APPENDIX 2
VEGETATION INFORMATION

2001

Vegetation Resources

Briggs Exploration Study Area

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TABLE OF CONTENTS

List of Tables, Charts, Maps, and Plates

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Canyon Resources Corporation

Vegetation Resources

BRIGGS EXPLORATION STUDY AREA

1.0 INTRODUCTION

1.1 Background

Cedar Creek Associates, Inc. (Cedar Creek) was retained by Canyon Resources Corporation (Canyon) to evaluate the vegetation resources of Canyon's proposed exploration area (2,900 ± acre claim block). The proposed exploration area is located on the western toe slopes of the Panamint Mountains of Southern California and encompasses several minor tributary drainages to the Valley's dry lakebed. Proposed activities would consist of access road development and drilling operations. The area is largely public domain lands under the jurisdiction of the Bureau of Land Management (BLM) and approximately 3 to 4 miles north of Canyon's current operations.

This technical document addresses the vegetation resources of the exploration area, and in association with other documents regarding floral resources, is intended to provide information in sufficient detail to satisfy BLM and state agency information requirements for preparation of exploration permitting and decision documents. Objectives of these floral investigations were to quantitatively evaluate and describe previously designated vegetation communities (Cedar Creek 1993), qualitatively assess and verify findings from previous investigations (Bagley 1989, JBR 1991a and 1991b, Cedar Creek 1998), and to perform limited sensitive species searches.

The sensitive plant survey efforts occurred from April 2-6, 2001 in areas below 3000 feet elevation and from April 23-27, 2001 in areas above 3,000 feet. Surveys were conducted by Cedar Creek's Senior Range Ecologist Mr. Steven R. Viert, and Plant Ecologist Mr. Erik M. Mohr, who have a combined 35 years of experience in plant identification throughout the Western U.S. Quantitative vegetation surveys were conducted during portions of the latter survey period. Cedar Creek's Reclamation Specialist, Mr. Stephen G. Long assisted Mr. Viert and Mr. Mohr during these surveys.

1.2 Environmental Setting

Geographically the exploration area lies immediately west of Death Valley upon the west facing toe slopes of the Panamint Mountains. The exploration area is characterized by extremely steep and unstable ridges and canyons exhibiting a generally westerly trending drainage system and broad gently sloping alluvial debris fans at canyon outfalls. Without exception, these drainages are ephemeral exhibiting flows only in response to severe precipitation events. Elevations in the exploration area range from approximately 4,200 feet near the northeast corner to 1,050 feet along the lower southwest side of the exploration area where it adjoins the dry lake bed.

Ecologically the exploration area lies within the Mojave Desert Province of California that is characterized by hot dry summers and cool dry winters. Climate of the site is very arid with a precipitation pattern of occasional winter rains and rare summer thunderstorms (resulting from the "rain shadow" effect of the mountains to the west). Average annual precipitation is estimated at 3.76 inches with a mean evaporation potential of 149.5 inches. The annual average minimum temperature of the site is 52°F while the annual average maximum is 82°F with the late spring to late fall period typically characterized by drought. Given these conditions, the exploration area is subject to a very long frost-free growing season.

Present land uses within the exploration area can be classified as wildlife habitat and historic mining and mineral exploration. With respect to vegetation resources, livestock grazing and related management practices do not occur due to the lack of suitable forage and watering sources.

2.0 METHODOLOGY

Information presented within this technical document has been gained primarily from site-specific studies conducted by Cedar Creek during 2001. However, additional sources of information include data and/or mapping from five previous site-specific studies (Bagley 1989, JBR 1991a, and 1991b, Cedar Creek 1993 and 1998).

2.1 2001 Quantitative Surveys

From April 23-27, 2001 the proposed exploration area was surveyed by Cedar Creek to evaluate existing vegetation resources and obtain quantitative estimates of important vegetation variables. A principal first effort was the evaluation of previous stratifications of the area into vegetation communities (types). Stratification according to vegetation communities was preferred over other designation protocols such as range sites or ecological response units due to precedent originally set by Bagley (1989) and the fact that standard vegetation community descriptions are more fully comprehensible to the lay public and more repeatable among independent investigators. Stratification was based on visually dominant floral species and habitat-related characteristics such as topographic position or surface soil textures. Where habitat-related characteristics lead to apparent shifts in density or composition of a particular community, subtypes were designated to facilitate quantitative expressions of this variability. In this manner the development of reclamation protocols given available soil resources will provide improved opportunity for the determination of revegetation success.

According to previous studies of the general area (Cedar Creek 1998), the present exploration area boundaries encompass a single major vegetation community as defined by the California Natural Diversity Data Base natural community system (Holland 1986). This is the Mojave Creosote Bush Scrub type. This vegetation community was subdivided by Bagley (1989) into three subtypes based on terrain. These subtypes were 1) bajada, 2) canyon bottoms and gullies, and 3) ridges and mountain slopes. In both 1993 and 1998, as well as currently, Cedar Creek concurs with Bagley's designations, but has further subdivided the Mojave Creosote Bush Scrub type for the proposed exploration area into a total of five subtypes given rationale provided in the preceding paragraph. These five subtypes are as follows:

1) Bajada (B) - the dominant subtype occurring on the alluvial debris fans segregated due to the dominance of creosote bush (*Larrea tridentata*) and burrobush *Ambrosia dumosa*.
2) Wash (Wsh) - segregated due to the dominance of white brittlebush (*Encelia farinose*) and the very significant component of surficial rock.

3) Sandy Gravelly Slopes (SGS) – former lacustrine influenced deposits along the base of the mountain slopes and immediately above the bajadas. Plant cover and density are notable reduced in this type, relative to the other four communities.

4) Mountain Slope Thin Soils (MSTS) - segregated principally due to geology and topographic position as this community occurs on residual rock slopes with little potential for soil genesis or accumulation.

5) Mountain Slope Deeper Soils (MSDS) – like MSTS, this type was segregated principally due to geology and topographic position as it occurs on residual rock slopes, but with greater potential for soil genesis and accumulation. This type also includes Desert Pavement communities.

6) A sixth designation occurs in the explortion area that is largely devoid of vegetation due to the extremely steep topography. This type basically consists of rock outcrop.

The boundaries for these five subtypes (see Map 1) were taken directly from previous mapping efforts by Cedar Creek (1998). The original mapped boundaries were determined by interpretation of each unique type's photographic signature on true-color stereo-paired aerial photos at a scale of 1:12,000 (exposed in December, 1987). Delineations were made on acetate overlays with the aid of a large format magnifying stereoscope which also aided the correction process for photo-distortion. Once interpretations were complete, delineations were transferred to a 1:12,000 scale topo-base map to exhibit juxtaposition of communities, habitats types, and other area features. Transfers were made from the clear acetate overlays to translucent mylars of the topo-base maps with the aid of large "light tables". During this process, adjunct delineations of valley bottoms, ridge crests, and other similar topographic features were utilized to "fine-tune" or adjust the relative positioning of the acetate overlays with respect to the topo-base maps thereby correcting for "photo-stretch" and / or misalignment. In this manner, photo-distortion of polygon shape and location was largely corrected during the transfer process.

Given the previous stratification of subtypes within the exploration area (Cedar Creek 1998) ground cover and woody plant density were determined through quantitative estimation (sampling) techniques. Production and related carrying capacity calculations were deemed unnecessary given the lack of livestock use of the area. Sampling for ground cover, composition, and woody plant density occurred on a total of 100 transects, 20 in each community subtype.

Ground cover at each of the 100 sampling sites was determined utilizing the point-intercept methodology (the most accurate means of measuring ground cover) as illustrated on Exhibit 1. This methodology has been utilized for range studies for nearly eighty (80) years, however, Cedar Creek utilizes new state-of-the-art instrumentation it has pioneered to facilitate much more rapid and accurate collection of data. Implementation of the technique in the exploration area occurred as follows: First, a transect of 10 meters length was extended generally along the contour from the starting point of each sample site. Then, at each one-meter interval along the transect, a "laser point bar" was situated above and parallel to the ground surface, and a set of 10 readings recorded as to hits on vegetation (by

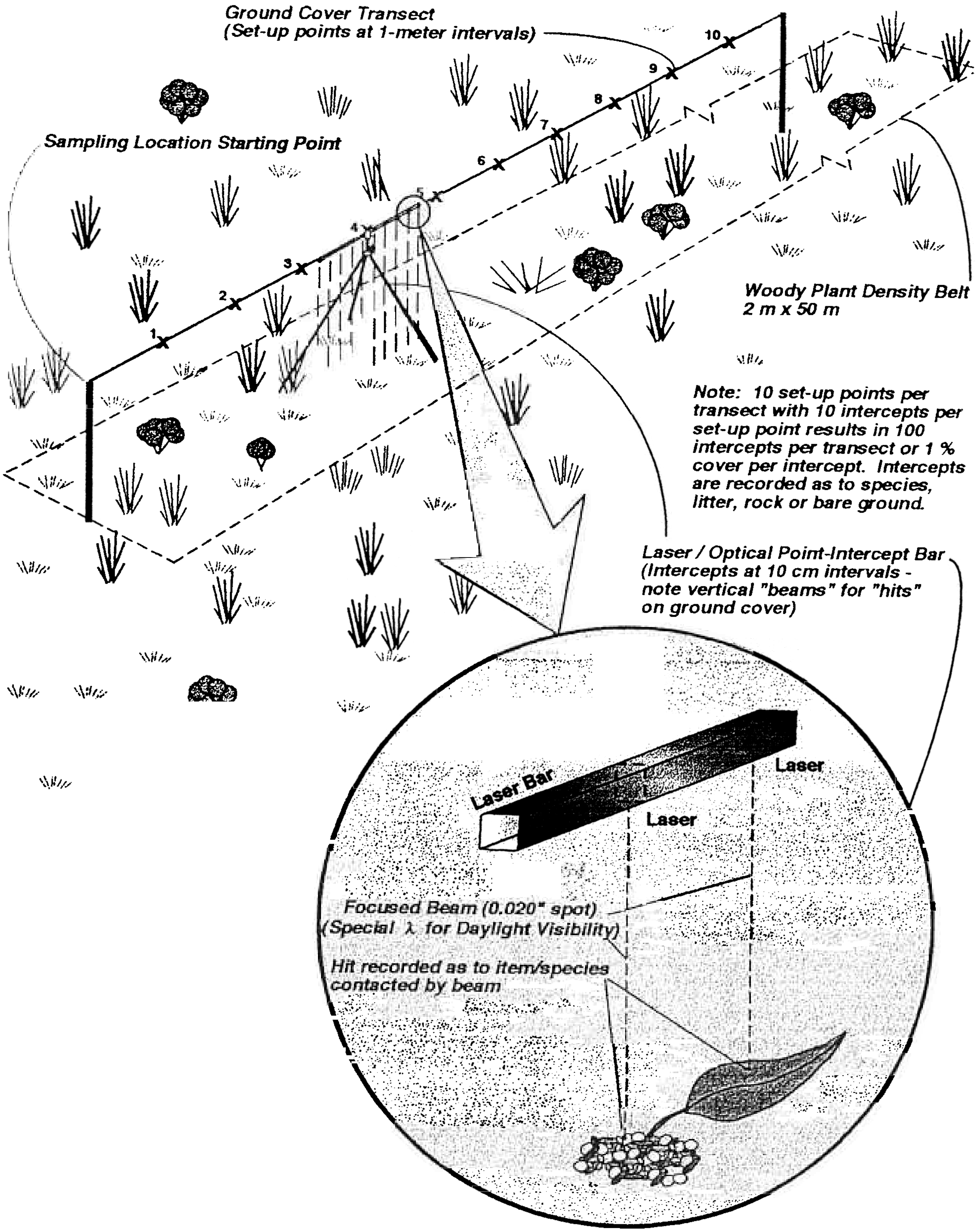

Exhibit 1

Ground Cover / Woody Plant Density Sampling Procedure at a Typical Sample Site Location

species), litter, rock, or bare soil. Hits were determined at each meter interval by activating a battery of 10 specialized lasers* situated along the bar at 10 centimeter intervals and recording the variable intercepted by each of the narrow (0.02") focused beams (see Exhibit 1). In this manner, a total of 100 intercepts per transect were recorded resulting in 1 percent cover per intercept. This methodology and instrumentation facilitates the collection of the most unbiased, repeatable, and precise ground cover data possible.

Woody plant density was determined by utilizing a direct count procedure within large quadrats or belts. At each of the 20 sample sites identified for cover sampling in each subtype, a large belt was established parallel to the cover transect with dimensions of 2 meters x 50 meters. Evaluation consisted of counting each live plant by species rooted within the belt. The total number of plants in each belt multiplied by the constant 40.5 resulted in the final values of woody plant density per acre.

For quantitative sampling efforts within each subtype, the 20 initial sample points were established in each designated area in such a manner as to obtain reasonable representation of each subtype. Following collection of the initial 20 samples in each subtype for each variable (cover and density), the adequacy of sampling was checked in the field. Sampling for a given variable within a particular type was deemed sufficient when an estimate to within 20 percent of the true mean with 90 percent confidence was obtained. This determination, using total ground cover of vegetation and total live stems for density, occurred as follows:

When the inequality ($n_{min} \leq n$) is true, sampling is adequate; and n_{min} is determined as follows:

$$n_{min} = (t^2 s^2)/(0.2\ \bar{x})^2$$

where: n = the number of actual samples collected (initial size = 20)

t = the value from the two-tailed t distribution for 90% confidence with n-1 degrees of freedom;

s^2 = the variance of the estimate as calculated from the initial 20 samples;

$\bar{x}$ = the mean of the estimate as calculated from the initial 20 samples.

If the initial 20 samples had not provided a suitable estimate of the mean (i.e., the inequality was false), additional samples would have been collected until the inequality ($n_{min} \leq n$) became true.

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* Lasers utilized for this instrument are state-of-the-art and of specialized design to emit a unique electro-magnetic wavelength visible under full sunlight, a condition previously not possible with portable low-energy lasers. These lasers are also unique because they can be focused to an extremely fine dot.

2.2 Limited Sensitive Plant Surveys

2.2.1 Rationale for Analyzed Sensitive Species

A literature review was conducted to develop a list of sensitive plant species having at least some potential to occur in the identified study area. This list was developed using information from previous work in the study area by Bagley (1989a, 1993, 1996), Cedar Creek (1998) and Fisher (1991), reports from nearby areas (Bagley 1985, 1986, 1988, NPS 1982, BLM 1982), and data from the California Natural Diversity Data Base (CDFG 1997b). In addition, information from regional and local collective floras (Abrams and Ferris 1923-1960, DeDecker 1984, Hickman 1993, Holland and Schramm 1979, Kurzius 1981, Munz 1974, Munz and Keck 1959, Peterson 1984, and Schramm 1982) was reviewed as well.

A plant was considered sensitive if it was federally or state listed or proposed as a rare, threatened, or endangered species; a federal candidate for listing; a BLM special status species; a California Natural Diversity Data Base (CNDDB) special plant; or listed by the California Native Plant Society (CNPS) in their inventory of rare and endangered plants of California. Sources for the current status of potentially sensitive species included BLM 1997, CDFG 1997a, Skinner and Pavlik 1994, USFWS 1996a, and 1996b.

A species was judged to have some potential for occurrence if it was known to occur in the vicinity of the exploration area in a habitat type and at an elevation range also known from the study area. Those plants known to occur in the Panamint Range as well as the Panamint Valley were considered for inclusion on the sensitive list.

In total, twenty-five sensitive plant taxa were determined to have some potential to occur in the study area. These were separated into two categories based on their identified status: priority sensitive species versus watch list species. Priority sensitive species were those that are federally or state listed, proposed or candidate species; BLM special status plant species; or included on CNPS Lists 1 or 2 (these CNPS lists are for plants presumed extinct, rare or endangered in California). Watch list species were those listed only on CNPS List 3, a review list, or List 4, a watch list.

Thirteen plants with some potential to occur in the study area and with priority sensitive status were identified; these included:

Arabis dispar	pinyon rock cress
Arctomecon merriamii	white bear poppy
Dudleya saxosa ssp. *saxosa*	Panamint dudleya

Enceliopsis covillei	Panamint daisy
Gilia ripleyi	Ripley's gilia
Hulsea vestita ssp. *inyoensis*	Inyo hulsea
Linanthus arenicola	sand linanthus
Lupinus magnificus var. magnificus	Panamint Mts. lupine
Penstemon calcareus	limestone beardtongue
Petalonyx thurberi ssp. *gilmanii*	Death Valley sandpaper plant
Phacelia mustelina	Death Valley round-leaved phacelia
Sphaeralcea rusbyi ssp. *eremicola*	Rusby's desert mallow
Tetracoccus ilicifolius	holly-leaved tetracoccus

The twelve remaining plants with watch list status included:

- *Cryptantha holoptera* — winged cryptantha
- *Cryptantha tumulosa* — New York Mtns. cryptantha
- *Enceliopsis nudicaulis* — naked-stemmed daisy
- *Eriogonum hoffmannii var. hoffmannii* — Hoffmann's buckwheat
- *Eriogonum hoffmannii var. robustius* — robust Hoffmann's buckwheat
- *Eriogonum intrafractum* — jointed buckwheat
- *Juncus nodosus* — knotted rush
- *Mimulus rupicola* — rock-midget
- *Oenothera caespitosa* ssp. *crinita* — caespitose evening-primrose
- *Salvia funerea* — Death Valley Sage
- *Sclerocactus polyancistrus* — Mojave fish-hook cactus
- *Selaginella leucobryoides* — Mojave spike-moss

It was not expected that all or even more than a few of these sensitive taxa would have elevated probability for occurrence in the study area. To the contrary, this list was designed to simply alert the field team to possible occurrences of sensitive species and to provide a focus for field surveys. However, based on the literature review, no taxa listed as threatened, endangered, or Federal candidate were determined to exist in or near the exploration study area.

2.2.2 Field Surveys

Field surveys were conducted in the spring of the year (from April 2-6, 2001 in areas below 3000 feet elevation and from April 23-27, 2001 in areas above 3,000 feet) when most plants in the exploration area are actively growing and in flower or fruit. Plant surveys were conducted to three different levels of intensity: high, medium, and low or reconnaissance level. Pedestrian surveys provided a high intensity survey corridor approximately 100 feet in width (50 feet on either side of the observer's path). Moderate intensity survey areas included those areas immediately adjacent to high intensity corridors out to an additional 100 feet on either side of the observer's pedestrian route. Finally, reconnaissance level survey areas included all observed areas beyond the moderate intensity limits. Much of the area observed in this manner enlisted the aid of binoculars to check habitat features, identify larger shrubs, and check for more visible sensitive species (such as Panamint daisy (*Enceliopsis covillei*)). Also, many portions of the study area are not conducive to survey by pedestrian methods within the limits of personal safety (e.g., cliff faces). Survey routes and intensity of survey were mapped in the field to document implemented efforts (See Map 2). Survey routes in the study area from 1997 surveys are also indicated on Map 2, and these areas were not revisited to avoid unnecessary duplication of effort.

Prior to conducting field surveys, information was gathered on status, general distribution, known habitat preferences, and elevational range for each of the 25 potential species of concern, with emphasis on the 13 priority species. "Sensitive Plant Species Predictive Maps" from the Cedar Creek 1998 GIS evaluation were also reviewed to identify high probability areas for each taxon and the study area as a whole. Line art drawings, photographs and/or descriptions of each taxon were reviewed prior to field surveys and then also carried in the field to aid maintenance of search images for field crew members. Surveys for sensitive plant species were conducted by searching habitats of high potential for their occurrence and identification of all plants observed in the study area. Emphasis was placed on the search of washes and carbonate soils, since these habitats have a higher potential for sensitive plant species.

All surveys were floristically based, i.e., all plant species encountered in the study area were identified to at least genus or to the level necessary to ensure that they were not sensitive taxa. All plant species encountered were recorded and compiled by vegetation / habitat type. Collections were made of taxa that were not readily identifiable in the field or that were closely related to sensitive plants with potential to occur in the area. Subsequent identification of these collections occurred in the office. Although 100% surveys were not practicable for this effort, a large and representative portion of potential exploration area habitats were evaluated.

2.3 Data Analyses

By design, analyses of collected data are simple. Cover data are collected from 100-intercept transects which facilitates interpretation as one-percent cover per intercept for each transect. Furthermore, a base level effort of 20 cover transects per subtype provides a minimum of 2000 intercepts which is usually more than sufficient to detect all but the more rare plant species of a particular community. Similarly, woody plant density data are collected using belts sized 2 meters wide by 50 meters long. Multiplication by the constant 40.5 converts these data to values on a "per acre basis".

3.0 AFFECTED ENVIRONMENT

3.1 Vegetation Communities

Site-specific mapping performed by Cedar Creek in 1998 within the exploration area indicates the existence of five subtypes of the Mojave Creosote Bush Scrub community. Juxtaposition of these subtypes is presented on Map 1. Observed occurrence and relative abundance of floral species within these five subtypes is exhibited in Table 1. As indicated in this table, a total of 119 species representing 33 families were observed within the exploration area. Of the 119 species observed in 2001, 61 taxa were annual forbs (51%) and 5 taxa were annual grasses (4%). Fourteen perennial forbs (12%) and three perennial grasses (3%) were observed as well as 29 shrubs (24%) and seven sub-shrub species (6%). By subtype observed taxa were as follows: bajada (49 species), washes (107 species), sandy-gravelly slopes (29 species), mountain slopes thin soils (72 species), and mountain slopes deeper soils (52 species). By comparison, 97 species (dry year) and 124 species (wet year) were observed in similar subtypes/communities in the existing Briggs project area during previous investigations. To give perspective regarding the relative abundance of these species, Cedar Creek only intercepted 23 of these species during quantitative efforts. Therefore, the vast majority of those species presented on this table are typically uncommon or rarely observed.

In total, Cedar Creek's evaluation shows the exploration area to exhibit on an unweighted average basis 10.0 percent ground cover by plants and a woody plant density of 1090 stems per acre. The average baseline values from the Briggs project area were 11.6 percent ground cover and 1130 woody plants per acre (MCBS type average). Collectively, these values are indicative of a sparse, nondiverse, unproductive community existing in a harsh climate (typical of Mojave Desert biomes). Overall the Mojave Creosote Bush Scrub community is a very open type, exhibiting variability in plant dominance, modest shifts in total plant cover, and a significant difference in physiography or surface texture contributing to variable plant composition. Individually, each subtype exhibits a distinctive set of variables that are presented in the following sections.

3.1.1 Bajada Subtype of the MCBS Community

The bajada subtype (see Plates 1 and 2) occurs at the lowest elevations and occupies an estimated 10 percent of the exploration area. It is found principally in the southwestern portions of the exploration area on the alluvial fans. The boundaries with the other subtypes are relatively broad ecotonal transitions except for those with the mountain slope subtypes which are rather abrupt at the interface between alluvial and parent material. The bajada subtype was segregated from the others due to the significant component of surficial rock, underlying soils, amount of vegetation, and dominance of creosote bush.

As with the other subtypes, species diversity is limited with only 49 taxa observed and 9 taxa intercepted by ground cover sampling. Of these nine, three species, desert Indian wheat, burrobush (or bur-sage), and creosote bush comprise the vast majority (89 percent) of the community's ground cover. The structural diversity of this community is fair owing to the herbaceous stratum, a moderately dense distribution of taller shrubs, and extensive piles of rock and cobble.

As indicated on Tables 2 and 7 and Charts 1 and 2, ground cover of living plants in the bajada subtype averages 11.8 percent, second highest of the subtypes of the Mojave Creosote Bush Scrub community within the exploration area. According to Cedar Creek's cover sampling in this subtype, desert Indian wheat predominates with 6.05 percent cover with subdominants of burrobush and creosote bush exhibiting 3.25 and 1.2 percent cover, respectively. However, owing to the physiognomic character and persistence of burrobush and creosote bush in comparison to the short-lived annual desert Indian wheat, this subtype is defined by these shrub species. Non-floral ground cover was principally comprised of rock (75.45 percent) and litter (4.0 percent). Bare ground exposure was determined to be 8.75 percent.

As presented in Tables 8 and 13 and Chart 3, woody plant density in the bajada subtype averages 1014 live plants per acre, third highest of the five subtypes. According to Cedar Creek's density sampling in this community, burrobush predominates with 613 live plants per acre. The other four woody or succulent species encountered in this subtype, beavertail cactus, creosote bush, Desert holly saltbush, and Brittlebrush exhibited 152, 121, 111, and 16 live plants per acre, respectively.

Based on field observations, the bajada subtype received an ecological rating of late-seral. Rationale for this rating was based on high relative cover by apparent climax species and little evidence of grazing or browsing pressure.

3.1.2 Wash Subtype of the MCBS Community

The wash subtype (see Plates 3 and 4) occurs at lower elevations and occupies less than 2 percent of the exploration area. It is found principally along all active fluvial channels within the exploration area. The boundaries with the other subtypes are relatively abrupt ecotonal transitions except for those with the bajada and sandy gravelly subtypes. The wash subtype was segregated from the others due to the significant component of surficial rock and physiognomic character.

As with the other subtypes, species diversity is limited, however the wash subtype exhibited 107 taxa observed and 19 taxa intercepted by ground cover sampling. Of these 19, four species, burrobush, desert Indian wheat, brittlebrush, and Desert holly saltbush comprise the vast majority (75 percent) of the community's ground cover. The structural diversity of this community is fair owing to the herbaceous stratum, a moderately dense distribution of taller shrubs, and extensive piles of rock and cobble.

As indicated on Tables 3 and 7 and Charts 1 and 2, ground cover of living plants in the wash subtype averages 12.8 percent, highest of the subtypes of the Mojave Creosote Bush Scrub community within the exploration area. According to Cedar Creek's cover sampling in this subtype, burrobush (bur-sage) predominates with 3.35 percent cover with subdominants of Desert Indian wheat, Brittlebrush, and Desert holly saltbush exhibiting 3.35, 2.7, 1.9, and 1.6 percent cover, respectively. Non-floral ground cover was principally comprised of rock (62.45 percent) and litter (7.25 percent). Bare ground exposure was determined to be 17.5 percent.

As presented in Tables 9 and 13 and Chart 3, woody plant density in the wash subtype averages 813 live plants per acre, second lowest of the five subtypes. According to Cedar Creek's density sampling in this community, burrobush predominates with 431 live plants per acre. The other five woody or succulent species encountered in this subtype comprise the remaining 382 plants per acre.

Based on field observations, the wash subtype also received an ecological rating of late-seral. Rationale for this rating was based on high relative cover by apparent climax species and little evidence of grazing or browsing pressure.

3.1.3 Sandy – Gravelly Slopes Subtype of the MCBS Community

The sandy – gravelly slopes subtype (see Plates 5 and 6) occurs at lower to middle elevations and occupies an estimated 25 percent of the exploration area. It is found principally above the bajada and below the mountain slope subtypes within the exploration area where old lacustrine deposits were distributed. The boundaries with the other subtypes are relatively broad ecotonal transitions except for those with the wash subtype. The sandy – gravelly slopes subtype was segregated from the others primarily due to the composition of the soils.

Species diversity is quite limited, exhibiting only 29 taxa observed and 13 taxa intercepted by ground cover sampling. Of these 13 only Desert holly saltbush (1.1 percent ground cover) could be considered a dominant taxon given the community's composition. The structural diversity of this community is poor owing to the relatively low cover and densities of larger shrubs.

As indicated on Tables 4 and 7 and Charts 1 and 2, ground cover of living plants in the sandy – gravelly slopes subtype averages only 4.65 percent, lowest of the subtypes of the Mojave Creosote Bush Scrub community within the exploration area. Non-floral ground cover was principally comprised of rock (72.35 percent) and litter (3.75 percent). Bare ground exposure was determined to be 19.25 percent.

As presented in Tables 10 and 13 and Chart 3, woody plant density in the sandy – gravelly slopes subtype averages 662 live plants per acre, lowest of the five subtypes. According to Cedar Creek's density sampling in this community, Desert holly saltbush and burrobush co-dominate with 328 and 253 live plants per acre, respectively. The other four woody or succulent species encountered in this subtype comprise the remaining 81 plants per acre.

Based on field observations, the sandy – gravelly slopes subtype also received an ecological rating of late-seral. Rationale for this rating was based on high relative cover by apparent climax species and little evidence of grazing or browsing pressure.

3.1.4 Mountain Slope Thin Soils Subtype of the MCBS Community

The mountain slope – thin soils subtype (see Plates 7 and 8) occurs at the upper elevations and occupies about 45 percent of the exploration area. It is found on the residual rock-based mountain slopes, especially where topography is steeper and rock outcrop more predominant. As a result, soil formation is substantially reduced over other subtypes. Boundaries with the other subtypes are relatively broad ecotonal transitions especially with the mountain slope – deeper soils subtype. The mountain slope subtypes were segregated from the others principally due to geology and topographic position. A significant portion of the mountain slope subtype exists on rock outcrop (3% of the exploration area) and severely eroded and unstable slopes. This portion of the subtype was not subject to sampling due to the hazardous conditions inherent in these circumstances.

As with the other subtypes, species diversity is limited, however the mountain slope – thin soils subtype exhibited 72 taxa observed and 12 taxa intercepted by ground cover sampling. Of these 12, three species, desert Indian wheat, burrobush, and brittlebrush comprise the vast majority (82 percent) of the community's ground cover. The structural diversity of this community is fair owing to the herbaceous stratum, a moderately dense distribution of taller shrubs, and occasional sites of rock outcrop.

As indicated on Tables 5 and 7 and Charts 1 and 2, ground cover of living plants in the mountain slope – thin soils subtype averages 9.85 percent, second lowest of the subtypes of the Mojave Creosote Bush Scrub community within the exploration area. According to Cedar Creek's cover sampling in this subtype, Desert Indian wheat, burrobush (bur-sage), and brittlebrush predominate with 3.5, 2.65, and 1.95 percent cover, respectively. Non-floral ground cover was principally comprised of rock (76.05 percent) and litter (5.05 percent). Bare ground exposure was determined to be 9.05 percent.

As presented in Tables 11 and 13 and Chart 3, woody plant density in the mountain slope – thin soils subtype averages 1,386 live plants per acre, second highest of the five subtypes. According to Cedar Creek's density sampling in this community, burrobush predominates with 864 live plants per acre. The other three woody species encountered in this subtype comprise the remaining 522 plants per acre.

Based on field observations, the mountain slope – thin soils subtype also received an ecological rating of late-seral. Rationale for this rating was based on high relative cover by apparent climax species and little evidence of grazing or browsing pressure.

3.1.5 Mountain Slope Deeper Soils Subtype of the MCBS Community

The mountain slope – deeper soils subtype (see Plates 9 and 10) occurs at the upper elevations and occupies about 15 percent of the exploration area. It is found on the residual rock-based mountain slopes, especially where topography is less steep. This type also includes those areas otherwise identified as Desert pavement. As a result, soil formation is somewhat greater than in the "thin soils" type. Boundaries with the other subtypes are relatively broad ecotonal transitions especially with the mountain slope – thin soils subtype. The mountain slope subtypes were segregated from the others principally due to geology and topographic position. A significant portion of the mountain slope subtype exists on rock outcrop (3% of the exploration area) and severely eroded and unstable slopes. This portion of the subtype was not subject to sampling due to the hazardous conditions inherent in these circumstances.

As with the other subtypes, species diversity is limited, however the mountain slope – deeper soils subtype exhibited 52 taxa observed and only 5 taxa intercepted by ground cover sampling. Of these 5, two species, desert Indian wheat, and creosote bush comprise the vast majority (86 percent) of the community's ground cover. The structural diversity of this community is fair owing to the herbaceous stratum, a moderately dense distribution of taller shrubs, and occasional sites of rock outcrop.

As indicated on Tables 6 and 7 and Charts 1 and 2, ground cover of living plants in the mountain slope – deeper soils subtype averages 11.0 percent, median among the subtypes of the Mojave Creosote Bush Scrub community within the exploration area. According to Cedar Creek's cover sampling in this subtype, Desert Indian wheat, creosote bush, and burrobush (bur-sage) predominate with 6.55, 2.90, and 1.35 percent cover, respectively. Non-floral ground cover was principally comprised of rock (72.15 percent) and litter (4.15 percent). Bare ground exposure was determined to be 12.7 percent.

As presented in Tables 12 and 13 and Chart 3, woody plant density in the mountain slope – deeper soils subtype averages 1,576 live plants per acre, highest of the five subtypes. According to Cedar Creek's density sampling in this community, burrobush predominates with 811 live plants per acre followed closely by creosote bush with 757 live plants per acre. The other two woody species encountered in this subtype comprise the remaining 8 plants per acre.

Based on field observations, the mountain slope – deeper soils subtype also received an ecological rating of late-seral. Rationale for this rating was based on high relative cover by apparent climax species and little evidence of grazing or browsing pressure.

3.2 Sensitive Species

3.2.1 Literature Review

Results of the detailed literature review revealed that no federal or state listed, proposed or candidate plant species were determined, or have potential, to exist in the exploration study area. To the contrary, the detailed literature review revealed that a total of twenty-five other plant species considered to be sensitive were known or suspected from the Panamint Range, and had at least some minimal potential to occur within the exploration study area. Of these, 13 species were designated "priority" sensitive plant species based on their status as BLM special status plants (BLM 1977) or CNPS rare or endangered plants (Lists 1 and 2, Skinner and Pavlik 1994). A few of these priority species are known to occur within 1-3 miles of the exploration study area. For several other priority species the nearest known occurrence is 20-25 miles to the north in the Aguerreberry Point–Tetracoccus Peak and Emigrant Canyon areas. The remaining 12 species were designated watch list species based on their status as CNPS watch list plants (List 4, Skinner and Pavlik 1994).

According to the "Sensitive Plant Species Predictive Maps" in the Cedar Creek Associates, Inc., 1998 report (Cedar Creek 1998), the exploration study area as a whole falls in the "Low" and "Very Low" potental categories. The 13 priority species maps were reviewed and four taxa (*Gilia ripleyi, Hulsea vestita ssp. inyoensis, Penstemon calcareous,* and *Tetracoccus ilicifolius*) were indicated as having zero probability of occurrence within the study area. Four other species (*Arabis dispar, Arctomecon merriamii, Lupinus magnificus var. magnificus,* and *Sphaeralcea rusbyi ssp. eremicola*) exhibited at least some areas of "Low" probability. To the contrary, five species (*Dudleya saxosa ssp. saxosa, Enceliopsis covillei, Linanthus arenicola, Petalonyx thurberi ssp. gilmanii,* and *Phacelia mustelina*) exhibited areas of "Moderate" to "Very High" potential within the exploration study area (based on the predictive maps – see Maps 3 through 16 at the rear of this document). During field efforts emphasis was placed on looking in the areas of high probability (e.g., the bajada complex in the southwest corner, canyon walls, and washes) and for these five species in general. Overall, the exploration study area lacks the carbonate soils (particularly limestone), surface water, or altitude that most of the priority sensitive and watch list species require.

3.2.2 Sensitive Plant Populations Observed

None of 13 priority sensitive species or 12 watch species were observed within the proposed exploration area. Survey routes and intensities of survey during 1997 and 2001 are presented on Map 3. Perusal of Map 3 indicates that all major and most minor washes / drainages were surveyed as well as the canyon walls that surround them. A representative portion of the mountain slopes at various elevations was also surveyed. In addition, the gently sloping bajada complex in the southwest corner of the study area was surveyed both at the beginning and end of April 2001 because of the high probability of *Linanthus arenicola* and *Petalonyx thurberi ssp. gilmanii* occurrence in that area.

3.2.3 Habitat Descriptions of Priority Sensitive Plant Species

The following section consists of summaries of habitat parameters for each of the 13 priority sensitive plant species with potential to occur in the exploration study. These summaries are based on previous investigations that included the exploration study area (Cedar Creek Associates, Inc., 1998).

3.2.3.1 *Arabis dispar*, pinyon rock cress

Only two occurrences of pinyon rock cress have been reported in the Panamint Mountains (CDFG 1997b). One of these is on a ridge on the south side of Pleasant Canyon, at 6500 feet elevation, about 3 miles east of the study area boundary (CDFG 1997b, Occurrence # 4). The second site is in the North Fork Hanaupah Canyon, at 7500 feet elevation, approximately 13 miles north-northeast of the study area (CDFG 1997b, Occurrence # 8).

Elevational Range: Pinyon rock cress is known from elevations of 4000 to 8000 feet. Only one CNDDB occurrence is below 5700 feet and that is in the San Bernardino Mountains considerably to the south. Professional judgment indicates that there is little or no chance of this species occurring in the study area below 4000 feet; from about 4000-5000 feet there is a low probability; and above 5000 feet there is a higher probability of its occurrence. It is expected that the highest chance of its occurrence in the Panamint Range would be from 6000-8000 feet.

Geology/Substrate: Pinyon rock cress has been reported on loose gravely, stony or rocky slopes and mesas, coarse alluvium, and compact talus. It is known to occur on granitic, basaltic and sandstone substrates, although no data on this parameter is recorded for most occurrences. A small-scale Death Valley geologic map shows the Pleasant Canyon population on later Precambrian sedimentary and metamorphic rocks (CDMG 1974) that are probably the sedimentary Kingston Peak formation (Johnson 1957). The Hanaupah Canyon population occurs on Cambrian-Precambrian marine sedimentary and metasedimentary rocks. However, the more generalized type on the Death Valley geologic map includes quartzite, sandstone, siltstone, and shale, in addition to dolomite. Given the variation in rock types this species is known to occur on, geology is probably a less important parameter within the study area.

Slope Angle: Pinyon rock cress occurs on a wide range of slopes, from nearly flat mesas to very steep mountainsides. However, available information is limited to a few occurrences. A study from the Coso Mountains, not included in the CNDDB, reports on two populations of pinyon rock cress from four transects where slope values were 15°, 10°, 5°, and nearly flat (Bagley et al. 1983). CNDDB reports give information on slope angle for only three occurrences: one at 8°, the Pleasant Canyon site on a "very steep mountainside," and a presumably flat or very gentle slope in a place named "Cactus Flat." Slope angles of about 50% and 60% were measured off of the USGS 15 minute series quadrangle for the two Panamint Mountains populations. This species apparently does not occur on cliffs or extremely steep slopes. Based on this limited information the highest potential for this species appears to be on 0-60% slopes, less potential on 60-100% slopes, and least on slopes >100%.

Slope Aspect: Little information is available on aspect preferences in pinyon rock cress populations. One CNDDB occurrence is reported on a north, another on a south-southwest slope. The Coso Mountains study reports pinyon rock cress on slopes with south, southwest, west-southwest, and west exposures (Bagley et al. 1983). Given the limited data available, it appears that aspect is not an important habitat parameter for this species.

Vegetation / Habitat Types: Pinyon rock cress has been reported in creosote bush scrub, Mojavean desert scrub (a broad type including Mojave creosote bush scrub and Mojave mixed woody scrub), Joshua tree woodland, big sagebrush scrub, and pinyon-juniper woodland.

3.2.3.2 *Arctomecon merriamii*, white bear poppy

The Panamint Mountains lie at the western edge of the geographic range of white bear poppy. This species is known from only one site in the Panamints: the Aguerreberry Point-Tetracoccus Peak area at about 5650-6250 feet in elevation (Bagley 1985, CDFG 1997b, Cochrane 1979, DeDecker 1977). This area is approximately 20 miles north-northeast of the study area.

Elevational Range: White bear poppy is known to occur at elevations of 1600 to 6250 feet. In the Amargosa Range, on the east side of Death Valley where this species is more widespread than in the mountains on the west side, populations are reported from 1600 to 5200 feet. The Aguerreberry Point population, at approximately 6250 feet, is the only known site above 5500 feet.[1] Given these data, it

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[1] Elevation of the Aguerreberry Point collection was incorrectly given as 6800 feet by Cochrane (1979) and Bagley (1985).

appears that there is little chance of white bear poppy occurring in the study area below 1600 feet. From 1600 to 4000 feet (above the upper elevation in the study area) there appears little reason to weight the probability of its occurrence in one elevational zone over another. Within this broad elevational range the underlying geology appears to be a more important factor.

Geology/Substrate: White bear poppy occurs on a great variety of sites. It has been reported on loose rocky-gravely slopes and ridges, talus, bajadas, sandy or rocky washes, flats, or old lakebeds, and in shallow gravely or rocky soils, outcrops, sand, or clay (CDFG 1997b, Cochrane 1979, Holland and Schramm 1979). This species is, however, restricted to limestone and dolomite substrates or gypsum rich soils. There is little if any probability this species would be found on the Precambrian gneiss and gravels that underlie this study area.

Slope Angle: White bear poppy grows on everything from clayey flats to steep rocky mountain slopes. However, it has not been reported on cliffs or extremely steep slopes. Therefore, professional judgment dictates that slopes >100% have little potential for this species.

Slope Aspect Aspect has been recorded at only seven sites for white bear poppy: two on south facing slopes, one on a southwest, two on a west, one on north northeast, and one on north and east facing slopes (Cochrane 1979, Chambers Group, Inc. 1996, CDFG 1997b). Given these observations it appears that aspect is a less important habitat parameter for this species.

Vegetation / Habitat Types: White bear poppy is known to occur in Mojave creosote bush scrub, Mojave mixed woody scrub, and desert chenopod scrub.

3.2.3.3 *Dudleya saxosa* ssp. *saxosa*, Panamint dudleya

Panamint dudleya is endemic to the Panamint Mountains. One small population was discovered during the 1997 surveys, roughly 1.5 miles northeast of the study area boundary. This was located between Pleasant Canyon and Middle Park Canyon, at about 5350 feet in elevation. Prior to this effort, the nearest known Panamint dudleya populations were located about six miles north of the study area in Surprise Canyon and about eight miles east of the study area at Arrastre Spring.

Elevational Range: Panamint dudleya is reported from elevations of 3000 to 7100 feet. Within this elevational range (which extends above the upper elevation in the study area) probability for occurrence could be evenly weighted, however, given the new observation a gradient of probability would be appropriate. Because there may be some chance for Panamint dudleya to occur below its reported range, a very low probability for occurrence in the study area should be given to elevations below 2000 feet, a slightly higher probability for elevations of 2000-3000 feet, and the highest probability for those greater than 3000 feet.

Geology/Substrate: Panamint dudleya occurs on dry rocky or stony slopes and in bedrock cracks. It has been reported on granitic or limestone slopes (Hickman 1993). However, it is likely that the term limestone has been used by some botanists to refer to carbonate soils, both limestone and dolomite. The new 1997 population occurred on a dolomite outcrop. The Death Valley geologic map shows the Surprise Canyon populations primarily on later Precambrian sedimentary and metamorphic rocks (CDMG 1974) that are probably all the sedimentary Kingston Peak formation (Johnson 1957). Precambrian gneiss has a low potential for Panamint dudleya, while there is little to no potential on the gravels.

Slope Angle: Although there is little data recorded regarding slope angle at Panamint dudleya sites, review of topographic maps where these sites occur indicates all on fairly steep, rugged mountain slopes. Given this information the highest potential for this species appears to be on 33-100% slopes, less on slopes >100%, even less on 10-33% slopes, and the least on slopes <10%.

Slope Aspect Although the Jepson Manual reports Panamint dudleya as occurring on north facing slopes (Hickman 1993), it is reported on both north and south facing slopes in Surprise Canyon (BLM 1982) and the 1997 population occurred on a south facing slope. Given these observations, it appears that aspect is probably not a very important habitat parameter for Panamint dudleya.

Vegetation / Habitat Types: As expected with an elevational range of 3000-7100 feet, Panamint dudleya is reported to occur from Mojave creosote bush scrub to pinyon-juniper woodland (Munz 1974). The 1997 population occurred in Mojave mixed woody scrub, on mountain slopes with deeper soils.

3.2.3.4 *Enceliopsis covillei,* Panamint daisy

Panamint daisy is endemic to the west side of the Panamint Mountains. One large population, located between Happy Canyon and Jackpot Canyon (3 miles north), was newly discovered during the 1997 surveys. Prior to the 1997 study, the only known populations of Panamint daisy occurred in Wildrose, Tuber, Jail, Hall, and Surprise canyons. The latter site is only about six miles north of the study area.

Elevational Range: Panamint daisy has been reported from 1200 to 6000 feet in elevation. Munz and Keck (1959) and Munz (1974) report this species as occurring from 1200 to 4000 feet, DeDecker (1984) as up to 4000 feet, and the Jepson Manual (Hickman 1993) as 400-1250 meters (1300-4100 feet). However, herbarium collections from 1949 and 1958 occur from 4500, 5000 and 6000 feet in Wildrose Canyon (Holland and Schramm 1979, CDFG 1997b). The lowest elevation collection was from 1400 feet at the type locality, collected in 1891 at the mouth of Hall Canyon. The 1997 population south of Happy Canyon occurred from approximately 2160 to 4900 feet. Panamint daisy appears to have little or no chance of occurring in the study area below 1200 feet. The rest of the study area above 1200 feet is within the reported range of the species. Therefore, there does not seem to be much reason to weight the probability of its occurrence in one elevational zone more than another within the majority of the study area. Within the broad elevational range, geology appears to be the most important factor.

Geology/Substrate: Panamint daisy has been reported on dry canyon walls, slopes, gravely and sandy washes, and talus slopes, in clayey, gravely and rocky soils. The Death Valley geologic map shows it primarily on later Precambrian sedimentary and metamorphic rocks (CDMG 1974) that are probably the sedimentary Kingston Peak formation (Johnson 1957). Exceptions to this rock type are sites in the lower portion of Wildrose Canyon that occur on Pliocene-Pleistocene nonmarine sedimentary deposits. The study area mapping includes this rock type as part of the gravels map unit. The 1997 population was confined to a distinct rock type in the later Precambrian sedimentary and metamorphic unit (CDMG 1974). This was a cobbly-gravely dark gray shale-like rock in a fine matrix of light gray powdery clay soil. Where this substrate occurred, the Panamint daisy occurred. It did not occur on the adjacent areas with what appeared like the same dark gray shale-like rock but no clayey matrix. Little data is recorded on rock type in the collection records (Holland and Schramm 1979, CDFG 1997b); one site in Surprise Canyon is noted as a gypsum talus slope (CDFG 1997b, Occurrence #4). The populations known from Wildrose Canyon are on tan or light brown sedimentary deposits in gravely-clayey soil. Of the two geologic map units in the study area mapping, the gravels unit has a higher potential than the Precambrian gneiss.

Slope Angle: Panamint daisy occurs on hillsides, canyons and washes on moderate to fairly steep slopes. None of the previously known sites have reported values for slope angle. However, the 1997 population south of Happy Canyon occurred on slopes from about 10 to 60% and included some plants, at lower densities, on the flatter hill tops. Based on this information, the highest potential for this species appears to be on 10-100% slopes, less so on slopes <10%, and the least on slopes >100%.

Slope Aspect: Little information is available on aspect in Panamint daisy populations. It has been observed in lower Wildrose Canyon on aspects ranging from east to south to west facing. In the 1997 population south of Happy Canyon it occurred on all aspects, although it was more dense on north facing slopes. It appears that aspect is not an important habitat parameter for this species.

Vegetation / Habitat Types: Panamint daisy is known to occur only in Mojave creosote bush scrub vegetation. It typically occurs where competing vegetation is very sparse and open.

3.2.3.5 *Gilia ripleyi,* Ripley's gilia

Ripley's gilia is reported to occur in the Panamint Mountains on Tetracoccus Ridge, Emigrant Canyon, and Johnson Canyon (Holland and Schramm 1979, CDFG 1997b). The latter site is closest to the study area (12 miles northeast).

Elevational Range: Over its entire range Ripley's gilia occurs from 2800 to 5800 feet in elevation. Collections in the Panamints range from 3500 to 5800 feet. Within the study area the highest probability of its occurrence would appear to be from 3500 feet up to the upper limit of the area at about 5840 feet; a lower probability zone would be from 3500 to 2500 feet; and a very low probability zone below 2500 feet. Substrate appears to be a more important factor.

Geology/Substrate: Ripley's gilia is restricted to carbonate rock types, mainly limestone and dolomite, but one report is on marble. It typically occurs in rock crevices on cliffs or steep rock slopes, but sometimes in the loose talus or gravely slopes below. There is little or no potential on the Precambrian gneiss and gravels.

Slope Angle: Ripley's gilia occurs on cliffs or steep slopes. Therefore, the highest potential for this species is on slopes >100%, less so on 33-100% slopes, even less on 10-33% slopes, and no potential on slopes <10%.

Slope Aspect: Little information is available on aspect in Ripley's gilia populations. Rhoads et al. (1978) state that it is usually on south facing cliffs, but mention a population on a ridge where the plants occurred on both the north and south facing sides. Several collection records indicate aspect; these include north, south, east and west slopes. Therefore, it appears that aspect is not a very important habitat parameter for this species.

Vegetation / Habitat Types: Ripley's gilia is reported from cliffs or steep slopes in Mojave creosote bush scrub, Mojave mixed woody scrub, desert calcicolous scrub, and, in Nevada, shadscale scrub.

3.2.3.6 *Hulsea vestita* ssp. *inyoensis*, Inyo hulsea

Inyo hulsea is known from only five widely scattered sites in California. Two of these sites are in the Cottonwood Mountains (which form the northern part of the Panamint Range). The closest of these sites is near Goldbelt Spring, about 43 miles north northwest of the study area. The Inyo hulsea site nearest to the study area is near Crystal Spring, on the east side of the Coso Mountains, about 33 miles to the west northwest.

Elevational Range: Although Wilken (1975, and in Hickman 1993) reports a range of 1700-3000 meters (5580-9840 feet) for Inyo hulsea, collection records show a range of 4600-7600 feet (CDFG 1997b, Cochrane 1979, Holland and Schramm 1979). Within California the reported populations occur from 5400-7600 feet. Therefore, within the study area, professional judgment dictates that there is little or no probability below 4400 feet.

Geology/Substrate: Inyo hulsea occurs in unstable soils on steep talus or scree slopes, less commonly in washes, and on loose soils in areas of human disturbance such as road banks. It is reported in rocky, gravely or sandy soils; on shale, slate, carbonate, granitic and volcanic substrates. Wilken (1971) has suggested that "physical structure of soil rather than geologic origin apparently influences establishment." Therefore, it appears that topography rather than geology is more of an important habitat parameter for this species.

Slope Angle: Inyo hulsea typically occurs on steep slopes, therefore, the highest potential for this species should be on slopes >100%, less so on 33-100% slopes, even less on 10-33% slopes, and very little potential on slopes <10%.

Slope Aspect: With sites reported on north, south, east and west slopes, it appears that Inyo hulsea has little preference for aspect.

Vegetation / Habitat Types: In California, Inyo hulsea occurs in Mojave mixed woody scrub, Great Basin sagebrush scrub and pinyon-juniper woodland. In addition, in Nevada it is also reported from blackbush scrub and four-wing saltbush scrub.

3.2.3.7 *Linanthus arenicola,* sand linanthus

Only two populations of sand linanthus have been reported in the Panamint Mountains; one near the mouth of Emigrant Canyon at the north end (CDFG 1997b, Occurrence # 17), the other near Wingate Pass at the south end (CDFG 1997b, Occurrence # 8). The site near Wingate Pass is the closest to the study area, located about 17 miles to the south southeast.

Elevational Range: Munz (1974) and Hickman (1993) report the elevational range of sand linanthus as 2500-4000 feet and 800-1400 meters (2600-4600 feet) respectively. However, the CNDDB reports the type locality near Needles, California as 600 feet in elevation (CDFG 1997b, Occurrence # 1). Recent studies in the Silurian Valley area have discovered many new sand linanthus populations below 2500 feet, including at least ten sites below 1000 feet and the lowest at 395 feet (Bagley 1994, Chambers Group, Inc. 1996). The highest reported site in California is at 4000 feet (CDFG 1997b, Occurrence # 5). However, a 1941 collection by Ripley and Barneby in Nye County, Nevada, was reported at 4900 feet in elevation (Cochrane 1979, Holland and Schramm 1979). Based on this information, the known range for sand linanthus is 395-4900 feet. Since only four California populations are known above 2600 feet, including two in the Panamint Range, and only one above 3000 feet, it seems reasonable that the highest probability for sand linanthus in the study area should be at or below 3000 feet, less at 3000-4000 feet, and low potential at 4000-5000 feet. However, this parameter seems to be somewhat less important than soil type.

Geology/Substrate: Sand linanthus occurs in loose wind blown sands or loose sandy to fine gravely soils, on dunes, bajadas, flats, or washes. Munz (1974) and Hickman (1993) report this species on gypsum rich soils, however there is little or no data to support the concept that it is confined to such soils. Although no soil samples were taken, there were no indications of gypsum rich soils at many of the occupied sites observed by Bagley (including sites in Eureka Valley, Indian Wells Valley, Wingate Pass, Cronese Valley, Soda Mountains, Silurian Valley, and Valjean Hills). Of the two geologic map units in the study area, the gravels unit appears to have the highest potential for sand linanthus because of its alluvial nature. The Precambrian gneiss unit has little or no potential. It appears that soil texture has more importance than parent rock type does for this species.

Slope Angle: Although there is little quantitative data, sand linanthus appears to typically occur on flat or relatively gentle slopes. Of 27 sites recorded in a 1995 study, 90% "were located on gentle slopes (less than 20 percent), while the remaining populations were on slopes less than 40 percent" (Chambers Group, Inc. 1996). Therefore, based on these data, the highest potential for this species is on slopes

<10%, less so on 10-33% slopes, much less on 33-100% slopes, and very little or no potential on slopes >100%.

Slope Aspect: No data was recorded on aspect in the collection records (CDFG 1997b, Cochrane 1979, Holland and Schramm 1979), but maps in several recent reports show sand linanthus on gentle bajada slopes facing north, east, southeast, south, southwest, and west (Bagley 1994, 1997, Chambers Group, Inc. 1996). Therefore, aspect does not appear to be a significant limiting factor for this species.

Vegetation / Habitat Types: Sand linanthus is reported in Mojave creosote bush scrub or desert dunes at nearly all of the sites where habitat data was recorded. It occurs in desert sink scrub at one site (CDFG 1997b, Occurrence # 11) and desert saltbush scrub at another (CDFG 1997b, Occurrence # 7). Although Munz (1974, and in Munz and Keck 1959) reported this species in Joshua tree woodland, none of the site records indicate this community type (Bagley 1994, 1997, CDFG 1997b, Chambers Group, Inc. 1996, Cochrane 1979, Dames & Moore 1993, Holland and Schramm 1979).

3.2.3.8 *Lupinus magnificus* var. *magnificus*, Panamint Mountains lupine

Panamint Mountains lupine is endemic to the Panamint Range, with previously known locations scattered in only five canyons from Hunter Mountain in the north to Pleasant Canyon in the south, and near the crest on the east slope of Rogers Peak [10 July 1974, *R.F. Thorne 44,823* (RSA)]. Prior to the 1997 study, the nearest known population was located about 5 miles northeast of the study area in Pleasant Canyon (Tierra Madre Consultants, Inc. 1995). One new population was discovered during the 1997 surveys and was located in South Park Canyon, roughly 1.5 miles east of the study area boundary.

Elevational Range: Munz (1974, and in Munz and Keck 1959) reported this species at 5500-7500 feet in elevation, but a more recent collection extends the known range up to 8500 feet (*R.F. Thorne 44,823*) and an older 1940 collection extends it down to 4000 feet (CDFG 1997b, Occurrence # 2). The newly discovered population in the study area occurred from about 4100 to 4630 feet. Because there may be some chance for Panamint Mountains lupine to occur below its reported range, a very low probability for occurrence in the study area should be given to elevations from 3000 to 4000 feet. There is probably no chance of it occurring below 3000 feet, but within its known elevational range of 4000-8500 feet there is little reason to weight the probability of its occurrence in one elevational zone more than another.

Geology/Substrate: Panamint Mountains lupine has been reported on dry gravely or sandy slopes and washes, and at two higher elevation sites (above 7400 feet) on rocky slopes or shaley talus slopes. The South Park Canyon population occurred in a broad wash in metamorphic and granitic cobble. No data on rock type was recorded for any other occurrences. A small-scale Death Valley geologic map shows the Pleasant and Surprise Canyon populations on later Precambrian sedimentary and metamorphic rocks (CDMG 1974) that are probably the sedimentary Kingston Peak formation (Johnson 1957). Other Panamint Mountains lupine sites are in areas mapped as Mesozoic granitic rocks and recent alluvium. With the variation in rock types this species appears to occur on, this is probably a relatively unimportant parameter within the study area. The more important substrate parameter appears to be a very loose well-drained soil.

Slope Angle: Little information is available on slope angle at Panamint Mountains lupine sites. The population in South Park Canyon occurred on a 1-2° slope and populations observed in Wildrose Canyon occur on gentle slopes in the canyon bottom and on moderately steep lower canyon slopes. One collection occurred "on and below shaley talus slopes", presumably indicating very steep slopes [*R.F. Thorne and C.W. Tilforth 44,605* (RSA)]. Although not in the original data, a slope angle of approximately 50% was measured off of the USGS 7.5 minute series quadrangle for a site in Pleasant Canyon (Tierra Madre Consultants, Inc. 1995). This species apparently does not occur on cliffs. With the wide range of slopes indicated by the little data available, the highest potential for this species appears to be on 0-60% slopes, less so on 60-100% slopes, and least on slopes >100%.

Slope Aspect Most of the available collection information for Panamint Mountains lupine does not indicate the aspect. However two sites are reported on north facing slopes, another on an east slope, and another on a west slope. Plants have been observed on a southwest facing slope near the Wildrose Charcoal Kilns. With the limited data available, it appears that aspect is not an important habitat parameter for this species.

Vegetation / Habitat Types: Panamint Mountains lupine occurs in Great Basin sagebrush scrub, pinyon-juniper woodland, and at the site in South Park Canyon in Mojave wash scrub. The CNPS inventory (Skinner and Pavlik 1994) erroneously reports it in upper montane coniferous forest, a vegetation type that does not occur in the Panamint Range. However, most of the lower elevation collection records (below 7000 feet) do not indicate vegetation type. It is expected that some of the lower sites (at least from 4000-6000 feet) might occur on slopes with Mojave mixed woody scrub or Mojave creosote bush scrub. These two types occurred on the canyon slopes adjacent to the Mojave wash scrub where Panamint Mountains lupine occurred in South Park Canyon.

3.2.3.9 *Penstemon calcareus,* limestone beardtongue

Limestone beardtongue is known from only one site in the Panamint Mountains: on Tetracoccus Peak at about 6000 feet in elevation (Holland and Schramm 1979). This area is approximately 23 miles north-northeast of the study area. Several other sites are known in the Cottonwood Mountains that form the northern portion of the Panamint Range.

Elevational Range: Limestone beardtongue is reported to occur from 3500 to 7800 feet in elevation. Within the study area the highest probability of its occurrence would appear to be from 3500 feet up to the upper limit of the area at about 4000 feet; a lower probability zone would be from 3500 to 2500 feet; and an extremely low probability zone below 2500 feet. Substrate appears to be a more important factor.

Geology/Substrate: Limestone beardtongue is restricted to carbonate rock types, mainly limestone and dolomite, but one report is on marble. It typically occurs on dry canyon sides and steep slopes in gravely soil or in rock crevices and narrow ledges on cliffs or steep rock slopes. Because this species appears to be limited to carbonate rock types, there is little or no potential on the Precambrian gneiss and gravels of the study area.

Slope Angle: Limestone beardtongue occurs on cliffs or steep slopes. Therefore, the highest potential for this species is on slopes >100%, less so on 33-100% slopes, far less on 10-33% slopes, and very little if any potential on slopes <10%.

Slope Aspect: Few of the available collection records for limestone beardtongue indicate aspect. However two sites are reported on northeast facing slopes and another on a south slope. Plants have been observed on both southwest and northeast facing canyon walls in DeDeckera Canyon in the Last Chance Range. Given the limited data, it appears that aspect is not an important habitat parameter for this species.

Vegetation / Habitat Types: Limestone beardtongue is reported to occur in Mojave creosote bush scrub, Mojave mixed woody scrub, desert calcicolous scrub, Joshua tree woodland, and pinyon-juniper woodland.

3.2.3.10 ***Petalonyx thurberi* ssp. *gilmanii*, Death Valley sandpaper plant**

Death Valley sandpaper plant is endemic to Death Valley, Panamint Valley and, with one collection, in the Argus Range, near Darwin. The nearest known population is located about 1.8 miles west of the study area boundary at the base of the Happy Canyon alluvial fan (Bagley 1989b).

Elevational Range: Except for one collection near Darwin at 5000 feet, the elevational range of Death Valley sandpaper plant is 200-3500 feet. Therefore, the highest probability for Death Valley sandpaper plant in the study area is in areas below 3500 feet and much less at 3500-4000 feet.

Geology/Substrate: Death Valley sandpaper plant occurs in loose soils; mainly sandy-gravely alluvium on bajada slopes and in canyons. It is typically in washes or areas of heavy sheet flow. It also occurs in loose sand on desert dunes, and at one site, Ubehebe Crater, on loose cinder slopes. Looking at population sites on the Death Valley geologic map (CDMG 1974) it appears that this species occurs in alluvium that was derived from a wide variety of different rock types. Of the two geologic map units used in the study area mapping, the gravels unit has the highest potential for Death Valley sandpaper plant because of its alluvial nature. The Precambrian gneiss has a lower potential. It appears that soil texture, a very loose well-drained soil in washes or on dunes, has more importance than parent rock type does for this species.

Slope Angle: Death Valley sandpaper plant typically occurs on gentle slopes, although in one location, at Ubehebe Crater, it occurs on moderately steep slopes. Therefore, the highest potential for this species is on slopes <10%, less so on 10-33% slopes, and the least on slopes >33%.

Slope Aspect: With sites on slopes facing north, south, east, west and points in-between (Bagley 1986), it appears that Death Valley sandpaper plant has no preference for aspect.

Vegetation / Habitat Types: Death Valley sandpaper plant occurs in Mojave creosote bush scrub, Mojave wash scrub and desert dunes.

3.2.3.11 ***Phacelia mustelina*, Death Valley round-leaved phacelia**

Death Valley round-leaved phacelia is known to occur in the Panamint Mountains in Emigrant, Wood, Wildrose, and Surprise canyons (CDFG 1997b, Cochrane 1979, BLM 1982, Holland and Schramm 1979). The Surprise Canyon site is nearest to the study area at about 5.5 miles to the northeast.

Elevational Range: Death Valley round-leaved phacelia is reported to occur from 2400 to 8600 feet in elevation. However, only two sites have been reported above 7300 feet and only one below 3000 feet. Within the study area the highest probability of its occurrence would appear to be from 3000 feet up to the upper limit of the area at about 4000 feet; a lower probability zone would be from 3000 to 2000 feet; and an extremely low probability zone below 2000 feet.

Geology/Substrate: Death Valley round-leaved phacelia has been reported most often growing in rock crevices and ledges of cliffs and outcrops. It also occurs on rocky or gravely slopes, talus slopes, a few sites in sandy soils, and one site in a gravely wash. It grows primarily on carbonate and volcanic rocks, although one site is reported on granite (*Cochrane 707*, in Cochrane 1979). Therefore, the Precambrian gneiss has a low potential, and the gravels have little to no potential.

Slope Angle: Although there is no quantitative data recorded on slope angle at Death Valley round-leaved phacelia sites, it is most often reported to occur on cliffs or steep slopes. Therefore, the highest potential for this species is on slopes >33%, less so on 10-33% slopes, and the least on slopes <10%.

Slope Aspect: Little information is available on aspect in Death Valley round-leaved phacelia populations. A few sites have been reported on west facing slopes, one on a south, and one on a north (Cochrane 1979). Rhoads et al. (1978) state that no obvious aspect preference has been noted. It appears that aspect is not a very important habitat parameter for this species.

Vegetation / Habitat Types: Death Valley round-leaved phacelia is known to occur in Mojave creosote bush scrub, Mojave mixed woody scrub, blackbush scrub, big sagebrush scrub, and pinyon-juniper woodland.

3.2.3.12 *Sphaeralcea rusbyi* ssp. *eremicola*, Rusby's desert mallow

Rusby's desert mallow is a little known species that occurs only at a few sites in the Panamint Range and, approximately 110 miles southeastward, in the Clark Mountain Range. The nearest reported site is approximately 23 miles north of the study area in Emigrant Canyon (CDFG 1997b, Occurrence # 4).

Elevational Range: Rusby's desert mallow is known to occur from 3200 to 4900 feet in elevation. Within this elevational range there does not seem to be any reason to weight the probability of its occurrence in one elevational zone more than another. Within the study area the highest probability of its occurrence would appear to be from 3000 to 4000 feet; a lower probability zone would be from 2000-3000; and the lowest probability zone below 2000 feet.

Geology/Substrate: Rusby's desert mallow has been reported on dry slopes, bajadas and washes in gravely- to rocky-clayish or gravely-sandy soils. In the Clark Mountains it occurs in carbonate or gypsum outcrops, but rock type has not been recorded in the Panamint Range. As a result, the Precambrian gneiss and the gravels units have little or no potential.

Slope Angle: Little information is available on slope angle at Rusby's desert mallow sites. The CNDDB microhabitat summary for this species states it is on steep slopes, but there is no slope data given for any of the occurrences in the database (CDFG 1997b). One observed population is at Keany Pass in the Clark Mountain Range (CDFG 1997b, Occurrence # 3) where the slopes were fairly moderate (<33%). Occurrence # 2 (CDFG 1997b) is mapped in an area where the slopes are all fairly gentle (<10%). The two sites in the Panamint Range occur in canyons with a variety of slopes, but they are described as occurring in washes, suggesting they may grow in the bottom of the canyons where the slopes are fairly gentle. Therefore, the highest potential for this species would appear to be on slopes <33%, less so on 33-100% slopes, and the least on slopes >100%.

Slope Aspect: Known sites of Rusby's desert mallow appear to occur on slopes that face generally east, west and northwest. Given this variability from only a few sites, aspect preference for this species appears less important.

Vegetation / Habitat Types: Rusby's desert mallow is reported to occur in Mojave creosote bush scrub, Mojave wash scrub, blackbush scrub, and Joshua tree woodland vegetation types.

3.2.3.13 *Tetracoccus ilicifolius,* holly-leaved tetracoccus

Only two known locations of holly-leaved tetracoccus have been reported in the Panamint Mountains; one in the Tetracoccus Peak area and the other near the head of Death Valley Canyon. The latter site is the closest at approximately 14 miles north-northeast of the study area.

Elevational Range: Holly-leaved tetracoccus is reported to occur from 2000 to 6000 feet in elevation (CDFG 1997b, Holland and Schramm 1979, Kurzius 1981). The Panamint Mountains populations occur from 5000 to 6000 feet. Therefore, there is a low probability zone from 2000 to 4000 feet, and little to no probability of it below 2000 feet. Substrate may be a more important factor.

Geology/Substrate: Holly-leaved tetracoccus occurs on steep rocky slopes and bedrock canyon walls. It appears to be confined to limestone or dolomite rocks. Therefore, there is little to no probability of this species occurring on the Precambrian gneiss and gravels within the study area.

Slope Angle: Holly-leaved tetracoccus has been reported on steep slopes and canyon walls. Therefore, the highest potential for this species is on slopes greater than about 50%, less so on 33-50% slopes, little potential on 10-33% slopes, and almost none on slopes <10%.

Slope Aspect: Not much has been recorded on aspect in holly-leaved tetracoccus populations. It has been noted on both west and north facing slopes at Tetracoccus Peak and a north facing slope in the Grapevine Mountains. Given this limited information little preference for aspect seems apparent for this species, except for north and west aspects.

Vegetation / Habitat Types: Holly-leaved tetracoccus is reported to occur in Mojave creosote bush scrub, Mojave mixed woody scrub and desert calcicolous scrub.

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Table 1 Briggs Exploration Area - 2001

Observed Plant Species & Relative Abundance

Family / Species (Vegetation Community Subtype -->)		Common Name	Bajada	Wash	Sandy-Gravelly Slopes	Mountain Slopes - Thin Soils	Mountain Slopes - Deeper Soils
Amaranthaceae							
Pf	*Tidestromia oblongifolia*	Honeysweet tidestromia		UC			UC
Asclepiadaceae							
Pf	*Sarcostemma hirtellum*	Climbing milkweed		R			
Asteraceae							
Sh	*Ambrosia dumosa*	Burro weed	VC	UC	VC	VC	VC
Sh	*Amphipappus fremontii*	Chaff bush	UC	R		C	C
Af	*Atrichoseris platyphylla*	Tobacco weed	C	VC	UC	R	R
Sh	*Bebbia juncea var. aspera*	Sweetbush	R	C	C		
Sh	*Brickellia arguta*	Spearleaved brickellbush		VC	R		R
Sh	*Brickellia desertorum*	Desert brickellbush		R			
Sh	*Brickelia multiflora*	Brickellbush		R			
Af	*Calycoseris parryi*	Yellow tack-stem		R		R	R
Af	*Chaenactis carpholinia var. c.*	Pebble pinchusion	C	VC	UC	VC	VC
Af	*Chaenactis fremontii*	Desert pinchusion				R	R
Af	*Chaenactis stevioides*	Stevia pinchusion		R		UC	UC
Sh	*Chrysothamnus teretifolius*	Rabbitbrush		R			
Sh	*Encelia actoni*	Acton encelia		C		R	
Sh	*Encelia farinosa*	Brittlebush	UC	VC	C	VC	UC
Af	*Filago depressa*	Fluffweed	R				
Ss	*Gutierrezia microcephela*	Sticky snakeweed	R	VC	R	UC	R
Af	*Malacothrix glabrata*	Desert dandelion	R	R			
Af	*Monoptilon bellioides*	Desert star	UC	R		C	R
Af	*Perityle emoryi*	Rock daisy	R	VC		R	
Sh	*Peucephyllum schottii*	Pygmy cedar	R	VC	R	R	
Ss	*Pleurocoronis pluriseta*	Arrow leaf		UC			
Pf	*Psathyrotes ramosissima*	Turtleback	R	R			
Af	*Rafinesquia neomexicana*	Desert chicory		R			R
Ss	*Senecio flaccidus var. monoensis*	Threadleaf grounsel		UC		R	
Af	*Senecio mohavensis*	Mojave groundsel		UC			
Pf	*Stephanomeria pauciflora var. p.*	Wire lettuce		R			
Af	*Stylocline micropoides*	Desert nest straw					R
Sh	*Tetradymia axillaris var. longispina*	Horsebrush		R			
Sh	*Viguiera reticulata*	Goldeneye		VC	R	R	
Ss	*Xylorhiza tortifolia var. t.*	Mojave Aster		UC	R	C	C
Boraginaceae							
Af	*Amsinckia tessellata*	Western fiddleneck	R	C		UC	UC
Af	*Cryptantha angustifolia*	Cryptantha		UC	R	UC	
Af	*Cryptantha nevadensis*	Nevada cryptantha	R	R			
Af	*Cryptantha pterocarya*	Winged cryptantha		R		R	R
Pf	*Cryptantha racemosa*	Forget-me-not cryptantha		R		R	
Af	*Cryptantha* sp.	Cryptantha		R		C	R
Af	*Pectocarya platycarpa*	Combseed		R		R	
Af	*Pectocarya recurvata*	Recurved combseed				UC	R
Af	*Plagiobothrys jonesii*	Popcornflower				R	
Brassicaceae							
Af	*Guilenia lasiophylla*	California mustard		R			R
Ss	*Lepidium fremontii*	Desert pepperweed	R	VC	R	UC	UC
Af	*Lepidium lasiocarpum var. l.*	Pepperweed		UC			
Af	*Sisymbrium irio*	London rocket		R			

Ag - Annual Grass   Af - Annual Forb   Pg - Perennial Grass
Pf - Perennial Forb   Ss - Sub Shrub   Sh - Shrub

VC - Very Common   C - Common
UC - Uncommon   R - Rare

Table 1 (continued)

	Family / Species	Vegetation Community Subtype --> / Common Name	Bajada	Wash	Sandy-Gravelly Slopes	Mountain Slopes - Thin Soils	Mountain Slopes - Deeper Soils
	Cactaceae						
Sh	*Echinocactus polycephalus var. p.*	Clustered barrel cactus				R	R
Sh	*Echinocereus englemanii*	Engleman hedgehog cactus				R	R
Sh	*Ferocactus cylindraceus*	Cottontop barrel cactus		R		UC	R
Sh	*Mammillaria tetrancistra*	Corkseed cactus				R	
Sh	*Opuntia basilaris var. b.*	Beavertail cactus	VC	UC	R		R
	Campanulaceae						
Af	*Nemacladus* sp.	Nemacladus	R				
	Caryophyllaceae						
Pf	*Arenaria macradenia*	Desert sandwort		R			R
	Chenopodiaceae						
Sh	*Atriplex hymenelytra*	Desert holly saltbush	VC	R	C	VC	VC
Sh	*Atrilpex polycarpa*	Cattle saltbrush	R	R			
Sh	*Grayia spinosa*	Hop sage				R	R
	Cuscutaceae						
Af	*Cuscuta* sp.	Dodder	C	C		UC	UC
	Ephedraceae						
Sh	*Ephedra nevadensis*	Nevada ephedra		R		R	
	Euphorbiaceae						
Af	*Chamaesyce micromera*	Littleleaf spurge		UC			
	Fabaceae						
Pf	*Astragalus coccineus*	Scarlet milkvetch		R			
Af	*Dalea mollissima*	Silk dalea		UC			
Af	*Lupinus concinnus*	Bajada lupine		R			
	Geraniaceae						
Af	*Erodium circutarium*	Filaree	UC	C	R	R	R
	Hydrophyllaceae						
Af	*Phacelia calthifolia*	Caltha- leaf phacelia		UC		UC	R
Af	*Phacelia crenulata var. c.*	Notch-leaf phacelia	VC	C	UC	VC	VC
Af	*Phacelia pedicellata*	Phacelia		R			
Af	*Phacelia rotundifolia*	Round-leaf phacelia	R	R			
Af	*Phacelia* sp.	Phacelia	UC	C		C	
	Lamiaceae						
Sh	*Salazaria mexicana*	Paper-bag bush		C			
Af	*Salvia columbariae*	Chia		R		R	
Sh	*Salvia dorrii var. pilosa*	Blue sage		R			
	Loasaceae						
Ss	*Eucnide urens*	Rock nettle	R	C			
Af	*Mentzelia albicaulis*	White-stemmed blazing star		R			
Af	*Mentzelia* sp.	Blazing star		C	UC	C	UC
Af	*Mentzelia tricuspis*	Spiny-haired blazing star	UC	C		C	C
	Malvaceae						
Af	*Eremalche rotundifolia*	Desert five-spot	R	UC		R	R
Pf	*Sphaeralcea ambigua ssp. a.*	Apricot globemallow	R	UC	R	R	R
	Nyctaginaceae						
Pf	*Anulocaulis annulatus*	Sticky ring-stem		R			
Pf	*Mirabilis bigelovii*	Wishbone bush	R	R			
	Onagraceae						
Af	*Camissonia boothii*	Booth evening primrose		UC		R	
Af	*Camissonia brevipes*	Suncups	VC	VC	C	VC	C
Af	*Camissonia cardiophylla ssp. c.*	Evening primrose		R		R	R
Af	*Camissonia claviformis*	Club-fruited evening primrose	R	R	R		R
Af	*Camissonia refracta*	Narrow-leaf evenig primrose		R		R	

Ag - Annual Grass **Af** - Annual Forb **Pg** - Perennial Grass **Pf** - Perennial Forb **Ss** - Sub Shrub **Sh** - Shrub

VC - Very Common **C** - Common **UC** - Uncommon **R** - Rare

Table 1 (continued)

Family / Species		Vegetation Community Subtype --> / Common Name	Bajada	Wash	Sandy-Gravelly Slopes	Mountain Slopes - Thin Soils	Mountain Slopes - Deeper Soils
Papaveraceae							
Pf	*Argemone munita*	Prickle poppy		R			
Af	*Eschscholzia minutiflora*	Little gold poppy	R	UC		R	
Plataginaceae							
Af	*Plantago ovata*	Indian wheat	VC	UC	C	VC	VC
Poaceae							
Pg	*Achnatherum speciosum*	Desert needlegrass		R		R	
Ag	*Bromus madritensis ssp. rubens*	Foxtail brome		R			
Ag	*Bromus tectorum*	Cheatgrass		R			
Ag	*Bromus trinii*	Chilean chess		R			
Pg	*Erioneuron pulchellum*	Fluff grass		R		R	
Pg	*Poa secunda ssp. secunda*	Sandberg bluegrass		R		R	
Ag	*Schismus arabicus*	Mediterranean grass		R			
Ag	*Vulpia octoflora*	Six-weeks fescue	UC	UC	R	R	R
Polemoniaceae							
Af	*Gilia latifolia*	Broad-leaf gilia		R		R	
Af	*Gilia* sp.	Gilia	UC	C	UC	C	C
Af	*Langloisia setosisima ssp. punctata*	Lilac sunbonnets	R	R		R	R
Af	*Langloisia setosisima ssp. s.*	Bristly gilia	R			R	R
Polygonaceae							
Af	*Chorizanthe brevicornu var. b.*	Brittle spineflower	C	UC	UC	VC	C
Af	*Chorizanthe rigida*	Spiny herb	VC	C	VC	VC	VC
Af	*Eriogonum deflexum*	Flat-topped buckwheat	R				
Sh	*Eriogonum fasciculatum ssp. polifolium*	California buckwheat		R		R	
Af	*Eriogonum inflatum var. i.*	Desert trumpet	C	UC	UC	C	C
Af	*Eriogonum nidularium*	Birdsnest buckwheat		R		R	R
Af	*Eriogonum rixfordii*	Rixford's buckwheat	R	UC		R	R
Af	*Eriogonum trichopes*	Little desert trumpet		R		R	
Portulacaceae							
Af	*Claytonia parviflora ssp. p.*	Miners lettuce		R		R	
Pteridaceae							
Pf	*Cheilanthes parryi*	Lace fern		R		R	
Resedaceaae							
Af	*Oligomeris linifolia*	Oligomeris	R	R			R
Rubiaceae							
Sh	*Galium stellatum var. eremicum*	Star bedstraw		R		R	
Rutaceae							
Sh	*Thamnosma montana*	Mohave desert-rue		R		R	
Scrophularicaeae							
Af	*Mimulus bigelovii*	Bigelow monkeyflower	C	C		R	
Af	*Mohavea breviflora*	Lesser mohavea	C	C	R	R	
Sh	*Penstemon fruiticiformis var. f.*	Desert mountain penstemon		R			
Solanaceae							
Pf	*Datura wrightii*	Jimson weed		R			
Sh	*Lycium andersonii*	Wolfberry		UC			
Pf	*Nicotiana obtusifolia*	Desert tobacco	R	VC		R	R
Ss	*Physalis crassifolia*	Thick-leaf ground cherry	R	UC	R	R	
Zygophyllaceae							
Sh	*Larrea tridentata*	Creosote bush	VC	C	C	VC	VC

Ag - Annual Grass Af - Annual Forb Pg - Perennial Grass Pf - Perennial Forb Ss - Sub Shrub Sh - Shrub

VC - Very Common C - Common UC - Uncommon R - Rare

Table 2 Briggs Exploration Area - Vegetation Cover - 2001

Bajada Community Type

Percent Ground Cover Based on Point-Intercept Sampling

		Transect No. --->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Cover
Grasses																							
	None																						0.00
Forbs																							
A	*Atrichoseris platyphylla*	Gravel Ghost	1																				0.05
A	*Chaenactis steviodes*	Stevia Pincushion					1							1									0.10
A	*Chorizanthe rigida*	Spiny Herb							1														0.05
A	*Mohavea breviflora*	Lesser Mohavea	1																				0.05
A	*Plantago ovata**	Indian Wheat	2	8	4	10	7	7	10	7	9	3	9	5	6	9	6	6	4	2	3	4	6.05
Sub-Shrubs, Shrubs & Cacti																							
P	*Ambrosia dumosa*	Bur-sage	5		4	2	4	6	3	5	2	7		5	2		4			3	5	8	3.25
P	*Atriplex hymenelytra*	Desert Holly Saltbush		3			2							3	2			4					0.70
P	*Larrea tridentata*	Creosote Bush							2				6			5			7	4			1.20
P	*Opuntia basilaris*	Beavertail Cactus					1											2				4	0.35
																							Mean
		Total Plant Cover	**9**	**11**	**8**	**12**	**15**	**13**	**16**	**12**	**11**	**10**	**15**	**14**	**10**	**14**	**10**	**12**	**11**	**9**	**8**	**16**	11.80
		Rock	75	79	86	77	65	72	77	79	84	74	79	78	76	75	84	73	75	59	78	64	75.45
		Litter	1	5	1	7	6	7	2	2	1	2	1	1	5	3	3	2	8	9	6	8	4.00
		Bare ground	15	5	5	4	14	8	5	7	4	14	5	7	9	8	3	13	6	23	8	12	8.75

Annual Plant Ground Cover = 6.30

Perennial Plant Ground Cover = 5.50

* Formerly known as *Plantago insularis*

Sampling Adequacy Calculations

Plant Cover Mean = 11.80 Variance = 6.48

n = 20 t = 1.729131 $n_{min\ 20/90}$ = 3.481

Table 3 Briggs Exploration Area - Vegetation Cover - 2001

Wash Community Type

Percent Ground Cover Based on Point-Intercept Sampling

		Transect No. --->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Cover
Grasses																							
A	*Vulpia octoflora*	Six-weeks Fescue																	1				0.05
Forbs																							
A	*Atrichoseris platyphylla*	Gravel Ghost																				1	0.05
A	*Chaenactis steviodes*	Stevia Pincushion													1							1	0.10
A	*Chorizanthe brevicornu*	Brittle Spineflower					1			1					2								0.20
A	*Chorizanthe rigida*	Spiny Herb				1																	0.05
A	*Lepidium lasiocarpum var. l.*	Pepperweed			1					1											1		0.15
A	*Mimulus bigelovii*	Bigelow Monkeyflower												1		1							0.10
A	*Mohavea breviflora*	Lesser Mohavea																1					0.05
A	*Perityle emoryi*	Rock Daisy											3										0.15
A	*Phacelia crenulata var. c.*	Notch-leaf Phacelia												1									0.05
A	*Plantago ovata**	Indian Wheat	4	3	2	5	5	5	6	4	5	2		1	3					3	2	4	2.70
P	*Stephanomeria pauciflora va*	Wire Lettuce	3																		5		0.40
Sub-Shrubs, Shrubs & Cacti																							
P	*Ambrosia dumosa*	Bur-sage	3	5	6	2	4	2	6	7		7			4		1	7		6	5	2	3.35
P	*Atriplex hymenelytra*	Desert Holly Saltbush			2			4			4		11	7			1		3				1.60
P	*Bebbia juncea var. aspera*	Sweetbush	5	6													4						0.75
P	*Encelia farinosa*	Brittlebrush				5						4		7	4		3	5	10				1.90
P	*Eucnide urens*	Rock Nettle														11							0.55
P	*Larrea tridentata*	Creosote Bush					2										1					7	0.50
P	*Opuntia basilaris*	Beavertail Cactus									2												0.10
																							Mean
		Total Plant Cover	**15**	**14**	**11**	**13**	**12**	**11**	**12**	**13**	**11**	**13**	**14**	**17**	**14**	**12**	**10**	**13**	**14**	**9**	**13**	**15**	12.80
		Rock	61	58	55	59	61	68	61	62	67	54	78	73	57	69	63	69	58	56	62	58	62.45
		Litter	9	6	6	8	7	4	16	11	2	5	6	4	9	0	3	2	10	14	9	14	7.25
		Bare ground	15	22	28	20	20	17	11	14	20	28	2	6	20	19	24	16	18	21	16	13	17.50

Annual Plant Ground Cover = 3.65

Perennial Plant Ground Cover = 9.15

* Formerly known as *Plantago insularis*

Sampling Adequacy Calculations		
Plant Cover Mean = 12.80		Variance = 3.54
n = 20	*t* = 1.729131	$n_{min\ 20/90}$ = 1.614

Table 4 Briggs Exploration Area - Vegetation Cover - 2001

Sandy - Gravelly Slopes Community Type

Percent Ground Cover Based on Point-Intercept Sampling

		Transect No.--->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Cover
Grasses																							
	None																						0.00
Forbs																							
A	*Camissonia brevipes*	Sun Drops	1	1												3				2			0.35
A	*Camissonia sp.*	Evening Primrose			2																		0.10
A	*Chaenactis stevioides*	Stevia Pincushion					1																0.05
A	*Chorizanthe brevicornu*	Brittle Spineflower			2							2											0.20
A	*Chorizanthe rigida*	Spiny Herb							1		2	1											0.25
A	*Eremalche rotundifolia*	Desert Five-spot																					0.05
A	*Eriogonum inflatum*	Desert Trumpet							1														0.05
A	*Mimulus bigelovii*	Bigelow Monkeyflower																1					0.05
A	*Phacelia crenulata var. c.*	Notch-leaf Phacelia											3	2			4	1					0.50
A	*Plantago ovata**	Indian Wheat					3		2	6	4	2		2									0.95
Sub-Shrubs, Shrubs & Cacti																							
P	*Ambrosia dumosa*	Bur-sage			1	2		5														4	0.65
P	*Atriplex hymenelytra*	Desert Holly Saltbush	4	3							2	1		2	2						8		1.10
P	*Encelia farinosa*	Brittlebrush			3														2			2	0.35
																							Mean
		Total Plant Cover	5	4	8	3	5	5	4	6	8	6	3	6	2	3	4	2	3	2	8	6	4.65
		Rock	63	68	65	64	75	78	79	76	76	74	75	55	59	77	93	92	61	74	70	73	72.35
		Litter	8	3	11	5	6	4	0	5	5	3	0	10	0	1	0	0	6	2	3	3	3.75
		Bare ground	24	25	16	28	14	13	17	13	11	17	22	29	39	19	3	6	30	22	19	18	19.25

Annual Plant Ground Cover = 2.55

Perennial Plant Ground Cover = 2.10

* Formerly known as *Plantago insularis*

Sampling Adequacy Calculations

Plant Cover Mean = 4.65 **Variance = 3.92**

n = 20 t = 1.729131 $n_{min\,20\%}$ = 13.564

Table 5 Briggs Exploration Area - Vegetation Cover - 2001

Mountain Slope - Thin Soils Community Type

Percent Ground Cover Based on Point-Intercept Sampling

		Transect No. --->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Cover
Grasses																							
	None																						0.00
Forbs																							
A	*Camissonia sp.*	Evening Primrose	1																				0.05
A	*Chaenactis steviodes*	Stevia Pincushion																1					0.05
A	*Chorizanthe brevicornu*	Brittle Spineflower						1															0.05
A	*Cryptantha sp.*	Cryptantha									1												0.05
A	*Eriogonum inflatum*	Desert Trumpet													1						2		0.15
A	*Lepidium lasiocarpum var.*	Pepperweed		1												1		1					0.15
A	*Phacelia crenulata var. c.*	Notch-leaf Phacelia											1	1									0.10
A	*Plantago ovata**	Indian Wheat	3	4	3	5	3	4	2	5	4	8	1	2	3	2	3	4	5	4	3	2	3.50
Sub-Shrubs, Shrubs & Cacti																							
P	*Ambrosia dumosa*	Bur-sage	3	5	4		3	4			1				1	1	4	6	3	2	4	12	2.65
P	*Atriplex hymenelytra*	Desert Holly Saltbush	1				1	2	3						2								0.45
P	*Encelia farinosa*	Brittlebrush	5	1	2	1		4	2	9	5		5	1						1		3	1.95
P	*Larrea tridentata*	Creosote Bush				2						2		1			3		3	3			0.70
																							Mean
		Total Plant Cover	**13**	**11**	**9**	**8**	**7**	**15**	**7**	**14**	**11**	**10**	**7**	**5**	**7**	**4**	**10**	**12**	**11**	**10**	**9**	**17**	**9.85**
		Rock	76	75	68	78	78	79	81	72	77	75	79	78	74	82	75	74	73	78	79	70	76.05
		Litter	3	5	7	3	7	4	6	7	2	7	5	5	8	1	6	6	5	6	3	5	5.05
		Bare ground	8	9	16	11	8	2	6	7	10	8	9	12	11	13	9	8	11	6	9	8	9.05

Annual Plant Ground Cover = 4.10

Perennial Plant Ground Cover = 5.75

* Formerly known as *Plantago insularis*

Sampling Adequacy Calculations

Plant Cover Mean = 9.85 **Variance = 10.98**

n = 20 t = 1.729131 $n_{min\ 20/90}$ = 8.456

Table 6 Briggs Exploration Area - Vegetation Cover - 2001

Mountain Slope - Deeper Soils Community Type

Percent Ground Cover Based on Point-Intercept Sampling

		Transect No. ——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Cover
Grasses																							
	None																						0.00
Forbs																							
A	*Eriogonum inflatum*	Desert Trumpet											1										0.05
A	*Plantago ovata**	Indian Wheat	10	13	7	11	10	6	8	6	8	5	6	4	2	5	4	6	4	2	5	9	6.55
Sub-Shrubs, Shrubs & Cacti																							
P	*Ambrosia dumosa*	Bur-sage		2			2					2		5	5			3		1	3	4	1.35
P	*Larrea tridentata*	Creosote Bush	5	1	1	2	2	4	2	7	2	2	8		2	4	3	4	2	7			2.90
P	*Opuntia basilaris*	Beavertail Cactus																	3				0.15
																							Mean
		Total Plant Cover	**15**	**16**	**8**	**13**	**14**	**10**	**10**	**13**	**10**	**9**	**15**	**9**	**9**	**9**	**7**	**13**	**9**	**10**	**8**	**13**	11.00
		Rock	68	59	76	71	78	75	58	72	81	86	50	75	76	77	80	70	80	75	63	73	72.15
		Litter	5	5	0	6	4	1	7	10	3	4	2	1	3	5	3	3	2	3	9	7	4.15
		Bare ground	12	20	16	10	4	14	25	5	6	1	33	15	12	9	10	14	9	12	20	7	12.70

Annual Plant Ground Cover = 6.60

Perennial Plant Ground Cover = 4.40

* Formerly known as *Plantago insularis*

Sampling Adequacy Calculations

Plant Cover Mean = 11.00 Variance = 7.37

n = 20 t = 1.729 $n_{min\ 20\ 60}$ = 4.552

Table 7 Briggs Exploration Area - Vegetation Cover - 2001

Ground Cover Summary

Percent Ground Cover Based on Point-Intercept Sampling

		Community Type -->	Bajadas	Wash	Sandy - Gravelly Slopes	Mountain Slopes - Thin Soils	Mountain Slopes - Deeper Soils	Overall Average Cover
Grasses								
A	*Vulpia octoflora*	Six-weeks Fescue		0.05				0.01
Forbs								
A	*Atrichoseris platyphylla*	Gravel Ghost	0.05	0.05				0.02
A	*Camissonia brevipes*	Sun Drops			0.35			0.07
A	*Camissonia sp.*	Evening Primrose			0.10	0.05		0.03
A	*Chaenactis steviodes*	Stevia Pincushion	0.10	0.10	0.05	0.05		0.06
A	*Chorizanthe brevicornu*	Brittle Spineflower		0.20	0.20	0.05		0.09
A	*Chorizanthe rigida*	Spiny Herb	0.05	0.05	0.25			0.07
A	*Cryptantha sp.*	Cryptantha				0.05		0.01
A	*Eremalche rotundifolia*	Desert Five-spot			0.05			0.01
A	*Eriogonum inflatum*	Desert Trumpet			0.05	0.15	0.05	0.05
A	*Lepidium lasiocarpum var. l.*	Pepperweed		0.15		0.15		0.06
A	*Mimulus bigelovii*	Bigelow Monkeyflower		0.10	0.05			0.03
A	*Mohavea breviflora*	Lesser Mohavea	0.05	0.05				0.02
A	*Perityle emoryi*	Rock Daisy		0.15				0.03
A	*Phacelia crenulata var. c.*	Notch-leaf Phacelia		0.05	0.50	0.10		0.13
A	*Plantago ovata*	Indian Wheat	6.05	2.70	0.95	3.50	6.55	3.95
P	*Stephanomeria pauciflora var.*	Wire Lettuce		0.40				0.08
Sub-Shrubs, Shrubs & Cacti								
P	*Ambrosia dumosa*	Bur-sage	3.25	3.35	0.65	2.65	1.35	2.25
P	*Atriplex hymenelytra*	Desert Holly Saltbush	0.70	1.60	1.10	0.45		0.77
P	*Bebbia juncea var. aspera*	Sweetbush		0.75				0.15
P	*Encelia farinosa*	Brittlebrush		1.90	0.35	1.95		0.84
P	*Eucnide urens*	Rock Nettle		0.55				0.11
P	*Larrea tridentata*	Creosote Bush	1.20	0.50		0.70	2.90	1.06
P	*Opuntia basilaris*	Beavertail Cactus	0.35	0.10			0.15	0.12
		Total Plant Cover	**11.80**	**12.80**	**4.65**	**9.85**	**11.00**	**10.02**
		Rock	75.45	62.45	72.35	76.05	72.15	71.69
		Litter	4.00	7.25	3.75	5.05	4.15	4.84
		Bare ground	8.75	17.50	19.25	9.05	12.70	13.45
		Annual Ground Cover	6.30	3.65	2.55	4.10	6.60	4.64
		Perennial Ground Cover	**5.50**	**9.15**	**2.10**	**5.75**	**4.40**	5.38

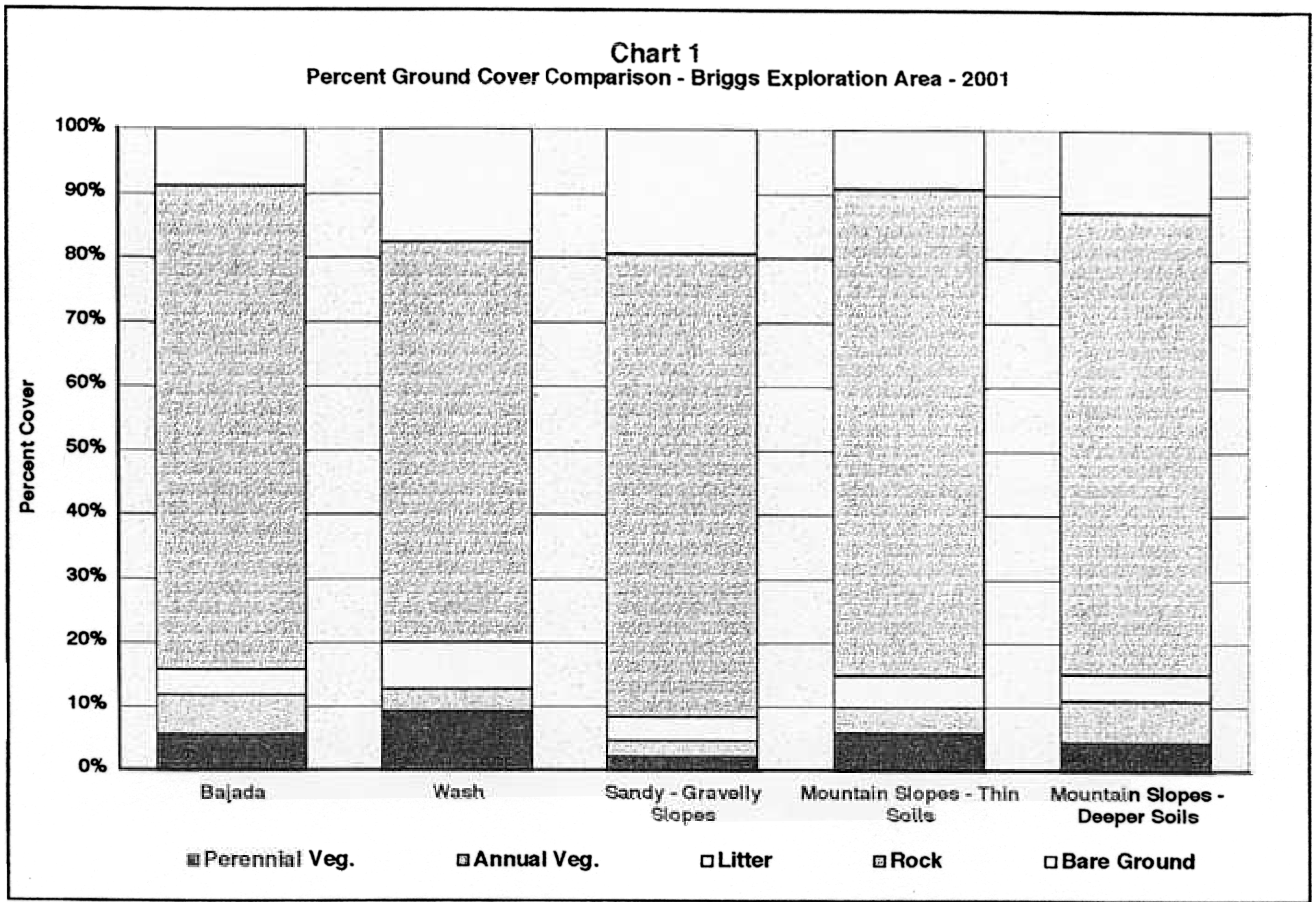


Chart 1
Percent Ground Cover Comparison - Briggs Exploration Area - 2001
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Cover
Bajada
Wash
Sandy - Gravelly Slopes
Mountain Slopes - Thin Soils
Mountain Slopes - Deeper Soils
Perennial Veg.
Annual Veg.
Litter
Rock
Bare Ground

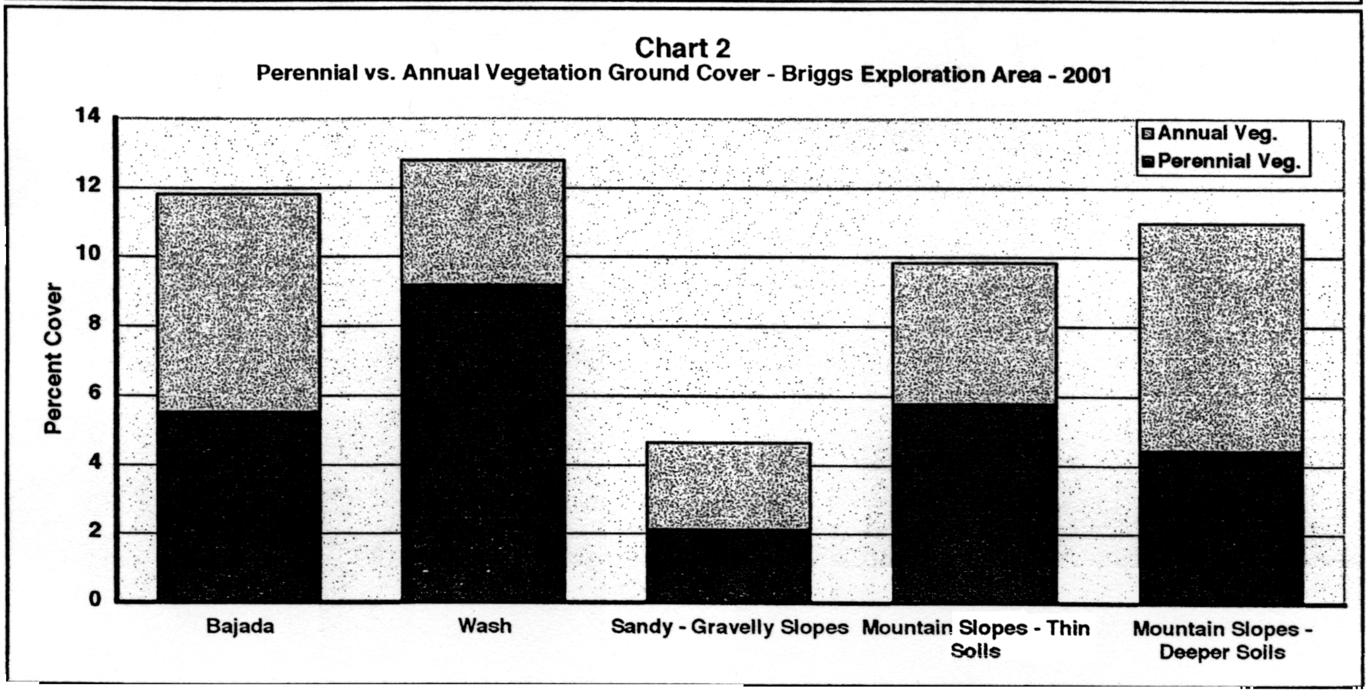


Chart 2
Perennial vs. Annual Vegetation Ground Cover - Briggs Exploration Area - 2001
14
12
10
8
6
4
2
0
Percent Cover
Annual Veg.
Perennial Veg.
Bajada
Wash
Sandy - Gravelly Slopes
Mountain Slopes - Thin Soils
Mountain Slopes - Deeper Soils

Table 8 Briggs Exploration Area - Woody Plant Density - 2001

Bajada Community Type

Each Woody Plant Density Belt - 2m X 50m

	Belt No. --->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Density
Ambrosia dumosa	Bur-sage	17	26	6	12	18	14	16	14	19	26	21	29	35	21	2		3	2	1	21	15.15
Atriplex hymenelytra	Desert Holly Saltbush	2	12	1		6	3	3	1	5	3		4	2	7	1		1		3	1	2.75
Bebbia juncea var. aspera	Sweetbush																					-
Encelia farinosa	Brittlebrush		1		6							1										0.40
Larrea tridentata	Creosote Bush	1		3	3				2	1	1	1	3		1	6	6	9	8	11	4	3.00
Opuntia basilaris	Beavertail Cactus	1		2		2	7	1	3	6	7	9		6	6	4	1	6	4	5	5	3.75
	Woody Plants Per Transect	21	39	12	21	26	24	20	20	31	37	32	36	43	35	13	7	19	14	20	31	Mean 25.05

Average Woody Plants Per Acre = 1,013.72

Sampling Adequacy Calculations: Mean = 25.05 n = 20 t = 1.729131 Variance = 100.47 $n_{min\ 20/90}$ = 11.97

Table 9 Briggs Exploration Area - Woody Plant Density - 2001

Wash Community Type

Each Woody Plant Density Belt - 2m X 50m

	Belt No. --->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Density
Ambrosia dumosa	Bur-sage	16	5	23	28	29	5	3	5	2	1		1	1		5	14	23	23	17	12	10.65
Atriplex hymenelytra	Desert Holly Saltbush	6	4		11	11	14	5	3			15	9	1	1	5	2	4	3	8	3	5.15
Bebbia juncea var. aspera	Sweetbush	2	4	4							7	3	2	4	6	1	2					1.75
Encelia farinosa	Brittlebrush						7	3	3	4	3		13		2	3	2					2.00
Larrea tridentata	Creosote Bush	3	2		1										1							0.35
Opuntia basilaris	Beavertail Cactus				1	1												1			1	0.20
	Woody Plants Per Transect	27	15	27	41	41	26	11	11	6	11	18	25	6	10	14	20	28	26	23	16	Mean 20.10

Average Woody Plants Per Acre = 813.41

Sampling Adequacy Calculations: Mean = 20.10 n = 20 t = 1.729131 Variance = 103.46 $n_{min\ 20/90}$ = 19.14

Table 10 Briggs Exploration Area - Woody Plant Density - 2001

Sandy-Gravelly Slopes Community Type

Each Woody Plant Density Belt - 2m X 50m

	Belt No. --->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Density
Ambrosia dumosa	Bur-sage	2		6	1	1	3		9	23	1	2	7	1	3	19	1	2	28	13	3	6.25
Atriplex hymenelytra	Desert Holly Saltbush	4	16	16	19	2	1	4	6	3	5	6	16	4	7	4	15	21	4	5	4	8.10
Bebbia juncea var. aspera	Sweetbush																				6	0.30
Encelia farinosa	Brittlebrush	5	1			4	5	1	1					1						2	3	1.15
Larrea tridentata	Creosote Bush							2						1		1	1			2		0.35
Opuntia basilaris	Beavertail Cactus			1		1								1					1			0.20
																						Mean
	Woody Plants Per Transect	11	17	23	20	8	9	7	16	26	6	8	23	8	10	24	17	23	33	22	16	16.35

Average Woody Plants Per Acre = 661.65

Sampling Adequacy Calculations: Mean = 16.35 n = 20 t = 1.729131 Variance = 59.713 $n_{min\ 20/90}$ = 16.70

Table 11 Briggs Exploration Area - Woody Plant Density - 2001

Mountain Slope - Thin Soils Community Type

Each Woody Plant Density Belt - 2m X 50m

	Belt No. --->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Density
Ambrosia dumosa	Bur-sage	38	19	14	36	1	5	29	48	12	22	7	13	13	22	1	22	53		36	36	21.35
Atriplex hymenelytra	Desert Holly Saltbush		2								3	4	14	4		4	2	4	1		2	2.00
Bebbia juncea var. aspera	Sweetbush																					-
Encelia farinosa	Brittlebrush	3	24		6		2	2	6	10	6	3	38	13	13			2		10	6	7.20
Larrea tridentata	Creosote Bush	4	3	4	2	17	7	1	1	3	2			7	1	2	4		16			3.70
Opuntia basilaris	Beavertail Cactus																					-
																						Mean
	Woody Plants Per Transect	45	48	18	44	18	14	32	55	25	33	14	65	37	36	7	28	59	17	46	44	34.25

Average Woody Plants Per Acre = 1,386.03

Sampling Adequacy Calculations: Mean = 34.25 n = 20 t = 1.729131 Variance = 271.14 $n_{min\ 20/90}$ = 17.28

Table 12 Briggs Exploration Area - Woody Plant Density - 2001

Mountain Slope - Deeper Soils Community Type

Each Woody Plant Density Belt - 2m X 50m

Belt No.--->		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Density
Ambrosia dumosa	Bur-sage	26	70	23	72		19	17	43	38	19	5	5	3	8	3	7	19	2	15	7	20.05
Atriplex hymenelytra	Desert Holly Saltbush												2						1			0.15
Bebbia juncea var. aspera	Sweetbush																					-
Encelia farinosa	Brittlebrush																					-
Larrea tridentata	Creosote Bush	23	10	12	13	15	17	15	22	17	16	13	7	33	19	19	23	17	41	16	26	18.70
Opuntia basilaris	Beavertail Cactus												1									0.05
	Woody Plants Per Transect	**49**	**80**	**35**	**85**	**15**	**36**	**32**	**65**	**55**	**35**	**18**	**15**	**36**	**27**	**22**	**30**	**36**	**44**	**31**	**33**	**Mean** 38.95

Average Woody Plants Per Acre = 1,576.23

Sampling Adequacy Calculations: Mean = 38.95 n = 20 t = 1.729131 Variance = 377.31 $n_{min\ 20/90}$ = 18.59

Table 13 Briggs Exploration Area - Woody Plant Density - 2001							
Woody Plant Density Summary							Woody Plants per Acre
	Community Type -->	Bajada	Wash	Sandy - Gravelly Slopes	Mountain Slopes - Thin Soils	Mountain Slopes - Deeper Soils	Average Density (per acre)
Ambrosia dumosa	Bur-sage	613.1	431.0	252.9	864.0	811.4	**594.5**
Atriplex hymenelytra	Desert Holly Saltbush	111.3	208.4	327.8	80.9	6.1	**146.9**
Bebbia juncea var. aspera	Sweetbush		70.8	12.1			**16.6**
Encelia farinosa	Brittlebrush	16.2	80.9	46.5	291.4		**87.0**
Larrea tridentata	Creosote Bush	121.4	14.2	14.2	149.7	756.8	**211.2**
Opuntia basilaris	Beavertail Cactus	151.8	8.1	8.1		2.0	**34.0**
	Woody Plants Per Acre	**1,013.7**	**813.4**	**661.7**	**1,386.0**	**1,576.2**	**1,090.2**

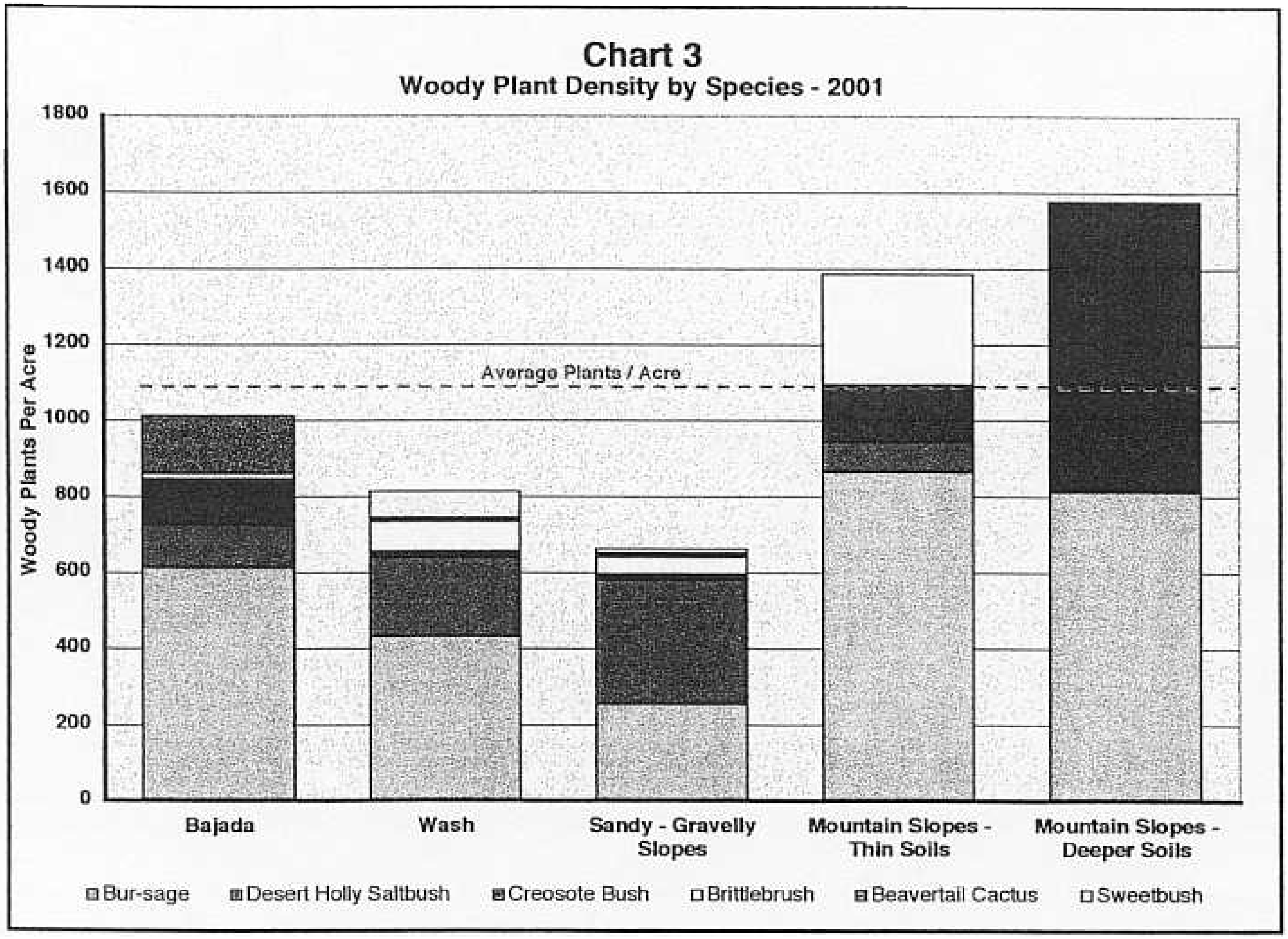


PLATE 1 – Bajada Landscape View

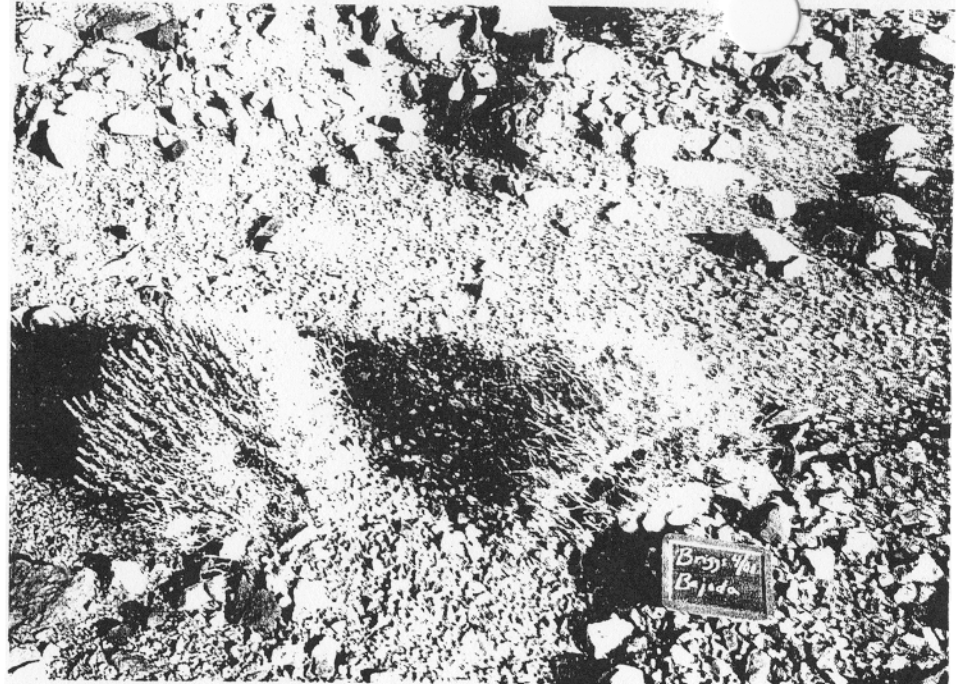


PLATE 2 – Bajada Close-up View

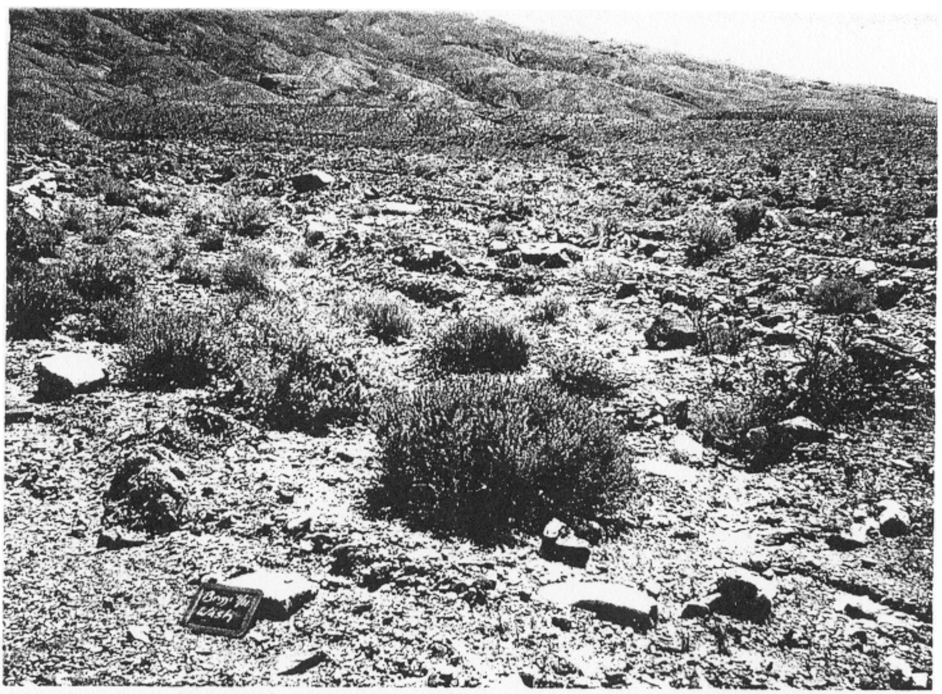
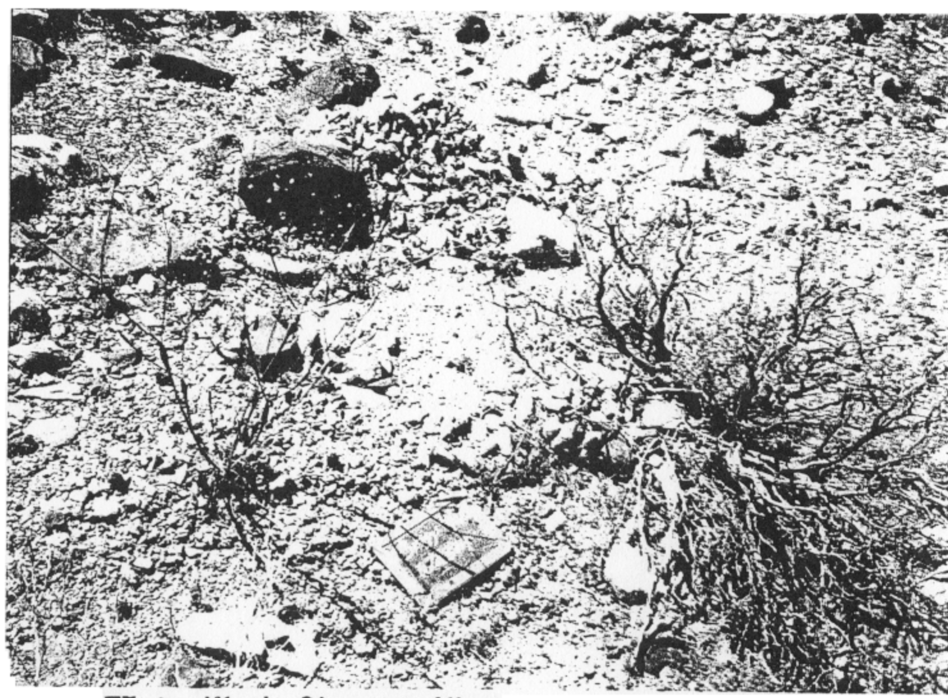


PLATE 3 – Wash Landscape View



TE 4 - Wash Close-up View


PLATE 5 – Sandy – Gravelly Slopes Landscape View


PLATE 6 - Sandy – Gravelly Slopes Close-up View

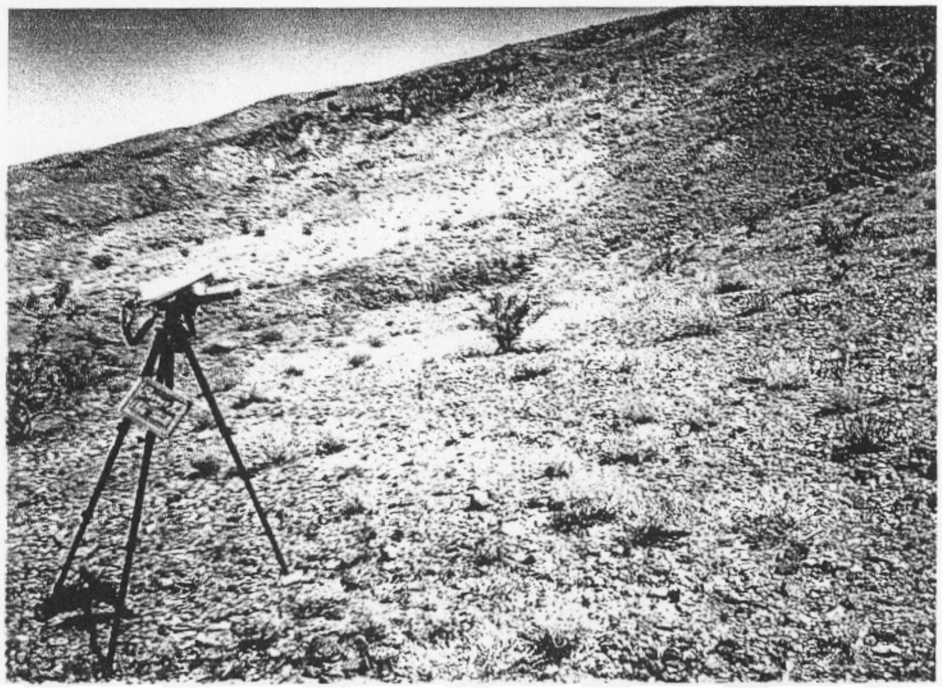
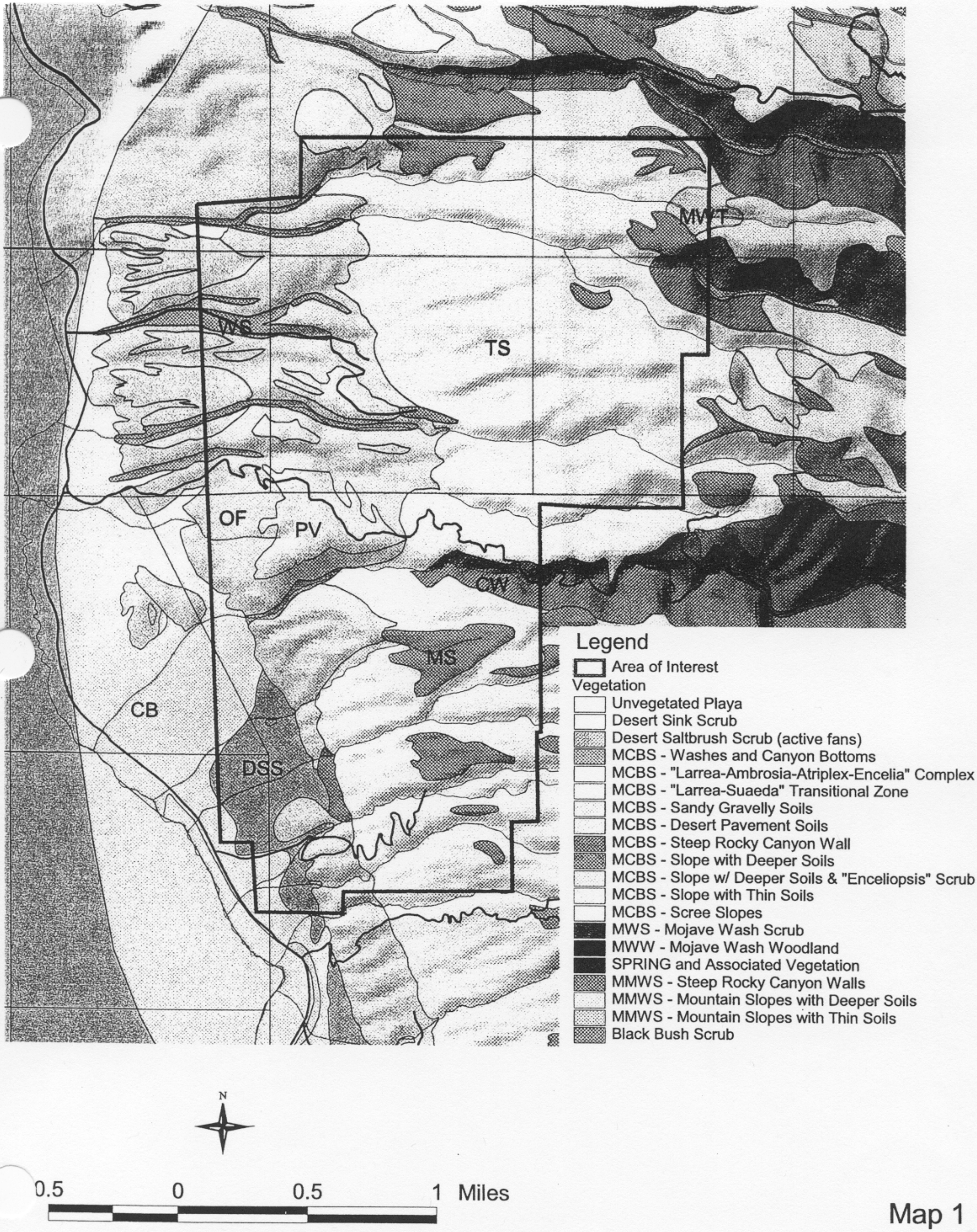


PLATE Mountain Slopes Thin Soils Landscape View

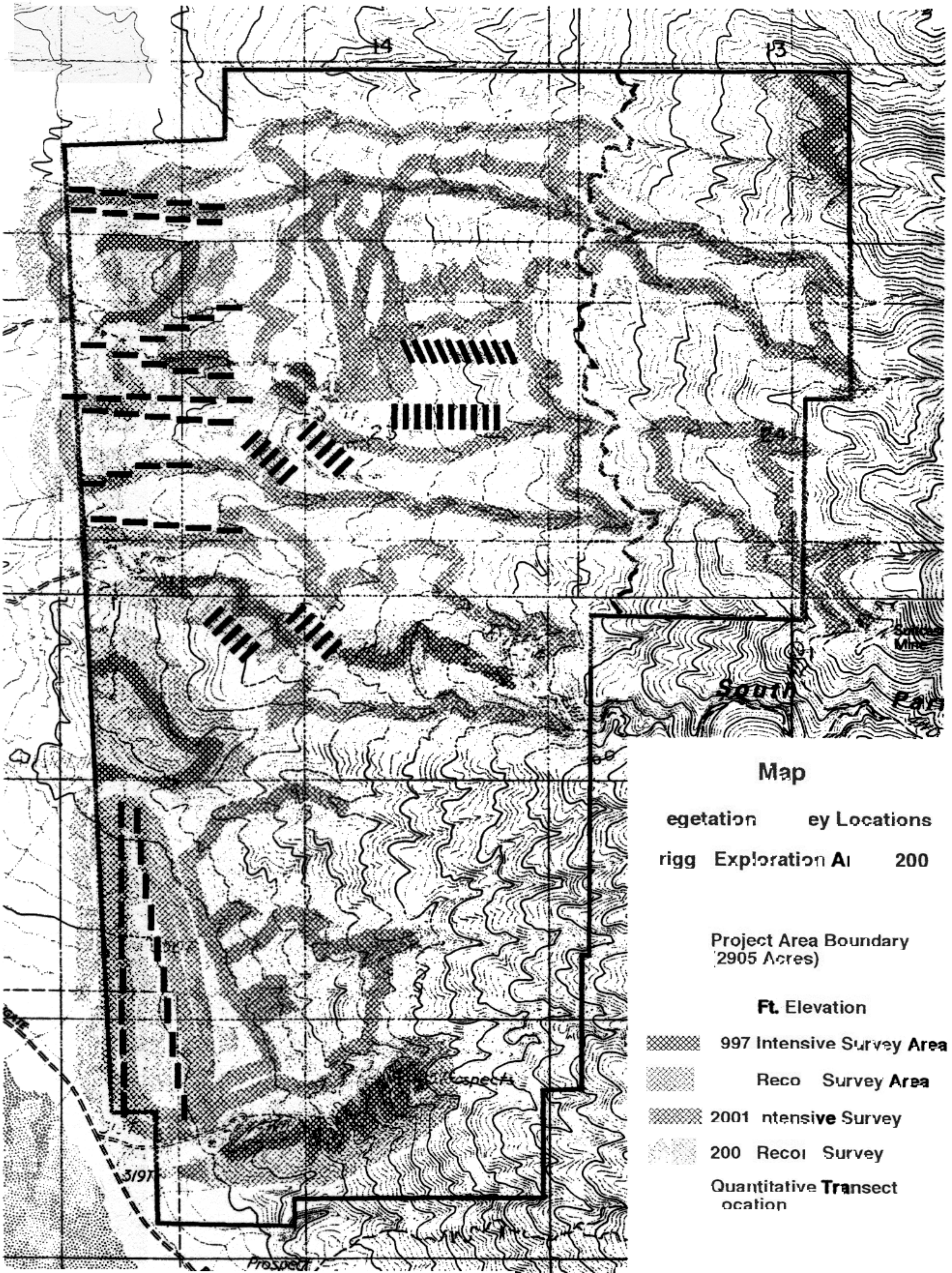

PLATE Mountai Slopes Thin Soils Close-up View

PLATE 9 - Mountain Slopes – Deeper Soils Landscape View
(Includes Desert Pavement)

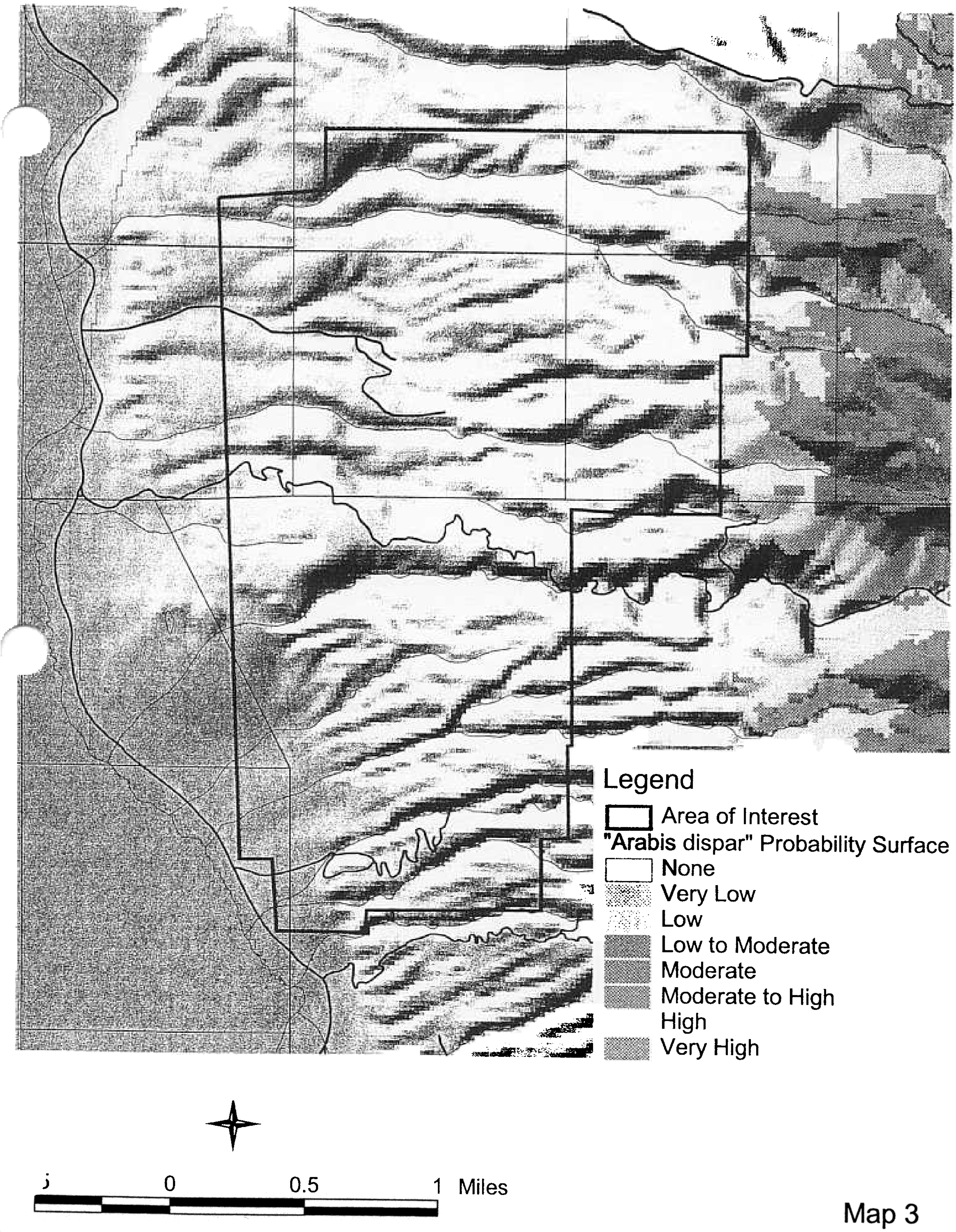
PLATE 10 - Mountain Slopes – Deeper Soils Close-up View
(Includes Desert Pavement)


MWT
WS
TS
OF
PV
CW
MS
CB
DSS
Legend
Area of Interest
Vegetation
Unvegetated Playa
Desert Sink Scrub
Desert Saltbrush Scrub (active fans)
MCBS - Washes and Canyon Bottoms
MCBS - "Larrea-Ambrosia-Atriplex-Encelia" Complex
MCBS - "Larrea-Suaeda" Transitional Zone
MCBS - Sandy Gravelly Soils
MCBS - Desert Pavement Soils
MCBS - Steep Rocky Canyon Wall
MCBS - Slope with Deeper Soils
MCBS - Slope w/ Deeper Soils & "Enceliopsis" Scrub
MCBS - Slope with Thin Soils
MCBS - Scree Slopes
MWS - Mojave Wash Scrub
MWW - Mojave Wash Woodland
SPRING and Associated Vegetation
MMWS - Steep Rocky Canyon Walls
MMWS - Mountain Slopes with Deeper Soils
MMWS - Mountain Slopes with Thin Soils
Black Bush Scrub
N
0.5
0
0.5
1 Miles

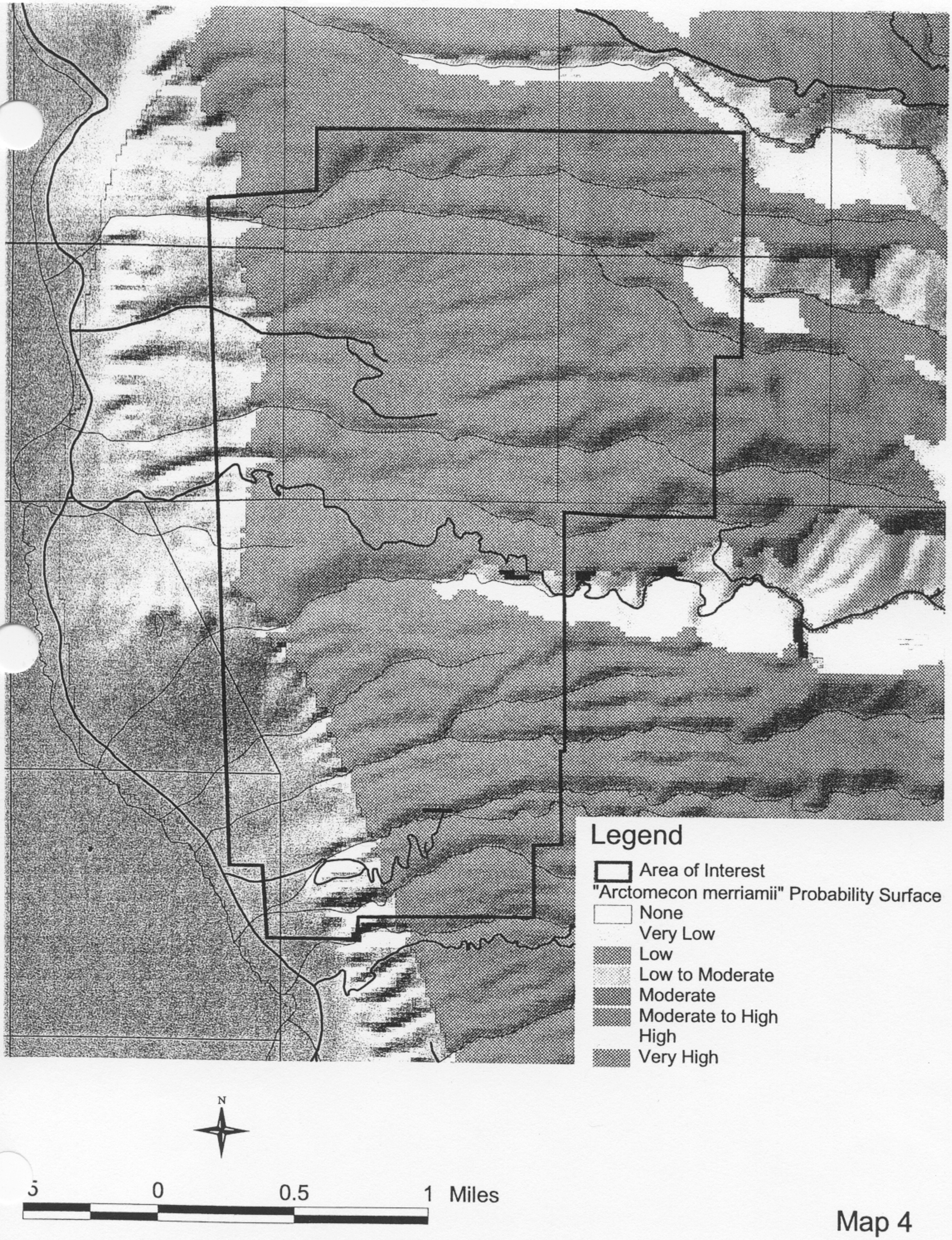
Map 1



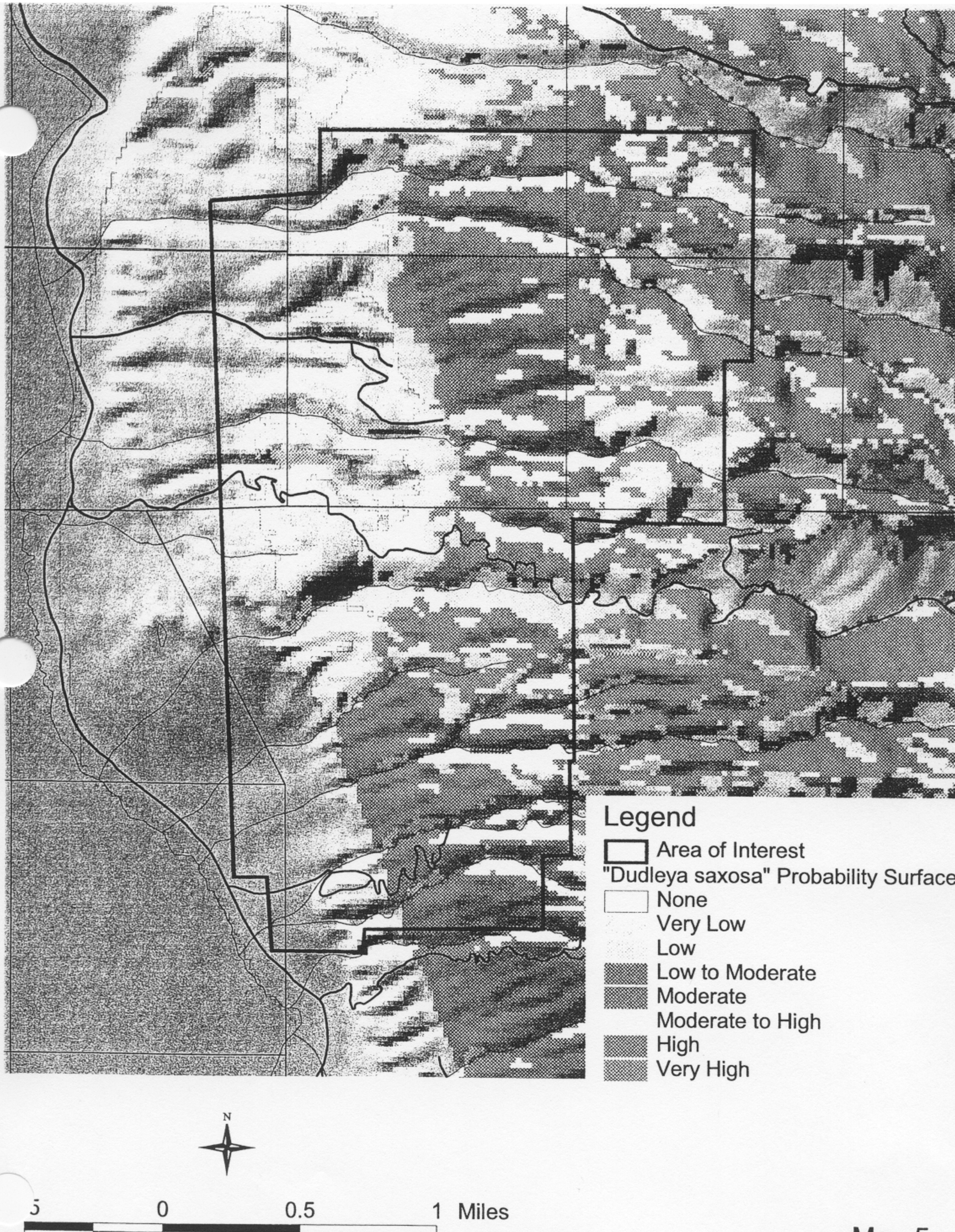
14
13
24
South
Prospects
Prospect
Map
egetation ey Locations
rigg Exploration Ar 200
Project Area Boundary
(2905 Acres)
Ft. Elevation
997 Intensive Survey Area
Reco Survey Area
2001 ntensive Survey
200 Recoı Survey
Quantitative Transect
ocation


Legend
Area of Interest
"Arabis dispar" Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
0
0.5
1 Miles

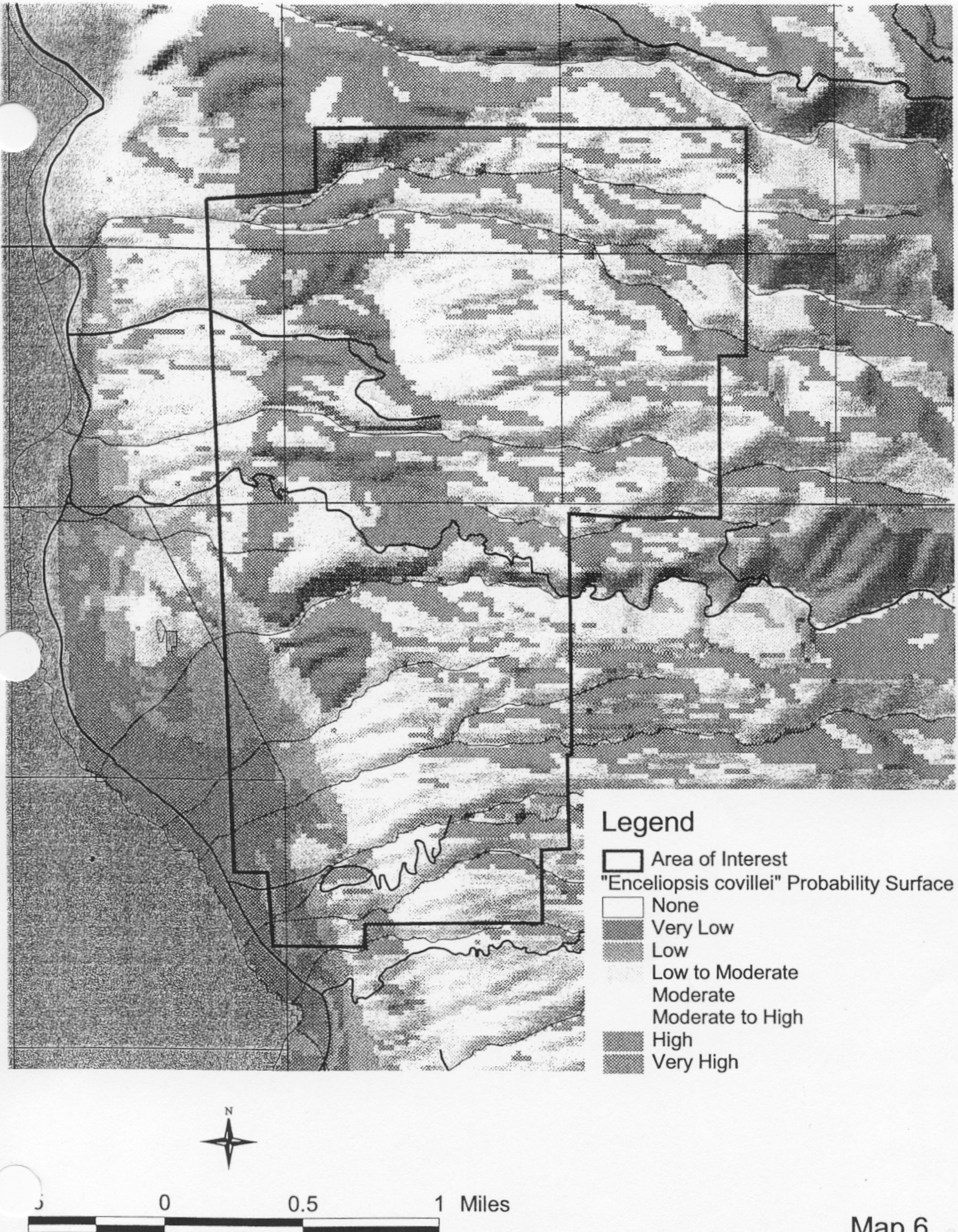
Map 3


Legend
Area of Interest
"Arctomecon merriamii" Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
0
0.5
1 Miles

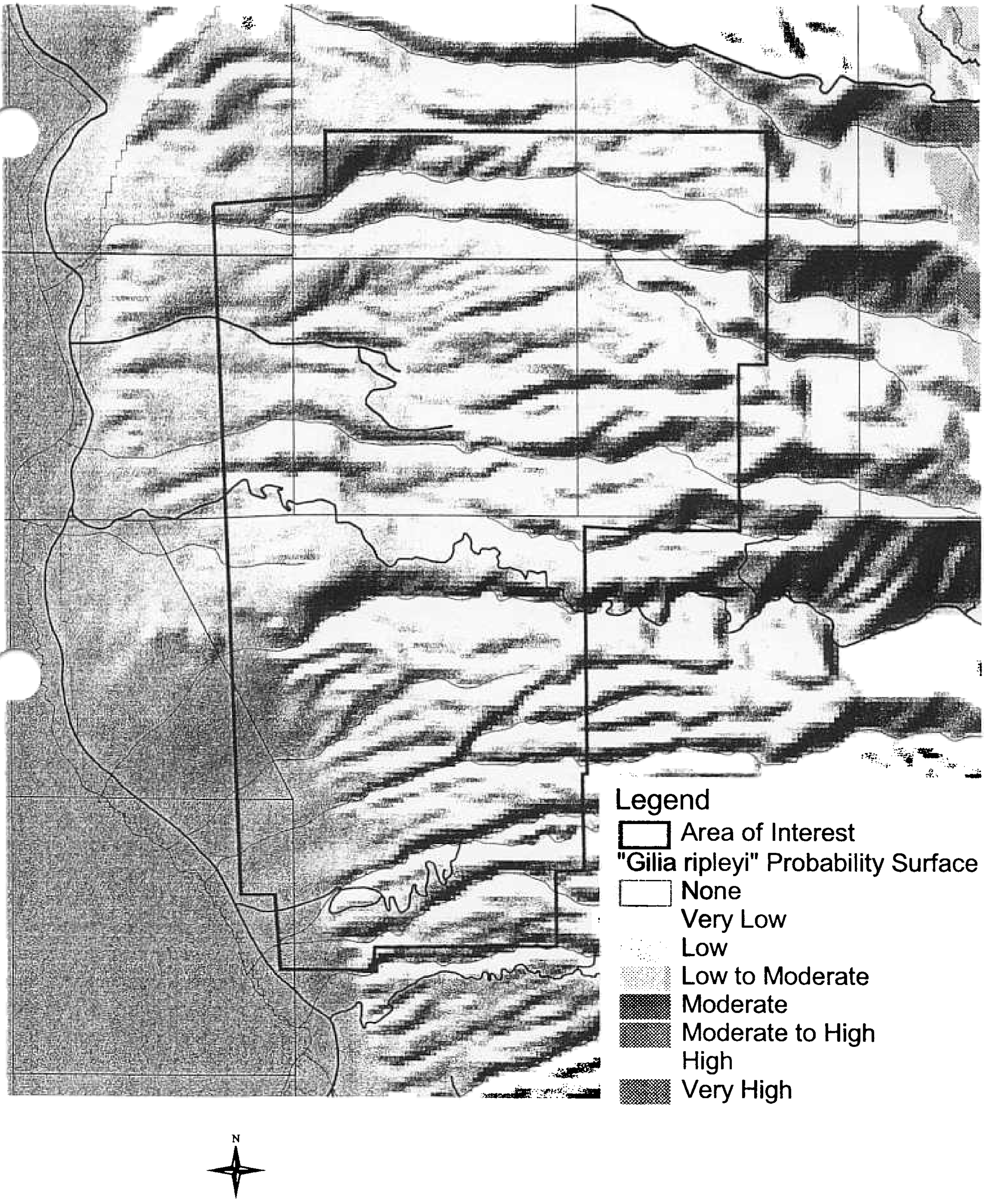
Map 4


Legend
Area of Interest
"Dudleya saxosa" Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
0
0.5
1 Miles

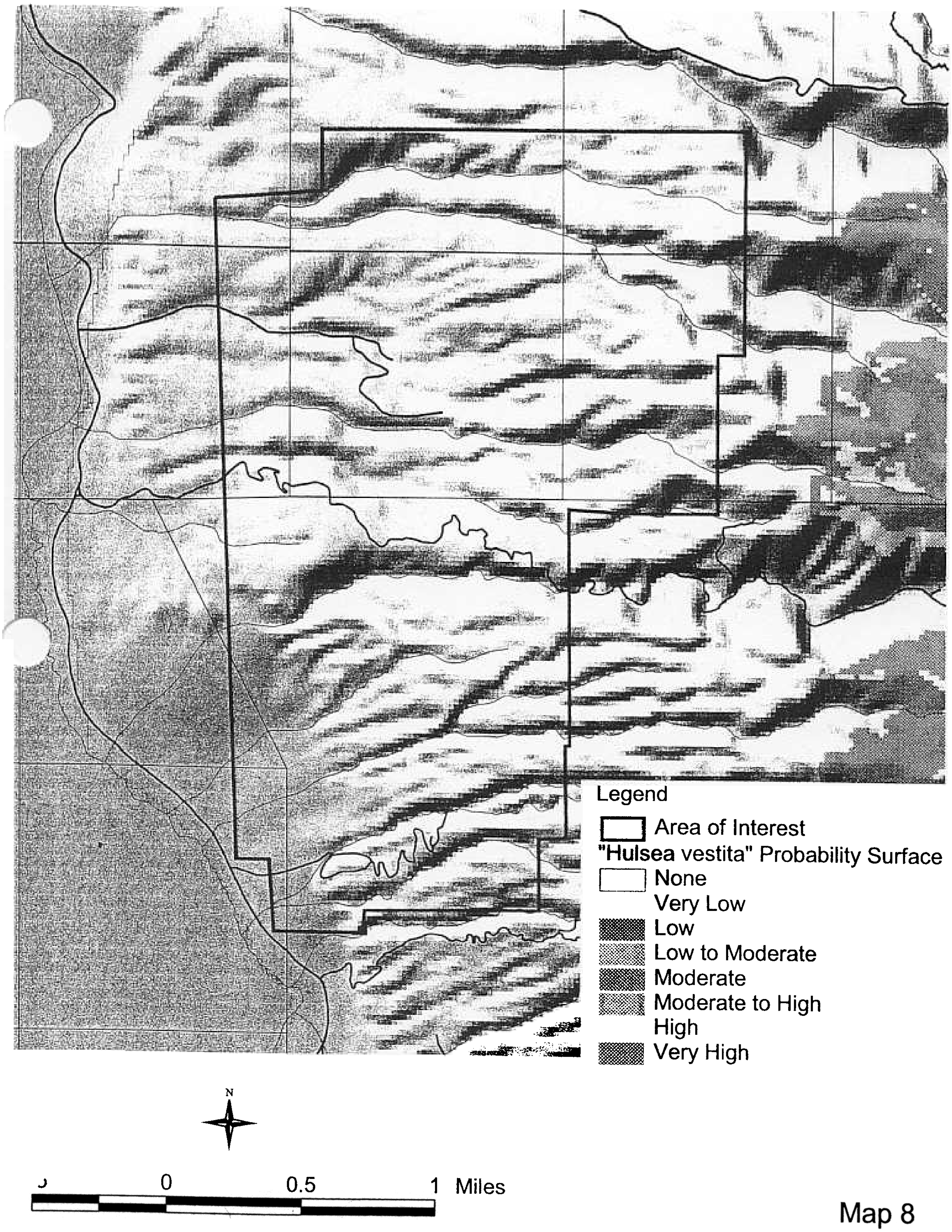
Map 5


Legend
Area of Interest
"Enceliopsis covillei" Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
0
0.5
1 Miles

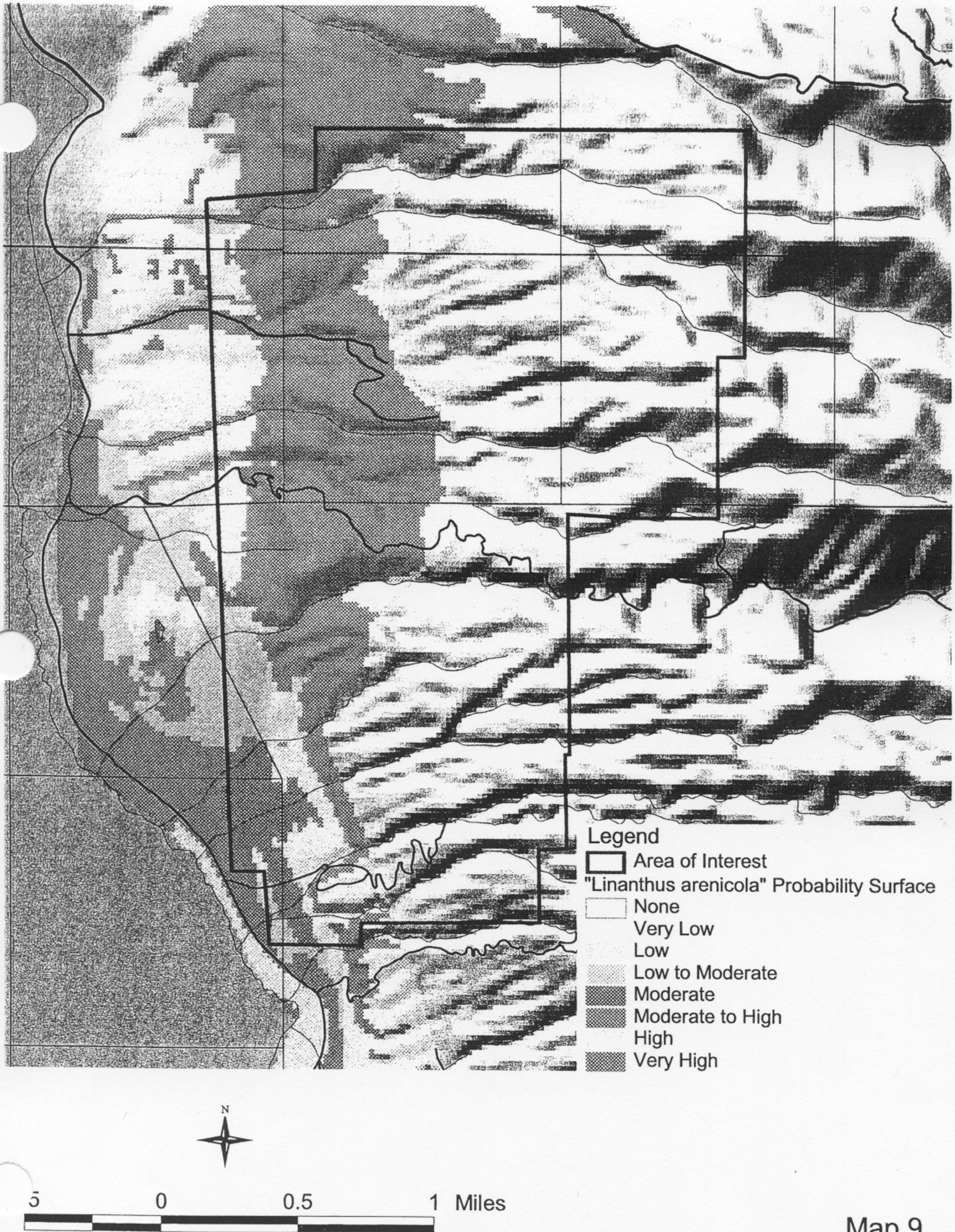
Map 6


Legend
Area of Interest
"Gilia ripleyi" Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
0
0.5
1 Miles

Map 7

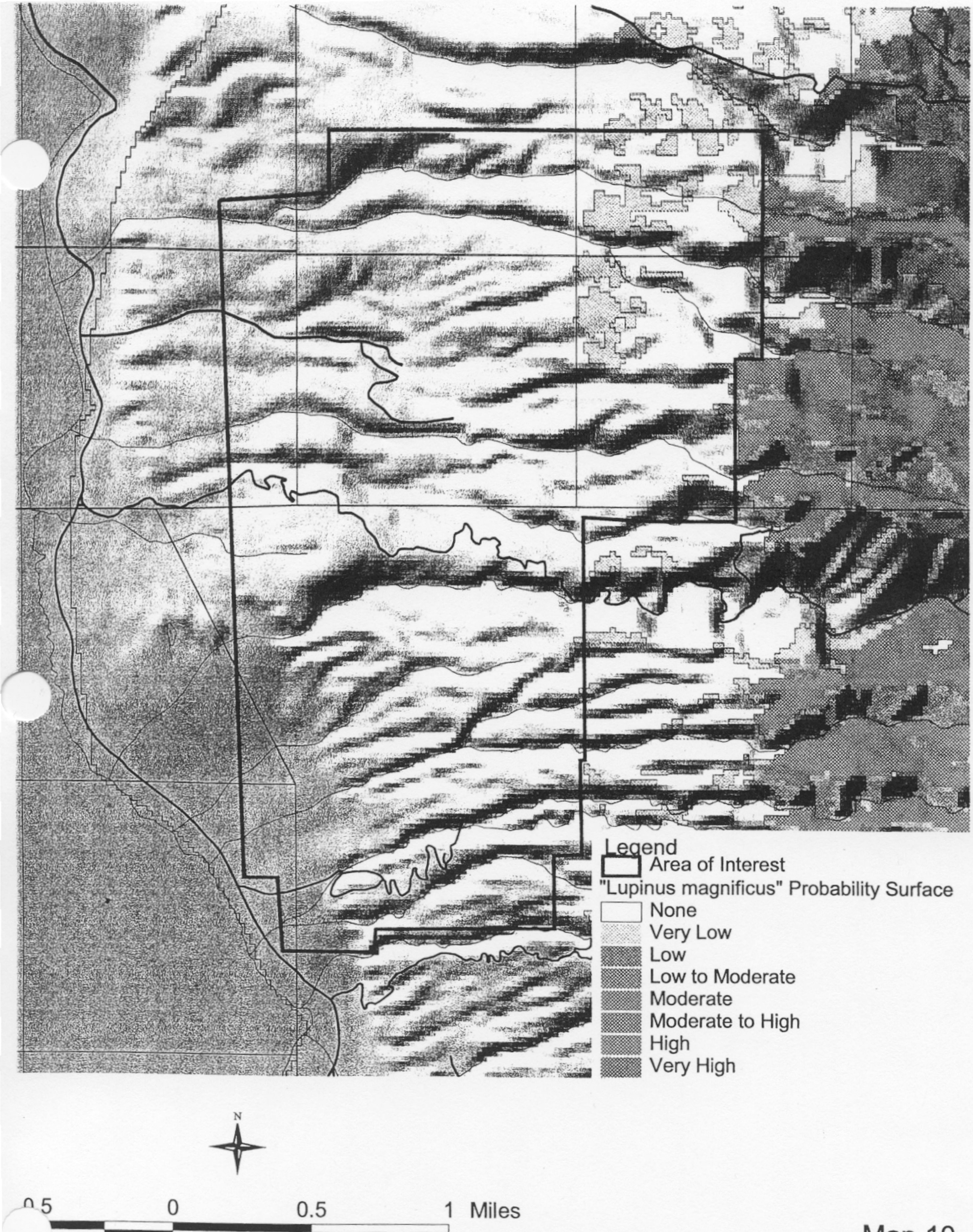

Legend
Area of Interest
"Hulsea vestita" Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
0
0.5
1 Miles

Map 8

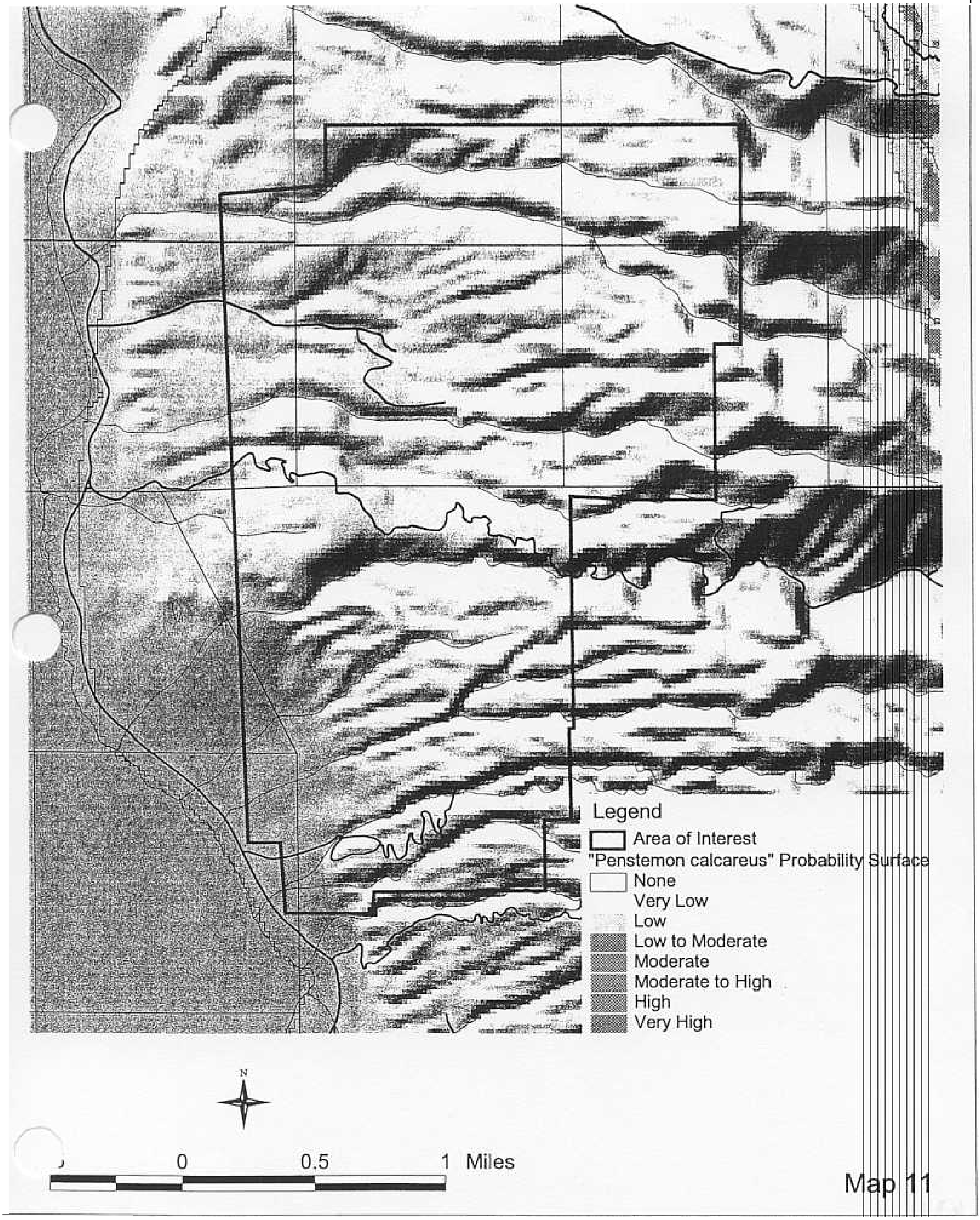


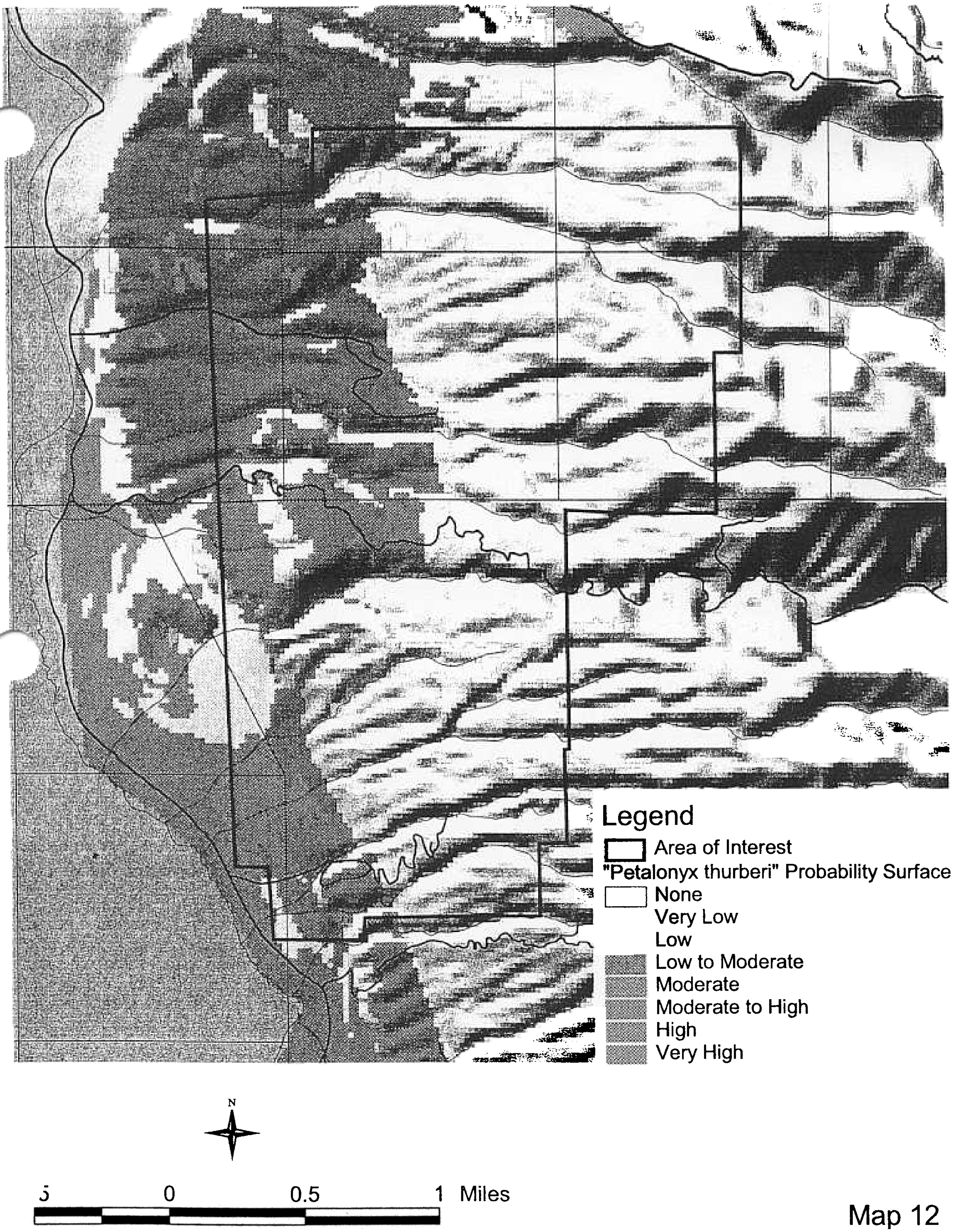
Legend
Area of Interest
"Linanthus arenicola" Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
.5
0
0.5
1
Miles

Map 9

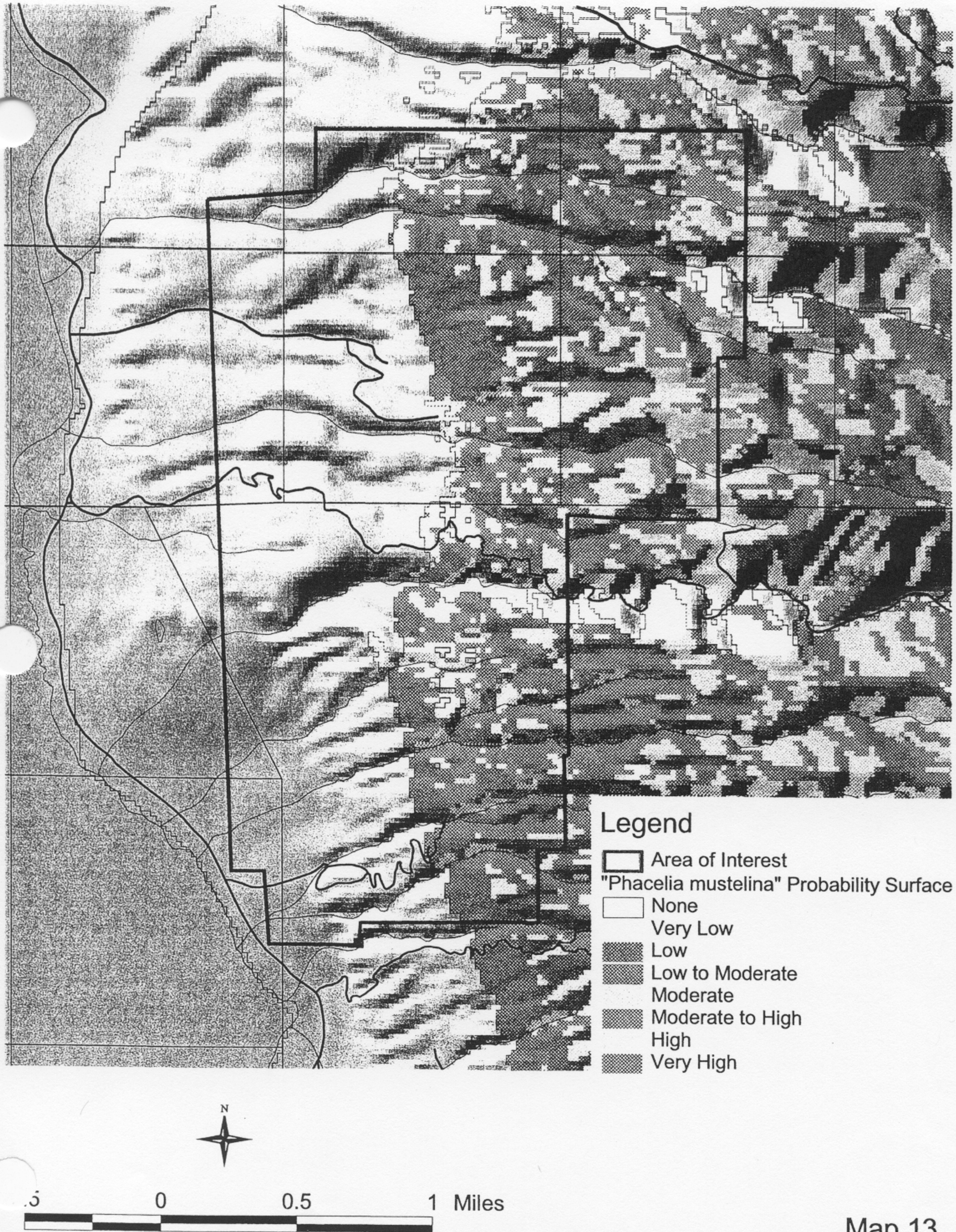

Legend
Area of Interest
"Lupinus magnificus" Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
0.5
0
0.5
1 Miles

Map 10


Legend
Area of Interest
"Penstemon calcareus" Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
0
0.5
1 Miles
Map 11

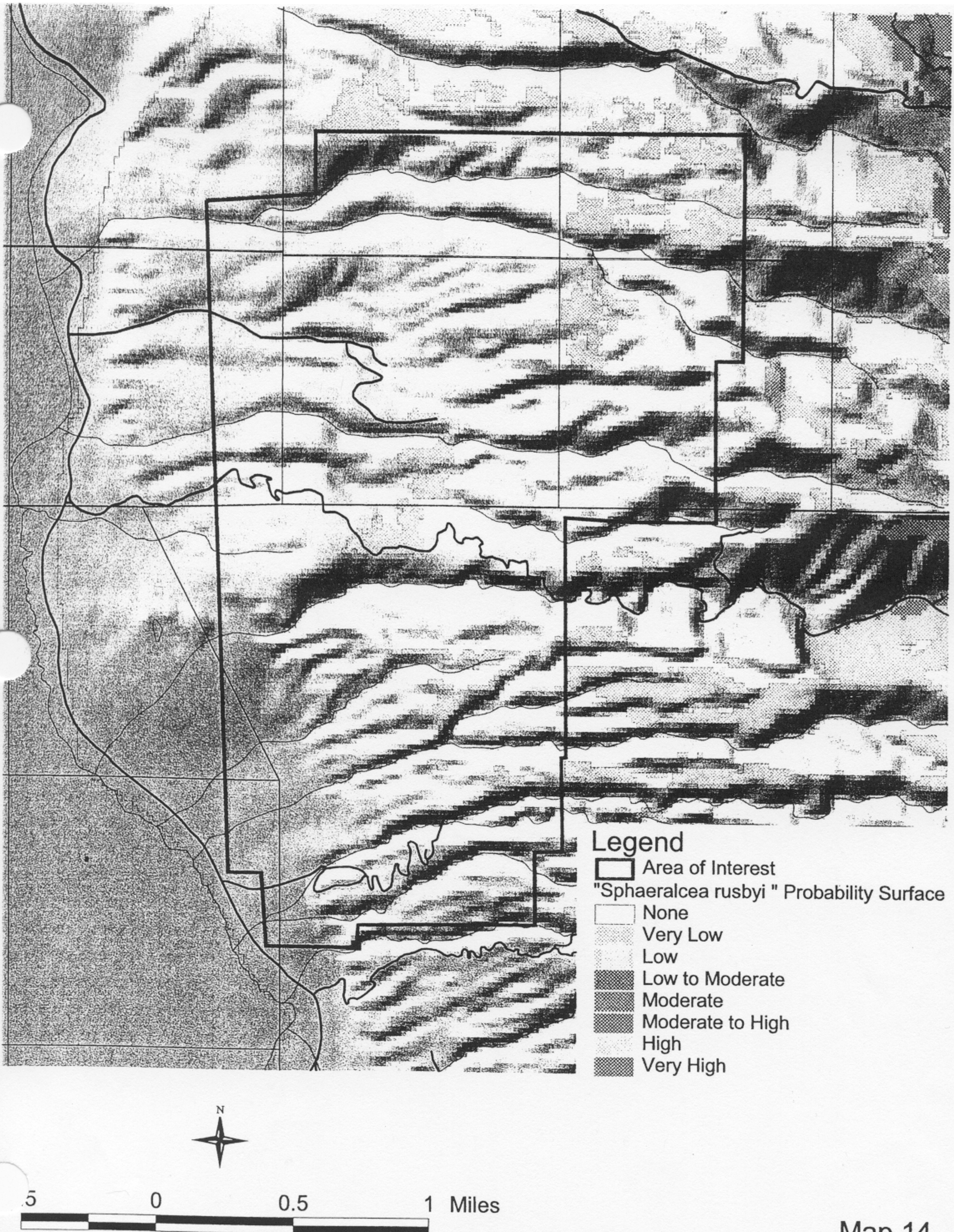

Legend
Area of Interest
"Petalonyx thurberi" Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
0
0.5
1 Miles

Map 12

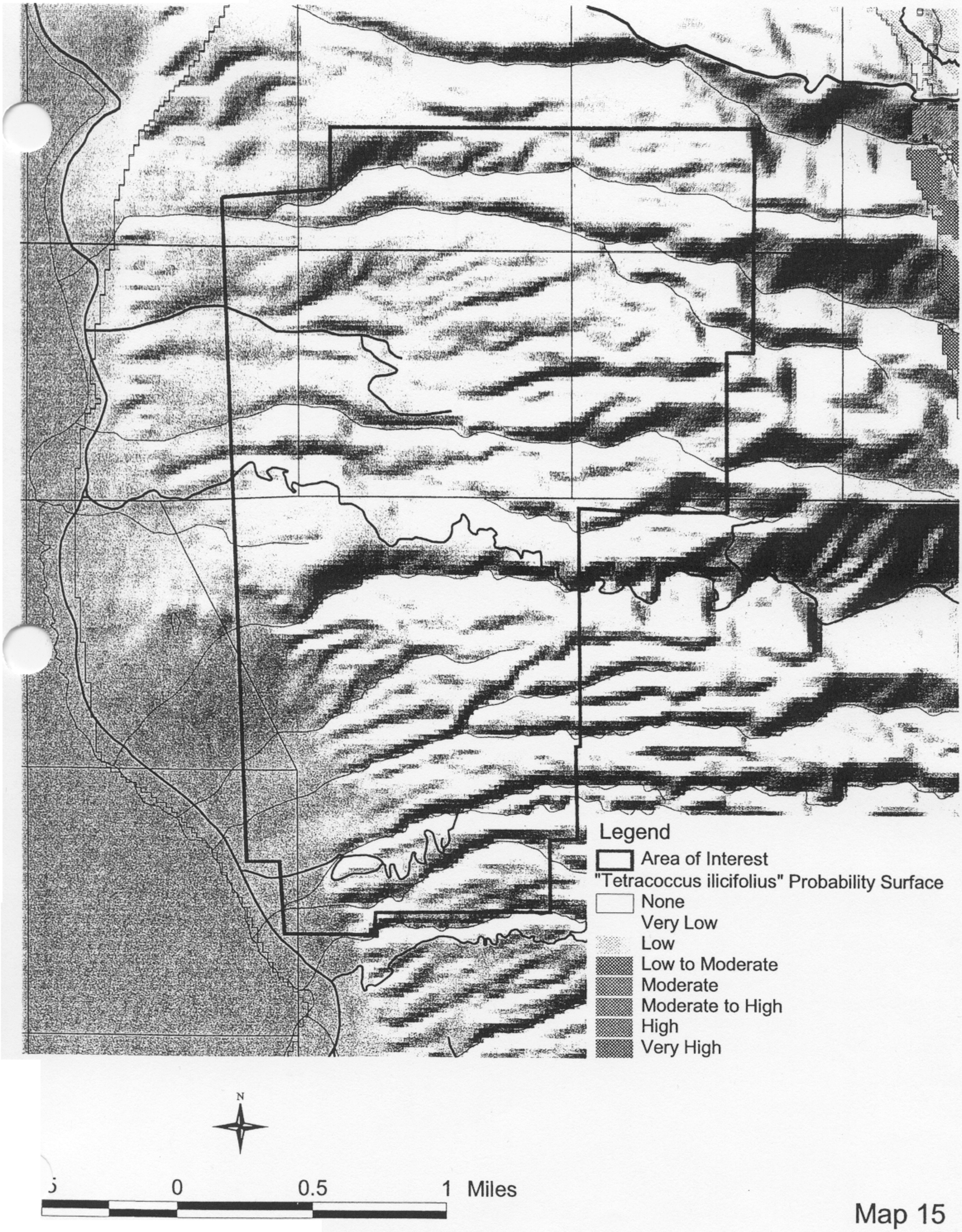


Legend
Area of Interest
"Phacelia mustelina" Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
0
0.5
1 Miles

Map 13

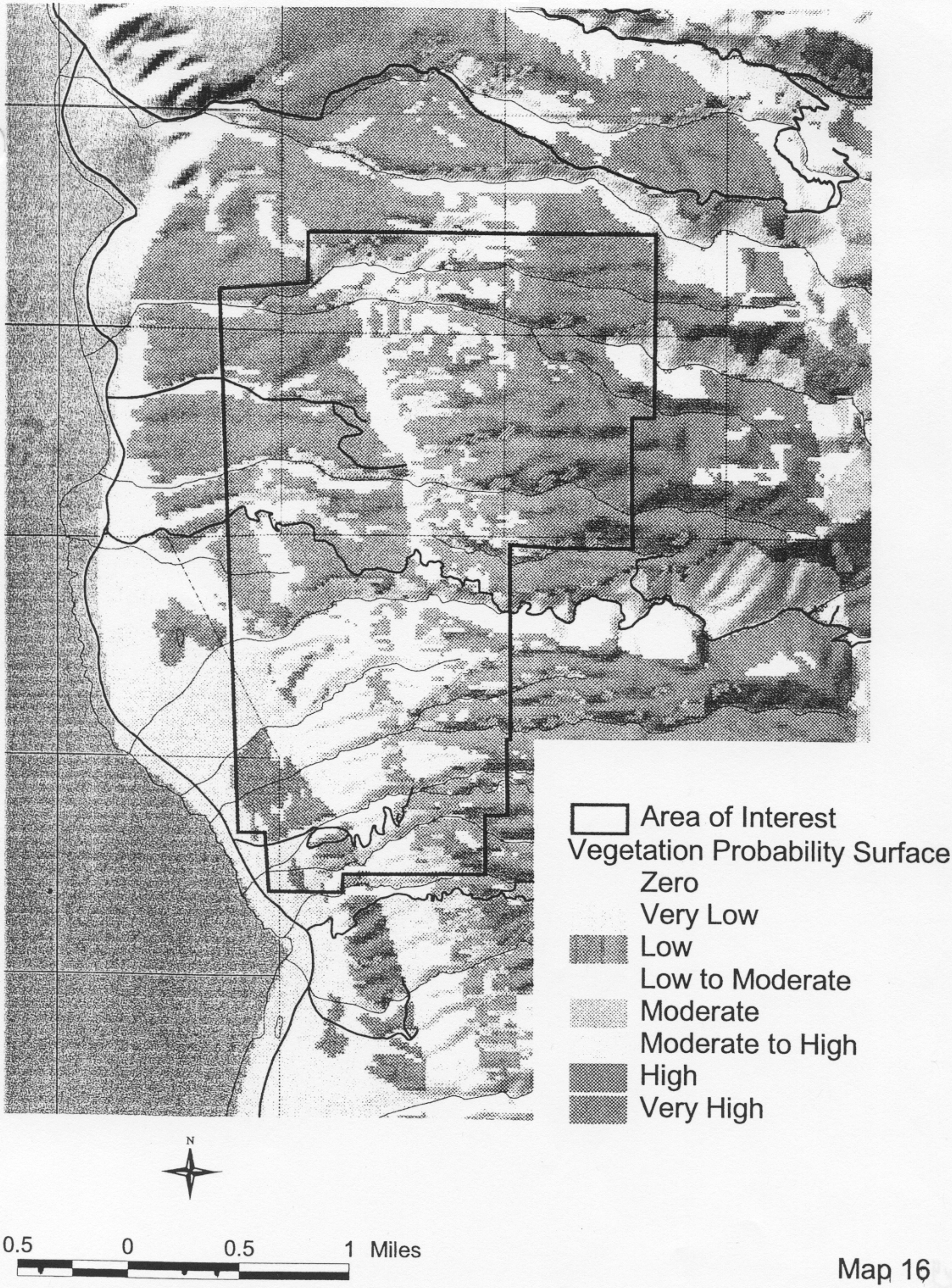

Legend
Area of Interest
"Sphaeralcea rusbyi " Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
.5
0
0.5
1 Miles

Map 14



Legend
Area of Interest
"Tetracoccus ilicifolius" Probability Surface
None
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
0
0.5
1 Miles

Map 15


Area of Interest
Vegetation Probability Surface
Zero
Very Low
Low
Low to Moderate
Moderate
Moderate to High
High
Very High
N
0.5
0
0.5
1 Miles

Map 16