of rainfall, averaging 8.6 inches per year.

The vegetative resources of Mojave National Preserve reflect the mingling of three major North American Deserts: the Great Basin, Mojave and Sonoran and is considered a unique floristic area. Vegetative attributes of the Preserve primarily represent the Mojave Desert but contain floral species of the Great Basin, Sonoran and some elements of the California Coastal Zone. 831 plant species have been documented within park boundaries. Many plants are distributed throughout Preserve boundaries; while other areas such as the New York Mountains contain species of manzanita (*Arctostaphylos pungens*) and California lilac (*Ceanothus greggii*) normally associated with coastal California. The Mid Hills have significant stands of Great Basin sagebrush and Utah juniper. The strongest association however, is with the Sonoran desert whose northernmost range is often recognized to intermingle with the southern border of the preserve. Common elsewhere in the Preserve are the playas, saltbush, creosote-covered flats, alluvial fans and Joshua tree forests. The Preserve is unusual in the complexity and density of the Joshua tree, Mojave yucca (*Yucca schidigera*) and banana yucca (*Yucca baccata*) communities. Higher elevations support grassland, sagebrush, blackbrush and pinyon-juniper woodlands. Many unique plant assemblages occur at MOJA in canyons within the New York Mountains. For example, Caruthers, Keystone and Live Oak canyons contain pinyon-oak-juniper woodlands or interior chaparral communities. Piute Creek is a perennial stream, bordered by riparian vegetation. Cottonwoods, willows, and sedges dominate this fragile and limited plant community.

Significant threats to MOJA natural resources exist and are in part related to exceptions in land use made by Congress. The enabling legislation of MOJA specifically allows the continuation of the following land uses that may threaten biological integrity in some areas of the park: mining, grazing, hunting, trapping, and utility rights of way (pipelines, major transmission lines, telephone relay stations, antennas, billboards, etc.). Other threats to park resources include introduction of non-native plant and animal species (ie. burros, tamarisk), air pollution, hazardous materials related to mining activities, military overflights, light pollution, off-road vehicle use, loss of critical habitat due to grazing, recreational activities and increased vehicular traffic along the Los Angeles to Las Vegas corridor.

The eastern Mojave Desert, with its high isolated mountains and vast basins holds a great fascination to botanists. In part, this is due to its diverse topography and unique geology, which supports considerable endemism. The Mojave National Preserve encompasses much of the rich flora of the eastern Mojave Desert, containing many species from the Great Basin and

southwestern deserts not otherwise reported in California.

Early botanical exploration of the region was extensive, lead by famous botanists such as T.S. Brandegee and Marcus .E. Jones, who explored the Providence Mountains in 1902 and 1906. Brandegee and W.L. Jepson collected in the New York Mountains in 1911 and 1913, while S.B. Parish visited the Ivanpah Mtns in 1915. Carl B. Wolf and Philip A. Munz began to intensively collect the ranges and valleys of the Preserve in the 1930s. And more recently Robert F. Thorne, Barry A. Prigge, and James Henrickson collected throughout the area between 1960 and 1980. In addition, a significant contribution has been made by a program directed out of the University of California in the late 1970s and early 1980s, which brought students from UCLA and UCSC to carry out inventory of selected ranges within the Preserve. Among these students included Bruce Baldwin, now curator of the Jepson Hebarium at UC Berkeley.

Floras have been published for the Clark Mountain Range (Prigge 1975), the Granite Mountains (Hart, Stein and Warrick 1979; Andre 2006), and the Old Dad Mountain and Kelso Peak area (Curry et. al. 1981). The Kelso Dunes and higher ranges were extensively studied by Thorne, Prigge and Henrickson, who eventually published *A Flora of the Higher Ranges and the Kelso Dunes of the Eastern Mojave Desert in California* in 1981 in *Aliso*.

Though considerable effort has been undertaken to document the vascular flora of the Mojave National Preserve region, many parts of the Preserve remain floristically unexplored. The Castle Peaks, Cima Cinder Cones, Von Trigger Hills, Woods and Hackberry Mountains, for example, remain relatively un-documented. Even the higher ranges such as the Granites, Providence and New York Mountains contain remote canyons and ridges that have not been visited by botanists. And very few vouchers have been made from the Piute Range, at the remote far eastern end of MOJA.

1.3.2 Manzanar Historic Site

Manzanar National Historic Site was established in 1992, "to provide for the protection and interpretation of the historical, cultural, and natural resources associated with the relocation of Japanese-Americans during World War II" (PL 102-248). This park represents the smallest in the Mojave Network with the fewest available resources to assist with inventory activities. MANZ is located in the Owens Valley of southern California and encompasses 814 acres (330 ha) at approximately 3800 feet (1,159 m) elevation (Table 1). The Owens Valley is well protected from ocean air masses by the Sierra crest and thus experiences a predominantly high desert type climate. Summer high temperatures often exceed 100 degrees F (37 ^{0} C), followed by evenings ranging from 65-75 degrees F (18 ^{0} C to 24 ^{0} C). Winter temperatures are moderate and on average drop below freezing about 10 days per year. Precipitation falls as a mix of rain and snow during the months from December through March. Average precipitation totals about 4 inches (10 cm) per year.

Natural resource diversity is highest along the primary natural watercourse, Bairs Creek, flowing west to east toward the Owens River. This stream is intermittent, carrying substantial flows during periods of spring and summer runoff, but tapering off to minimal or no flow during fall and winter months. Soils are composed of alluvial materials deposited by erosion of the Sierra

Nevada Mountains. Materials are coarse and well-drained.

Natural vegetation at MANZ is primarily Great Basin sagebrush scrub, characterized by low shrubs such as sagebrush (*Artemisia tridentata*), saltbush (*Atriplex polycarpa*), and rabbitbrush (*Chrysothamnus nauseosus*), and a variety of herbaceous and succulent plants. A portion of the park is covered by a large cottonwood grove that exists in a unique hydrologic area where groundwater remains relatively near the surface. Finally, a small riparian zone is present along Bairs Creek. While natural vegetation patterns are reasserting themselves over much of the camp, the twentieth century agricultural and residential uses have significantly affected the vegetation on-site.

No threatened or endangered species have been documented within MANZ, however, the California Department of Fish and Game's Natural Diversity Database lists Owens Valley checkerbloom (*Sidalcea covillei*), Nevada oryctes (*Oryctes nevadensis*) and Inyo County star-tulip (*Calochortus excavatus*) as special status plants that occur in or near MANZ.

Existing threats to natural resources at MANZ include a lack of baseline data, non-native plants such as black locust (*Robinia pseudoacacia*) and tamarisk (*Tamarix ramosissima*), groundwater withdrawal to the City of Los Angeles, soil loss through erosion due to Los Angeles Department of Water and Power water spreading activities, visitor use activities and development of park facilities (roads, trails, etc.).

Several botanists have worked extensively in the Owens Valley during the last half-century, most notably Mary DeDecker. Recent work by G.L. Clifton and J.M. André (in progress) to complete a comprehensive *Flora of the Owens Valley* has yet to include surveys of the Manzanar Historic Site. Given this larger effort, and since no prior collections exist in any herbarium for MANZ, justification for a full inventory of the site is warranted. Of even greater importance however, is the integration of present day floristic diversity at MANZ with the historic uses of the site since World War II. A complete documentation of both native and introduced plants is of paramount interest to the ethnobotanical story and cultural history that is being described there.

1.4 Objectives

The primary objective of this project is to inventory and document at least 90% of the vascular plant species currently estimated to occur within MOJA and MANZ, and:

1. Inventory and document occurrence of vascular plant species within the identified Priority Sampling locations at MOJA. Inventory of vascular plants at MANZ will be park-wide;

2. Provide one voucher specimen for each new taxon for which no previous voucher exists for each park unit;

3. Provide a list of sensitive species that are known to be federally or state listed, rare, NPS sensitive, endemic or worthy of special consideration that occur within each park. Provide a GIS-compatible digital file of the precise coordinates for all

species of concern;

4. Provide all species data to Mojave I&M Network Data Manager for entry into the National Park Service NPSpecies database;

5. Provide all deliverables as outlined in the project Scope of Work.

2.0 METHODS

2.1 Herbarium Surveys

2.1.1 Database and Bibliographic Query

Many of the major herbariums have developed searchable databases of their holdings in the past 5 years, which significantly reduces the time required to conduct a survey of herbarium records. We conducted a complete survey of the Jepson Online Interchange (contributed to by a consortium of herbariums in CA) for all vouchers made at MANZ and MOJA. Our goal was to identify additional species not previously found in earlier data-gathering efforts. When new species were encountered, and where feasible, we visited the herbariums to confirm the identification of the voucher.

In addition, we surveyed the botanical literature for recent taxonomic revisions, new species descriptions, or other notable range extensions that added species or unique and significant populations to MANZ or MOJA.

For rare plants, we conducted a review of the published and unpublished literature by both traditional and electronic bibliographic search methods. A full query of RAREFIND, the California Natural Heritage Program's microcomputer-based Natural Diversity Data Base (NDDB) software program, was conducted for the 7.5-minute USGS quadrangles traversed by MANZ and MOJA, and surrounding regions. Any existing literature on regional endemism, sensitive habitat, and known or potential occurrences of special-status plant species within the parks was documented.

2.2 Field Surveys

2.2.1 Mojave National Preserve

Our sample design incorporates probability-based sampling to allow extrapolation of results to areas of interest, while attempting to use inventory techniques that will most efficiently add to park species lists. Unfortunately, it is often true that the best inventory techniques for detecting species presence/absence are insufficiently random, while purely randomized approaches frequently miss small-scale heterogeneity and localized 'hot spots.' We will try to strike a balance between these two objectives by: 1) establishing a core set of randomly-located sample sites; 2) identifying small scale 'rare and sensitive features' to be targeted for sampling; and 3) describing ancillary data collection techniques and promoting opportunistic data collection.

The primary focus of the field surveys was to identify species that had not been previously documented in MOJA. Secondarily, rare plant occurrences and non-native alien species were documented when encountered.

We conducted a combination of "Area Searches of Priority Locations", "Opportunistic Surveys" and "Targeted Surveys" as our primary survey method at MOJA. Area Searches incorporated the relevé concept whereby vegetation types of an area were searched until the number of species

no longer increased with increasing area within that vegetation type. Priority Locations for FY 2002/2003 (BASE YEAR) included the Piute Range and Castle Peaks area along the eastern boundary of the Preserve, and all areas above 4,500 ft elevation (a total of about 500,000 acres). Priority Locations in FY2003/2004 (OPTION YEAR 1) included the Kelso Dunes, Preserve border areas, and the lower elevations in general, including the dry lake basins at Soda Dry Lake and near Nipton. Priority Locations during the extended period of FY2004/2005 included disturbed sites, the Hackberry Burn area, and summer annual blooms where they occurred in response to summer rains. Area Searches were chosen systematically in representative habitats within these larger Priority Locations. In general, Areas Searches were in the range of 10-600 hectares in size.

The Mojave National Preserve is quite expansive (approximately 1.5 million acres) with many areas that are remote and difficult to access. Thus, in addition to the Area Searches, we conducted Targeted Surveys and Opportunistic Surveys elsewhere throughout the Preserve. Targeted Surveys were usually conducted in sensitive habitats, or areas with high potential to add new species to the park master list. Opportunistic Surveys were done in areas that, because of favorable conditions (ex. localized summer rains), incidental observation, or through leads from other sources, had high potential of new species.

2.2.2 Manzanar Historic Site

Because the areal extent of MANZ is small (814 acres), we could easily access the entire park. Thus, we conducted a comprehensive census of the entire site, documenting all taxa observable during the timeframe of this survey.

2.3 Voucher Specimens

Prior to this study, no voucher specimens had been collected for the flora at MANZ. Thus, we attempted to collect at least two vouchers for all species found there. At MOJA, a voucher specimen was collected for each new plant species discovered, or for any previously observed species that lacked a voucher collection. We recorded location (in UTM NAD 27) for each voucher using a Global Positioning System. All MANZ specimens were deposited at Manzanar (then to be transferred to DEVA). For MOJA, vouchers were deposited at the University of California's Sweeney Granite Mountain Desert Research Center (GMDRC). If duplicate voucher specimens of relatively common species were collected, they were deposited at a regional herbarium as specified by the Park. These included the University of California Riverside Herbarium (UCR), and Rancho Santa Ana Botanic Garden (RSA). Enough plant material was collected to cover two 39.5 X 29.5 cm herbarium sheets.

Investigators were required to collect adequate vouchers to document species occurrence, but extensive vouchering to document the full range of phenotypic variability was not undertaken. Every attempt was made to locate and study existing voucher collections and data prior to collecting additional vouchers. Voucher preparation followed the basic guidelines outlined in 36 CFR, the Museum Handbook. NPS Management Policies; NPS 77, Natural Resource Management Guidelines; and Director's Order 24 for Museum Collections will be followed

while the best possible storage and curatorial arrangements are made to provide for long term maintenance and access.

2.4 Survey Timing

Surveys at MOJA were conducted throughout the year beginning in October 2002 and continuing into 2006. Emphasis for all surveys was to capture peak flowering phenology for all major groups of plants. Thus, the majority of surveys were conducted in spring, early summer, and early fall of each year. During the summer monsoon season, we closely monitored the National Weather Service base reflectivity radar for the occurrence of thunderstorm activity in the MOJA. In response to one of the wettest winters on record, spring and early summer of 2005 was an epic bloom in the MOJA. During late summer of 2005, numerous severe thunderstorms occurred throughout MOJA dropping copious amounts of precipitation in places, and resulting in an outstanding bloom of summer annuals in late September and early October 2005. These flowering events offered a rare opportunity to find unique or new species not previously found in the area. To capture this opportunity, we conducted numerous surveys throughout the MOJA in 2005.

MANZ was surveyed in spring 2003 and 2004. Above average blooms occurred during both years. Late summer and fall surveys were also conducted at MANZ in 2003.

2.5 Field Investigators

Principal Investigator for this project was James M. André, University of California Riverside. Mr André is Director of UC Riverside's Sweeney Granite Mountains Desert Research Center (located within the Mojave National Preserve) and has over 20 years experience as a botanist in the Mojave Desert and Owens Valley. His role in the project included overseeing field surveys, data and budget management, and reporting. The field survey team included taxonomic experts Frank Smith and Glenn Clifton. Frank Smith has over 25 years experience in the Great Basin and Mojave Deserts, while Mr. Clifton is regarded as one of the foremost field botanists in the western U.S. Assistance with field surveys was also provided by Tim Thomas, Jason Sexton, Valerie Soza, Jodi Ross and Tasha La Doux, all with advanced knowledge of the MOJA flora. Ms. La Doux is the Botanist at Joshua Tree National Park (JOTR). Ms. Soza, Ms. Ross, Staci Auvenshine and Jeff Galvin assisted with the curation of specimen vouchers. Mr. Sexton, Mr. Galvin and the JOTR office of Tasha La Doux assisted with data management for the project.

3.0 RESULTS

3.1 Level of Effort

At MOJA, a total of 1,465 Person Hours were expended in BASE YEAR (FY2002/2003). Number of Person/Field Days totaled 132. Number of Person Hours used during OPTION YEAR 1 (FY2003/2004) totaled 1,328, with 126 total Person/Field Days. A total of 942 Person/Field Hours (108 Person/Field Days) were applied to surveys during the extended period FY2004/2005 and into 2006.

Total Person Hours for the entire project at MOJA was 3,735 hours. Approximately 2,200 of these hours were volunteered by our survey team at no charge to the NPS.

At MANZ, a total of 8 Person/Field Days of surveying was conducted, covering 100% of the 814 acres.

3.2 Summary of Findings – Manzanar Historic Site

Due to significant rains in the Owens Valley during the winter of 2002/2003, MANZ experienced a significant flowering event during the spring of 2003. Above average rainfall also occurred in 2003/2004 leading to an average bloom in spring/summer of 2004. Surveys were conducted in mid-April, 2003, late-May, 2003, September of 2003, and again in May of 2004.

We documented a total of 108 vascular plant taxa at the Manzanar Historic Site during our surveys (Table 1). A total of 169 vouchers were collected for 93 taxa. A total of 15 taxa were not vouchered either because their numbers were so few within the site, or because they lacked diagnostic features (e.g., not reproductive) and would not have been quality voucher material. Positive identification was possible for all 108 taxa. No collections from MANZ were found in herbarium and literature searches for the site.

No special-status or otherwise notable native plants were found during this survey. Some introduced species, however, are of great interest. Seven of the 23 non-native species could be classified as historic cultivars likely left from the occupation in the 1940s. These included several fig trees (*Ficus carica*), and Arizona cypress (*Cupressus arizonica*). The latter may be a horticultural variety of *Cupressus stephensonii*, known only from Cuyamaca Peak in San Diego County. Horticultural transplants of rare California cypress are common. The list of historic cultivars included tamarisk (*Tamarix parviflora*), black locust (*Robinia pseudoacacia*), Siberian Elm (*Ulmus minor*), Catalpa (*Catalpa bignonioides*), English Elm (*Ulmus minor)* and white mulberry (*Morus alba*).

Although our surveys were comprehensive over the entire 814 acres, subsequent surveys could add perhaps three to five taxa to the inventory. These additional taxa would most likely be annual species found during late summer or fall, following sufficient summer rainfall. At this time, we estimate that more than 95% of the species at MANZ were documented (vouchered or observed) during our surveys, thus meeting the overall goal of this contract.

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Table 1. Checklist of vascular plant taxa known to occur in the Manzanar Historic Site.

Total: 108 taxa, (85 native, 23 alien/non-native). ! indicates alien/non-native

	Taxonomic Name	Number of Vouchers Collected
	CONIFEROPYHTA (Conifers)	
	Cupressaceae (Cypress Family)	
!	*Cupressus arizonica*	1
	Ephedraceae (Ephedra Family)	
	Ephedra nevadensis	2
	Ephedra viridis	0
	ANTHOPHYTA - DICOTYLEDONEAE	
	Apocynaceae (Dogbane Family)	
	Apocynum cannibinum	1
	Asclepiadaceae (Milkweed Family)	
	Asclepias fascicularis	0
	Asteraceae (Sunflower Family)	
	Ambrosia acanthicarpa	4
	Artemisia dracunculus	2
	Artemisia ludovisciana ssp. *incompta*	2
	Artemisia tridentata ssp. *tridentata*	3
	Chaenactis fremontii	3
	Chrysothamnus nauseosus ssp. *consimilis*	1
	Chrysothamnus nauseosus ssp. *hololeucus*	1
	Encelia actonii	0
	Eriophyllum pringlei	2
	Eriophyllum wallacei	4
	Filago depressa	2
	Glyptopleura marginata	1
	Hymenoclea salsola ssp. *salsola*	2
	Layia glandulosa	2
	Malacothrix glabrata	3
	Rafinesquia neomexicana	1
	Stephanomeria pauciflora	2
	Syntrichopappus schottii	1
!	*Xanthium strumarium*	0
	Bignoniaceae (Bignonia)	
!	*Catalpa bignonioides*	3
	Boraginaceae (Borage Family)	
	Amsinckia tessellata	2
	Cryptantha circumscissa	2
	Cryptantha micrantha	1
	Cryptantha nevadensis	3
	Cryptantha pterocarya	2
	Heliotropium curassavicum	1
	Pectocarya heterocarpa	1
	Pectocarya penicillata	2
	Tiquilia nuttallii	2
	Brassicaceae (Mustard Family)	
!	*Brassica tournefortii*	2

	Descurainia pinnata ssp. *glabra*	3
!	*Descurainia sophia*	2
	Lepidium flavum var. *flavum*	3
	Lepidium fremontii	2
Campanulaceae (Bellflower Family)		
	Nemacladus glanduliferus ssp. *glanduliferus*	1
Capparaceae (Caper Family)		
	Cleomella obtusifolia	1
Chenopodiaceae (Goosefoot Family)		
	Atriplex confertifolia	1
	Atriplex canescens ssp. *canescens*	3
	Atriplex serenana	3
	Atriplex polycarpa	2
	Atriplex lentiformis ssp. *torreyi*	1
	Bassia hyssopifolia	0
!	*Salsola tragus*	3
Convolvulaceae (Morning Glory Family)		
!	*Convolvulus arvensis*	1
Fabaceae (Pea Family)		
	Glycyrrhiza lepidota	2
!	*Robinia pseudoacacia*	2
Geraniaceae (Geranium Family)		
!	*Erodium cicutarium*	1
Hydrophyllaceae (Waterleaf Family)		
	Nama demissum var. *demissum*	1
	Nama depressum	0
	Phacelia distans	2
	Phacelia fremontii	2
Loasaceae (Loasa Family)		
	Mentzelia affinis	1
	Mentzelia albicaulis	2
Malvaceae (Mallow Family)		
	Eremalche exilis	2
Moraceae (Pear Family)		
!	*Ficus carica*	3
!	*Morus alba*	2
Oleaceae (Olive Family)		
	Fraxinus velutina	2
	Forestiera pubescens	2
Onagraceae (Evening Primrose Family)		
	Camissonia boothii ssp. *desertorum*	2
	Camissiona claviflormis ssp. *aurantiaca*	2
	Camissonia claviformis ssp. *claviformis*	3
Papaveraceae (Poppy Family)		
	Eschscholzia minutiflora	1
Polemoniaceae (Phlox Family)		
	Eriastrum sparsiflorum	2
	Eriastrum wilcoxii	1

	Gilia cana ssp. *triceps*	3
	Gilia sinuata	2
	Linanthus parryae	2
	Loeseliastrum schottii	2
Polygonaceae (Buckwheat Family)		
	Centrostegia thurberi	1
	Chorizanthe rigida	1
	Eriogonum brachyanthum	1
	Eriogonum maculatum	2
	Eriogonum pusillum	3
	Oxytheca perfoliata	1
Portulacaceae (Purselane Family)		
	Calyptridum monandrum	3
Rosaceae (Rose Family)		
	Rosa woodsii var. *ultramontana*	3
Salicaceae (Willow Family)		
	Populus fremontii	3
	Salix exigua	0
	Salix laevigata	1
	Salix lasiolepis	6
Saururaceae (Lizard's-tail Family)		
	Anemopsis californica	0
Scrophulariaceae (Figwort Family)		
	Castilleja linariifolia	1
!	*Verbascum thapsus*	0
Simaroubaceae (Quassia Family)		
!	*Ailanthus altissima*	2
Solanaceae (Nightshade Family)		
	Datura wrightii	1
	Lycium andersonii	1
Tamaricaceae (Tamarisk Family)		
!	*Tamarix parviflora*	2
Ulmaceae (Elm Family)		
!	*Ulmus minor*	2
!	*Ulmus pumila*	2
Urticaceae (Nettle Family)		
	Urtica dioica	0
ANTHOPHYTA - MONOCOTYLEDONEAE		
Juncaceae (Rush Family)		
	Juncus effusus var *pacificus*	2
	Juncus mexicanus	0
Poaceae (Grass Family)		
!	*Bromus catharticus*	2
!	*Bromus madritensis* ssp. *rubens*	0
!	*Bromus tectorum*	0
!	*Cynodon dactylon*	1
	Distichlis spicata	1

!	*Hordeum murinum* ssp. *leporinum*	2
	Muhlenbergia asperifolia	1
	Phragmites australis	0
	Poa pratensis	1
!	*Schismus arabicus*	2
!	*Schismus barbatus*	0

3.3 Summary of Findings – Mojave National Preserve

3.3.1 Field Surveys

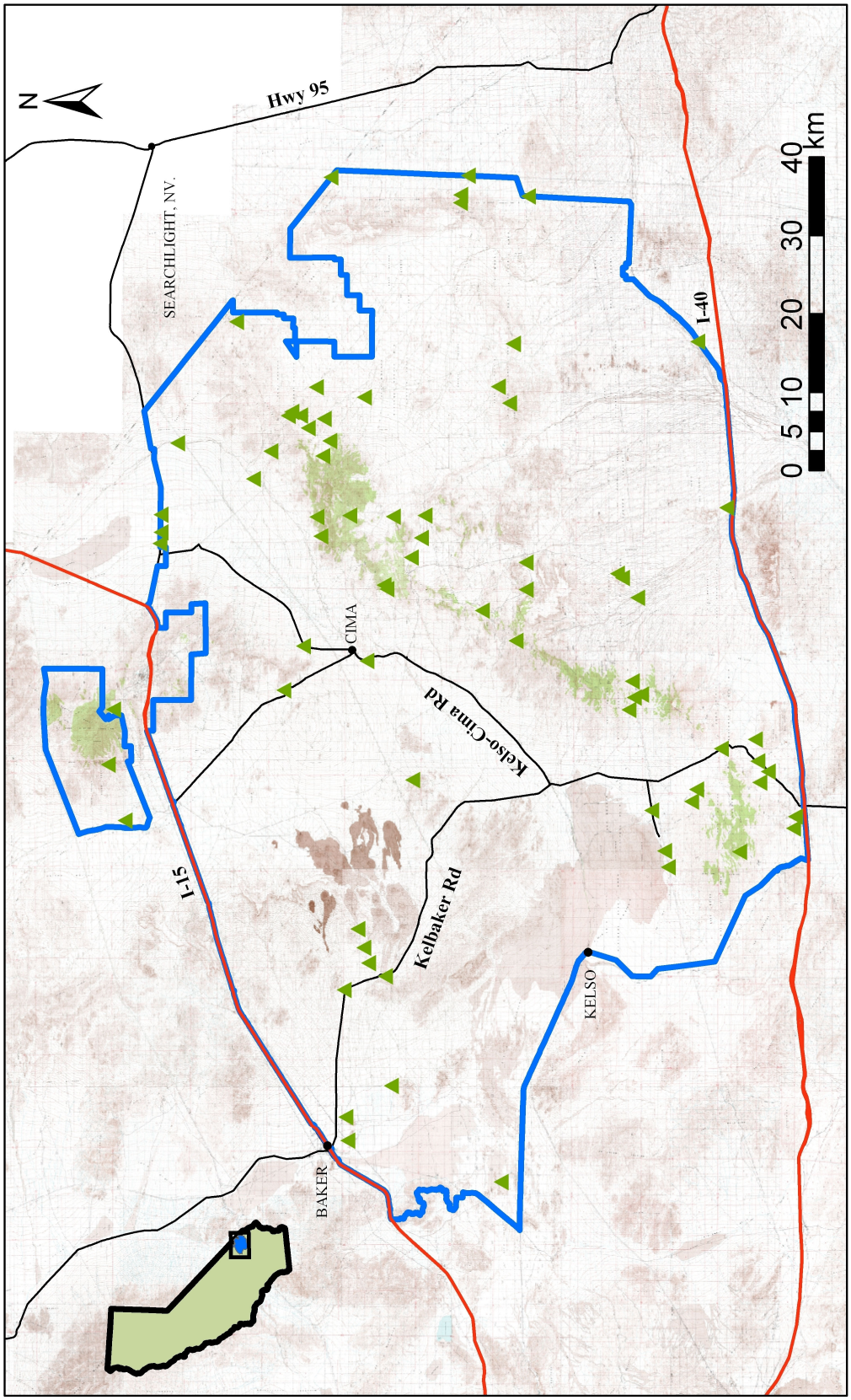
Over the course of this study, a total of 76 surveys were conducted: 44 Area Searches of Priority Locations, 10 Targeted Surveys, and 22 Opportunistic Surveys. Map 1 shows the distribution of these surveys throughout the Preserve. Total area surveyed at MOJA was 7,700 ha (~20,000 ac). Area Searches averaged 120 ha (or approximately one-half square mile). Targeted Surveys and Opportunistic Surveys were more restrictive in size, but usually yielded good results as they focused on areas with highest potential for unique species.

Appendix A summarizes survey activities and significant results for the 76 surveys at MOJA. Surveys are indicated by Type (Area Search in Priority Sampling Area, Targeted Survey and Opportunistic Survey) and are listed chronologically. A comprehensive species list was compiled for the majority of the surveys. The accompanying species lists ranged from 15-20 species in the small surveys, to more than 150 species in the larger areas that were surveyed. Appendix B lists the species present in each of the surveys summarized in Appendix A. Because Appendix B is a rather large matrix file (in Excel), it could not be printed for display herein, but is included in this report on the attached CD ROM. A more detailed discussion of the findings in Appendix A is presented below.

3.3.2 New Vascular Plant Taxa for MOJA

Prior to this study, a total of 831 vascular plant taxa had been documented in MOJA (Andre 2001). Over the course of this 3.5 year project an additional 85 taxa were added, representing a 10.2% increase in the number of vascular plants known to occur in MOJA. This surprising increase included several new species documented through incidental discoveries, and during the 2005-2006 rare plant surveys conducted as part of the *Hackberry Complex BAER Stabilization Plan*. The current total number of vascular plant taxa known to MOJA (at this time) stands at 913. Of these, 827 taxa are native, while 86 are non-native alien species. Of the alien taxa, 69 are invasive (e.g., *Tamarix ramosissima*), occurring or having the potential to spread into and reproduce in native vegetation. The other 17 alien species are casual aliens (e.g., *Washingtonia filifera*), which may flourish in a particular area, but which do not form self-replacing populations, or depend on repeated introductions for their persistence.

An updated master checklist of vascular plants in MOJA is provided in Table 2. A more detailed Excel spreadsheet of this list (Appendix C.) is included with this report on CD ROM. For each species listed in Appendix C a representative herbarium voucher, publication citation, or qualified observation is included as confirmation of its presence in the MOJA.



Map 1. Distribution of all Area Searches in Priority Locations, Targeted Surveys, and Opportunistic Surveys conducted in the Moiave National Preserve. 2002 – 2005.

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Table 2. Checklist of vascular plant taxa known to occur in the Mojave National Preserve.

Total: 89 Familes, 387 genera, 913 Species/Taxa (827 native, 86 alien/non-native)

PTEROPHYTA (Ferns)

Dryopteridaceae (Wood Fern Family)
Woodsia oregana
Woodsia plummerae

Polypodiaceae (Polypody Family)
Polypodium hesperium

Pteridaceae (Brake Family)
Adiantum capillus-veneris
Argyrochosma jonesii
Argyrochosma capillus-veneris
Astrolepis cochisensis
Cheilanthes covillei
Cheilanthes feei
Cheilanthes parryi
Cheilanthes viscida
Cheilanthes wootoni
Notholaena californica
Pellaea mucronata var. *mucronata*
Pellaea mucronata var. *californica*
Pellaea truncata
Pentagramma triangularis ssp *maxonii*
Pentagramma triangularis ssp. *triangularis*

CONIFEROPHYTA (Conifers)

Cupressaceae (Cypress Family)
Juniperus californica
Juniperus osteosperma

Ephedraceae (Ephedra Family)
Ephedra aspera
Ephedra californica
Ephedra fasciculata var. *clokeyi*
Ephendra funerea
Ephendra nevadensis
Ephedra viridis

Pinaceae (Pine Family)
Abies concolor
Pinus edulis
Pinus monophylla

LYCOPODIOPHYTA

Selaginellaceae (Spike-Moss Family)
Selaginella leucobryoides

EQUISETOPHYTA

Equisetaceae (Horsetail Family)
Equisetum laevigatum

ANTHOPHYTA - DICOTYLEDONEAE

Aceraceae (Maple Family)
Acer glabrum var. *diffusum*

Aizoaceae (Fig-Marigold Family)
Sesuvium verrucosum
Trianthema portulacastrum

Amaranthaceae (Amaranth Family)
! *Amaranthus albus*
Amaranthus blitoides
Amaranthus fimbriatus
Amaranthus palmeri
Amaranthus torreyi
Tidestromia lanuginosa
Tidestromia oblongifolia

Anacardiaceae (Sumac Family)
Rhus trilobata

Apiaceae (Carrot Family)
Bowlesia incana
Cymopterus gilmanii
Cymopterus multinervatis
Cymopterus panamintensis var. *acutifolius*
Cymopterus purpurascens
Daucus pusillus
Lomatium nevadense var *nevadense*
Lomatium nevadense var. *parishii*
Lomatium parryi
Yabea microcarpa

Apocynaceae (Dogbane family)
Amsonia tomentosa
Apocynum cannabinum
! *Nerium oleander*

Asclepiadaceae (Milkweed family)
Asclepias asperula ssp. *asperula*
Asclepias erosa
Asclepias nyctaginifolia
Asclepias subulata
Cynanchum utahense
Sarcostemma cynanchoides ssp. *hartwegii*
Sarcostemma hirtellum

Asteraceae (Sunflower Family)
Acamptopappus shockleyi
Acamptopappus sphaerocephalus var. *hirtellus*
Acamptopappus sphaerocephalus var. *sphaerocephalus*
! *Acroptilon repens*
Adenophyllum cooperi
Adenophyllum porophylloides
Ageratina herbacea
Ambrosia acanthicarpa

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! *Ambrosia artemisifolia*
Ambrosia confertiflora
Ambrosia dumosa
Ambrosia eriocentra
Amphipappus fremontii var. *fremontii*
Amphipappus fremontii var. *spinosus*
Anisocoma acaulis
! *Artemisia biennis*
Artemisia bigelovii
Artemisia dracunculus
Artemisia ludoviciana ssp. *albula*
Artemisia ludoviciana ssp. *incompta*
Artemisia nova
Artemisia spinescens
Artemisia tridentata ssp. *tridentata*
Artemisia tridentata ssp. *parishii*
Atrichoseris platyphylla
Baccharis brachyphylla
Baccharis salicifolia
Baccharis sergiloides
Bahia dissecta
Baileya multiradiata
Baileya pauciradiata
Baileya pleniradiata
Bebbia juncea var. *aspera*
Brickellia arguta var. *arguta*
Brickellia atractyloides
Brickellia californica
Brickellia desertorum
Brickellia incana
Brickellia microphylla
Brickellia multiflora
Brickellia oblongifolia var. *linifolia*
Brickellia watsonii
Calycoseris parryi
Calycoseris wrightii
! *Centaurea melitensis*
Chaenactis carphoclinia var. *carphoclinia*
Chaenactis fremontii
Chaenactis macrantha
Chaenactis stevioides
Chaetopappa ericoides
Chrysothamnus depressus
Chrysothamnus nauseosus ssp. *hololeucus*
Chrysothamnus nauseosus ssp. *leiospermus*
Chrysothamnus nauseosus ssp. *mohavensis*
Chrysothamnus paniculatus
Chrysothamnus teretifolius
Chrysothamnus viscidiflorus ssp. *viscidiflorus*
Cirsium arizonicum var. *tenuisectum*
Cirsium neomexicanum
Conyza canadensis
Dicoria canescens
Encelia actoni
Encelia farinosa
Encelia frutescens
Encelia virginensis
Enceliopsis nudicaulis
Ericameria cooperi var. *cooperi*
Ericameria cuneata var. *spathulata*
Ericameria larcifolia
Ericameria linearifolia
Ericameria nana
Erigeron aphanactis var. *aphanactis*
Erigeron breweri var. *covillei*
Erigeron breweri var. *porphyreticus*
Erigeron concinnus var. *concinnus*
Erigeron divergens
Erigeron uncialis var. *uncialis*
Erigeron utahensis
Eriophyllum ambiguum var. *paleceum*
Eriophyllum lanosum
Eriophyllum pringlei
Eriophyllum wallacei
Filago arizonica
Filago californica
Filago depressa
Geraea canescens
Glyptopleura marginata
Gnaphalium canescens ssp. *canescens*
Gnaphalium palustre
Gnaphalium stramineum
Gutierrezia microcephala
Gutierrezia sarothrae
Hymenoclea salsola var. *fasciculata*
Hymenoclea salsola var. *pentalepis*
Hymenoclea salsola var. *salsola*
Hymenopappus filifolius var. *eriopodus*
Hymenopappus filifolius var. *megacephalus*
Hymenoxys acaulis var. *arizonica*
Hymenoxys cooperi
)*Isocoma acradenia* var. *acradenia*
Isocoma menziesii var. *vernonioides*
! *Lactuca serriola*
Layia glandulosa
Lepidiospartum latisquamum
Lepidiospartum squamatum
Lessingia lemmonii var. *lemmonii*
Machaeranthera arida
Machaeranthera canescens var. *leucanthemifolia*
Machaeranthera carnosa
Machaeranthera gracilis
Machaeranthera tanacetifolia
Malacothrix coulteri
Malacothrix glabrata
Malacothrix sonchoides
Malacothrix stebbinsii
Monoptilon bellidiforme
Monoptilon belliodes
Nicolletia occidentalis
Palafoxia arida var. *arida*
Pectis papposa var. *papposa*
Perityle emoryi
Perityle megalocephala var. *oligophylla*
Petradoria pumila ssp. *pumila*
Peucephyllum schottii
Pleurocoronis pluriseta
Pluchea sericea
Porophyllum gracile
Prenanthella exigua
Psathyrotes annua
Psathyrotes ramosissima
Psilostrophe cooperi

Rafinesquia californica
Rafinesquia neomexicana
Sanvitalia abertii
Schkuhria multiflora var. *multiflora*
Senecio flaccidus var. *monoensis*
Senecio mohavensis
Senecio multilobatus
Solidago confinis
! *Sonchus asper* ssp. *asper*
! *Sonchus oleraceus*
Stephanomeria exigua var. *exigua*
Stephanomeria parryi
Stephanomeria pauciflora var. *pauciflora*
Stylocline intertexta
Stylocline micropoides
Syntrichopappus fremontii
Tetradymia argyraea
Tetradymia axillaris var. *axillaris*
Tetradymia canescens
Tetradymia stenolepis
Thymophylla pentachaeta var. *belenidium*
Trichoptilium incisum
Trixis californica var. *californica*
Uropappus lindleyi
Viguiera parishii
Xylorhiza tortifolia var. *tortifolia*

Berberidaceae (Barberry Family)
Berberis fremontii
Berberis fremontii X *Berberis haematocarpa*

Bignoniaceae (Bignonia Family)
! *Catalpa bignonioides*
Chilopsis linearis ssp. *arcuata*

Boraginaceae (Borage Family)
Amsinckia menziesii var. *intermedia*
Amsinckia tessellata var. *tessellata*
Cryptantha angustifolia
Cryptantha barbigera
Crypthantha circumscissa
Crypthantha confertiflora
Crypthantha decipiens
Crypthantha dumetorum
Cryptantha flavoculata
Cryptantha gracilis
Crypthantha maritima
Crypthantha micrantha
Cryptantha nevadensis
Cryptantha nova sp.
Cryptantha pterocarya
Cryptantha racemosa
Cryptantha recurvata
Cryptantha tumulosa
Cryptantha utahensis
Cryptantha virginensis
Heliotropium curvassavicaum
Heliotropium convolvulaceum var. *californicum*
Lappula redowskii var. *redowskii*
Lithospernum incisum
Pectocarya heterocarpa
Pectocarya penicillata
Pectocarya platycarpa
Pectocarya recurvata
Pectocarya setosa
Plagiobothrys arizonicus
Plagiobothrys jonesii
Tiquilia canescens
Tiquilia nuttallii
Tiquilia palmeri
Tiquilia plicata

Brassicaceae (Mustard Family)
Arabis glaucovalvula
Arabis perennans
Arabis pulchra var. *gracilis*
Arabis pulchra var. *pulchra*
Athysanus pusillus
! *Brassica nigra*
! *Brassica tournefortii*
! *Capsella bursa-pastoris*
! *Cardaria pubescens*
Caulanthus cooperi
Caulanthus crassicaulis var. glabra
Caulanthus major
Descurainia pinnata ssp. *glabra*
Descurainia pinnata ssp. *halictorum*
! *Descurainia sophia*
Dithyrea californica
Draba cuneifolia
! *Eruca vesicaria* ssp. *sativa*
Guillenia lasiophylla
Halimolobos jaegeri
! *Hirschfeldia incana*
Hutchinsia procumbens
Lepidium densiflorum var. *elongatum*
Lepidium densiflorum var. *pubicarpum*
Lepidium fremontii var. fremontii
Lepidium lasiocarpum var. *lasiocarpum*
Lepidium latifolium
Lepidium montanum var. *cinereum*
Lepidium virginicum var. *pubescens*
! *Lepidium virginicum* var. *virginicum*
Lesquerella kingii ssp. *kingii*
Lesquerella kingii ssp. *latifolia*
Lesquerella tenella
! *Malcolmia africans*
Physaria chambersii
! *Rorippa nasturtium-aquaticum*
! *Sisymbrium altissimum*
! *Sisymbrium irio*
! *Sisymbrium orientale*
Stanleya pinnata var. *pinnata*
Streptanthella longirostris
Streptanthus cordatus var. *cordatus*
Thelypodium integrifolium ssp. *affine*
Thysanocarpus curvipes var. *eradiatus*
Thysanocarpus laciniatus

Buddlejaceae (Buddleja Family)
Buddleja utahensis

Cactaceae (Cactus Family)
Corypantha chlorantha

Corypantha vivipara
Cylindropuntia acanthocarpa var. *coloradensis*
Cylindropuntia bigelovii var. *bigelovii*
Cylindropuntia echinocarpa
Cylindropuntia ramosissima
Echinocactus polycephalus var. *polycephalus*
Echinocereus engelmanii
Echinocereus triglochidiatus
Ferocactus cylindraceus var. *lecontei*
Mammillaria tetrancistra
Opuntia acanthocarpa var. *coloradensis*
Opuntia basilaris var. *basilaris*
Opuntia basilaris var. *brachyclada*
Opuntia chlorotica
Opuntia curvispina
Opuntia echinocarpa
Opuntia engelmannii var. *engelmannii*
Opuntia erinacea var. *erinacea*
Opuntia phaeacantha
Opuntia polycantha var. *erinacea*
Opuntia ramosissima
Sclerocactus polyancistrus

Campanulaceae (Bellflower Family)
Nemacladus glanduliferus var. *orientalis*
Nemacladus rubescens
Nemacladus sigmoideus

Cannabaceae (Hemp Family)
! *Cannabis sativa*

Capparaceae (Caper Family)
Cleome lutea
Cleomella obtusifolia
Isomeris arborea
Wislizenia refracta var. *refracta*

Caprifoliaceae (Honeysuckle Family)
Sambucus mexicana
Symphoricarpos longiflorus

Caryophyllaceae (Pink Family)
Achyronychia cooperi
Arenaria congesta var. *charlestonensis*
Arenaria macradenia var. *macradenia*
Scopulophila rixfordii
Silene antirrhina
Silene verecunda ssp. *andersonii*

Celastraceae (Staff-Tree Family)
Mortonia utahensis

Chenopodiaceae (Goosefoot Family)
Allenrolfea occidentalis
Atriplex canescens
Atriplex confertifolia
Atriplex elegans var. *fasciculata*
Atriplex elegans var. *elegans*
Atriplex lentiformis ssp. *lentiformis*
Atriplex hymenlytra
Atriplex phyllostegia
Atriplex polycarpa
! *Atriplex rosea*
! *Chenopodium album*
Chenopodium fremontii
Chenopodium incanum var. *occidentale*
Chenopodium leptophyllum
! *Chenopodium murale*
! *Cycloloma atriplicifolium*
Grayia spinosa
! *Halogeton glomeratus*
Krascheninnikovia lanata
Nitrophila occidentalis
! *Salsola paulsenii*
! *Salsola tragus*
Suaeda moquinii

Convolvulaceae (Morning Glory Family)
! *Convolvulus arvensis*
Cressa truxillensis

Crassulaceae (Stoncrop Family)
Dudleya pulverulenta ssp. *arizonica*
Dudleya saxosa ssp. *aloides*
Sedum niveum

Crossosomataceae (Crossosoma Family)
Glossopetalon pungens
Glossopetalon spinescens

Cucurbitaceae (Gourd Family)
Cucurbita foetidissima
Cucurbita palmata

Cuscutaceae (Dodder Family)
Cuscuta californica var. *californica*

Ericaceae (Heath Family)
Arctostaphylos nova sp.
Arctostaphylos pungens

Euphorbiaceae (Spurge Family)
Chamaesyce abramsiana
Chamaesyce albomarginata
Chamaesyce fendleri
Chamaesyce micromera
Chamaesyce ocellata ssp. *arenicola*
Chamaesyce parishii
Chamaesyce parryi
Chamaesyce polycarpa
Chamaesyce revoluta
Chamaesyce serpyllifolia
Chamaesyce setiloba
Croton californica
Ditaxis neomexicana
Ditaxis serrata
Eremocarpus setigerus
Euphorbia exstipulata var. *exstipulata*
Euphorbia incisa
Stillingia linearifolia
Stillingia spinulosa
Tragia ramosa

Fabaceae (Pea Family)

Acacia greggii
Astragalus acutirostris
Astragalus allochrous var. *playanus*
Astragalus bernardianus
Astraglus calycosus var. *calycosus*
Astragalus cimae var. *cimae*
Astragalus didymocarpus var. *didymocarpus*
Astragalus didymocarpus var. *dispermus*
Astragalus layneae
Astragalus lentiginosus var. *borreganus*
Astragalus lentiginosus var. *fremontii*
Astragalus minthorniae var. *vilosus*
Astragalus mojavensis var. *mojavensis*
Astragalkus newberryi var. *newberryi*
Astragalus nutans
Astragalus nuttallianus var. *imperfectus*
Astragalus purshii var. *tinctus*
Astragalus tidestromii
! *Caesalpinia gilliesii*
! *Cercidium floridum* ssp. *floridum*
Dalea mollis
Dalea mollissima
Dalea searlsiae
Glycyrrhiza lepidota
Hoffmannseggia glauca
Lotus argyraeus var. *multicaulis*
Lotus argyraeus var. *notitius*
Lotus humistratus
Lotus rigidus
Lotus salsuginosus var. *brevivexillus*
Lotus strigosus
Lupinus argenteus var. *argenteus*
Lupinus arizonicus
Lupinus brevicaulis
Lupinus concinnus
Lupinus flavoculatus
Lupinus microcarpus var. *microcarpus*
Lupinus shockleyi
Lupinus sparsiflorus
Marina parryi
! *Melilotus alba*
! *Melilotus indica*
! *Parkinsonia aculeata*
Prosopis glandulosa var. *torreyana*
Prosopis pubescens
Psorothamnus arborescens var. *minutifolius*
Psorothamnus fremontii var. *fremontii*
Psorothamnus spinosus
Robinia neomexicana
! *Robinia pseudoacacia*
Senna armata
Senna covesii

Fagaceae (Oak Family)

Quercus chrysolepis
Quercus turbinella

Garryaceae (Silk Tassel Family)

Garrya flavescens

Gentianaceae (Gentian Family)

Centaurium venustum
Swertia albomarginata

Geraniaceae (Geranium Family)

! *Erodium cicutarium*
Erodium texanum

Grossulariaceae (Gooseberry Family)

Ribes cereum var. *cereum*
Ribes velutinum

Hydrophyllaceae (Waterleaf Family)

Emmenanthe penduliflora var. *penduliflora*
Eriodictyon angustifolium
Eucrypta chrysanthemifolia var. *bipinnatifida*
Eucrypta micrantha
Nama demisssum var. *demissum*
Nama depressum
Nama dichotomum var. *dichotomum*
Nama pusillum
Nemophila menziesii var. *integrifolia*
Phacelia affinis
Phacelia anelsonii
Phaceliabarnebyana
Phacelia campanularia ssp. *vasiformis*
Phacelia coerulea
Phacelia crenulata var. *ambigua*
Phacelia crenulata var. *crenulata*
Phacelia cryptantha
Phacelia curvipes
Phacelia distans
Phacelia fremontii
Phacelia ivesiana
Phacelia lemmonii
Phacelia neglecta
Phacelia pachyphylla
Phacelia pedicellata
Phacelia perityloides var. *jaegeri*
Phacelia rotundifolia
Phacelia vallis-mortae
Pholistoma membranaceum
Tricardia watsonii

Krameriaceae (Rhatany Family)

Krameria erecta
Krameria grayi

Lamiaceae (Mint Family)

Hedeoma drummondii
Hedeoma nanum var. *californicum*
! *Marrubium vulgare*
! *Mentha arvensis*
Monarda pectinata
Monardella linoides ssp. *linoides*
Salazaria mexicana
Salvia columbariae
Salvia dorrii var. *dorrii*
Salvia dorrii var. *pilosa*
Salvia mohavensis
Salvia pachyphylla

Lennoaceae (Lennoa Family)
Pholisma arenarium

Linaceae (Flax Family)
Linum lewisii
Linum puberulum

Loasaceae (Loasa Family)
Eucnide urens
Mentzelia albicaulis
Mentzelia desertorum
Mentzelia involucrata
Mentzelia laevicaulis
Mentzelia multiflora ssp. *longiloba*
Mentzelia obscura
Mentzelia oreophila
Mentzelia polita
Mentzelia pterosperma
Mentzelia reflexa
Mentzelia veatchiana
Petalonyx thurberi var. *thurberi*

Lythraceae (Loosestrife Family)
Lythrum californicum

Malvaceae (Mallow Family)
Arbutilon parvulum
Eremalche exilis
Eremalche rotundifolia
Sphaeralcea ambigua var. *ambigua*
Sphaeralcea ambigua var. *rugosa*
Sphaeralcea rusbyi var. *eremicola*

Meliaceae (Mahogany Family)
! *Melia azedarach*

Molluginaceae (Carpet-Weed Family)
! *Mollugo cerviana*

Nyctaginaceae (Four O'Clock Family)
Abronia nana var. *covillei*
Abronia villosa var. *villosa*
Allionia incarnata
Boerhavia coulteri
Boerhavia intermedia
Boerhavia triquetra
Boerhavia wrightii
Mirabilis bigelovii var. *bigelovii*
Mirabilis bigelovii var. *retrorsa*
Mirabilis coccinea
Mirabilis multiflora var. *pubescens*
Mirabilis oblongifolia
Mirabilis pumila
Tripterocalyx micranthus

Oleaceae (Olive Family)
Forestiera pubescens
Fraxinus anomala
Menodora scabra
Menodora scoparia
Menodora spinescens

Onagraceae (Evening Primrose Family)
Camissonia boothii var. *boothii*
Camissonia boothii var. *condensata*
Camissonia boothii var. *desertorum*
Camissonia boothii ssp. *intermedia*
Camissonia brevipes var. *brevipes*
Camissonia brevipes var. *pallidula*
Camissonia californica
Camissonia campestris
Camissonia chamaeneroides
Camissonia claviformis ssp. *aurantiaca*
Camissonia claviformis ssp. *claviformis*
Camissonia kernensis ssp. *gilmanii*
Camissonia pallida ssp. *pallida*
Camissonia palmeri
Camissonia pterosperma
Camissonia refracta
Camissonia walkeri ssp. *tortilis*
Epilobium canum ssp. *latifolium*
Epilobium ciliatum ssp. *ciliatum*
Gaura coccinea
Oenothera caespitosa ssp. *crinita*
Oenothera caespitosa ssp. *marginata*
Oenothera californica ssp. *avita*
Oenothera elata
Oenothera deltoides ssp. *deltoides*
Oenothera longissima
Oenothera primaveris ssp. *bufonis*
Oenothera primaveris ssp. *primaveris*

Orobanchaceae (Broom-Rape Family)
Orobanche cooperi
Orobanche fasciculata
Orobanche parishii ssp. *parishii*

Papaveraceae (Poppy Family)
Arctomecon merriamii
Argemone corymbosa
Argemone munita
Eschscholzia californica
Eschscholzia glyptosperma
Eschscholzia minutiflora
Eschscholzia parishii

Philadelphaceae (Mock Orange Family)
Fenderella utahensis
Philadelphus microphyllus

Plantaginaceae (Plantain Family)
! *Plantago major*
Plantago ovata
Plantago patagonica

Polemoniaceae (Phlox Family)
Aliciela hutchinsifolia
Aliciela latifolia ssp. *latifolia*
Aliciela leptomeria
Aliciela lottiae
Aliciela triodon
Eriastrum densifolium
Eriastrum diffusum
Eriastrum eremicum ssp. *eremicum*

Eriastrum sparsiflorum
Gilia aliquanta ssp. *aliquanta*
Gilia aliquanta ssp. *breviloba*
Gilia cana ssp. *speciformis*
Gilia cana ssp. *triceps*
Gilia clokeyi
Gilia latiflora ssp. *latiflora*
Gilia malior
Gilia ochroleuca ssp. *ochroleuca*
Gilia ophthalmoides
Gilia scopulorum
Gilia sinuata
Gilia stellata
Gilia transmontana
Ipomopsis arizonica
Ipomopsis polycladon
Langloisia setosissima ssp. *punctata*
Langloisia setosissima ssp. *setosissima*
Leptosiphon aureus ssp. *aureus*
Leptosiphon aureus ssp. *decorus*
Linanthus arenicola
Linanthus bigelovii
Linanthus demissus
Linanthus dichotomus
Linanthus filiformis
Linanthus jonesii
Linanthus pungens
Loeseliastrum matthewsii
Loeseliastrum schottii
Microsteris gracilis
Phlox stansburyi
Saltugilia australis
Saltugilia splendens ssp. *splendens*

Polygalaceae (Milkwort Family)
Polygala acanthoclada

Polygonaceae (Buckwheat Family)
Centrostegia thurberi
Chorizanthe brevicornu var. *brevicornu*
Chorizanthe corrugata
Chorizanthe rigida
Chorizanthe watsonii
Eriogonum brachyanthum
Eriogonum brachypodum
Eriogonum davidsonii
Eriogonum deflexum var. *baratum*
Eriogonum deflexum var. *deflexum*
Eriogonum ericifolium var. *thornei*
Eriogonum fasciculatum ssp. *polifolium*
Eriogonum heermanii var. *argense*
Eriogonum heermanii var. *floccosum*
Eriogonum heermanii var. *sulcatum*
Eriogonum inflatum var. *inflatum*
Eriogonum maculatum
Eriogonum microthecum var. *simpsonii*
Eriogonum mohavense
Eriogonum nidularium
Eriogonum palmerianum
Eriogonum panamintense
Eriogonum plumatella
Eriogonum pusillum
Eriogonum reniforme
Eriogonum thomasii
Eriogonum trichopes
Eriogonum umbellatum var. *juniporinum*
Eriogonum umbellatum var. *subaridum*
Eriogonum wrightii var. *wrightii*
Nemacaulis denudata var. *gracilis*
Oxytheca perfoliata
! *Polygonum arenastrum*
Pterostegia drymarioides
! *Rumex crispus*
Rumex hymenosepalus

Portulacaceae (Purslane Family)
Calyptridium monandrum
Claytonia parviflora ssp. *utahensis*
Claytonia parviflora ssp. *viridis*
Portulaca halimoides
! *Portulaca oleracea*
Portulaca nova sp. (*retusa*?)

Primulaceae (Primrose Famil)
! *Anagallis arvensis*

Ranunculaceae (Buttercup Family)
Anemone tuberosa
Aquilegia formosa
Delphinium parishii ssp. *parishii*
Myosurus cupulatus

Resedaceae (Mignonette Family)
Oligomeris linifolia

Rhamnaceae (Buckthorn Family)
Ceanothus greggii var. *vestitus*
Rhamnus californica ssp. *californica*
Rhamnus ilicifolia
Rhamnus tomentella var. *ursina*

Rosaceae (Rose Family)
Amelanchier utahensis
Cercocarpus intricatus
Cercocarpus ledifolius var. *intermontanus*
Coleogyne ramosissima
Fallugia paradoxa
Holodiscus microphyllus var. *microphyllus*
Ivesia jaergeri
Ivesia saxosa
! *Malus sylvestris*
Prunus eremophila
Prunus fasciculata var. *fasciculata*
Purshia mexicana var. *stansburyana*
Purshia tridentata var. *glandulosa*

Rubiaceae (Madder Family)
Galium angustifolium var. *gracillimum*
Galium aparine
Galium magnifolium
Galium munzii
Galium parishii
Galium proliferum
Galium stellatum var. *eremicum*

Galium wrightii

Rutaceae (Rue Family)
Thamnosma montana

Salicaceae (Willow Family)
Populus fremontii ssp. *fremontii*
Salix exigua
Salix gooddingii
Salix lasiolepis

Saururaceae (Lizard's-tail Family)
Anemopsis californica

Saxifragaceae (Saxifrage Family)
Heuchera rubescens var. *alpicola*

Scrophulariaceae (Figwort Family)
Antirrhinum filipes
Antirrhinum kingii
Castilleja angustifolia
Castilleja linariifolia
Cordylanthus parviflorus
Keckiella antirrhinoides var. *microphylla*
Maurandya antirrhiniflora ssp. *antirrhiniflora*
Mimulus bigelovii var. *bigelovii*
Mimulus guttatus
Mimulus parishii
Mimulus pilosus
Mimulus rubellus
Mohavea breviflora
Mohavea confertiflora
Penstemon calcareus
Penstemon centranthifolius
Penstemon clevelandii var. *mohavensis*
Penstemon eatonii var. *eatonii*
Penstemon eatonii var. *undosus*
Penstemon palmeri
Penstemon pseudospectabilis
Penstemon rostriflorus
Penstemon stephensii
Penstemon thompsoniae
Penstemon thurberi
Penstemon utahensis

Solanaceae (Nightshade Family)
Chamaesaracha coronopus
Datura wrightii
Lycium andersonii
Lycium cooperi
! *Nicotiana acuminata* var. *multiflora*
Nicotian attenuata
Nicotiana obtusifolia
Physalis crassifolia
Physalis hederifolia var. *fendleri*
Physalis lobata
Solanum americanum
! *Solanum eleagnifolium*
! *Solanum triflorum*

Sterculiaceae (Cacao Family
Ayenia compacta

Tamaricaceae (Tamarisk Family)
! *Tamarix aphylla*
! *Tamarix ramosissima*

Ulmaceae (Elm Family)
Celtis reticulata
! *Ulmus pumila*

Urticaceae (Nettle Family)
Parietaria hespera var. *hespera*
Urtica dioica ssp. *holosericea*

Verbenaceae
Aloysia wrightii
Verbena bracteata
Verbena gooddingii

Viscaceae (Mistletoe Family)
Arceuthobium divaricatum
Phoradendron californicum
Phoradendron juniperinum

Zygophyllaceae (Caltrop Family)
Kallstroemia californica
! *Kallstroemia parviflora*
Larrea tridentata
! *Tribulus terrestris*

ANTHOPHYTA - MONOCOTYLEDONEAE

Araceae (Arum Family)
! *Phoenix dactylifera*
! *Washingtonia filifera*
! *Washingtonia robusta*

Cyperaceae (Sedge Family)
Carex alma
Carex aurea
Carex hassei
Carex occidentalis
Carex praegracilis
Carex rossii
Carex subfusca
Cyperus eragrostis
Cyperus squarrosus
Eleocharis parishii
Scirpus americanus
Scirpus pungens

Iridaceae (Iris Family)
Sisyrinchium halophilum

Juncaceae (Rush Family)
Juncus balticus
Juncus bufonius var. *bufonius*
Juncus bufonius var. *occidentalis*
Juncus cooperi
Juncus macrophyllus
Juncus mexicanus
Juncus nodosus
Juncus occidentalis
Juncus torreyi

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Juncus xiphioides

Liliaceae (Lily Family)

Agave deserti
Agave utahensis
Allium atrorubens var. *cristatum*
Allium nevadense
Calochortus flexuosus
Calochortus kennedyi var. *kennedyi*
Calochortus kennedyi var. *munzii*
Dichelostemma capitatum ssp. *pauciflorum*
Hesperocallis undulata
Muilla coronata
Muilla transmontana var.?
Yucca baccata
Yucca brevifolia
Yucca schidigera
Zigadenus brevibracteatus

Poaceae (Grass Family)

Achnatherum aridum
Achnatherum c.f. *coronatum*
Achnatherum hymenoides
Achnatherum parishii
Achnatherum speciosum
! *Agrostis semiverticillata*
Aristida adscensionis
Aristida purpurea var. fendleriana
Aristida purpurea var. longiseta
Aristida purpurea var. *nealleyi*
Aristida purpurea var. *parishii*
Aristida purpurea var. *purpurea*
Aristida purpurea var. *wrightii*
Aristida ternipes var. *hamulosa*
! *Arundo donax*
! *Avena fatua*
Bothriochloa barbinodis
Bouteloua aristidoides var. *aristidoides*
Bouteloua barbata var. *barbata*
Bouteloua curtipendula
Bouteloua eriopoda
Bouteloua gracilis
Bouteloua trifida
! *Bromus arenarius*
Bromus carinatus var. *carinatus*
! *Bromus diandrus*
! *Bromus hordeaceus*
! *Bromus madritensis* ssp. *madritensis*
! *Bromus madritensis* ssp. *rubens*
! *Bromus tectorum*
! *Bromus trinii*
! *Cynodon dactylon*
Deschampsia danthonioides
Digitaria californica
Distichlis spicata
! *Echinochloa crusgalli* var. *crusgalli*
Elymus elymoides ssp. *brevifolius*
Elymus elymoides ssp. *elymoides*
Elymus glaucus ssp. *glaucus*
Elymus multisetus
Elymus trachycaulus ssp. *trachycaulus*
! *Elytrigia intermedia* ssp. *intermedia*
Enneapogon desvauxii
! *Eragrostis cilianensis*
Eragrostis pectinacea var. *pectinacea*
Erioneuron pilosum
Erioneuron pulchellum
! *Hordeum murinum* ssp. *glaucum*
! *Hordeum murinum* ssp. *murinum*
! *Hordeum vulgare*
Melica frutescens
Melica imperfecta
Muhlenbergia appressa
Muhlenbergia arsenei
Muhlenbergia asperifolia
Muhlenbergia fragilis
Muhlenbergia microsperma
Muhlenbergia minutissima
Muhlenbergia pauciflora
Muhlenbergia porteri
Muhlenbergia rigens
Munroa squarrosa
Panicum urvilleannum
Pascopyrum smithii
Phragmites australis
Piptatherum micranthum
Pleuraphis jamesii
Pleuraphis rigida
! *Poa annua*
Poa bigelovii
Poa fendleriana ssp. *longiligula*
Poa secunda ssp. *secunda*
! *Polypogon australis*
! *Polypogon monspeliensis*
! *Schismus arabicus*
! *Schismus barbatus*
Scleropogon brevifolius
Setaria gracilis
Sporobolus airoides
Sporobolus contractus
Sporobolus cryptandrus
Sporobolus flexuosus
Tridens muticus
! *Triticum aestivum*
! *Vulpia bromoides*
Vulpia microstachys var. *ciliata*
Vulpia microstachys var. *pauciflora*
! *Vulpia myuros* var. *myuros*
Vulpia octoflora var. *hirtella*
Vulpia octoflora var. *octoflora*

Potamogetonaceae (Pondweed Family)

Ruppia cirrhosa

Typhaceae (Cattail Family)

Typha domingensis
Typha latifolia

Zannichelliaceae (Horned-Pondweed Family)

Zannichellia palustris

Table 3 lists the 85 new taxa added to MOJA during this project. Some of the more notable new taxa include several that are new to science: *Prunus eremophila* (B.A. Prigge, Madroño 49:285-288 2002) from the Von Trigger Hills, a new species of *Cryptantha* (J. André) from the New York Mountains and a new *Arctostaphylos* (J. André) species from the Granite Mountains. The later two species are in the process of being described by the author. All three taxa are listed as extremely rare in California and easily meet criteria for listing (CNPS List 1B).

Eight species are not only new to the MOJA but represent new discoveries for the Mojave Desert of California, including: *Athysanus pusillus*, *Digitaria californica, Camissonia boothii* ssp. *boothii, Bowlesia incana, Senna covesii*, *Apocynum cannabinum*, *Ambrosia confertiflora* and *Nicotiana acuminata* var. *multiflora.* The Senna, Digitaria and Camissonia also have status as rare plants in California (CNPS List 2).

Table 3. List of new taxa confirmed during this inventory to occur in MOJA.

! indicates non-native alien taxa. Total = 85 taxa; 61 native, 24 non-native aliens.

Family		Genus/Species/var-ssp
Apiaceae		*Bowlesia incana*
Apiaceae		*Lomatium nevadense* var. *nevadense*
Apocynaceae		*Apocynum cannabinum*
Asclepiadaceae		*Cynanchum utahense*
Asteraceae		*Acamptopappus sphaerocephalus* var. *sphaerocephalus*
Asteraceae	!	*Acroptilon repens*
Asteraceae	!	*Ambrosia artemisiifolia*
Asteraceae		*Ambrosia confertiflora*
Asteraceae		*Calycoseris wrightii*
Asteraceae	!	*Centaurea melitensis*
Asteraceae		*Eriophyllum ambiguum* var. *paleceum*
Asteraceae		*Filago arizonica*
Asteraceae		*Hymenoclea salsola* var. *pentalepis*
Asteraceae		*Hymenoclea salsola* var. *fasciculata*
Asteraceae		*Machaeranthera arida*
Asteraceae		*Malacothrix sonchoides*
Asteraceae		*Tetradymia axillaris* var. *axillaris*
Bignoniaceae	!	*Catalpa bignonioides*
Boraginaceae		*Amsinckia menziesii* var. *intermedia*
Boraginaceae		*Cryptantha* nova sp.
Boraginaceae		*Tiquilia palmeri*
Brassicaceae		*Arabis pulchra* var. *pulchra*
Brassicaceae		*Athysanus pusillus*
Brassicaceae	!	*Cardaria pubescens*
Brassicaceae	!	*Eruca vesicaria* ssp. *sativa*
Brassicaceae	!	*Lepidium latifolium*
Brassicaceae		*Lepidium virginicum* var. *pubescens*
Brassicaceae	!	*Lepidium virginicum* var. *virginicum*
Brassicaceae	!	*Sisymbrium orientale*
Brassicaceae		*Thelypodium integrifolium* ssp. *affine*
Capparaceae		*Wislizenia refracta* var. *refracta*
Chenopodiaceae		*Allenrolfea occidentalis*
Chenopodiaceae		*Atriplex elegans* var. *elegans*
Convolvulaceae	!	*Convolvulus arvensis*
Ericaceae		*Arctostaphylos* nova sp.

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Table 3. Cont…

Family		Genus/Species/var-ssp
Euphorbiaceae		*Chamaesyce abramsiana*
Euphorbiaceae		*Eremocarpus setigerus*
Fabaceae		*Astragalus allochrous* var. *playanus*
Fabaceae	!	*Cercidium floridum* ssp. *floridum*
Fabaceae		*Lotus salsuginosus* var. *brevivexillus*
Fabaceae		*Marina parryi*
Fabaceae		*Senna covesii*
Lamiaceae	!	*Mentha arvensis*
Loasaceae		*Mentzelia laevicaulis*
Malvaceae		*Malvella leprossa*
Malvaceae		*Sphaeralcea ambigua* var. *rugosa*
Onagraceae		*Camissonia boothii* var. *boothii*
Onagraceae		*Oenothera primaveris* ssp. *primaveris*
Onagraceae		*Oenothera elata*
Polemoniaceae		*Aliciella triodon*
Polemoniaceae		*Gilia aliquanta* ssp. *aliquanta*
Polemoniaceae		*Linanthus arenicola*
Polemoniaceae		*Microsteris gracilis*
Polygonaceae	!	*Polygonum arenastrum*
Portulacaceae		*Claytonia parviflora* ssp. *viridis*
Portulacaceae		*Portulaca* nova sp *(retusa?)*
Primulaceae	!	*Anagallis arvensis*
Rhamnaceae		*Rhamnus californica* ssp. *californica*
Rosaceae	!	*Malus sylvestris*
Rosaceae		*Prunus eremophila*
Rubiaceae		*Galium matthewsii*
Scrophulariaceae		*Mohavea confertiflora*
Solanaceae	!	*Nicotiana acuminata* var. *multiflora*
Solanaceae		*Physalis lobata*
Solanaceae	!	*Solanum triflorum*
Verbenaceae		*Verbena bracteata*
Zygophyllaceae		*Kallstroemia californica*
Cyperaceae		*Carex praegracilis*
Cyperaceae		*Cyperus eragrostis*
Cyperaceae		*Cyperus squarrosus*
Juncaceae		*Juncus bufonius* var. *occidentalis*
Poaceae	!	*Arundo donax*
Poaceae	!	*Bromus madritensis* ssp. *madritensis*
Poaceae		*Digitaria californica*
Poaceae		*Elymus elymoides* ssp. *elymoides*
Poaceae		*Eragrostis pectinacea* var. *pectinacea*
Poaceae	!	*Hordeum murinum* ssp. *murinum*
Poaceae	!	*Leymus triticoides*
Poaceae	!	*Lolium multiflorum*
Poaceae	!	*Schismus arabicus*
Poaceae	!	*Triticum aestivum*
Poaceae		*Vulpia microstachys* var. *ciliata*
Potamogetonaceae		*Ruppia cirrhosa*
Typhaceae		*Typha latifolia*
Zannichelliaceae		*Zannichellia palustris*

Several very noteworthy range extensions for California were made: *Mentzelia laevicaulis* was found at one location in Lanfair Valley; *Microsteris gracilis* was found at Goldstone Spring in the Providence Mountains and on Wildhorse Mesa; and *Chamaescye abramsiana* was found in the Van Winkle Mountains. All represent the first vouchers for these species in the Mojave Desert of San Bernardino County. Numerous other geographical range extensions (e.g., species previously known from one mountain range found in another) were also made. For example, we found a population of the rare scaley cloak fern *Astrolepis cochisensis* in the Clark Range that was not previously documented in that range, and documented an occurrence of the rare *Aliciela triodon* found at Pinto Mountain, the previously known from just north of the Clark Range.

Of the 85 newly documented taxa, 24 were non-native species that have recently naturalized either in localized or widespread areas in the Preserve. Some of these are noxious weeds and merit immediate management attention, including: *Cardaria pubescens*, *Acroptilon repens*, *Lepidium latifolium*, *Malcolmia africana, Centaurea melitensis, Nicotiana acuminata* var. *multiflora, Triticum aestivus* (wheat), and *Eruca vesicaria* ssp. *sativa*. The *Triticum*, which has not been previously observed in the Mojave Desert as a problem species was especially widespread throughout MOJA in 2004, even in remote canyons and bajadas away from roads and railways. It has recently been used by CalTrans as a sterile erosion control seed mix along highways. However, it appears quite capable of reproducing and rapidly dispersing into most native plant communities.

The following is a brief synopsis of the abundance and significance of the new species found at MOJA during this project. Plants shown with an asterisk are non-native alien species.

Acamptopappus sphaerocephalus var. *sphaerocephalus*. We documented numerous occurrences in Ivanpah Valley from Nipton to the Castle Peaks area.

**Acroptilon repens*. Known from only one location growing in an artificial swale along Hart Mountain Road, east of Barnwell. This is a U.S. Noxious Weed and should be eradicated.

Aliciella triodon. We found two small occurrences: the Pinto Mountain area, Mid Hills; and northeast Clark Range. **This represents a southern range extension for this rare CA taxon.**

Allenrolfea occidentalis. Observed on the extreme western boundary of MOJA, growing in the subsaline flats just south of Soda Dry Lake.

**Ambrosia artemisifolia*. Known from only one occurrence along Kelbaker Road, just north of I-40 (possibly extirpated).

Ambrosia confertiflora. Known from only two occurrences, one in the Mid Hills, and one occurrence at Mail Spring, NY Mountains. **This represents a new record for the taxon in the California Mojave Desert.**

Amsinckia menziesii var. *intermedia*. Found at numerous locations in the Granite and southern Providence Mountains.

Anagallis arvensis. Known only from an artificial water source at Marl Spring in the Marl Mountains.

Apocynum cannabinum. Known from only one location near Oak Spring in the Mid Hills. **This represents a new record for the taxon in the Mojave Desert.**

Arabis pulchra var. *pulchra*. It is interesting that this relatively common Mojave Desert species had not been documented in the Preserve prior to this study. We found occurrences on the west slopes of the Granite Mountains, and also in Macedonia Canyon in the Mid Hills.

Arctostaphylos nova sp. Is this the rarest species in the world? We documented ONLY ONE PLANT on a remote ridge in eastern Granite Mountains. **Manzanita experts Michael Vasey and John Keeley believe this to be a new species to science and will soon describe it.** The problem remains however, that there is only one known individual.

**Arundo donax*. We found this unlikely desert dweller at the Brant Siding mine site in the New York Mountains. Plants were clearly historically planted there and have persisted through vegetative reproduction.

Astragalus allochrous var. *playanus*. Known only from the Goffs area, it occurs in vacant lots in around the town and along the shoulder of Ivanpah Road just north of Goffs (within the Preserve). **This is the only documented population in California and therefore marks a northwestern range extension for this rare plant (CNPS List 2).**

Athysanus pusillus. Glenn Clifton recorded an occurrence of this taxon in Cottonwood Basin, Granite Mountains. **This is a significant find in that it represents the only record of the taxon in the California Desert.**

Atriplex elegans var. elegans. Often confused with the more common *A. elegans* var. *fasciculata*, we found just one occurrence in Ivanpah Valley near Nipton.

Bowlesia incana. Documented at two occurrences: one in the Von Trigger Hills near Von Trigger Spring, and the other on the eastern slopes of Wildhorse Mesa. **This is the first record of this species for the California Mojave Desert.** The author has since documented occurrences in the Old Woman Mountains 40 miles to the south.

**Bromus madritensis* ssp. *madritensis*. Commonly overlooked in the east Mojave Desert. We documented one occurrence above Brant Siding in the New York Mountains.

Calycoseris wrightii. Known from only one location in the northern Piute Range. More commonly found in southern Clark County, Nevada.

Camissonia boothii ssp. *boothii*. Known only from one small occurrence along the south side of Cedar Canyon Road near Quail Rock and Government Holes. **This represents a first record of the species in San Bernardino County, and a southern range extension for the species (of approximately 160 miles to the south and east).**

**Cardaria pubescens*. Know from only one location just west of Barnwell. This is a U.S. Noxious Weed.

Carex praegracilis. Only one known occurrence near Coldstone Spring, Providence Mountains. Discovered by Annie Kearns, MOJA staff. **New record for the eastern Mojave Desert.**

**Catalpa bignonioides*. Known from only one occurrence at Pachalka Spring, Clark Range. Likely planted during historic development of the site.

**Centaurea melitensis*. One occurrence at Marl Spring in the Marl Mountains. MOJA staff have attempted to eradicate this U.S. Noxious Weed from site.

**Cercidium floridum* ssp. *floridum*. One naturalized occurrence observed just west of Goffs. Native to the Sonoran Desert to the south.

Chamaesyce abramsiana. Known from only one confirmed occurrence on the north side of the Van Winkle Mountains. **This represents a new record for San Bernardino County for this rare plant (CNPS List 2).**

Claytonia parviflora ssp. *viridis*. We documented several occurrences in the Granite Mountains and Wildhorse Mesa area.

**Convolvulus arvensis*. Known from two occurrences: along Kelbaker Road just north of I-40, and at Pachalka Spring, Clark Range.

Cryptantha nova sp. Known from one occurrence near Brant Siding, NY Mountains. A second population discovered by J. André on west side of Joshua Tree National Park in 2006. **This is a new species to science and will be listed by CNPS as List 1B.**

Cynanchum utahense. Known from only one confirmed population near the Blind Hills near the Essex Road offramp at I-40. **CNPS List 2.**

Cyperus eragrostis. Known only from Marl Spring in the Marl Mountains. **First documented occurrence of species in the California deserts.**

Cyperus squarrosus. Documented at two separate locations: Bathtub Springs in the Mid Hills and near the "cross" on Cima Dome.

Digitaria californica. Known from only one occurrence at Rock Spring in the Mid Hills (approximately 100 plants total). When found in 2005, it was the **first record for the species in California**. A second occurrence has since been documented in southern Borrego State Park. **This represents a northwestern range extension of the species, which occurs east into Arizona and New Mexico. Upon discovery it became immediately listed by CNPS (List 2).**

Elymus elymoides ssp. *elymoides*. Found only at Indian Creek in the Cima Cinder Cones.

Eragrostis pectinacea var. *pectinacea*. Known from just one occurrence along Cima Road near the "cross" on Cima Dome.

Eremocarpus setigerus. Known from only one occurrence along Kelbaker Road, about 3 mi. north of I-40.

Eriophyllum ambiguum var. *paleceum*. Discovered via herbarium search. Collected in the 1980s at Cove Spring, Granite Mountans by Alan Romspert. Recently confirmed by J. André.

Eruca vesicaria* ssp. *sativa*. Along National Trails Hwy west of Goffs. **First occurrence documented in the east Mojave Desert. High invasive potential.

Filago arizonica. One occurrence along Wildhorse Canyon Road, about 3 mi. west of Hole-in-the-wall. **Represents a northern range extension of species in California.**

Galium matthewsii. Discovered via herbarium search. Collected by B.A. Prigge in the Clark Range in the late 1970s. Collection only recently deposited at UCLA.

Gilia aliquanta ssp. *aliquanta*. Only one occurrence was discovered at Granite Pass between the Granite and Providence Mountains.

**Hordeum murinum* ssp. *murinum*. Found growing in Granite Cove in the Granite Mountains. Probably a waif, and not likely to spread into natural vegetation communities.

Hymenoclea salsola var. *fasciculata.* Discovered via herbarium surveys and later verified in field (along Cedar Cyn Rd). Found elsewhere in Mid Hills, NY and Granite Mountains.

Hymenoclea salsola var. *pentalepis*. Common throughout MOJA, but never formally documented until this inventory.

Juncus bufonius var. *occidentalis*. Known from only one occurrence at Budweiser Spring area, west side of the Granite Mountains.

Kallstroemia californica. Documented for first time in Ivanpah Valley, 2004, and then again near I-40, south of Granite Mountains. **Represents a northern range extension.**

Lepidium latifolium*. One location at Mail Spring, NY Mountains. **This represents the only documented occurrence of this taxon in the California Mojave Desert.

Lepidium virginicum var. *pubescens*. One occurrence above Vulcan Mine at Foshay Pass, Providence Mountains.

**Lepidium virginicum* var. *virginicum*. One occurrence on old dirt road to Coldstone Spring, Providence Mountains.

**Leymus triticoides*. One location at Pachalka Spring, Clark Range.

Linanthus arenicola. Rare annual found near Baker on south side of Soda Dry Lake, and in Ivanpah Valley.

**Lolium multiflorum*. We found only one occurrence growing in the flats just west of Nipton, lower Ivanpah Valley.

Lomatium nevadensis var *nevadensis*. We found only location just east of Barnwell along Ivanpah Road, NY Mountains area. **A southern range extension for the species in California.**

Lotus salsuginosus ssp. *brevivexillus*. A fairly common plant in the Mojave Desert that germinates only after abundant rains. Previously undocumented in the Preserve.

Machaeranthera arida. Two occurrences were documented; just west of Nipton and just south of the Desert Studies Center (Zzyzx).

Malacothrix sonchoides. Ivanpah Valley at base of Cliff Canyon**. Represents a southern range extension of species in California.**

**Malus sylvestris*. Found growing at Pachalka Spring. This crab apple was likely planted during historic development of site.

Malvella leprossa. One location in an artificial swale along Ivanpah Road near Barnwell.

Marina parryi. Two locations in northern Piute Range. **A northern range extension for the species in California.**

Mentha arvensis*. One occurrence at Twin Spring in the Granite Mountains. **Represents the first known occurrence of species in the California Mojave Desert.

Mentzelia laevicaulis. One location along Ivanpah Road in Lanfair Valley. **First record in the Mojave Desert of San Bernardino County**.

Microsteris gracilis. Two localized occurrences at Coldstone Spring in Providence Mountains and along the east slopes of Wildhorse Mesa. **First occurrence in the California Mojave Desert. A range extension from Arizona and the San Bernardino Mountains.**

Mohavea confertiflora. Known only from Piute Range (just south of Piute Gorge). Also has been documented near Baker, but not within MOJA boundaries.

Nicotiana acuminata* var. *multiflora*. Only one occurrence just west of Quail Rock along Cedar Canyon Road. **Represents the only occurrence of this species in the California Mojave Desert.

Oenothera elata. One occurrence in upper Granite Cove in the Granite Mountains. **Represents the only occurrence of this species in the east Mojave Desert.**

Oenthera primaveris ssp. *primaveris*. Only found along Ivanpah Road just southwest of Barnwell.

Physalis lobata. Discovered via herbarium searches and later verified in the field. Known only from area one mi. east of O-X Ranch, Lanfair Valley. CNPS List 2.

**Polygonum arenastrum*. We found one location at Mail Spring in the NY Mountains.

Portulaca nova sp. Common summer annual from the Granite Mountains to the Mid Hills following abundant summer rains in 2005 and 2006. **This is a native plant resembling *Portulaca oleracea*, a non-native alien that is uncommon in MOJA and grows only in highly disturbted sites. *Portulaca* nova sp. grows in undisturbed conditions, and seems most closely allied to *Portulaca retusa* (from Arizonia) due to the cleistogamous flowers. However, it is likely to be described as a new species.**

Prunus eremophila. **A major discovery that occurred during this project; described by B.A. Prigge in 2002 in *Madroño* (vol. 49:285-288). Very rare California endemic with only a few scattered occurrences on north side of Von Trigger Hills. Plant has been listed by CNPS as List 1B.**

Rhamnus californica ssp. *californica*. Known only from Providence Mountains at Cornfield Spring. Nearest occurrence outside the MNP is the Kingston Range to the north.

Ruppia cirrhosa. Known only from the pond at Zzyzx (artificial habitat), and from the perennial Indian Spring (natural occurrence) on the west side of the Cima Cinder Cones.

**Schismus arabicus*. Only one occurrence on the south side of Castle Peaks. This taxon likely overlooked as it is difficult to distinquish from *S. barbatus*.

Senna covesii. Two locations of this rare plant were discovered in the northern Piute Range**. Major northern range extension of this Sonoran Desert plant. These findings also represent new occurrences to the California Mojave Desert. CNPS List 2.**

**Sisymbrium orientale*. Found in the Clark Range (near Mountain Pass) and along the National Trails Hwy west of Goffs.

Solanum triflorum*. Found just west of Quail Rock along Cedar Canyon Road, and just outside the MNP below Green's Well on the east side of the Clark Range. **New Record for San Bernardino County and a southern range extension in the Mojave Desert.

Sphaeralcea ambigua var. *rugosa*. Documented in the Hackberry Mountains and east slopes of the Clark Range. This species is often overlooked by botanists due to its dubious distinction from var. *ambigua*.

Tetradymia axillaris var. *axillaris*. Only a few plants were found on a rocky knoll along

Wildhorse Canyon Rd, about 3 mi. west of Hole-in-the-Wall. **Represents a southern range extension for the species in California.**

Thelypodium integrifolium ssp. *affine*. One occurrence at a spring in the north fork of Indian Creek, Cima Cinder Cones. **Represents 130 mi. eastern range extension of species in San Bernardino County.**

Tiquilia palmeri. W.L. Jepson apparently recorded this species somewhere "near Kelso" in the 1930s. We found a population of this species on the east end of the Kelso Dunes on the somewhat stabilized dunes about 1 mile west of Kelbaker Road.

Triticum aestivum*. Widespread throughout bajadas and canyons in the Preserve during 2004. Escaped from CalTrans revegetation programs along I-15 and I-40. **Incorrectly assumed to be sterile.

Typha latifolia. Known from only one location growing at the mouth of the canyon below Brant Siding, north side of NY Mountains.

Verbena bracteata. Known in the MOJA from one location about 4 mi. east of Barnwell, and outside the MOJA boundary at Mountain Pass.

Vulpia microstachys var. *ciliata*. Known from just one location in northeast drainage (Hackberry Springs area) in the Hackberry Mountains.

Wislizenia refracta var. *refracta*. Discovered at Indian Creek (just north of Cane Spring) on west side of the Cima Cinder Cones. **Represents a significant eastern range extension for the species in California. CNPS LIST 4**.

Zannichellia palustris. At Indian Creek near Cane Spring, west side of Cima Cinder Cones. **Previously undocumented in the California Mojave Desert.**

3.3.3 Special-Status Plants

Though the principal goal of this study was to add new taxa to the MOJA master plant list we also documented all rare plant occurrences that we encountered. As a result, our surveys significantly expanded upon the records for special-status plant occurrences known to occur within the Preserve.

Currently, a total of 113 vascular plant taxa (representing 12.3% of the flora) in the Mojave National Preserve retain state or federal listing status. Table 4 lists each of these 113 rare taxa along with their regulatory status, flowering windows, and general location within the Preserve. We opted to add *Penstemon bicolor* to the list because of its prominent status and the fact that it occurs just outside the Preserve boundaries in and around the Hart Mine in the Castle Mountains. This candidate for federal listing was previously observed in this area but never formally recorded there (i.e., no voucher specimens were collected). We also discovered several other populations in the Castle Mountains that are new records for California.

Table 4. Special-status plant species known to occur in the Mojave National Preserve.

Scientific Name	CNPS Status[1]	State Rank[2]	Global Rank[3]	Federal/ State	Flowering Phenology	Location in Preserve[4]
Abronia nana ssp. *covillei*	List 4.2	S3.2	G4T3	-	May-Jun	NY
Abutilon parvulum	List 2.3	S1.3	G5	-	Apr-May	WM, PR
Agave utahensis var. *nevadensis*	List 4.2	S3.2	G4T3Q	-	May-Jun	CL
Agertina herbacea	List 2.3	S2.3	G5	-	Aug-Oct	MH
Aliciela triodon	List 2.2	S1.3	G5	-	Apr-Jun	MH, CL
Allium atrorubens var. *cristatum*	List 4.3	S3.3	G4T3?	-	Apr-May	GR
Allium nevadense	List 2.3	S1.3	G4	-	Apr-May	CP, NY, PR
Aloysia wrightii	List 4.3	S3.3	G5	-	May-Jun	CL, NY, CP
Arctomecon merriamii	List 2.2	S2.2	G3	-	Apr-May	CL
Arenaria congesta var. *charlestonensis*	List 1B.3	S1.3	G5T2?	-	May-Jun	NY
Argyrochosma limitanea var. *limitanea*	List 2.3	S2.3	G4G5T3T4	-	Mar-Oct	NY
Asclepias asperula ssp. *asperula*	List 4.3	S3.3	G5T5	-	May-Jul	PR, NY
Asclepias nyctaginifolia	List 2.3	S1.3	G4G5	-	May-Jul	NY, LV
Astragalus allochrous var. *playanus*	List 2.2	S1.2	G4T3?	-	Apr-Jun	near Goffs
Astragalus cimae var. *cimae*	List 1B.2	S2.3	G2T2	-	Apr-Jun	CD, MH, NY, CL
Astragalus lentiginosus var. *borreganus*	List 4.3	S3.3	G5T4T5	-	Mar-May	KD
Astragalus nutans	List 4.3	S3.3	G3	-	Apr-Jun	all high ranges
Astrolepis cochisensis ssp. cochisensis	List 2.3	S2.3	G5?T4	-	May-Oct	PR, CL
Ayenia compacta	List 2.3	S3.3	G4	-	Mar-Apr	WM, PR
Berberis fremontii	List 3	S2?	G5	-	May-Jun	GR, PR, NY, MH
Bouteloua eriopoda	List 4.2	S3.2	G5	-	May-Oct	CD, CL, PR, NY, MH
Bouteloua trifida	List 2.3	S2?	G4G5	-	May-Oct	CD, CL, PR
Camissonia boothii var. *boothii*	List 2.3	S2.3	G5T4	-	Apr-May	MH
Chamaesyce abramsiana	List 2.2	S1.2	G4	-	Aug-Nov	VW, Goffs area
Chamaesyce parryi	List 2.3	S1.3	G5	-	Aug-Nov	KD, OD
Chamaesyce revoluta	List 4.3	S3.3	G5	-	Aug-Nov	WM, PR, MH, CL
Cheilanthes wootonii	List 2.3	S1.3	G5	-	Apr-Nov	GR, NY
Cirsium arizonicum var. *tenuisectum*	List 1B.2			-	Apr-Jun	NY
Cordylanthus parviflorus	List 2.3	S1S2	G4G5	-	Aug-Sep	PR, NY
Corypantha chlorantha	List 2.2	S2.2	G2G3	-	May-Jun	CL, IV
Corypantha vivipara	List 2.2	S2.2	G5T3	-	May-Jun	MH, CL, IV, NY
Cryptantha nova sp. (new)	List 1B.1	S1.1	G1	-	Apr-Jun	NY (Brant Siding)
Cryptantha tumulosa	List 4.3	S3.3	G4?	-	Apr-Jun	PR, WM, MH, NY, CP
Cymopteris gilmanii	List 2.3	S2.2	G3?	-	May-Jun	CL

Table 4. Cont…

Scientific Name	CNPS Status[1]	State Rank[2]	Global Rank[3]	Federal/ State	Flowering Phenology	Location in Preserve[4]
Cynanchum utahensis	List 4.3	S3.3	G4	-	Apr-Jun	IV and Essex Rd near I-40
Digitaria californica	List 2.3	S1.3	G5	-	Jul-Nov	PV near Rock Spring
Echinocereus engelmannii var. *howei*	List 1B.1	S1.1	G5T1	-	Apr-May	near Goffs
Enneapogon desvauxii	List 2.3	S2?	G5	-	Aug-Sep	PR, CL
Ericameria nana	List 4.3	S3.3	G5	-	Jul-Nov	IV
Erigeron utahensis	List 2.3	S1.3	G4	-	May-Sep	PR, NY
Eriodictyon angustifolium	List 2.3	S2.3	G5	-	May-Jun	GR, NY
Eriogonum ericifolium var. *thornei*	List 1B.2	S1.1	G3T1	CA End.	Jul-Oct	NY (two occurrences)
Eriogonum heermannii var. *floccosum*	List 4.3	S3.3	G5T3	-	Aug-Oct	CL, GR, PR, NY, MH
Eriogonum umbellatum var. *juniporinum*	List 2.3	S1S2	G5T3?	-	Jul-Sep	PR, MH
Erioneuron pilosum	List 2.3	S2S3	G5	-	May-Jun	CL
Euphorbia exstipulata var. *exstipulata*	List 2.1	S1.3	G5T5?	-	Mar-Jun	CL
Fendlerella utahensis	List 4.3	S3.3	G5	-	Jun-Aug	CL, PR
Galium angustifolium ssp. *gracillimum*	List 4.2	S3.2	G5T3	-	Apr-Jun	PR
Galium munzii	List 4.3	S3.3	G4G5	-	May-Jul	CL, GR, PR, NY, MH
Galium wrightii	List 2.3	S1.2	G3G4	-	May-Jul	CL (three occurrences)
Glossopetalon pungens	List 1B.2	S1.3	G2G3	-	May-Jun	CL (one occurrence)
Hedeoma nanum var. *californicum*	List 4.3	S3.3	G5T4	-	Apr-Jun	PR, NY, CL
Hymenopappus filifolius var. *eriopodus*	List 2.3			-	May-Jun	NY, CL
Ivesia jaegeri	List 1B.3	S1.3	G2G3	-	Apr-Jun	CL
Juncus nodosus	List 2.3	S2.3	G5	-	May-Jul	CL, GR
Leymus salinus ssp. *mojavensis*	List 2.3	S1.3	G5T3?	-	May-Aug	CL, PR, NY
Linum puberulum	List 2.3			-	Apr-Jun	NY, CL
Lithospermum incisum	List 2.3	S1.3	G5	-	Apr-Jun	NY
Lotus argyraeus var. *multicaulis*	List 1B.3	S1.3	G4?T1	-	Apr-Jun	NY, WM
Lotus argyraeus var. *notitius*	List 1B.3	S1.3	G4?T1	-	Apr-Jun	PR (one occurrence)
Machaeranthera gracilis	List 4.3	S3.3	G5	-	Apr-Jul	MH, CL, PR, NY
Maurandya antirrhiniflora ssp. *antirrhiniflora*	List 2.3	S1.3	G4G5T3?	-	Apr-May	PR
Menodora scabra	List 2.3			-	Apr-Jun	CL, CD, NY, VT
Mentzelia polita	List 1B.2			-	Apr-Jun	CL
Mentzelia pterosperma	List 2.3			-	Apr-Jun	CL
Mirabilis coccinea	List 2.3	S2.3	G5	-	Apr-Jun	NY, CP
Monarda pectinata	List 2.3	S1.3	G5	-	Jul-Sep	VT?
Mortonia utahensis	List 4.3	S3.3	G4G5	-	May-Jul	CL

Table 4. Cont…

Scientific Name	CNPS Status[1]	State Rank[2]	Global Rank[3]	Federal/ State	Flowering Phenology	Location in Preserve[4]
Muhlenbergia appressa	List 2.2	S3?	G4	-	Jul-Nov	PR, WM, MH
Muhlenbergia arsenei	List 2.3	S1S2	G5	-	Jul-Oct	CL, NY
Muhlenbergia fragilis	List 2.3	S1.3?	G5?	-	Aug-Oct	CL, NY
Muhlenbergia pauciflora	List 2.3	S1.3?	G5	-	Jul-Oct	NY, MH
Muilla coronata	List 4.2	S3.2?	G3	-	Apr-May	NY
Munroa squarrosa	List 2.2	S1S2	G5	-	May-Jul	CL, NY
Nama dichotomum var. *dichotomum*	List 2.3	S1.3?	G4T4?	-	May-Jun	NY
Oenothera caespitosa ssp. *crinita*	List 4.2	S3.3	G5T4T5	-	Apr-Jun	CL
Oenothera longissima	List 2.3			-	Apr-Jun	PR (Cornfield Spr.), NY
Opuntia basilaris var. *brachyclada*	List 1B.2	S1.2	G5T1	-	Apr-May	PR (alluvial fans, E side)
Opuntia curvospina	List 2.2	S1.2	G3G4	-	Apr-Jun	NY
Pellaea truncata	List 2.3	S2	G5	-	Mar-Nov	NY, PV, MH
Penstemon bicolor ssp. *roseus*	List 2.3	S1.3	G3T3Q	-	Apr-Jun	Hart Mtn, near CL (just outside MNP)
Penstemon calcareus	List 2.3	S2.3	G2	-	Apr-Jun	PR
Penstemon stephensii	List 1B.3	S2.3	G2	-	Apr-Jun	PR, GR
Penstemon thompsoniae	List 2.3	S1.3	G4	-	Apr-Jun	CL, NY
Penstemon thurberi	List 4.2	S3.2?	G5	-	Mar-May	KD
Penstemon utahensis	List 2.3	S2.3	G4	-	Apr-Jun	NY, PR
Petradoria pumila ssp. *pumila*	List 4.3	S3.3	G5T4	-	May-Jul	CL, NY, PR
Phacelia anelsonii	List 2.3	S2.3?	G2G3	-	Apr-Jun	NY, CP
Phacelia coerulea	List 2.3	S1.3	G5	-	Apr-May	NY, CL, CP, PV
Phacelia perityloides var. *jaegeri*	List 1B.3	S1.3	G4T2	-	Apr-May	CL
Physalis lobata	List 2.3	S1.3?	G5	-	Mar-May	PI (Grotto Hills)
Physaria chambersii	List 2.3	S2.3	G4	-	Mar-May	CL, IV
Pinus edulis	List 3.3	S1.3?	G5	-	May-Oct	NY
Piptatherum micranthum	List 2.3	S2S3	G5	-	Jun-Sep	CL
Polygala acanthoclada	List 2.3	S2.3	G4	-	May-Jun	NY
Portulaca halimoides	List 4.2	S3.2	G5	-	Jul-Nov	GR, CL, MH, NY
Prunus eremophila	List 1B.2	S1.2	G1	-	Mar-May	VT
Quercus turbinella	List 4.3	S3.3	G5	-	Mar-Oct	NY
Robinia neomexicana	List 2.3	S1.3	G4	-	Jul-Oct	MH
Sanvitalia abertii	List 2.2	S1S2	G5	-	Jul-Oct	CL, NY, PV
Schkuhria multiflora var *multiflora*	List 2.3	S1.3	G5T5	-	Jul-Oct	NY, MH, PV

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Table 4. Cont…

Scientific Name	CNPS Status[1]	State Rank[2]	Global Rank[3]	Federal/ State	Flowering Phenology	Location in Preserve[4]
Scleropogon brevifolius	List 2.3	S1.3	G5	-	Jun-Oct	NY (Caruthers Cyn)
Sedum niveum	List 4.2	S3.2	G3	-	May-Jul	NY
Selaginella leucobryoides	List 4.3	S3.2	G3	-	Mar-Nov	PR
Senna covesii	List 2.2	S2.2	G5?	-	Mar-May	PI (northeast corner)
Sphaeralcea rusbyi var. *eremicola*	List 1B.2	S1.3	G4T1	-	Apr-Jun	CL
Swertia albomarginata	List 4.3	S3.3	G5	-	May-Jul	CL, PR, NY, MH, WM
Tetradymia argyraea	List 4.3	S3.3	G4?	-	Aug-Sep	CL, GR, PR, MH, WM
Tragia ramosa	List 4.3	S3.3	G5	-	Apr-Jul	PR, NY, MH
Tripterocalyx micranthus	List 2.3	S1.3	G5	-	Mar-May	KD
Wislizenia refracta ssp. *refracta*	List 2.2	S1.2?	G5T5?	-	Apr-Jun	CCC (Indian Spr)
Woodsia plummerae	List 2.3	S1.3?	G5	-	Mar-Oct	NY

1. California Native Plant Society Codes:
   List 1B: Plants Rare, Threatened, or Endangered in CA or elsewhere
   List 2: Plants Rare, Threatened, or Endangered in CA, but more common elsewhere
   List 3: Plants about which we need more information - a review list
   List 4: Plants of limited distribution - a watch list
   Threat Code
   .1 - Seriously endangered in California
   .2 – Fairly endangered in California
   .3 – Not very endangered in California

2. State Ranking Codes:
   The state rank (S-rank) is assigned much the same way as the global rank,
   except state ranks in California often also contain a threat designation attached to the S-rank.
   S1 = Less than 6 EOs OR less than 1,000 individuals OR less than 2,000 ac.
   S1.1 = very threatened
   S1.2 = threatened
   S1.3 = no current threats known
   S2.1 = very threatened
   S2.2 = threatened
   S2.3 = no current threats known
   S3 = 21-80 EOs or 3,000-10,000 individuals OR 10,000-50,000 acres

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Table 4. Cont…

Scientific Name	CNPS Status[1]	State Rank[2]	Global Rank[3]	Federal/ State	Flowering Phenology	Location in Preserve[4]

S3.1 = very threatened
S3.2 = threatened
S3.3 = no current threats known

3. Global Ranking Codes:
G1 = Less than Less than 6 viable element occurrences (EOs) OR less than 1,000 individuals OR less than 2,000 acres
G2 = 6-20 EOs OR 1,000-3,000 individuals OR 2,000-10,000 acres.
G3 = 21-80 EOs OR 3,000-10,000 individuals OR 10,000-50,000 acres.
G4 = Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern.
G5 = Population or stand demonstrably secure to ineradicable due to being commonly found in the world.
Subspecies Level: The G-rank reflects the condition of the entire species, whereas the T-rank reflects the global situation of just the subspecies or variety.

4. NY = New York Mtns
PR = Providence Mtns
CL = Clark Range
GR = Granite Mtns
IV = Ivanpah Mtns
IVV = Ivanpah Valley
MH = Mid Hills
KD = Kelso Dunes
CD = Cima Dome
CP = Castle Peaks
LV = Lanfair Valley
OD = Old Dad Mtn
VW = Van Winkle Mtns
VT = Von Trigger Hills
WM = Wildhorse Mesa
PI = Piute Range
CCC = Cima Cinder Cones
PV = Pinto Valley

Prior to this study, 220 rare plant occurrences had been documented at MOJA. Using a combination of field surveys and herbarium database searches, we more than quadrupled this number. We recorded an additional 655 occurrences which brings the total to 875 special-status plant occurrences known to occur in MOJA. A complete database providing details about each of these occurrences are catalogued in Appendix D (See file on accompanying CD ROM). Appendix D includes all rare plant occurrences documented during the Area Searches and Targeted and Opportunistic Surveys conducted during this study (See Appendices A and B). Appendix D and Table 4 should provide an excellent foundation upon which to develop a rare plant management program at Mojave National Preserve.

3.3.4. Non-Native Alien Plants

As reported above, a total of 86 non-native alien plant taxa occur in the Mojave National Preserve (Table 2, Appendix C). Of these, 17 taxa are casual aliens with no invasive potential. The remaining 69 species vary in their invasive qualities however. Though considerable inventory and mapping of invasive alien plants is still needed at MOJA, the results of our inventory, as summarized in Appendices A and B, provides a valuable baseline record for interpreting the distribution of invasives throughout MOJA.

Several invasive species are ubiquitous at MOJA, especially *Bromus madritensis* ssp. *rubens*, *Bromus tectorum*, *Erodium cicutarium*, and *Schismus barbatus*. These four renowned invasives of the Mojave Desert established here decades ago and are well-known for their deleterious impacts upon native plant associations and natural ecological processes. Not surprisingly all four species were present in nearly all of our surveys.

Other prominent invasive alien species have more recently advanced into MOJA and continue to spread. A partial list includes: *Tamarix ramosissima, Brassica tournefortii, Salsola tragus, Descurainia sophia* and *Sisymbrium irio*. Of these, Sahara mustard (*B. tournefortii*) and tumbleweed (*S. tragus*) represent the most serious threat to continue their spread within MOJA, especially in the sandy soils at Kelso Dunes/Soda Dry Lake, Ivanpah Valley, and Lanfair Valley.

During this survey we documented several isolated occurrences of non-native aliens that could pose a serious threat in the near future. These include: *Malcomia africana* (one occurrence on Kelso Peak), *Eruca vesicaria* var. *sativa* (near Goffs), *Sisymbrium altissimum* (Mescal Range and scattered elsewhere), *Acroptilon repens* (near of Barnwell), *Cardaria pubescens* (also near Barnwell), and *Centaurea melitensis* (at Marl Spring). All are very isolated occurrences within the MOJA, but are notorious for their invasive potential and therefore warrant immediate attention. As evidenced by its recent explosive spread throughout Clark County in Nevada, *Malcomia africana* poses perhaps the biggest future threat from this group.

4.0 DISCUSSION

4.1 Summary

The results of this study very much exceeded the initial expectations of our team of botanists. And even though some of our surveys targeted areas with the highest potential to add new taxa to the MOJA master plant list, we did not expect to add as many as 82 new taxa (we predicted about 30 new taxa). We also were surprised to add 655 additional rare plant occurrences in the Preserve.

We estimate that 95-97% of the MOJA flora has been documented. But what these results clearly indicate is that the botanical inventory of MOJA is far from completed. In effect, we only surveyed 20,000 acres, or just 1.4% of the total area of MOJA. An estimated 25 native and 10 non-native plant taxa could be found with continued surveys, assuming a similar level of effort equal to this study (approximately 3,000 person hours). It is unlikely that additional herbarium searches will yield many new species from historic collections, but the UCLA and UNLV collections should also be searched. In terms of management, a more significant and important outcome of this inventory were the many noteworthy range extensions, new rare plant population records and non-native alien species occurrences that were documented. This information is essential to the MOJA vegetation management and natural history interpretation programs.

4.2 Recommendations

1) <u>Continue the inventory of the Mojave National Preserve</u>. Many areas still remain relatively unexplored and would likely yield additional species. These include the Castle Peaks, Woods Mountains, Piute Range, Devil's Playground, remote canyons of the higher ranges and all springs, seeps and riparian areas. In addition, we were able to add several new species (summer annuals and fall-flowering species) during summer and fall surveys. So future surveys should be based upon the phenologies of ALL taxa, not just the more abundant spring-flowering species.

Numerous taxa are still suspected to occur within MOJA but have yet to be documented. For example, we discovered *Penstemon bicolor* (federal candidate for listing as Endangered) in the Castle Mountains in 2005, less than 1 mile from the Preserve boundary. This represented the first verified occurrence in California for this rare taxon. Based upon these findings, additional surveys in suitable habitat in the Castle Peaks and near the Hart and Viceroy Mines have reasonable probability of finding this taxon within MOJA.

In addition to continuing with field surveys, herbarium searches should be regularly conducted. The Jepson Online Interchange (http://ucjeps.berkeley.edu/interchange.html) provides a rapid search engine of most the major herbariums in California. At this time, the UCLA and UNLV herbariums have not been searched and would likely contain additional vouchers from MOJA.

2) Complete the inventory of Manzanar Historic Site. Several additional summer and fall-flowering annuals may be added following sufficient summer rains.

3) Update NPSpecies and the Certification of the MOJA master plant list. Using preliminary results of this study, we assisted I&M coordinator Christina Heister and her staff in 2005 in an effort to certify the NPSpecies record of vascular plant taxa in MOJA. The certification is incomplete however, and should be updated with the information in this report. To avoid compounding errors that are inherent to the certification process, we highly recommend that future certification efforts be done by a qualified botanist with a high level of expertise in the region and in working with taxonomic nomenclature.

4) Rare Plants Management Program. The results of this study provide an excellent foundation to develop a rare plant program at MOJA. In addition to the occurrence information provided here, the author manages an extensive database on observations regarding rare plant distributions, ecological and life history attributes, known or potential threats and wishes to share this information with the Preserve. Starting with those species that merit highest priority, status or management plans that summarize or prescribe inventory, mapping, basic research, and protection and enhancement of rare plant populations are needed.

In addition to the 113 special-status species listed in Table 4, there are dozens of taxa that do not have state or federal status, but represent important relict or disjunct populations within MOJA. Examples of such species include hackberry (*Celtis reticulata*), white fir (*Abies concolor*) and maidenhair fern (*Adiantum capillus-veneris*). These "**unique populations"** also merit high management concern and should be included in the rare plants management program.

5) Inventory and Monitor Exotic Species. This year we have been assisting Annie Kearns at MOJA to develop priorities for the management of non-native alien species in the Preserve. This effort of course begins with an understanding of the distribution of alien species throughout MOJA, and the potential invasive threat that each poses. The distribution and abundance of alien species presented in this report forms a foundation to build upon. However, we highly recommend that MOJA launch an ongoing inventory and monitoring program that focuses on alien species. Monitoring should focus on early detection, and the rate of spread for invasive alien species.

6) Develop a Digital Library for MOJA and MANZ Plants. During this project we photographed hundreds of species at both MOJA and MANZ. These high resolution digital photographs are available upon request. We recommend that these photos and those contributed by others, be used to develop a photo library. Of particular interest to management is the need for photos of all special-status and alien plants.

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Wislizenia refracta* ssp. *refracta
(the rare jackass clover discovered at Indian Spring)

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Appendix A. A summary for surveys conducted during Base Year (FY 2002-2003), Option Year 1 (FY 2003-2004), and in FY 2004-2005 at Mojave National Preserve. Surveys are indicated by Type (Area Search in Priority Sampling Area, Targeted Survey and Opportunistic Survey) and are listed chronologically.

Note: A complete species list for each of the following list of surveys, referenced by survey Stop Number and Date, can be found in Appendix E (not included here as hard copy: electronic copy attached). For survey areas of 100 ha or larger, additional UTM points are provided to define the survey perimeter.

Stop #1, 3/29/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: 3 mi. west of Homer Mtn, southern Piute Range
UTM: 11S N-3878768 E-0684506
Elevation: 2,894 ft
Description: 3 mi. west of Homer Mtn, southern Piute Range
Total Area Surveyed: 10 ha
New Vouchers for MNP? No
Special Status Plants? No
Notable Range Extensions? No
Non-Native Exotics: *Bromus tectorum*, *Bromus madritensis rubens*, *Erodium cicutarium*, *Schismus barbatus*
Species List? Yes

Stop # 2, 3/29/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Where Lower Piute Cr. from Poleline Rd to about 400 m. upstream (west)
UTM: 11S N-3886448 E-0686517
Elevation: 2,425 ft
Total Area Surveyed: 12 ha
New Vouchers for MNP? 2 Species: ***Acamptopappus sphaerocephalus* var. *sphaerocephalus, Amsinckia menziesii* var. *intermedia***
Special Status Plants? No
Notable Range Extensions? We found *Juncus torreyi* here. Previously this taxon was known to the MNP only in Keystone Cyn in the NY Mtns.
Non-native Exotics: *Bromus tectorum*, *Bromus madritensis rubens*, *Erodium cicutarium*, *Schismus barbatus*
Species List? Yes

Stop # 3, 3/29/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Upper Piute Gorge, from Fort area upper NW drainage.
Base UTM: **11S N-3887381 E-0683636**
Northern boundary: N-3887798 E-0684299
Eastern boundary: N-3887290 E-0683746
Southern boundary: N-3887198 E-0683087
Western boundary: N-3887439 E-0680038
Elevation: 2,667 ft
Total Area Surveyed: 120 ha
New Vouchers MNP? No
Special Status Plants? No
Notable Range Extensions? *Juncus torreyi* (see above), *Scirpus americana* (previously only known at Zzyzx Rd), and *Rorripa nasturtium-aquatica* (nearest location: Pachalka Spr., Clark Mtn).
Non-Native Exotics: *Tamarix ramossisima* (about 400 large plants), *Bromus tectorum*, *Bromus madritensis rubens*, *Erodium cicutarium*, *Schismus barbatus*
Species List? Yes

Stop #1, 4/2/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Foshay Pass above and to east of Vulcan Mine
UTM: 11S N-3865120 E-0630878

Elevation: 4,340 ft
Total Area Surveyed: 80 ha
New Vouchers MNP? No
Special Status Plants: ***Penstemon calcareus, Hedeoma nanum* var. *californicum, Selaginella leucobryoides, Astrolepis cochisensis* ssp. *cochisensis, Muhlenbergia appressa***
Notable Range Extensions: *Selaginella leucobryoides* - previously known in MNP only from Bonanza King Mine area of Providence Mtns. *Muhlenbergia appressa* - previously known in MNP only from east side of Providence Mtns. Other Notable finds: *Tricardia watsonii, Argyrochosma jonesii, Artemisia nova.*
Non-native Exotics: *Bromus madritensis rubens, Erodium cicutarium, Bromus tectorum, Schismus barbatus.*
Species List? Yes

Stop #1, 4/19/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Lower Piute Gorge from Fort Piute east downstream 1 mi.
Base UTM: **11S N-3887376 E-0684475**
Northern Boundary: N-3887573 E-0684909
Eastern Boundary: N-3887398 E-0686739
Southern Boundary: N-3887239 E- 0684592
Western Boundary: N-3887390 E-0683622
Elevation: 2,667 ft
Total Area Surveyed: 110 ha
New Vouchers for MNP? No
Special Status Plants? No
Notable Range Extensions? *Rorripa nasturtium-aquatica* (see above), *Juncus torreyi* (see above).
Non-native Exotics: *Cynodon dactylon, Sonchus asper, Schismus barbatus*
Species List? Yes

Stop #1, 4/23/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Live Oak Spring area, Mid Hills
UTM: 11S N-3995998 E-0643069
Elevation: 4,913 ft
Total Area Surveyed: 85 ha
New Vouchers for MNP? No
Special Status Plants: ***Corypantha vivipara***
Notable Range Extensions? No
Non-native Exotics? *Erodium cicutarium, Bromus trinii, Vulpia myros, Bromus tectorum, Bromus madritensis rubens, Schismus barbatus*
Species List? Yes

Stop #1, 4/24/03
Survey Type: **TARGETED SURVEY (Boundary location)**
UTM: 11S N-3943826 E-0619943
Description: Lower Willow Springs Basin, Wash near I-40
Elevation: 3,135 ft
Total Area Surveyed: 65 ha
New Vouchers for MNP? No
Special Status Plants? No
Notable Range Extensions? *Nicolletia occidentalis* - this is the only known location in MNP, we expanded upon its local distribution by about 0.5 mi.
Non-native Exotics? *Erodium cicutarium, Bromus madritensis rubens, Schismus barbatus*
Species List? Yes

Stop # 2, 4/24/03
Survey Type: **OPPORTUNISTIC SURVEY**
Description: Along Kelbaker Rd, 3.8 mi. north of I-40
UTM: 11S N-3847340 E-0624645
Elevation: 3,8431 ft
Total Area Surveyed: <1 ha
New Vouchers for MNP? One Species: ***Convolvulus arvensis***
Special Status Plants? No
Notable Range Extensions? *Convolvulus arvensis*: this noxious weed, native of Europe, was not previously known to the Mojave

Desert of CA.
Non-native Exotics? *Convolvulus arvensis*
Species List? No, plant growing along shoulder of road in barren soil.

Stop #1, 4/25/03
Survey Type: **TARGETED SURVEY**
Description: Sandy Ridge along Poleline Rd south of Kelso Dunes
UTM: 11S N-3860383 E-0616122
Elevation: 2,443
Total Area Surveyed: 65 ha
New Vouchers for MNP? ***Muilla* nova sp (undescribed)**
Special Status Plants? ***Muilla* sp (undescribed)** - only 3 plants, did not voucher at this location.
Notable Range Extensions? *Nemacaulis denudata* (previously only known to MNP at Devil's Playground)
Non-native Exotics? *Bromus tectorum, Bromus madritensis rubens, Schismus barbatus, Erodium cicutarium*
Species List? Yes

Stop #1, 4/30/03
Survey Type: **OPPORTUNISTIC SURVEY**
Description: Along Cima Rd, 2 mi. west of Cima, CA
UTM: 11S N-3898406 E-0635519
Elevation: 4,126 ft
Total Area Surveyed: < 1 ha
New Vouchers for MNP? One Species: ***Triticum aestivum***
Special Status Plants? No
Notable Range Extensions? *Triticum aestivum* (newly escaped in MNP)
Non-native Exotics? *Triticum aestivum*
Species List? No

Stop #1, 5/2/03
Survey Type: **TARGETED SURVEY**
Description: Along Southern Pacific Railroad Tracks, 2 mi. southwest of Nipton, CA
UTM: 11S N-3922774 E-0657867
Elevation: 3,112 ft
Total Area Surveyed: 40 ha
New Vouchers for MNP? Two Species: ***Schismus arabicus, Triticum aestivum***
Special Status Plants? No
Notable Range Extensions? *Filago depressus* - previously only known in MNP from Desert Studies Center at Zzyzx.
Non-native Exotics? *Triticum aestivum (new to MNP but not vouchered here), Bromus tectorum, Erodium cicutarium, Schismus arabicus, Schismus barbatus*
Species List? Yes

Stop #2 5/2/03 and completed 5/6/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Malpais Spring, N. of Castle Mtns, E. of NY Mtns, on E. Edge of MNP
Base UTM: **11S N-3915533 E-0670651**
Northern boundary: N-3917839 E-0669394
Eastern boundary: N-3915193 E-0673425
Southern boundary: N-3915033 E-0671834
Western boundary: N-3915932 E-0668021
Elevation: 4,596 ft
Total Area Surveyed: 210 ha
New Vouchers for MNP? One Species: ***Triticum aestivum***
Special Status Plants? ***Allium nevadense*, *Phacelia coerulea*, *Phacelia anelsonii*, *Aloysia wrightii*, *Eriogonum heermanii* var. *floccosum*, *Asclepias nytaginifolia, Mirabilis coccinea, Tragia ramosa, Cryptantha tumulosa, Astragalus nutans***
Notable Range Extensions? *Glycyrrhiza lepidota* (only known from two other places in MNP), *Phacelia anelsonii (*only known from NY Mtns in MNP)*, Lupinus shockleyi (*previously only known from Kelso Dunes and Clark Mtn), *Solanum elaeagnifolium* (previously known in MNP at one location near Barnwell).
Non-native Exotics? *Bromus madritensis rubens, Triticum aestivum, Cynodon dactylon, Solanum elaeagnifolium, Schismus barbatus*
Species List? Yes (big list).

Stop #3, 5/2/03
Survey Type: **TARGETED SURVEY**
Description: Subsaline flats south of Nipton Rd, about 5 mi. west of Nipton
UTM: 11SN-3924744 E-0650347
Elevation: 2,587ft
Total Area Surveyed: 60 ha
New Vouchers for MNP? One Species: ***Machaeranthera arida***
Special Status Plants? No
Notable Range Extensions? *Machaeranthera arida* (nearest location west of Soda Dry Lake)
Non-native Exotics? *Salsola tragus, Schismus barbatus, Descurainia sophia*
Species List? Yes

Stop #4, 5/2/03
Survey Type: **OPPORTUNISTIC SURVEY**
Description: Along Southern Pacific Railroad Tracks, 1 mi. northeast of Ivanpah Rd
UTM: 11S N-3913077 E-0654293
Elevation: 3,334 ft
Total Area Surveyed: 10 ha
New Vouchers for MNP? One Species: ***Acamptopappus sphaerocephalus*** var. ***sphaerocephalus***
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Schismus barbatus, Erodium cicutarium*
Species List? No

Stop #5, 5/2/03
Survey Type: **OPPORTUNISTIC SURVEY**
Description: On north-facing slopes along Ivanpah Rd, 0.5 mi. northeast of Barnwell
UTM: 11S N-3907216 E-0661010
Elevation: 4,861 ft
Total Area Surveyed: 20 ha
New Vouchers for MNP? One Species: ***Lomatium nevadensis* var. *nevadensis***
Special Status Plants? No
Notable Range Extensions? Nearest known voucher of *Lomatium nevadensis nevadensis* is approx. 80 miles to the north (Kingston Range).
Non-native Exotics? *Bromus tectorum*
Species List? No

Stop #1, 5/6/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Northern Piute Range at CAL/NEV corner of MNP
Base UTM: **11S N-3903863 E-0685988**
Northern boundary: N-3904632 E-0683843
Eastern boundary: N-3903638 E-0685983
Southern boundary: N-3902239 E-0685132
Western boundary: N-3904602 E-0682438
Elevation: 2,691 ft
Total Area Surveyed: 260 ha
New Vouchers for MNP? Four Species: ***Calycoseris wrightii, Senna covesii, Marina parryi, Acamptopappus sphaerocephalus* var. *sphaerocephalus***
Special Status Plants? ***Senna covesii***
Notable Range Extensions? *Senna covesii* (known from Riverside Co.- Whipple and Turtle Mtns), *Marina parryi* (nearest populations in Dead Mtns), *Calycoseris wrightii* (nearest populations from near Jean, Nevada), *Acamptopappus sphaerocephalus* var. *sphaerocephalus* (new location in East Mojave), *Asclepias subulata* (previously known in MNP only near Essex Rd),
Non-native Exotics? *Erodium cicutarium, Schismus barbatus, Bromus madritensis rubens, Bromus tectorum, Tamarix aphylla, Sonchus asper*
Species List? Yes

Stop #1, 5/7/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Ivanpah Rd, about 3 mi. north of Barnwell
UTM: 11S N-3908797 E-0660953
Elevation: 4,557 ft

Total Area Surveyed: 45 ha
New Vouchers for MNP? No
Special Status Plants? ***Allium nevadense***
Notable Range Extensions? No
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium*
Species List? Yes

Stop #2, 5/7/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Lower Cliff Canyon, NY Mtns
Base UTM: **N-3904445 11S E-0648463**
Northern boundary: N-3905332 E-0648001
Eastern boundary: N-3904832 E-0648909
Southern boundary: N-3901123 E-0646283
Western boundary: N-3901483 E-0645233
Elevation: 4,326 ft
Total Area Surveyed: 170 ha
New Vouchers for MNP? ***Cryptantha* nova sp.**
Special Status Plants? ***Pellea truncata*, *Pinus edulis, Allium nevadense***
Notable Range Extensions? The occurrence of *Cryptantha* nova sp here is significant and is discussed at length in the text of this report. Only other known occurrence of this new taxon is a very isolated and small population in Long Canyon, west end of Joshua Tree National Monument (2006 discovery). This taxon was initially called Cryptantha clokeyi, which it will key to in the Jepson Manual. *Malacothrix stebbinsii* (previously known in MNP only in Granite Mtns)
Non-native Exotics? *Schismus barbatus, Bromus trinii, Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium, Sonchus asper*
Species List? Yes

Stop #3, 5/7/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: "Brant" Siding, Canyon just east of Cliff Canyon, NY Mtns
Base UTM: **11S N-3904985 E-0650468**
Northern boundary: N-3906238 E-0654237
Eastern boundary: N-3903238 E-0651389
Southern boundary: N-3901344 E-0650876
Western boundary: N-3904832 E-0650028
Elevation: 4,473 ft
Total Area Surveyed: 135 ha
New Vouchers for MNP? Two Species: ***Arundo donax, Typha latifolia***
Special Status Plants? ***Pellaea truncata*, *Phacelia coerulea***
Notable Range Extensions? *Arundo donax*: previously undocumented in the East Mojave Desert of CA. *Typha latifolia*: nearest voucher of this species approximately 150 mi. to west.
Non-native Exotics? *Tamarix ramosissima*, *Arundo donax, Vulpia myros, Bromus diandrus*, *Erodium cicutarium, Schismus barbatus, Bromus madritensis rubens*
Species List? Yes

Stop #1, 5/8/03
Survey Type: **OPPORTUNISTIC SURVEY**
Description: Dirt Rd near landfill, 1 mi. southeast of Baker, CA
UTM: 11S N-3900226 E-0585359
Elevation: 932 ft
Total Area Surveyed: 30 ha
New Vouchers for MNP? No
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Schismus barbatus, Brassica tournefortii, Salsola tragus*
Species List? Yes

Stop #2, 5/8/03
Survey Type: **OPPORTUNISTIC SURVEY**
Description: Granitic knobs, 0.4 mi. north of Kelbaker Rd, 10 mi. southeast of Baker, CA
UTM: 11S N-3900840 E-0601090
Elevation: 2,040 ft

Total Area Surveyed: 70 ha
New Vouchers for MNP? No
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Schimus barbatus, Bromus madritensis rubens*
Species List? Yes

Stop #1, 5/10/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Keystone Canyon to high ridges at 6,000 ft
Base UTM: **11S N-3904354 E-0656824**
Northern boundary: N-3905321 E-0655293
Eastern boundary: N-3904218 E-0657328
Southern boundary: N-3900243 E-0653324
Western boundary: N-3901832 E-0650893
Elevation: 5,256 ft
Total Area Surveyed: 320 ha
New Vouchers for MNP? One Species: ***Verbena bracteata***
Special Status Plants? ***Hedeoma nanum* var. *californicum, Quercus turbinella*, *Penstemon utahensis, Abronia nana covillei, Cryptantha tumulosa, Corypantha vivipara, Hedeoma drummondii, Swertia albomarginata, Polygala acathoclada, Lithospermum incisum, Eriodictyon angustifolium, Tragia ramose, Penstemon thompsoniae, Astragalus nutans, Leymus salinus, Petradoria pumila, Pellaea truncate, Cirsium arizonica tenuisectum, Linum puberulum***
Notable Range Extensions? *Verbena bracteata* (new for MNP) - did not take voucher because only 2 plants; *Equisetum laevigatum* (only second location in MNP),
Non-native Exotics? *Bromus tectorum, Bromus madritensis rubens, Schismus barbatus, Tamarix ramosissima, Erodium cicutarium*
Species List? Yes

Stop #1, 5/13/03
Survey Type: **TARGETED SURVEY**
Description: 0.5 mi north of I-40 on Essex Rd
UTM: 11S N-3853035 E-0652287
Elevation: 2,065 ft
Total Area Surveyed: 80 ha
New Vouchers for MNP? One Species: ***Asclepias subulata***
Special Status Plants? ***Cynanchum utahense***
Notable Range Extensions? *Cynanchum utahense* (previously known to MNP only in Ivanpah Valley); *Psorothamnus spinosus* (previously known to MNP only in eastern Granite Mtns); *Asclepias subulata* (also found in MNP at Malpais Spring in the Castle Peaks, and near Goffs)
Non-native Exotics? *Schismus barbatus, Erodium cicutarium, Brassica tournefortii,*
Species List? Yes

Stop #1, 5/15/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Coldstone Spring, south of Foshay Pass in Providence Mtns
Base UTM: **11S N-3863530 E-0632521**
Northern boundary: N-3863893 E-0634327
Eastern boundary: N-3861884 E-0634984
Southern boundary: N-3861028 E-0633953
Western boundary: N-3862389 E-0632103
Elevation: 4,618 ft
Total Area Surveyed: 110 ha
New Vouchers for MNP? One Species: ***Microsteris gracilis***
Special Status Plants? No
Notable Range Extensions? This is the first documented occurrence *of Phlox gracilis* in the Mojave Desert. *Sambucus mexicana* (previously known in MNP only at Pachalka Spr. in Clark Mtn); *Quercus chrysolepis* (not common in the Providence Mtns)
Non-native Exotics? *Bromus madritensis rubens, Bromus diandrus, Sisymbrium irio, Hordeum murinum*
Species List? Yes

Stop #2 5/15/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Foshay Spring and surrounding area, Providence Mtns

UTM: 11S N-3864708 E-0633868
Elevation: 4,205 ft
Total Area Surveyed: 30 ha
New Vouchers for MNP? One Species: ***Amsinckia menziesii*** var. ***intermedia***
Special Status Plants? No
Notable Range Extensions? ***Amsinckia menziesii*** var. ***intermedia*** (new for MNP, discovered in many locations, this population documented but not vouchered)
Non-native Exotics? *Erodium cicutarium, Bromus tectorum, Bromus madritensis rubens*
Species List? Yes

Stop #3 5/15/03
Survey Type: **OPPORTUNISTIC SURVEY**
Description: Foshay Pass Rd, 1 mi. west of Essex/Mitchell Caverns Rd.
UTM: 11S **N-**3864171 E-0642645
Elevation: 3,008 ft
Total Area Surveyed: 40 ha
New Vouchers for MNP? One Species: ***Triticum aestivum*** (one of many locations for this plant new to MNP - did not voucher this population)
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Erodium cicutarium, Bromus tectorum, Bromus madritensis rubens, Schismus barbatus, Triticum aestivum*
Species List? Yes

Stop #1, 5/16/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Von Trigger Wash/Spring, in the Von Trigger Hills near the Piute Range
UTM: 11S N-3880412 E-0669003
Elevation: 3,474 ft
Total Area Surveyed: 84 ha
New Vouchers for MNP? One Species: ***Bowlesia incana*** Collected in March, we revisited the site this date to obtain UTM data.
Special Status Plants? ***Prunus eremophila, Asclepias nyctaginifolia, Menodora scabra***
Notable Range Extensions? *Bowlesia incana* (this is a new record for the MNP, as well as the Mojave Desert of California).
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum*
Species List? Yes

Stop # 2, 5/16/03
Survey Type: **OPPORTUNISTIC SURVEY**
Description: About 1/8 mi. within MNP boundaries, off Goffs Rd about 4 mi. northeast of I-40
UTM: 11S N-3857026 E-0669659
Elevation: 2,219 ft
Total Area Surveyed: 2 ha
New Vouchers for MNP? One Species: ***Cercidium floridum*** (never documented in MNP, though it occurs as planted at Desert Studies Center - Zzyzx.
Special Status Plants? No
Notable Range Extensions? *Cercidium floridum* (these two plants do not appear to be planted, and they are growing in natural vegetation community)
Non-native Exotics? *Erodium cicutarium*
Species List? No

Stop #1, 5/21/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Budweiser Cyn and west ridges of Granite Mtns (2 day backpack)
Base UTM: **11S N-3850861 E-0616145**
Northern boundary: N-3858323 E-0607489
Eastern boundary: N-0385342 E-0617832
Southern boundary: N-3846389 E-0614032
Western boundary: 3849328 E-0606200
Elevation: 6,070 ft
Total Area Surveyed: 490 ha
New Vouchers for MNP? One Species: ***Juncus bufonius* var. *occidentalis***
Special Status Plants? ***Tetradymia argyrea, Allium atrorubens* var. *cristatum***
Notable Range Extensions? *Juncus bufonius* var. *occidentalis*: Nearest voucher to MNP unknown;

Allium atrorubens var. *cristatum* (new location in Granite Mtns)
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Tamarix ramossisima*
Species List? Yes

Stop #1, 5/24/03
Survey Type: **OPPORTUNISTIC SURVEY**
Description: Lower Bajada west of Willow Springs Basin, Granite Mtns
UTM: 11S N-3844077 E-0618715
Elevation: 3,208 ft
Total Area Surveyed: 15 ha
New Vouchers for MNP? No
Special Status Plants? No
Notable Range Extensions? *Krascheninikovia lanata* (new for south side of Granite Mtns)
Non-native Exotics? *Bromus tectorum, Bromus madritensis rubens, Erodium cicutarium, Schismus barbatus, Brassica tournefortii*
Species List? No

Stop #1, 5/26/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Pachalka Spring and slopes above, Clark Mtn
UTM: 11S N-3931044 E-0624225
Elevation: 4,895 ft
Total Area Surveyed: 96 ha
New Vouchers for MNP? Three Species: ***Leymus triticoides* (rediscovered - not seen at Pachalka Spring since 1940), *Malus sylvestris, Catalpa bignonioides***
Special Status Plants? ***Aloysia wrightii, Mortonia utahensis, Cryptantha tumulosa, Astrolepis cochisensis* var. *cochisensis*, *Agave utahensis* var. *nevadensis, Mentzelia pterosperma***
Notable Range Extensions? *Leymus triticoide,Anemopsis californica* (only occurrence in MNP except for Bull Canyon - Granite Mtns), *Sambucus mexicana* (only occurrence in MNP except for Coldstone Spr in Providence Mtns), *Polypogon australis* (only occurrence in MNP), *Epilobium ciliatum* (only occurrence in MNP except for Coyote Spr - Granite Mtns), *Plantago major* (only occurrence in MNP), *Astrolepis cochisensis* (new location in Clark Mtn for this CNPS-listed plant).
Non-native Exotics? *Leymus triticoides, Catalpa bignonioides, Malus sylvestris, Hordeum murinum, Descurainia sophia, Schismus barbatus, Melilotus indicus, Bromus diandrus, Bromus tectorum, Polypogon australis, Sisymbrium irio, Plantago major, Bromus carinatus, Bromus trinii, Erodium cicutarium*
Species List? Yes

Stop #2, 5/26/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Spring 1 mi. east of Live Oak Spring, Mid Hills
UTM: 11S N-3896366 E-0643466
Elevation: 5,211 ft
Total Area Surveyed: 50 ha
New Vouchers for MNP? One Species: ***Apocynum cannibinum***
Special Status Plants? No
Notable Range Extensions? *Equisetum laevigatum* (known only from two other locations in MNP).
Non-native Exotics? *Erodium cicutarium, Bromus tectorum, Bromus madritensis rubens*
Species List? Yes

Stop #1, 6/23/03
Survey Type: **OPPORTUNISTIC SURVEY**
Description: 5.5 mi. west of Niption, 1.0 mi. E. of Ivanpah Rd, just south of Nipton Rd, Ivanpah Valley.
UTM: 11S N-3924718 E-0648532
Elevation: 2,518 ft
Total Area Surveyed: 10 ha
New Vouchers for MNP? One Species: ***Machaeranthera arida***
Special Status Plants? No
Notable Range Extensions? Nearest known occurrence of *Macharanthera arida* is approximately 120 miles to the west.
Non-native Exotics? *Descurainia sophia, Cynodon dactylon, Salsola tragus, Schismus barbatus*
Species List? Partial

Stop #2, 6/23/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**

Description: Vernal swale along dirt road to Castle Peaks (4 mi. east of Barnwell)
UTM: 11S N-3905301 E-0664012
Elevation: 4,548 ft
Total Area Surveyed: 30 ha
New Vouchers for MNP? Three Species: ***Verbena bracteata, Nicotiana acuminata* var. *multiflora, Acroptilon repens***
Special Status Plants? No
Notable Range Extensions? *Hoffmannseggia glauca* (previously known from only one other location in MNP), *Verbena bracteata* (nearest population at Mtn Pass), *Nicotiana acuminata* var. *multiflora* (new to MNP), *Acroptilon repens* (new to MNP).
Non-native Exotics? *Acroptilon repens, Nicotiana acuminata multiflora*
Species List? Yes

Stop #3, 6/23/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Swales along south side of Ivanpah Rd, 0.4 mi. west of Barnwell, NY Mtns
UTM: 11S N-3906233 E-0659719
Elevation: 4,840 ft
Total Area Surveyed: 12 ha
New Vouchers for MNP? Two Species: ***Malvella leprossa,Oenothera primaveris* ssp. *primaveris, Cardaria pubescens***
Special Status Plants? No
Notable Range Extensions? *Malvella leprossa* (new to MNP), *Hoffmannseggia glauca* (one of two occurrences in the MNP), *Solanum elaeagnifolium* (known from two other locations in MNP), *Cardaria pubescens* (new to MNP), *Oenothera primaveris primaveris*, new to E. Mojave.
Non-native Exotics? *Cardaria pubescens* (U.S. "noxious weed"), *Solanum elaeagnifolium*
Species List? Yes

Stop #4, 6/23/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Mail Spring, NY Mtns
UTM: 11S N-3903474 E-0658439
Elevation: 5,028 ft
Total Area Surveyed: 20 ha
New Vouchers for MNP? Three Species: ***Lepidium latifolium, Polygonum arenastrum, Ambrosia confertiflora***
Special Status Plants? No
Notable Range Extensions? *Lepidium latifolium* (new to MNP and first collection from Mojave Desert) , *Polygonum arenastrum* (new to MNP), *Ambrosia confertiflora* (new to MNP and to Mojave Desert)
Non-native Exotics? *Lepidium latifolium, Polygonum arenastrum*
Species List? Partial

Stop #5, 6/23/03
Survey Type: **OPPORTUNISTIC SURVEY**
Description: Along Cedar Cyn Rd, 0.8 mi. west of Quail Rock, Mid Hills
UTM: 11S N-3891682 E-0648474
Elevation: 4,953 ft
Total Area Surveyed: 8 ha
New Vouchers for MNP? One Species: ***Nicotiana acuminata* var. *multiflora***
Special Status Plants? No
Notable Range Extensions? *Nicotiana acuminata* var. *multiflora* (new to MNP, new to Mojave Desert), *Solanum triflorum* (previously known in MNP only to Clark Mtn), *Ambrosia confertiflora* (known elsewhere in MNP only from Mail Spring)
Non-native Exotics? *Nicotiana acuminata* var. *multiflora, Solanum triflorum, Bromus tectorum, Erodium cicutarium*
Species List? Partial

Stop #6, 6/23/03
Survey Type: **TARGETED SURVEY**
Description: In wash, along Ivanpah Rd, about 5 mi. south of Barnwell, upper Lanfair Valley
UTM: 11S N-3899162 E-0663073
Elevation: 4,400 ft
Total Area Surveyed: 1 ha
New Vouchers for MNP? One Species: ***Mentzelia laevicaulis*** (about 50 plants)
Special Status Plants? No
Notable Range Extensions? *Mentzelia laevicaulis* (new to MNP, new to Mojave Desert).
Non-native Exotics? No
Species List? No

Stop #1, 9/8/03
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
UTM: 11S N-3924825 E-0647364
Elevation: 2,596 ft
Description: 6 mi. west of Niption, 0.5 mi. E. of Ivanpah Rd, just south of Nipton Rd, Ivanpah Valley.
Total Area Surveyed: 35 ha
New Vouchers for MNP? One Species: ***Kallstroemia californica***
Special Status Plants? ***Portulaca halimoides***
Notable Range Extensions? *Boerhavia coulteri*, previously only known in MNP from Valley Wells (SW Clark Mtn).
Non-native Exotics? *Kallstroemia parviflora, Mollugo cerviana*
Species List? Yes

Stop # 1, 3/11/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Marl Spring and surrounding area, N. side of Marl Mtns, SE. of Cima Cinder Cones
UTM: 11S N-3892432 E-0623147
Elevation 3,852 ft
Total Area Surveys: 40 ha
New Vouchers for MNP? Three Species: ***Anagallis arvensis, Centaurea melitensis, Cyperus eragrostis***.
Special Status Plants? No
Notable Range Extensions? This is the first voucher of *Cyperus eragrostis* in the Mojave Desert of CA, representing a significant occurrence. Following these findings, MNP implemented a removal program for *Centaurea melitensis* (which is a noxious weed) at Marl Spring.
Non-native Exotics? *Anagallis arvensis Centaurea melitensis*, *Bromus madritensis rubens, Erodium cicutarium, Sisymbrium irio, Sonchus asper, Polypogon monspeliensis.*
Species List? Yes

Stop # 2, 3/11/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Sand ramp and limestone outcrop, 3 mi. SW of Baker.
UTM: 11S N-3900479 E-0587800
Elevation: 995 ft
Total Area Surveyed: 45 ha
New Vouchers for MNP? ***Linanthus arenicola.*** Although *L. arenicola* has been documented near the western margin of the Preserve (Prigge #2583, 1978), this is the first confirmed voucher within the MNP.
Special Status Plants? ***Astragalus lentiginosus borreganus***
Notable Range Extensions? In the MNP*, A. lentiginosus borreganus* was previously known only in the shifting sands of the Kelso Dunes. Thus, this occurrence represents a modest extension of its distribution in the Preserve. This occurrence is also the first observation of this taxon on a substrate (sand ramp) other than mobile shifting dunes.
Non-native Exotics? *Brassica tournefortii, Schismus barbatus*
Species List? Yes

Stop # 1, 3/13/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Lake margin and low dunes, approx. 2 mi. south of the CS Desert Study
Base UTM: **11S N-3880738 E-0581216**
Northern boundary: N-3881389 E-0581321
Eastern boundary: N-3880183 E-0582122
Southern boundary: N-3879832 E-0580003
Western boundary: N-3881283 E-0579832
Elevation: 982 ft
Center headquarters.
Total Area Surveyed: 120 ha
New Vouchers for MNP? No
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Bassia hyssopifolia*
Species List? Yes

Stop # 1, 3/19/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**

Description: Van Winkle Spring, NW side of Van Winkle Mtn.
Base UTM: **11S N-3849054 E-0627999**
Northern boundary: N-3849132 E-06271073
Eastern boundary: N-3848743 E-0628562
Southern boundary: N-3847393 E-0628422
Western boundary: N-3848933 E-0627293
Elevation: 3,673 ft
Total Area Surveyed: 135 ha
New Vouchers for MNP? One Species***: Chamaesyce abramsiana*** (found 9/5/05 during return visit).
Special Status Plants? ***Chamaesyce abramsiana***
Notable Range Extensions? *Chamaesyce abramsiana* previously known only to the Sonoran Desert south of I-10.
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Schismus barbatus, Sisymbrium irio*
Species List? Yes

Stop # 1, 3/29/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Coyote Spring area, NE side of Granite Mountains
Base UTM: **N-385704911S E-0621377**
Northern boundary: N-3857383 E-0621542
Eastern boundary: N-3856412 E-0622032
Southern boundary: N-3855423 E-0620893
Western boundary: N-3857320 E-0619832
Elevation: 3185 ft
Total Area Surveyed: 115 ha
New Vouchers for MNP? ***Amsinckia menziesii* var. *intermedia*.** We documented this taxon in numerous locations within the MNP.
Special Status Plants? No
Notable Range Extensions? We found ***Epilobium ciliatum ciliatum*** just above the artificial pond, growing in a natural side-hill seep in the main drainage. This species was previously known to the MNP only at Pachalka Spring, Clark Mtn, making this a very significant (and more natural) disjunct occurrence.
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium, Schismus barbatus.*
Species List? Yes

Stop # 1, 4/7/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Upper Von Trigger Wash, including Von Trigger Spring, approx. 1 mi. E. of Lanfair Rd.
Base UTM: **11S N-3880368 E-0669031**
Northern boundary: N-3887032 E-0668923
Eastern boundary: N-3884831 E-0667832
Southern boundary: N-3880235 E-0669421
Western boundary: N-3886323 E-0668392
Elevation 3508 ft
Total Area Surveyed: 345 ha
New Vouchers for MNP? One species: ***Prunus eremophila*** (see reference to Madrono publication)
Special Status Plants? ***Asclepias nyctaginifolia*, *Prunus eremophila, Menodora scabra***
Notable Range Extensions? *Asclepias nyctaginifolia* previously only known from near Barnwell (NY Mtns) and from Clark Mtn.
Non-native Exotics? *Brassica tournefortii, Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium, Hordeum murinum murinum, Schismus barbatus*, *Sisymbrium irio*
Species List? Yes

Stop #2, 4/7/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Hackberry Spring and drainage surrounding spring, NE side of Hackberry Mtns
Base UTM: **11S N-3880746 E-0662770**
Northern boundary: N-3883898 E-0663820
Eastern boundary: N-38832931 E-0664293
Southern boundary: N-3880022 E-0662793
Western boundary: N-3879731 E-0662100
Elevation: 4,458 ft
Total Area Surveyed: 185 ha
New Vouchers for MNP? Four Species: ***Amsinckia menziesii* var. *intermedia*, *Hordeum murinum* ssp. *murinum*, *Sphaeralcea ambigua* var. *rugosa*, *Vulpia microstachys* var. *ciliata***

Special Status Plants? ***Pellaea truncata***
Notable Range Extensions? Contrary to the information we had, it turns out there IS in fact hackberry in the Hackberry Mtns. We found approximately 4 plants of **hackberry *(Celtis reticulata*)** growing at Hackberry Spr. These may have been planted or could be a natural occurrence. This represents only one of two localities for this species in the East Mojave and the MNP, with the other being at Cornfield Spring.
Non-native Exotics? *Bromus diandrus, Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium, Schismus barbatus*.
Species List? Yes

Stop # 3, 4/7/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: 2 mi. NE and below Hackberry Spring, Hackberry Mtns
UTM: 11 S N-3882200 E-0664489
Elevation: 3,970 ft
Total Area Surveyed: 45 ha
New Vouchers for MNP? Two Species: ***Sphaeralcea ambigua* var. *rugosa, Vulpia octoflora* var. *hirtella***
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Schismus barbatus*.
Species List? Yes

Stop #4, 4/7/04
Survey Type: **OPPORTUNISTIC SURVEY**
Description: 2 mi. E. of Quail Rock, Pinto Valley - Mid Hills
UTM: 11S N-3891288 E-0650834
Elevation: 4,932 ft
Total Area Surveyed: 5 ha
New Vouchers for MNP? No
Special Status Plants? ***Astragalus cimae* var. *cimae***
Notable Range Extensions? No
Non-native Exotics? N/A
Species List? No

Stop #1 4/8/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Muilla population on N. side of poleline road, Kelso Dunes
UTM: 11 S N-3859910 E-0614416
Elevation: 2,344 ft
Total Area Surveyed: 90 ha
New Vouchers for MNP? One species: ***Muilla* nova sp.**
Special Status Plants? ***Astragalus lentiginosus borreganus, Penstemon thurberi***
Notable Range Extensions? *Muilla* nova sp. is discussed in detail in text of report. *Nemacaulis denudata gracilis* found at this site represents a new locality for this species previously known only from Devil's Playground to the north.
Non-native Exotics? *Schismus barbatus*
Species List? Yes

Stop # 2, 4/8/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Granite knob along dirt road to Cane Spring, 2 mi. W. of Cane Spring
UTM: 11S N-3898405 E-0605528
Elevation: 2,593 ft
Total Area Surveyed: 60 ha
New Vouchers for MNP? No
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium, Schismus barbatus*.
Species List? Yes

Stop # 3, 4/8/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Indian Creek and Cane Spring area, Cima Cinder Cones
Base UTM: 11S **N-3899173 E-0607469**
Northern boundary: N-3901032 E-0609932

Eastern boundary: N-3899733 E-0611827
Southern boundary: N-3892637 E-0607833
Western boundary: N-3898630 E-0606538
Elevation: 2,849 ft
Total Area Surveyed: 360 ha
New Vouchers for MNP? Four species: ***Elymus elymoides* ssp. *elymoides, Thelypodium integrifolium* ssp. *affine, Wislizenia refracta* var. *refracta, Zannichellia palustris***
Special Status Plants? ***Wislizenia refracta refracta***
Notable Range Extensions? Nearest occurrence of *Wislizenia refracta refracta* (jackass clover) is near the town of 29 Palms, about 120 mi. to the south, making this a major northward range extension for the species. *Thelypodium integrifolium affine* is known to alkali seeps in the Tehachapi Mtns, and along the extreme western margin of the Mojave Desert. This marks a major eastward range extension in the Mojave Desert. *Zannichellia palustris* is a widespread aquatic in the west, but is very uncommon in the Mojave Desert. Requiring year-round flowing water, the nearest known locality of this species is the Mojave River near Victorville. *Phacelia pachyphylla* is rare in the East Mojave. The only other known occurrences of this taxon in the MNP are at the base of Bull Cyn in the Granite Mtns (isolated population), and scattered patches on the W. side of Clark Mtn.
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Polypogon monspeliensis, Schismus barbatus*.
Species List? Yes

Stop #4, 4/8/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Lower portion of road to Cane Spring, approx. 1 mi. E. of Kelbaker Rd
UTM: 11S N-3897778 E-0603932
Elevation: 2,342 ft
Total Area Surveyed: 85 ha
New Vouchers for MNP? One species: ***Nemacladus* nova sp. (see discussion in final report).**
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Bromus tectorum, Schismus barbatus*
Species List? Yes

Stop #1, 4/13/04
Survey Type: **TARGETED SURVEY**
Description: Upper Foshay Pass, N. side of main dirt road.
Base UTM: 11S **N-3864457 E-0632169**
Northern boundary: N-3865323 E-0632893
Eastern boundary: N-3865199 E-0633543
Southern boundary: N-3864231 E-0631888
Western boundary: N-3864398 E-0632005
Elevation: 4,173 ft
Total Area Surveyed: 125 ha
New Vouchers for MNP? No
Special Status Plants? ***Astrolepis cochisensis, Eriogonum heermannii flocossum, Hedeoma nanum californicum, Muhlenbergia appressa, Penstemon calcareus, Penstemon utahensis***
Notable Range Extensions? *Muhlenbergia appressa* is limited to the Providence Mtns in the Mojave Desert, this adds an additional population record to this significant disjunct occurrence.
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Polypogon monspeliensis, Schismus barbatus*.
Species List? Yes

Stop # 1, 4/17/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: 8 mile N. to S. transect of Kelso Dunes, Cottowood Wash at S. parking area to RR 3 mi. W. of Kelso
Base **UTM: 11S N-3862079 E-0620358**
Northern boundary: N-3870112 E-0617389
Eastern boundary: N-3862134 E-0620450
Southern boundary: N-3862079 E-0620358
Western boundary: N-386828 E-0614866
Elevation: 2,657 ft
Total Area Surveyed: 620 ha
New Vouchers for MNP? No
Special Status Plants? ***Astragalus lentiginosus borreganus, Penstemon thurberi***
Notable Range Extensions? No
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Polypogon monspeliensis, Schismus barbatus*.

Species List? Yes

Stop # 1, 4/27/04
Survey Type: **TARGETED SURVEY**
Description: Twin Springs area, Granite Mountains
Base UTM: **11S N-3856402 E-0622624**
Northern boundary: N-3856791 E-0622042
Eastern boundary: N-3856300 E-0622821
Southern boundary: N-3856196 E-0622442
Western boundary: N-3856625 E-0621981
Elevation: 3,439 ft
Total Area Surveyed: 110 ha
New Vouchers for MNP? One species: ***Mentha arvensis***
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium, Polypogon monspeliensis, Schismus barbatus*.
Species List? Yes

Stop # 1, 4/29/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: From Cedar Cyn Rd to SW base of Pinto Mtn
Base UTM: **11S N-3892929 E-0646424**
Northern boundary: N-3893843 E-0647245
Eastern boundary: N-3893637 E-0647445
Southern boundary: N-3892432 E-0646297
Western boundary: N-3892902 E-0645877
Elevation: 5,107 ft
Total Area Surveyed: 150 ha
New Vouchers for MNP? One species: ***Amsinckia menziesii* var. *intermedia***
Special Status Plants? ***Astragalus cimae cimae, Cordylanthus parviflorus, Berberis fremontii, Cryptantha tumulosa, Hedeoma nanum californicum, Munroa squarrosa, Phacelia coerulea*, *Aliciela triodon, Linum puberulum***
Notable Range Extensions? We found *Gilia triodon* growing on the slopes of Pinto Mtn. This taxa was previously known in MNP only below Colossium Mine, Clark Mtn.
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium*
Species List? Yes

Stop #1, 5/1/04
Survey Type: **OPPORTUNISTIC SURVEY**
UTM: 0644704 3866145
Elevation: 3,104 ft
Description: Lower Colton Hills, approx 2 mi. N. of Essex-Black Cyn Rd Jct.
Total Area Surveyed: 75 ha
New Vouchers for MNP? No
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Bromus madritensis rubens, Erodium cicutarium*
Species List? Yes

Stop # 2, 5/1/04
Survey Type:**OPPORTUNISTIC SURVEY**
Description: Wildhorse Cyn Rd, 1 mi. W. of lower Black Cyn Rd
UTM: 11S N-3878365 E-0646117
Elevation: 4,088 ft
Total Area Surveyed: 40 ha
New Vouchers for MNP?
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Bromus madritensis rubens, Erodium cicutarium*
Species List? Yes

Stop #3, 5/1/04
Survey Type: **OPPORTUNISTIC SURVEY**
Description: Wildhorse Cyn Rd, 2.5 mi. W. of lower Black Cyn Rd
UTM: 11S N-3878344 E-0643273
Elevation: 4,371 ft
Total Area Surveyed: 75 ha
New Vouchers for MNP? One Species: ***Tetradymia axillaris* var. *axillaris***
Special Status Plants? *Abutilon parvulum*
Notable Range Extensions? This populations of Tetradymia axillaris axillaris represents a major range extension southward (~ 110 miles) from the Kingston Range, and northeastward (~ 120 miles) from the Little San Bernardino Mtns.
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium*
Species List?

Stop #4, 5/1/04
Survey Type: **OPPORTUNISTIC SURVEY**
Description: Wildhorse Cyn Rd, approx. 0.7 mi. N. of Macedonia Cyn Rd
UTM: 11S N-3883860 E-0641012
Elevation: 5,088 ft
Total Area Surveyed: 40 ha
New Vouchers for MNP? One Species: ***Ambrosia confertiflora***
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium*
Species List? No

Stop #1, 5/20/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Pinto Valley - wash S. of Anderson Ranch
UTM: 11S N-3895303 E-0650654
Elevation: 5,185 ft
Total Area Surveyed: 80 ha
New Vouchers for MNP? One Species: ***Ambrosia confertiflora***
Special Status Plants? ***Berberis fremontii, Cordylanthus parviflorus, Cryptantha tumulosa***
Notable Range Extensions? No
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium*
Species List? Yes

Stop # 2, 5/20/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Lower Fourth of July Canyon
Base UTM: **11S N-3900819 E-0650677**
Northern boundary: 3902572 E-0650741
Eastern boundary: 3902377 E-0650918
Southern boundary: 3900670 E-0650493
Western boundary: 39000831 E-0650338
Elevation: 5,484 ft
Total Area Surveyed: 110 ha
New Vouchers for MNP? No
Special Status Plants? ***Berberis fremontii, Corypantha vivipara, Lotus argyraeus multicaulis, Quercus turbinella, Tragia ramosa***
Notable Range Extensions? *Machaeranthera tanacetifolia* was found among willows, confirming an old report from Thorne R.F., et al, 1981. This is one of the only occurrences of this species in CA.
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium*
Species List? Yes

Stop # 1, 5/24/04
Survey Type: **OPPORTUNISTIC SURVEY**
Description: N. of Morningstar Rd, 4.5 mi. N. of Cima
Base UTM: **11S N-3906490 E-0636955**
Northern boundary: 3909828 E-0637381
Eastern boundary: 3909766 E-0637482
Southern boundary: 3906222 E-0636441

Western boundary: 3906236 E-0636389
Elevation: 4,197 ft
Total Area Surveyed: 180 ha
New Vouchers for MNP? No
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium*
Species List? Yes

Stop #1, 6/16/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Ivanpah Rd, approx. 3 mi. NE of Barnwell
UTM: 11S N-3908321 E-0661374
Elevation: 4,609 ft
Total Area Surveyed: 70 ha
New Vouchers for MNP? No
Special Status Plants? ***Mirabilis coccinea***
Notable Range Extensions? No
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium*
Species List?

Stop #1, 9/25/04
Survey Type: **AREA SEARCH OF PRIORITY LOCATION**
Description: W. of Kelbaker Rd, 5 mi. N. of I-40, 3 mi. S. of Granite Pass
UTM: 11S N-3848681 E-0625710
Elevation: 3,910 ft
Total Area Surveyed: 90 ha
New Vouchers for MNP? One Species: ***Portulaca* nova sp (retusa?)**
Special Status Plants? No
Notable Range Extensions? If this is *Portulaca retusa*, it is new to CA, or, this is a new taxon to science. Portulaca retusa occurs from Arizona to New Mexico.
Non-native Exotics? *Mollugo cerviana*
Species List? Yes

Stop #2, 9/25/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Clark Mtn, "picnic area" on SE side, 2 mi. NE of Burro Spring
Base UTM: **11S N-3930464 11S E-0629959**
Northern boundary: 3931090 E-0629435
Eastern boundary: 3930460 E-0630821
Southern boundary: 3930008 E-0630327
Western boundary: 3930744 E-0628643
Elevation: 5,732 ft
Total Area Surveyed: 180 ha
New Vouchers for MNP? No
Special Status Plants? ***Agave utahensis, Enneapogon desvauxii, Eriogonum heermanii floccosum, Escobaria vivipara rosea, Hedeoma nanum californicum, Muhlenbergia arsenei, Penstemon utahensis, Sanvitalia abertii***
Notable Range Extensions? We found the purported occurrence of *Chrysothamnus nauseosus leiospermus,* which is only found in this locality in the MNP. However, the taxon does not quite fit the description of this variety (see discussion in text).
Non-native Exotics? *Bromus tectorum*, *Eragrostis ciliensis*
Species List? Yes

Stop #3, 9/25/04
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Cima Dome, approx 0.5 mi. E. of "cross"
UTM: 11S N-3908908 E-0632290
Elevation: 5,040 ft
Total Area Surveyed: 90 ha
New Vouchers for MNP? Two Species: ***Cyperus squarrosus, Eragrostis pectinacea pectinacea***
Special Status Plants? ***Mirabilis coccinea, Portulaca halimoides, Tragia ramosa***
Notable Range Extensions? We found a new occurrence of *Muhlenbergia minutissima* in the MNP at this site. This taxon was previously known only the Clark Mtn. Both *Cyperus squarrosus* and *Eragrostis pectinacea pectinacea* are rare in the Mojave

Desert, but are widespread in the western U.S. These occurrences are new within the ranges of both species.
Non-native Exotics? *Bromus tectorum, Erodium cicutarium*
Species List? Yes

Stop # 1, 10/3/04
Survey Type: **TARGETED SURVEY**
Description: upper Globe Canyon, Providence Mtns
Base UTM: **11S N-3879513 E-0637903**
Northern boundary: 3879932 E-0638890
Southern boundary: 3878286 E-0638552
Western boundary: 3879211 E-0637687
Elevation: 4,652 ft
Total Area Surveyed: 145 ha
New Vouchers for MNP?
Special Status Plants? No
Notable Range Extensions? No
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Bromus trinii*
Species List? Yes

Stop # 1, 10/4/04
Survey Type: **OPPORTUNISTIC SURVEY**
Description: 3 mi. N. of Essex Rd, on Black Cyn Rd
Base UTM: **11S N-3866783 E-0645125**
Northern boundary: N-3866900 E-0645323
Eastern boundary: N-3866310 E-0645999
Southern boundary: N-3865832 E-0645730
Western boundary: N-3866644 E-0644935
Elevation: 3,151 ft
Total Area Surveyed: 125 ha
New Vouchers for MNP? One Species: ***Bowlesia incana***
Special Status Plants? No
Notable Range Extensions? We found *Bowlesia incana* in the Von Trigger Hills, in spring of 2004. Prior to that the species had not been vouchered in the Mojave Desert of CA. Thus, this marks the second location of the species in the MNP. At this site we also found *Boerhavia coulteri*, which previously had only been known to Clark Mtn (Valley Wells).
Non-native Exotics? Mollugo cerviana, Schismus barbatus
Species List? Yes

Stop # 1, 3/24/05
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: SW of Willow Wash near Brannigan Mine
Base UTM: **11S N-3895602 E-0602574**
Northern boundary: N-3895823 E-0602469
Eastern boundary: N-3895550 E-0602590
Southern boundary: N-3893898 E-0601678
Western boundary: N-3894422 E-0600203
Elevation: 2,325 ft
Total Area Surveyed: 230 ha
New Vouchers for MNP? One Species: ***Amsinckia menziesii intermedia***
Special Status Plants?
Notable Range Extensions? *Atriplex confertifolia* previously known in the MNP on the N. side of Clark Mtn. *Boerhavia coulteri* was previously only known in the MNP at Clark Mtn (Valley Wells). *Phacelia neglecta* had been previously known to one locality in the MNP near "Hayden", approx. 6 mi. E. of Kelso.
Non-native Exotics? *Brassica tournefortii, Bromus madritensis rubens, Bromus tectorum, Erodium cicutarium, Sisymbrium irio, Schismus barbatus*
Species List? Yes

Stop # 2, 3/24/05
Survey Type: **AREA SEARCH IN PRIORITY LOCATION**
Description: Little Cowhole Mtn, E. end of Soda Dry Lake
Base UTM: 11S **N-3894732 E-0591134**
Northern boundary: N-3895428 E-0591042
Eastern boundary: N-3894248 E-0591833

Southern boundary: N-3894193 E-0590423
Western boundary: N-3894427 E-0588452
Elevation: 1,288 ft
Total Area Surveyed: 360 ha
New Vouchers for MNP? One Species: ***Linanthus arenicola***. Though it has been documented "just west of Devil's Playground", this is the first accurate voucher of the species in the MNP.
Special Status Plants? No
Notable Range Extensions? This is the second location for *Trichoptilium incisum* in the MNP (the other being the W. side of the Granite Mtns). Also, this is the second location for *Psathyrotes ramosissima* in the MNP (the other locality being NW side of the Providence Mtns). Though common just west of the MNP, the *Boerhavia wrightii* at this site marks only the third known location in the MNP (the other two being Clark Mtn at Valley Wells, and Granite Pass). Also, this is a small range extension for *Gilia leptomeria*, previously known in the MNP on the S. side of the Kelso Dunes.
Non-native Exotics? *Brassica tournefortii, Bromus madritensis rubens, Descurainia sophia, Erodium cicutarium, Salsola tragus, Schismus barbatus*
Species List? Yes

Stop #1, 4/7/05
Survey Type: **OPPORTUNISTIC SURVEY**
Description: ¼ mi. N. of Granite Pass, W. side of Kelbaker Rd, Granite Mtns
UTM: 11S N-3853345 E-0626977
Elevation: 3,889 ft
Total Area Surveyed: 20 ha
New Vouchers for MNP? One Species: ***Gilia aliquanta* ssp. *aliquanta***
Special Status Plants? No
Notable Range Extensions? *Gilia aliquanta aliquanta* was previously not documented in the MNP, the nearest voucher unknown.
Non-native Exotics? *Bromus madritensis rubens, Bromus tectorum, Schismus barbatus, Erodium cicutarium*
Species List? No

Stop # 1, 4/30/05
Survey Type: **OPPORTUNISTIC SURVEY**
Description: Lanfair Rd, approx. 3 mi. S. of Barnwell
UTM: 11S N-3904232 E-0660734
Elevation: 4,754 ft
Total Area Surveyed: 50 ha
New Vouchers for MNP? One Species: ***Mentzelia laevicaulis***
Special Status Plants? ***Allium nevadense, Berberis fremontii, Linum puberulum, Cryptantha tumulosa, Hedeoma nanum californicum, Penstemon utahensis, Polygala acanthoclada***
Notable Range Extensions? *Gilia clokeyi*: this species previously known in MNP only on Clark Mtn. This is the second occurrence of *Mentzelia laevicaulis* found in the MNP during this project; the first was found in 2003 2 mi. south of this locality. *M. laevicaulis* was previously not known to the MNP nor the east Mojave Desert of San Bernardino Co.
Non-native Exotics? *Erodium cicutarium, Bromus tectorum, Bromus madritensis rubens, Schismus barbatus*.
Species List? Yes

Stop #1, 5/4/05
Survey Type: **OPPORTUNISTIC SURVEY**
Description: wash along Excelsior Mine Rd, SW. of Clark Mtn, N. of Valley Wells
UTM: 11S N-3928840 E-0618427
Elevation: 3,124 ft
Total Area Surveyed: 55 ha
New Vouchers for MNP? One Species: ***Hordeum murinum* ssp. *murinum***
Special Status Plants? *Escobaria vivipara rosea*
Notable Range Extensions? No
Non-native Exotics? *Bromus tectorum, Bromus madritensis rubens, Bromus trinii, Erodium cicutarium, Schismus barbatus, Hordeum murinum murinum.*
Species List? Yes

Stop # 1, 5/11/05
Survey Type: **TARGETED SURVEY**
Description: mine area and limestone slopes above Slaughterhouse Spring, NY Mtns
Base UTM: **11S N-3910928 E-0657230**
Northern boundary: N-3912038 E-0656881

Eastern boundary: N-3910335 E-0657593
Southern boundary: N-3910034 E-0657382
Western boundary: N-3910243 E-0655200
Elevation: 3,875 ft
Total Area Surveyed: 200 ha
New Vouchers for MNP?
Special Status Plants? ***Allium nevadense, Cryptantha tumulosa, Penstemon utahensis, Phacelia anelsonii***
Notable Range Extensions? This is a new range extension in the MNP for *Gilia clokeyi* (previously known only from Clark Mtn).
Non-native Exotics? *Bromus tectorum, Bromus madritensis rubens, Erodium cicutarium, Schismus barbatus*
Species List? Yes

Stop #1, 9/2/05
Survey Type: **OPPORTUNISTIC SURVEY**
Description: Sandy bank above wash, 1.5 mi. S. of Granite Cove, Granite Mtns
UTM: 11S E-0623483 N-3848394 E-0623483
Elevation: 3,983 ft
Total Area Surveyed: 5 ha
New Vouchers for MNP? One Species: ***Kallstroemia californica***
Special Status Plants? No
Notable Range Extensions? This is the second record of *Kallstroemia californica* in the MNP (the other is in Ivanpah Valley).
Non-native Exotics? *Bromus tectorum, Bromus madritensis rubens, Erodium cicutarium, Schismus barbatus*
Species List? No