

Cross 1996
ER ID #52021

LA-UR-94-26

*Title: Biological Assessment for
Environmental Restoration
Program; Operable Unit 1130;
TAs 36, 68, and 71*

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ER Record I.D.# 52021



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LA-UR-94-26

January 1996

*Biological Assessment for Environmental
Restoration Program; Operable Unit 1130;
TAs 36, 68, and 71*

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Received by ER-RPF
JAN 25 1996
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ABSTRACT

This report summarizes the results of surveys for threatened, endangered, and sensitive (TES) species and floodplain and wetlands in Operable Unit 1130 (OU 1130) at Los Alamos National Laboratory (LANL). This OU is an administrative unit defined by LANL's Environmental Remediation (ER) program; it encompasses Technical Areas (TAs) 36, 68, and 71. The LANL Biological Resources Evaluation Team (BRET) conducted these surveys prior to the site characterization phase of remediation activities at OU 1130. The purpose of the surveys was to ascertain if the proposed activities could have an effect on TES species or floodplain and wetlands. The surveys are part of LANL's effort to comply with the federal Endangered Species Act (ESA), New Mexico's Wildlife Conservation Act (WCA), New Mexico's Endangered Plant Species Act (EPSA), Floodplain/Wetland Executive Orders (EOs) 11990 and 11988, DOE's Order 5400.1, 10 CFR 1022, and the National Environmental Policy Act (NEPA).

The team established thirty vegetation transects in the OU in order to characterize habitat. We calculated cover and frequency values for understory plants, and density, cover, and frequency for overstory plants. Based on analysis of these parameters, we assigned each plant species a value for relative importance within the vegetation. In addition, the team measured the diameter at breast height of trees in the transects.

We compared the vegetation information with habitat requirements of TES species from the LANL area and found that there may be habitat in OU 1130 for the northern goshawk, the spotted bat, and grama grass cactus. These initial surveys are not adequate to confirm the presence of these species, but BRET nonetheless recommends mitigation measures to protect their habitat.

BRET mapped wetlands and floodplains areas using the National Wetland Inventory Maps compiled by the US Fish and Wildlife Service. We confirmed wetland status by checking each wetland on the ground. The boundaries of these wetlands remain poorly defined; BRET will delineate their borders prior to site characterization to ensure that sampling activities are restricted from wetlands.

1. INTRODUCTION

This report summarizes the results of surveys for threatened, endangered, and sensitive (TES) species and floodplain and wetlands in Operable Unit 1130 (OU 1130) at Los Alamos National Laboratory (LANL). This OU is an administrative unit defined by LANL's Environmental Remediation (ER) program; it encompasses Technical Areas (TAs) 36, 68, and 71. The LANL Biological Resources Evaluation Team (BRET) conducted these surveys prior to the site characterization phase of remediation activities at OU 1130. The purpose of the surveys was to ascertain if the proposed activities could have an effect on TES species or floodplain and wetlands.

The surveys are part of LANL's effort to comply with an array of state and federal and state requirements. These include the federal Endangered Species Act (ESA), New Mexico's Wildlife Conservation Act (WCA), New Mexico's Endangered Plant Species Act (EPSA), Floodplain/Wetland Executive Orders (EOs) 11990 and 11988, DOE's Order 5400.1, 10 CFR 1022, and the National Environmental Policy Act (NEPA).

Section 7 of the Endangered Species Act requires federal agencies to ensure that their activities and programs do not jeopardize the continued existence of any federally listed threatened or endangered species or its designated critical habitat. The WCA and the EPSA mandate similar measures for protecting species that are under state protection. Implementation of Section 7 of the Federal ESA, as well as New Mexico's WCA and EPSA, is done within the framework of NEPA.

DOE Order 5400.1 requires an environmental pre-operational survey prior to the start-up of a new site, facility, or process which has the potential for significant adverse environmental impact. The survey should begin a minimum of one year, and preferably two years, before the start-up to allow for the evaluation of biotic communities under seasonal change. This base line data support the "environmental setting" portion of the work plans for site investigation. In addition, the base line data are important for measuring the environmental impacts of corrective measures.

There are three possible outcomes of an assessment for TES species:

- 1) no TES species found utilizing the proposed project area habitat;
- 2) there are TES species utilizing the proposed project area habitat, but there are no adverse impacts to the species; or
- 3) there are TES species utilizing the proposed project area habitat, and there are adverse impacts to the species.

When BRET foresees no adverse impacts to TES species, LANL refers the biological assessment to the appropriate state and or federal agency for its concurrence. If BRET finds that the proposed project could jeopardize a listed species or its habitat, LANL consults with the appropriate state or federal agency for a recommendation. Formal consultation could result in project modifications, implementation of alternative projects, or abandonment of the proposed project to avoid impacts to the protected species.

Two EOs provide protection for floodplains and wetlands. EO 11988, "Floodplain Management," ensures the protection of floodplains, and stipulates that before any federally funded project in a floodplain is initiated, the potential effects of the action must be evaluated. EO 11990, "Protection of Wetlands," requires all federally funded agencies to implement or amend proposed procedures to protect wetlands from loss and/or degradation.

The US Department of Energy (DOE) procedures for compliance with the floodplain/wetland Eos are codified in 10 CFR 1022. This legal mandate does not specify a minimum size for wetlands. Besides explicitly directing DOE to comply with the EOs, 10 CFR 1022 provides the means for a public review of impacts to floodplains and wetlands. Public review of potential impacts is also provided through NEPA documentation or Federal Register Notification. If floodplains or wetlands could be affected, a floodplain/wetland assessment must be conducted to determine if the impact would be considered adverse.

Additionally, under Section 404 of the Clean Water Act, the degradation of wetlands and floodplains is controlled by limiting the discharge of fill into these sensitive areas. Two types of permits are issued by the US Army Corps of Engineers (COE), depending on the size of the floodplain or wetland to be

impacted. Nationwide permits are applicable if the impact is less than 4 ha (10 ac). If the impact will affect an area larger than this, individual permits must be issued before activities can be initiated.

2. PROJECT DESCRIPTION

2.1 Background

Since LANL's inception, research activities have resulted in the formation of a large number of Solid Waste Management Units (SWMUs) throughout the 111-km² (43-mi²) site facility. SWMUs at LANL are defined as "any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste" (IT 1990). These SWMUs contain various contaminants released from Laboratory facilities.

The US Environmental Protection Agency (EPA), deriving its authority from the Resource Conservation and Recovery Act (RCRA), is the regulatory authority in charge of SWMUs. In accordance with the requirements of RCRA, LANL must develop corrective actions to clean up and/or contain all releases of hazardous waste into the environment.

The Laboratory's Environmental Restoration (ER) group (EM-13) is responsible for developing and implementing corrective actions for SWMUs at LANL. The corrective action process is divided into four phases: (1) site assessment, (2) site characterization, (3) development of proposed corrective actions, and (4) selecting and performing corrective actions (IT 1990).

This biological assessment has been prepared for use with the site characterization phase, which focuses primarily on soil sampling, although additional disturbances associated with the sampling could occur. Biological assessments for other phases of site remediation may also be required.

2.2 SWMUs and Proposed Sampling

Several types of SWMUs are located within TA 36 and are associated with the following:

- material disposal Area AA ("Lower Slobbovia") and landfills
- sump
- septic systems
- firing sites and test facilities
- boneyard
- surface disposal areas
- waste high explosives container storage areas
- waste explosive treatment
- mortar impact area

TA 36 also contains many firing sites:

- Eenie (TA 36-3),
- Meenie (TA 36-6),
- Minie (TA 36-8), and
- Lower Slobbovia (TA 36-12).

Sampling surface and subsurface soils will determine the type, quantity, and extent of any environmental contamination at these SWMUs and areas downgradient from them (Fig. 1). EM-13 personnel will collect surface and near-surface soils using scoops and hand augers. The required drilling depth will determine the method of obtaining subsurface soils. A hollow stem auger will be used for samples less than 61 m (200 ft) below the ground surface. Holes surpassing this depth will be drilled with air, mud rotary coring, or Odex drilling (Devaurs 1991). (All soil sampling is expected to occur in previously disturbed areas. LANL has not conducted any operations in TAs 68 or 71 and no sampling will take place within their boundaries.)

3. ENVIRONMENTAL SETTING

3.1 General Setting

OU 1130 is located within the boundaries of LANL in Los Alamos County, New Mexico. The Laboratory lies in north-central New Mexico approximately 80 km (50 mi) north of Albuquerque and 56 km (35 mi) northwest of Santa Fe (Fig. 2).

The Laboratory is located on the Pajarito Plateau on the east-central edge of the Jemez Mountains. These mountains are formed of a volcanic rock complex along the northwest margin of the Rio Grande Rift in north-central New Mexico (Burton 1982). The plateau, which forms an apron of volcanic sedimentary rocks along the eastern flank of the mountains, is aligned approximately north-south and is approximately 32-40 km (20-25 mi) in length and 8-16 km (5-10 mi) wide. From an elevation of approximately 2273 m (7500 ft) near the mountains, the plateau slopes gently eastward toward the Rio Grande River. The Pajarito Plateau terminates at an elevation of approximately 1879 m (6200 ft), at which point the river has cut steep slopes. The plateau has been dissected into a number of narrow mesas by southeast-trending intermittent streams.

The plateau extends as finger-like mesas separated by deep canyons. A geological substrate of Bandelier Tuff, deposited from volcanic eruptions in the Jemez Mountains occurring roughly from 1.1-1.4 million years ago, overlaps other volcanic layers that are underlain by the conglomerate of the Puye Formation (LANL 1988). This conglomerate intermixes with Chino Mesa basalts along the Rio Grande River (Fig. 3).

The climate in the LANL region is a semi-arid, temperate mountain type (Bowen 1990). Climate characteristics in this type are highly variable season to season as well as year to year. For example, precipitation at the Laboratory, including rainfall and water-equivalent snowfall, averages about 46 cm (18 in.) per year, but year to year accumulations have varied by nearly 60 cm (24 in.) over the past 69 years (Fig. 4). Precipitation increases with elevation on the Pajarito Plateau so that the western portions of

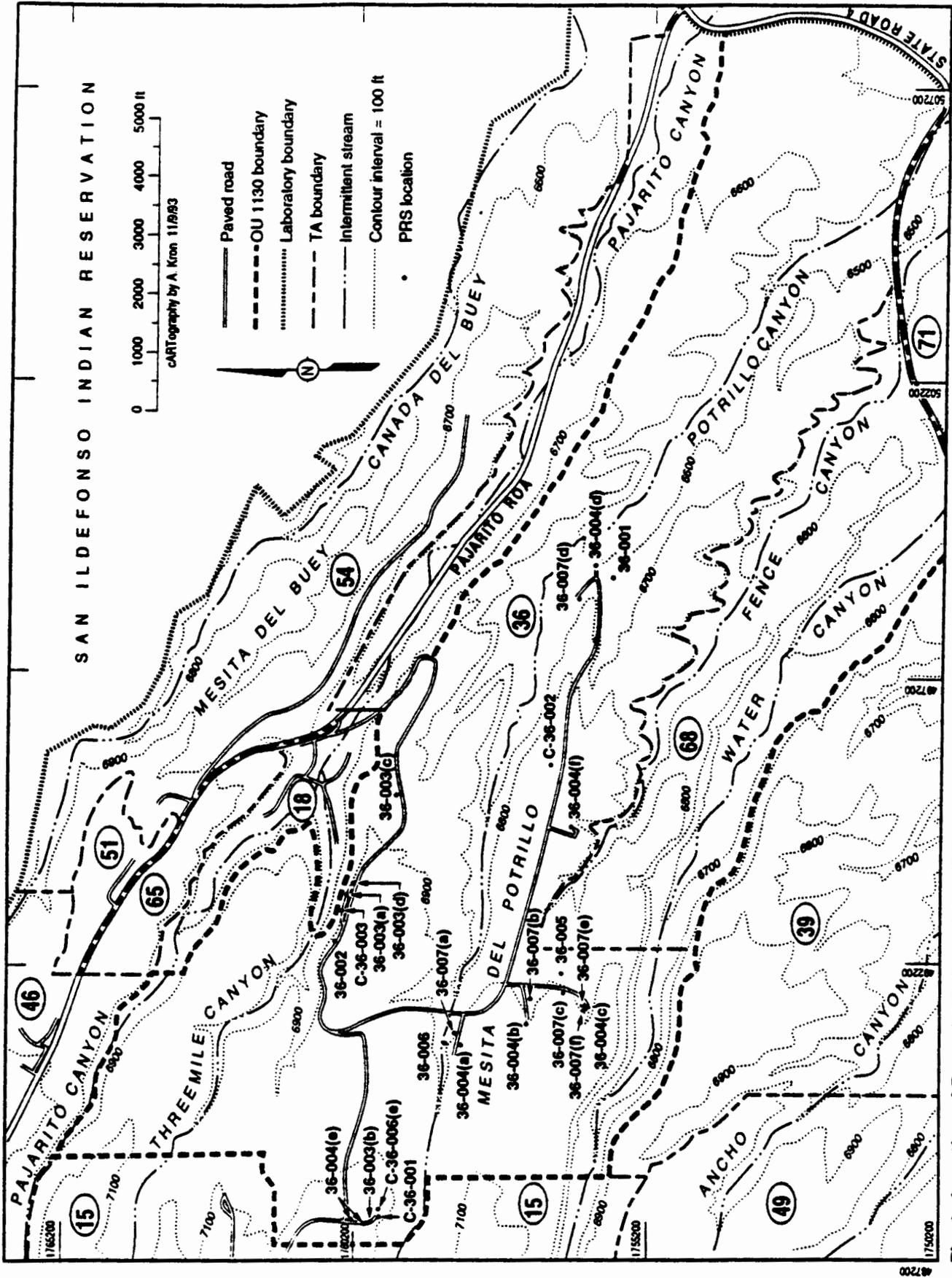


Fig. 1. Location of Potential Release Sites (PRSs) within Operable Unit 1130.

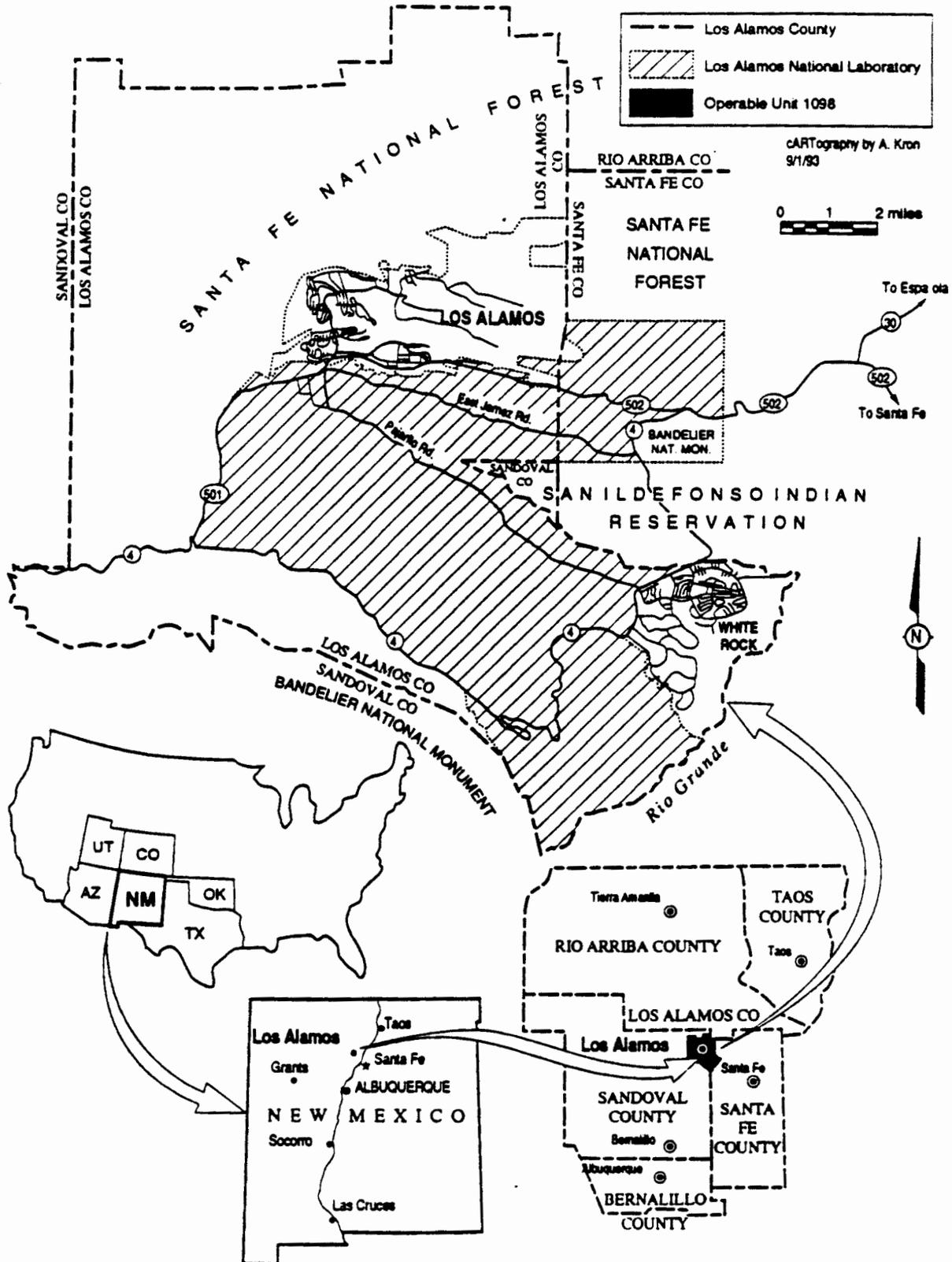


Fig. 2. Location of Los Alamos National Laboratory.

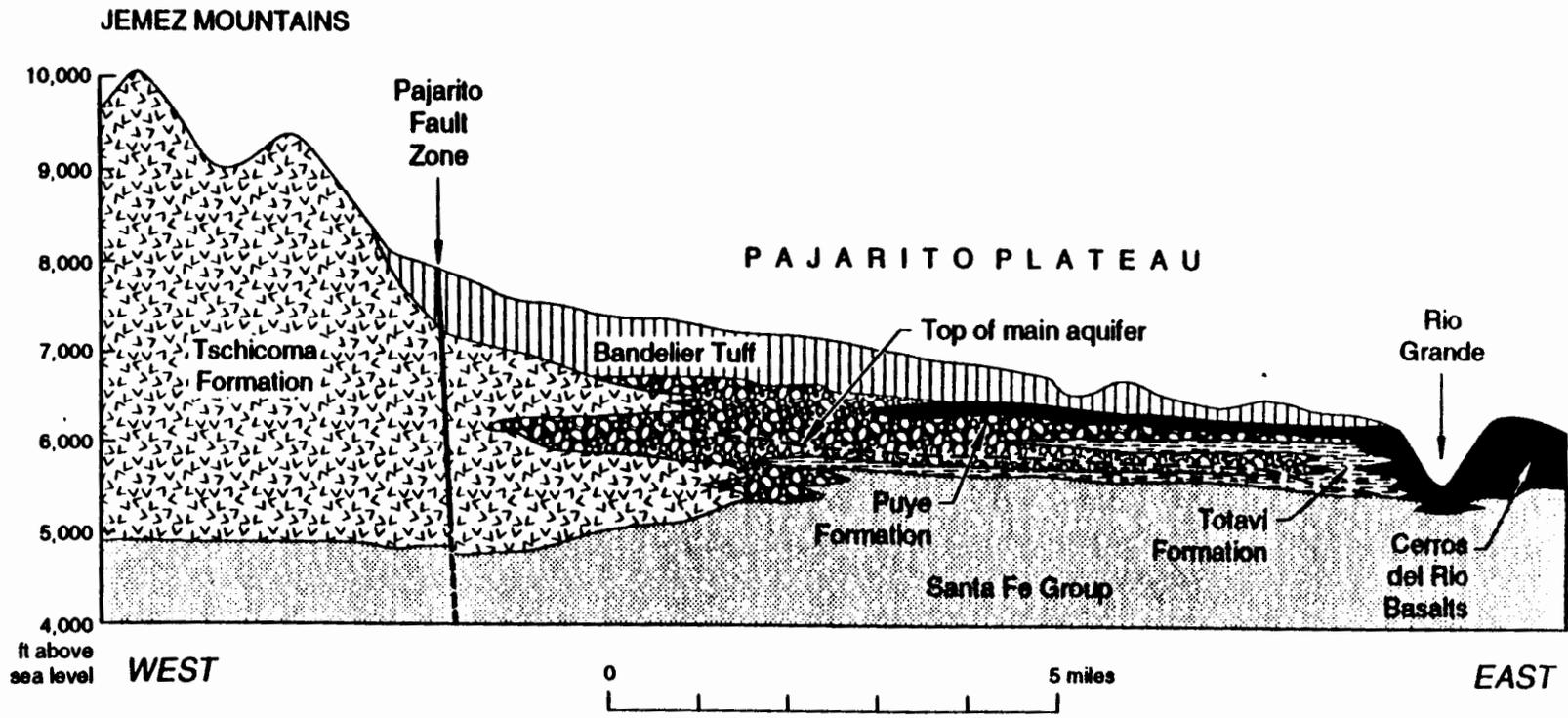


Fig. 3. Generalized cross section of the Pajarito Plateau.

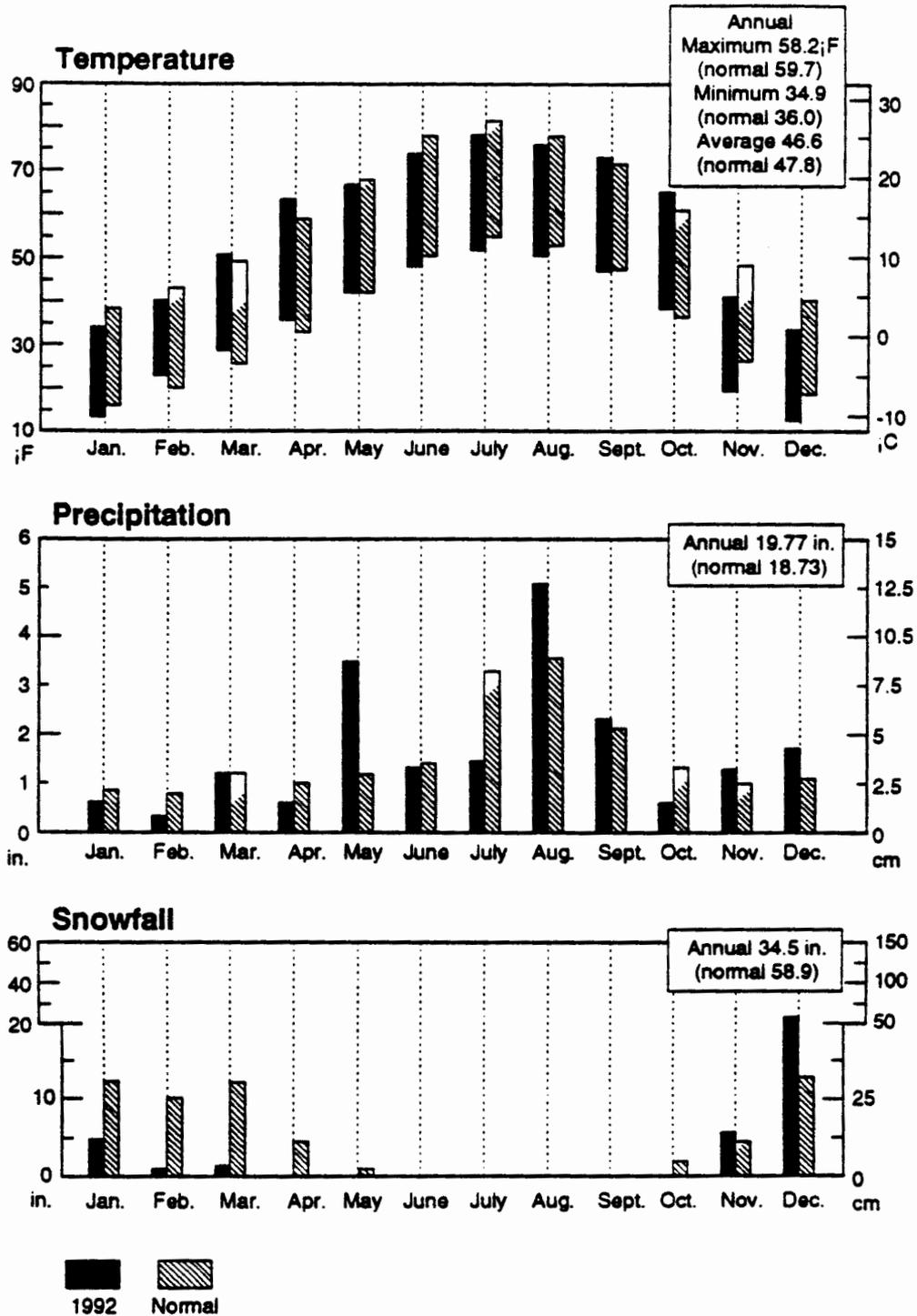


Fig. 4. Meteorological conditions for 1992 at Los Alamos, NM (elevation 7425 ft.).

LANL receive considerably more rainfall and water-equivalent snowfall than the lower elevations along the Rio Grande.

Precipitation is not evenly distributed through the year, but occurs in two distinct periods. During the summer months (predominantly July and August), air masses from the Gulfs of Mexico and California bring the heaviest precipitation of the year, with rainfall locally concentrated in the vicinity of thunder showers. Winter storms derive from Pacific frontal systems and deliver lesser amounts of precipitation from November through March, much of it in the form of snow.

Temperatures in the Laboratory region are relatively mild and variable. Even though Los Alamos is situated at a relatively low latitude (35°32' North), air temperatures are typically cool because of the area's 2255 m (7400 ft) average elevation. Thin, dry air and clear skies encourage both strong daytime heating and nighttime cooling, resulting in differences in the daily temperature extremes of as much as 14°C (25°F).

Winter temperatures typically range from -9°C to -4°C (15°F to 25°F) during the night and from 1°C to 10°C (30°F to 50°F) during the day. Summers days are usually relatively warm, while summer nights are cool. Daily afternoon temperatures range from 21°C to 27°C (70 to 80 °F), occasionally reaching 32°C (90°F). Even after the warmest days, the relatively thin air, light winds, clear skies, and dry atmosphere cause nighttime temperatures to drop into the 10°-15°C (50-60 °F) range.

The large diversity of ecosystems in the Los Alamos area is caused primarily by the 1515-m (5000-ft) elevation gradient from the Rio Grande to the Jemez Mountains. The plant and animal communities of Los Alamos County have been classified into six major vegetative types: sub-alpine grassland, spruce-fir, mixed conifer, ponderosa pine, piñon-juniper, and juniper grassland. Within the boundaries of the Laboratory, the predominant community types are ponderosa pine at 2091 to 2288 m (6900 to 7550 ft), piñon-juniper between 1879 and 2091 m (6200 and 6900 ft) and juniper-grassland at 1697 to 1894 m (5600 to 6250 ft). The north facing canyon slopes support stands of mixed conifer forest (LANL, n.d.).

3.2 Description of OU 1130

OU 1130 is located along the southeastern border of the Laboratory (Fig. 5). The northern edge of the OU is near Pajarito Road and the southern edge is slightly south of Water Canyon.

The OU contains parts of Potrillo, Fence, and Water Canyons. The elevation ranges between approximately 1768 m (5800 ft) at the eastern boundary of TA 71 to 2171 m (7120 ft) near the western boundary of TA 36. Topography within the OU includes steep canyon cliffs, relatively level mesa tops, forested slopes, and canyon bottoms.

TA-68 and TA 71 were established in 1989 when the Laboratory redefined technical area boundaries. These sites serve primarily as Laboratory buffer zones and have not been used for Laboratory operations. No soil characterization studies are scheduled within TA 68 or TA 71.

The bulk of TA-36 (Kappa Site) is included in OU 1130, although the Pajarito wetlands area is within OU 1093. TA-36 is underlain by welded Bandelier Tuff except for the bottom of lower Pajarito Canyon, which is underlain by alluvium (Nyhan et al. 1978). At TA-36, the potentiometric surface of the main aquifer lies at an elevation of 1741-1820 m (5710-5970 ft). Thus, over 183 m (600 ft) of unsaturated tuff and volcanic rock separate the ground surface from the aquifer in this area (IT 1987a). There is little potential for downward water flow from the surface because of low moisture conditions of the tuff (IT 1987a). Soils in the TA include Sanjue-Arribe complex, Nyjack loam, Hackroy-Rock outcrop complex, Hackory sandy loam, Penistaja sandy loam, Prieta silt loam, Servilleta loam, and rock outcrop (Nyhan et al., 1978). Soil sampling for site characterization is expected to occur only in previously disturbed areas.

There are many prehistoric Indian ruins within TA 36, and some of these were excavated during the early 1900's (McGehee n.d.). There are no known historic homesteads within OU 1130, but the southwestern portion of the OU was in the Ramon Vigil Grant and may contain undiscovered homesteads and historic ruins from ranching operations.

SANTA FE NATIONAL FOREST

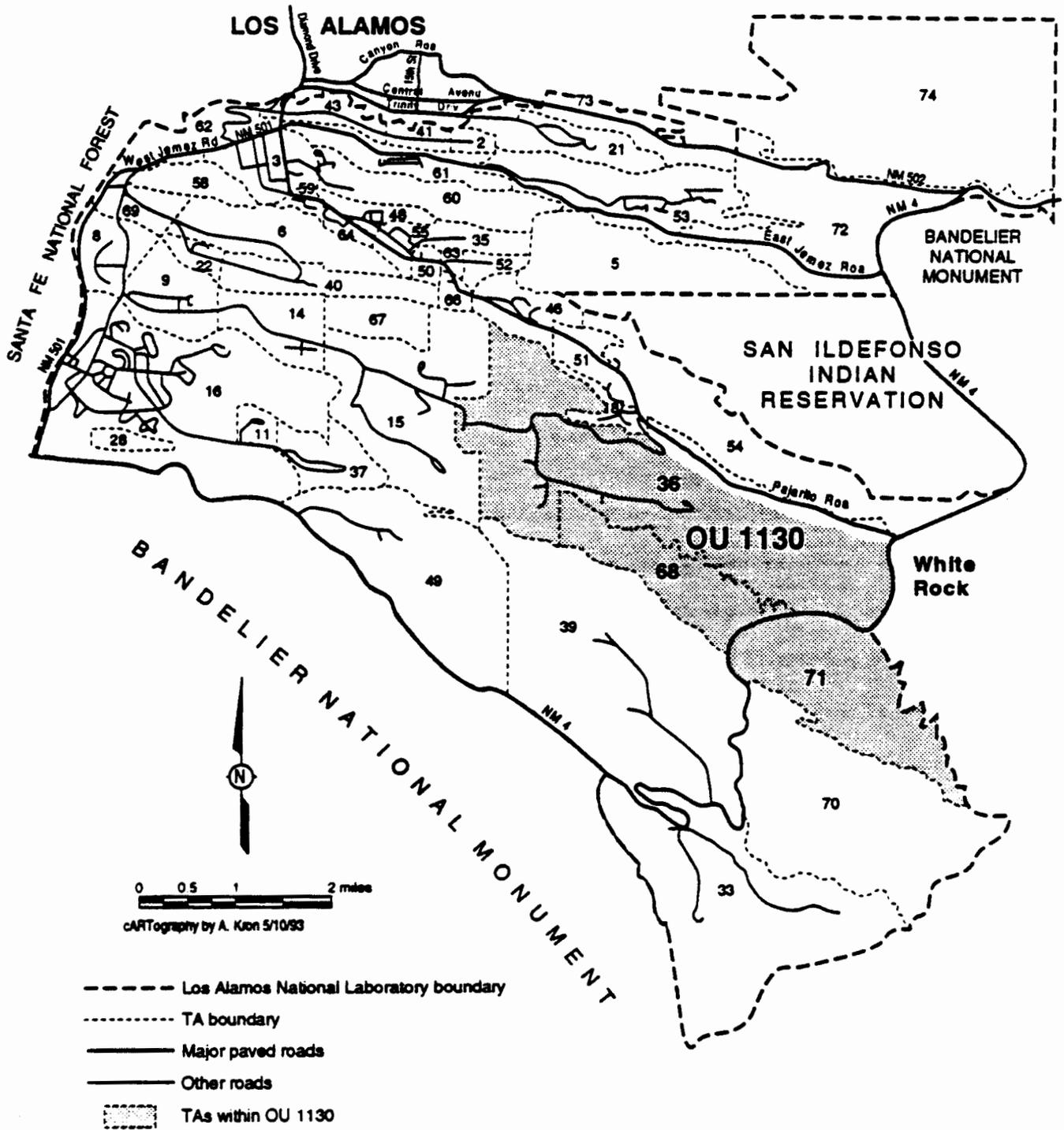


Fig. 5. Location of OU 1130.

4. PREVIOUS STUDIES

Prior to the 1992 surveys, several site-specific studies were completed within or adjacent to OU 1130. These studies include information about the biological resources the potential for TES species to utilize the area. Much of the information from these studies can be extrapolated for use as a general description of the project area's biological make-up. The 1992 surveys were necessary to characterize the biological community more completely.

4.1 Plants

Since 1977, several plant surveys have been conducted within and near OU 1130 (Table 1). Appendix A contains a checklist of plant species identified during these and the 1992 surveys.

4.2 Wildlife

A limited number of studies characterizing the fauna of the area have been conducted since 1975. These studies are discussed below by type of organism.

4.2.1 Insects

Hanson and Miera conducted soil-litter invertebrate studies at Lower Slobbovia and the EF Site in TA-15. They used the Tullgren funnel technique on 97 samples 1-dm³ (0.035 ft³) each in volume, but their data does not specify which species were found in the Lower Slobbovia sites. Nonetheless, a complete list of organisms found in this study is given in Appendix B.

Table 1. Previous Vegetation Surveys Conducted within OU 1130

Authors	Date	Survey Title (Location)
Foxx, T.S., and G.D. Tierney	1977-1978	"Endangered Species Survey" (Water Canyon)
Foxx, T.S., and G.D. Tierney	1980	"Status of the Flora of the Los Alamos National Environmental Research Park" (Water Canyon)
Foxx, T.S., and G.D. Tierney	1982	"Rooting Depth Study" (Fence and Potrillo Canyons)
Foxx, T.S., and G.D. Tierney	1986	"Large Bore Gun" (TA 36)
Foxx, T.S., and G.D. Tierney	1986-1987	"Live Firing Range" (Water Canyon)
Padien, Daniel	1987	"Stand Structure and Nutrient Dynamics in a Piñon-Juniper Community of Northern New Mexico" (Lower Slobbovia)
Foxx, T.S., and G.D. Tierney	1987	"Pulsed Power Assembly Building" (lower Ancho Canyon)
Tierney, G.D.	1987-1988	"PNM Survey, Ole Power Line" (Fence Canyon)
Foxx, T.S., and Naomi Becker	1988	"Watersbed Analysis" (Potrillo Canyon)

Information in a comprehensive ant study conducted by MacKay (1986) indicates that numerous ant species are likely to be present in ponderosa pine and ponderosa pine-riparian areas similar to those found within OU 1130 (See Appendix C).

In 1991, Haarman used pitfall traps to conduct a survey of insects in Ancho Canyon. A list of species he identified is given in Appendix D.

4.2.2 Mollusks

No comprehensive field surveys for mollusks have been conducted within Los Alamos County.

5.2 Level 2 (Habitat Evaluation) Surveys

Using Level 1 survey results, Level 2 surveys were undertaken. Level 2 surveys are designed to quantitatively measure the habitat, to document the habitat parameters, and to determine if habitat for sensitive species is present. Additionally, data from the habitat evaluation can be used as baseline information for characterizing the general environmental setting and to run habitat evaluation procedures.

The habitat evaluation survey uses standard ecological techniques to measure cover, density, and frequency of the overstory and understory plants. Species information obtained from vegetation transects is summarized for mapping with a hierarchical system of vegetation classification. Ultimately, BRET will use this data in a Geographic Information System.

Table 2 provides a definition for each element of the classification. The classification for both upland and wetland vegetation types for the Pajarito Plateau is contained in Appendix I. This listing includes known and potential habitat types and phases. It is based on Brown (1982), Moir and Ludwig (1979), and an unpublished U.S. Forest Service document. We made no attempt to develop new habitat types for the area. Potential habitat sites include any study area that did not fit within a designated habitat type.

We surveyed thirteen sites within TA 36 and two within TA 68, identifying and measuring both understory and overstory components at each site (Fig. 6). (We did not set up transects in TA-71 because no site characterization activities are planned there.) Transect numbers are composed of the TA number, the order in which the transect was read, and a "u" for understory or a "c" for overstory or canopy layer. For example, transect 36-2c is the second overstory transect read within TA 36.

5.2.1 Overstory Evaluation

BRET used the line intercept technique (Lindsey 1955; Woodin and Lindsey 1954) to measure overstory components within coniferous forest areas. We collected data within a twenty-foot wide strip centered on a transect line through the habitat (Fig. 7). Within the strip, the diameter at breast height (DBH) of all trees was determined and all shrub stems were counted. We estimated foliar cover by measuring the total length

TABLE 2. Definitions of biotic community classification

Vegetation type: Vegetation established under existing climate and includes one of two types: Upland and Wetland.

Formation type: Formations that are vegetative responses to various environmental factors, primarily available soil moisture, and include the following:

UPLAND	WETLAND
Tundra	Wet tundra
Forest and woodland	Forest
Scrub land	Swamp-scrub
Grassland	Marshland
Desert	Strand
Non-vascular	Submergent

Climatic zone: One of the four world climatic zones which minimum temperature is the primary determining factor. These include Arctic-Boreal, Cold Temperate, Warm Temperate, and Tropical-Subtropical.

Biotic community: A unit characterized by a distinct evolutionary history within a formation and centered in a biogeographic region with a particular precipitation pattern or climatic regime.

Series: A principal plant-animal community within a biotic community. These are based on distinct climax plant dominants.

Habitat type: An area within a series defined by the occurrence of a particular dominant species of local or regional distribution.

Phase: A sub category established by analyzing detailed data collection to determine codominants, understory, and other associated species.

of vegetation intercept along the transect line. This measurement was made by placing a ground-level tape measure along the transect center line and making a vertical projection of the vegetation canopy onto that line (Fig. 7). Each fifty-foot strip segment constituted a plot which was used to determine plant frequency.

The team used a circular plot technique to measure the overstory components within riparian zones and piñon-juniper woodlands. Field technicians placed a transect line within the habitat and established circular plots every 30 m (100 ft) along the transect (Fig. 8). All trees within a 9-m (30-ft) radius of the center point on the transect line were measured for basal diameter if multistemmed or DBH if

4.2.3 Reptiles and Amphibians

In 1978, Charles Bogart surveyed the reptiles and amphibians within the boundaries of the Laboratory (Bogart 1986). His research included three canyons within or adjacent to OU 1130. Appendix E contains a checklist of amphibians and reptiles he identified.

4.2.4 Birds

A county-wide study of breeding birds was conducted by the Pajarito Ornithological Society over a 5-year period (Travis 1992) (see Appendix F also). In addition to this work, Wenzel and Kent conducted bird surveys in Potrillo Canyon in February and March of 1986 (see Appendix G).

4.2.5 Fish

The stream reaches within OU 1130 are ephemeral, and no fish occur within these intermittent waters.

4.2.6 Mammals

In November 1974 and June 1975, Hanson and Miera conducted small mammal trapping at the Minie Site and Lower Slobbovia. Wenzel and Kent surveyed the mammals in Potrillo Canyon during February and March of 1986. In April of the same year, Olinger surveyed the mammals of Water Canyon. The species identified in these investigations are listed in Appendix H.

4.3 Threatened, Endangered, and Sensitive Species

4.3.1 Plants

Foxx and Tierney conducted several TES plant species and NEPA compliance surveys for proposed projects within TA 36 (Table 1). They found several stream orchids (*Epipactis gigantea*) by a seep within lower Pajarito Canyon near its confluence with the Rio Grande. Specimens of grama grass cactus (*Toumeyia papyracantha*) were discovered within a basalt area near the White Rock overlook. To date, no

TES plant species have been found within OU 1130, although suitable habitat is present in TA 71 for both stream orchid and grama grass cactus.

4.3.2 Wildlife

Terrell Johnson assessed the potential effects on peregrine falcons of a proposed firing range in Water Canyon (Johnson 1985). He repeatedly visited the areas in question and used a spotting scope to aid identification. Johnson concluded that peregrine falcons would not be seriously affected by the firing range. A later report includes management guidelines for the falcon's habitat (Johnson 1992).

For several years, Patricia Kennedy has observed goshawks and Cooper's hawks on LANL property. She also used radio-tagged adults to gather data on home range size and activity patterns. Topography and vegetative structure and composition of each nest site was characterized using standard Forest Service silvicultural examination techniques. The study included diet determination, prey identification, and reproductive success monitoring.

5. METHODOLOGY

Three levels of surveys were conducted within and near the OU. The primary purpose of these surveys was to determine if there were any species of concern or sensitive habitats that might be affected by site characterization sampling.

5.1 Level 1 (Reconnaissance) Surveys

The Level 1 (reconnaissance) survey is a walk-through of the area for evaluating general habitats and site features. It is an initial survey conducted to determine placement of line transects and the potential impacts of the transects and to identify water sources and floodplains. The reconnaissance survey is also an opportunity to take note of disturbances in the area. The results of the Level 1 survey of OU 1130 indicated that Level 2 (habitat evaluation) surveys were required.

single-stemmed. All shrub stems were counted and the cover was estimated within each of the plot's four quarters.

We calculated an importance index for all trees and shrubs within the transects by averaging their relative cover, relative density, and relative frequency values. The derived number is a measure of species dominance within a transect.

5.2.2 Understory Evaluation

BRET used the quadrat method with a Daubenmire plot of 20 x 50 cm (8 x 20 in.) (Daubenmire, 1959) to measure cryptogamic and herbaceous layers, percentage of bare soil and litter, and shrubs less than 0.9 m (3 ft) in height. We made visual estimates of foliar cover to determine percent cover (Fig. 9). Using the transect established for overstory evaluation, quadrats were read at 3-m (10 ft) intervals until the number of species within the plots had not increased (the species area curve had flattened) or a maximum of 100 quadrats along a transect had been read.

All plants were identified using Hitchcock (1950), Martin and Hutchins (1980), Foxx and Hoard (1984), and Foxx and Tierney (1985). When necessary, voucher specimens were collected and archived in the herbarium at LANL Group ESH-8. Any questionable identifications were confirmed at the University of New Mexico Herbarium.

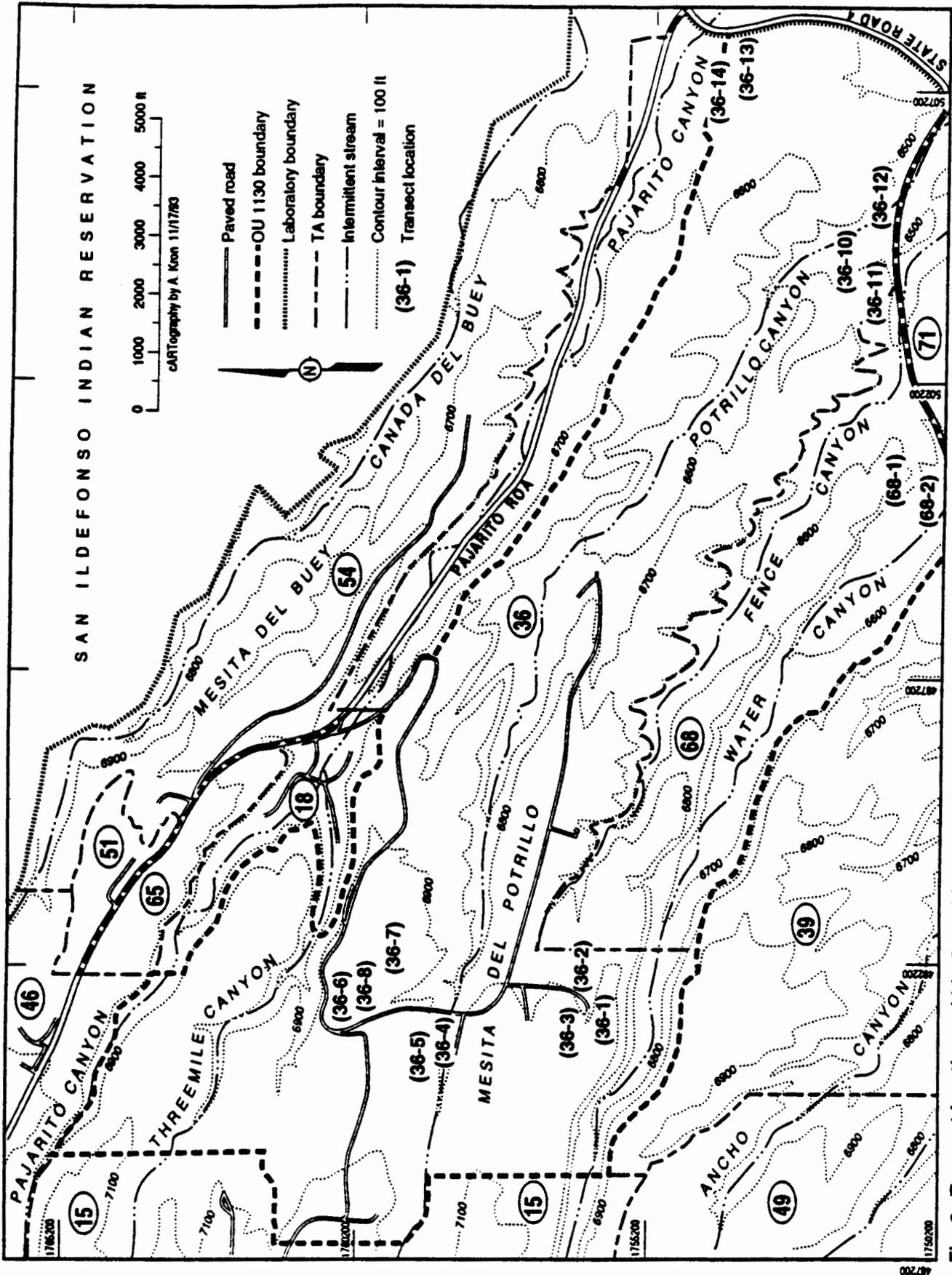
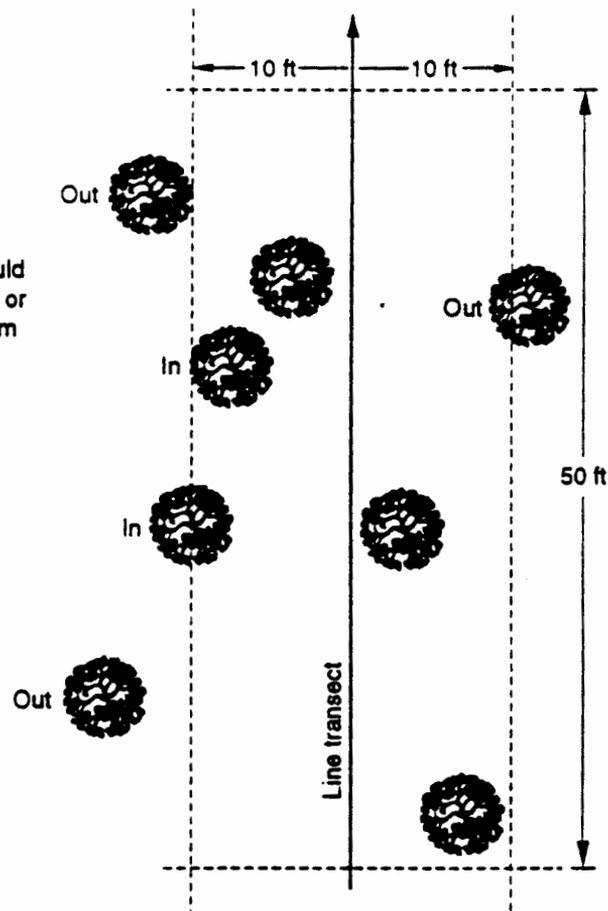


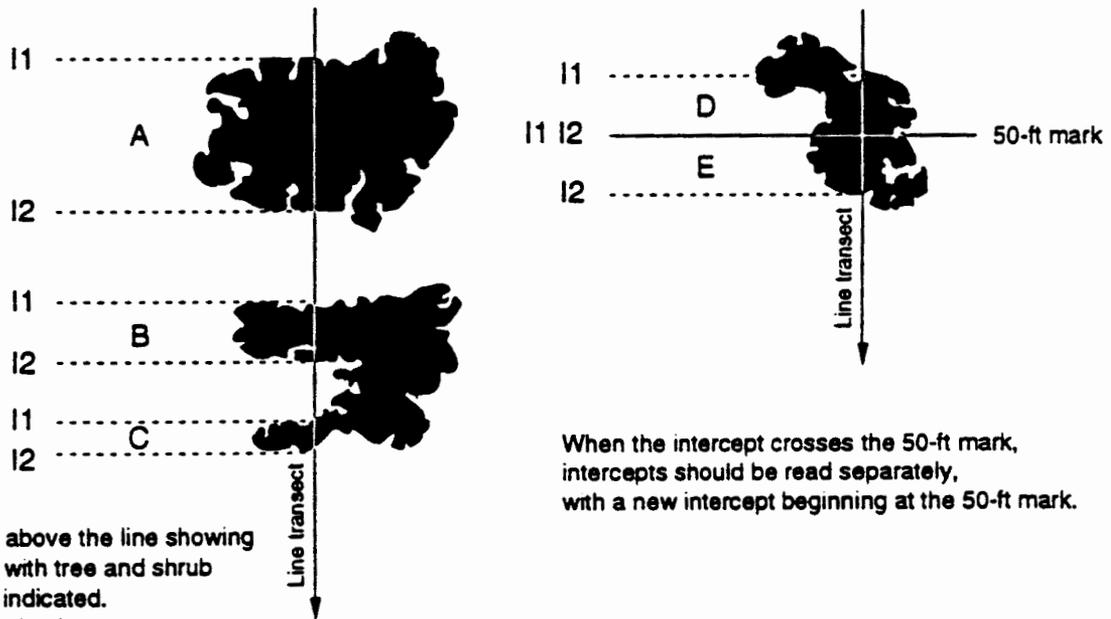
Fig. 6. Transect locations within Operable Unit 1130.

(a)

Tree boles or stems should be counted in when 50% or greater of the bole or stem is in the plot



(b)



View from above the line showing a transect with tree and shrub intercepts indicated.

I1 = beginning intercept

I2 = ending

When the intercept crosses the 50-ft mark, intercepts should be read separately, with a new intercept beginning at the 50-ft mark.

Fig. 7. (a) Line transect method of tree bole measurements and stem counts; (b) reading foliar intercepts.

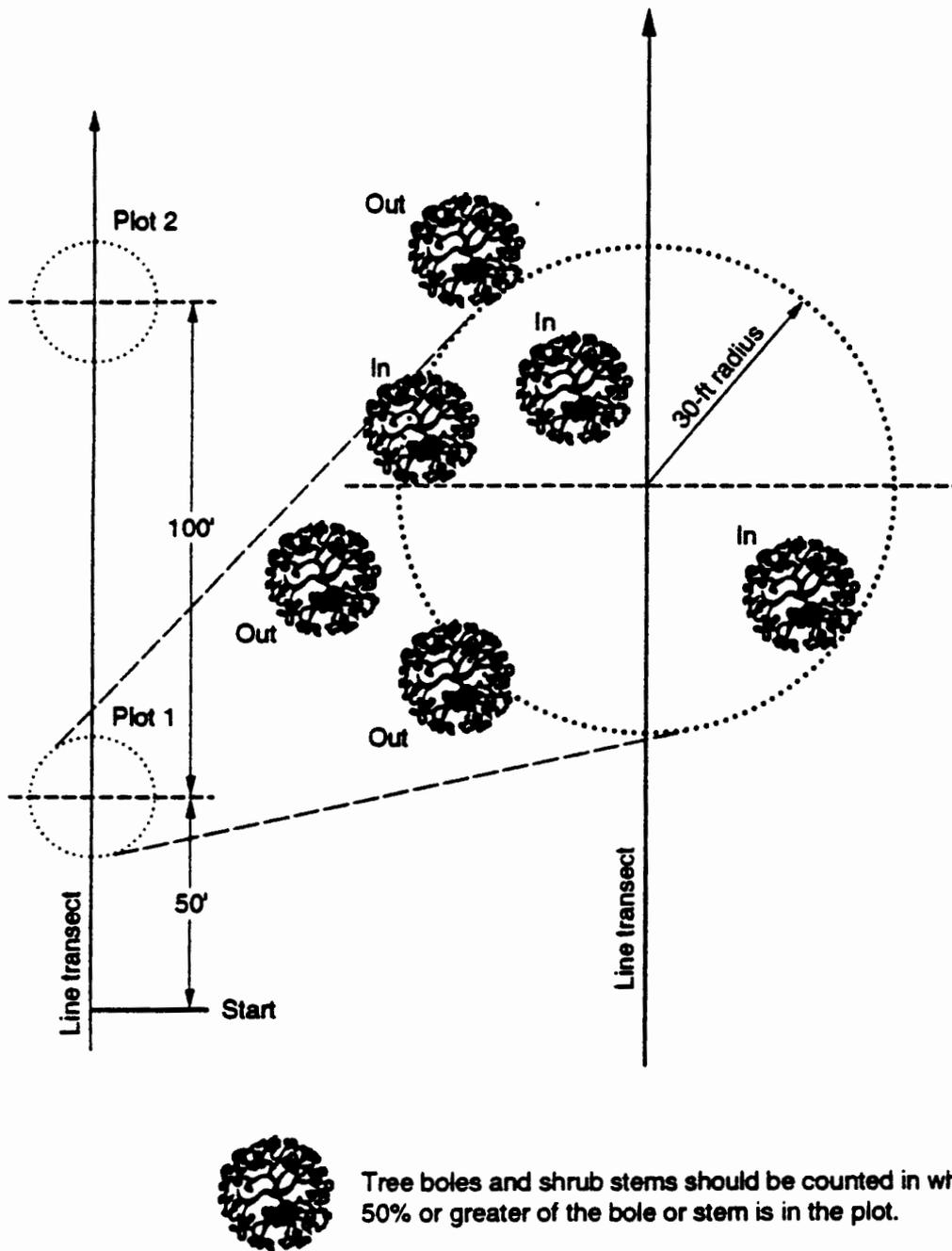


Fig. 8. Circular plot method of overstory evaluation.

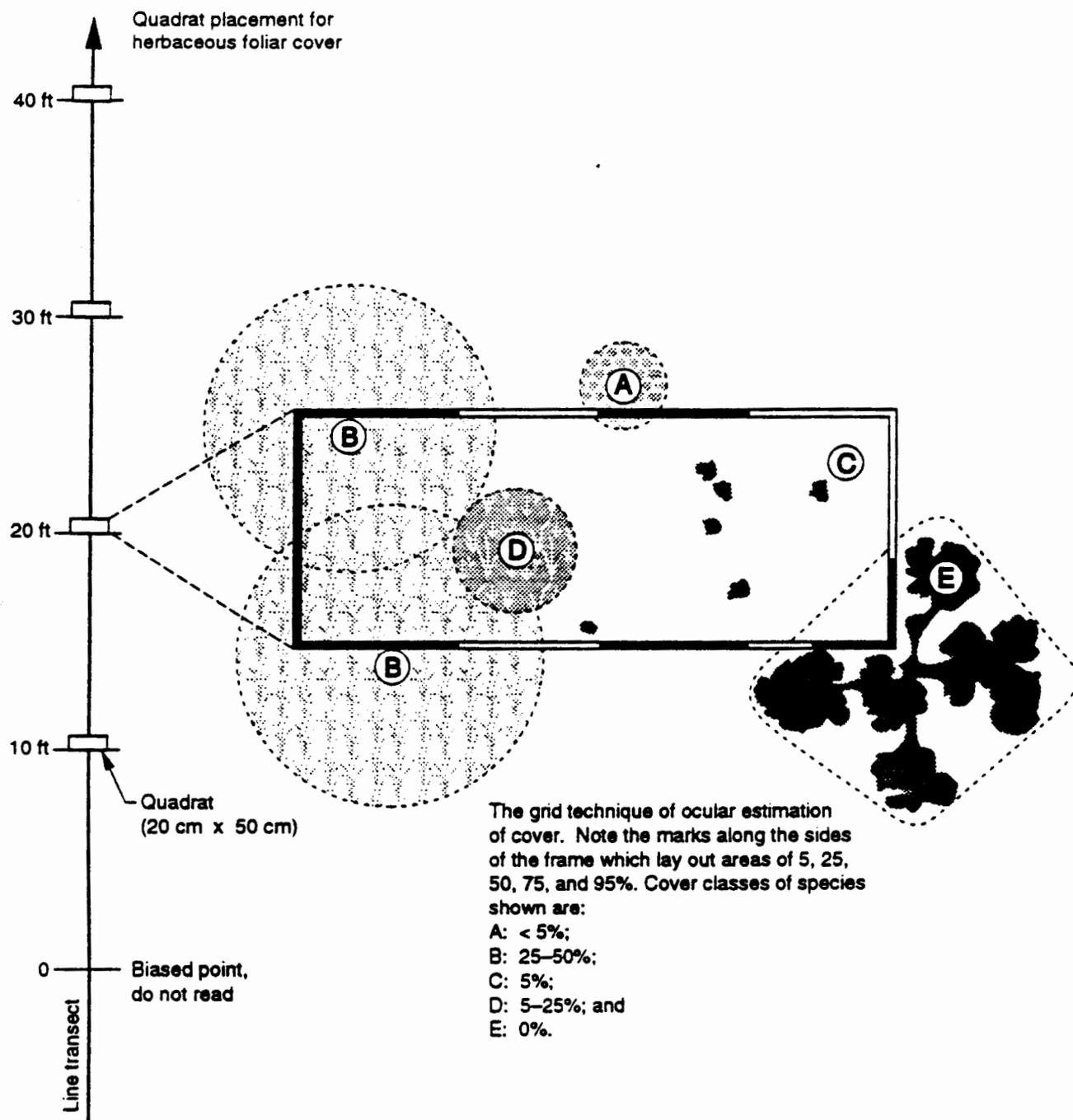


Fig. 9. Location of quadrats for understory transects of herbaceous foliar cover, and the grid technique of ocular estimation of cover (from Daubermire 1973).

5.3 Level 3 (Species-Specific) Surveys

A Level 3 (species-specific) survey uses established protocols to search for a single species of concern. These surveys are primarily conducted for TES species.

5.3.1 Spotted Bat

Based on Level 1 and 2 survey results, and on consultation with experts, we conducted Level 3 surveys for the spotted bat (*Euderma maculatum*). Mist nets raised at dusk and run for several hours at night were closely monitored and checked for bats every few minutes. This method of capture is not specific to spotted bats and allows general inventory data to be collected. When a bat was caught in the net, it was carefully removed by gently holding it while pulling the net strands away from its body and wings. Species were identified, sexed, photographed, and immediately released by rabies-immunized researchers. Identifications were made using Whitaker (1980) and Burt and Grossenheider (1976).

5.3.2 Northern Goshawk

To survey for goshawks, BRET followed the guidelines developed by Kennedy and Stahlecker (1993), who recommend broadcasting goshawk alarm calls at specific intervals along line transects. They suggest spacing the calling stations 152 m (500 ft) apart during egg incubation and 198 m (650 ft) apart during early nestling and fledgling-dependency stages. Researchers measure the distance between stations by pacing. A vocal or aggressive response from any accipiter leads to an intensive nest search in the response area. The search area covers approximately 2508 m² (3000 m²) and varies in shape according to terrain and vegetation (Sinton and Kennedy 1993). Each tree in the immediate area is scanned with binoculars for an active nest. In addition, searchers look for feces, molted feather, inactive stick nests and the plucked remains of prey.

6. RESULTS

6.1 Wetlands and Floodplains

There are some floodplains and wetlands within the OU (Fig. 10). BRET did not delineate wetlands because the precise locations of sampling locations were unknown. When the final sampling plan is established and sampling sites are clearly located, BRET will accurately delineate wetlands where appropriate.

The wetlands within OU 1130 are riverine, primarily occurring along canyon bottoms. There are two such sites in lower Water Canyon (TA-71) and one in mid-Water Canyon (TA-68). These have been broadly mapped by U.S. Fish and Wildlife Service using a hierarchical system described by Cowardin (1979) based solely on aerial photography (Fig. 13).

OU 1130 contains a single wastewater outfall (NPDES # EPA-06A-106), which is located in TA 36. Its discharge is ephemeral and although the effluent enters Three Mile Canyon, it does not reach the main water course of the canyon. This outfall has no distinct channel and hydrophytic vegetation is not present. In 1991, a field team from BRET found no environmental concerns at the discharge site. BRET compiled a plant checklist noting the wetlands indicator status using the *Corps of Engineers Wetlands Delineation Manual* (US COE 1987) for each plant species found in the surveys (Appendix K).

6.2 Level 1 (Reconnaissance) Surveys

Reconnaissance surveys were conducted within the OU to determine potential habitats, identify sampling locations, determine access, and record seasonal observations. The general plant communities, level of disturbance, terrain, and physical features of the site were noted. All sampling locations were readily accessible, either by vehicle or a relatively brief walk.

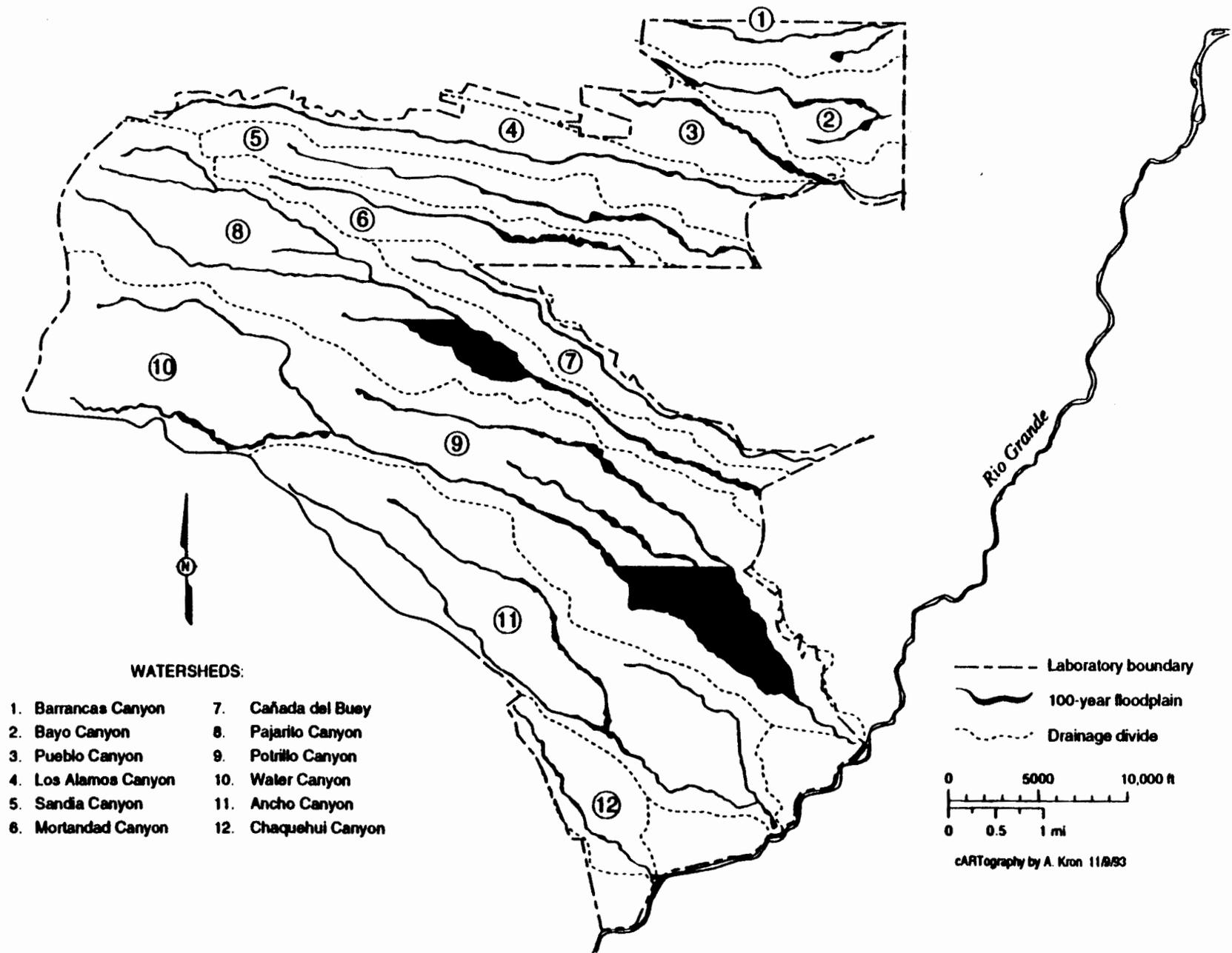


Fig. 10. 100-year floodplain map for Los Alamos National Laboratory.

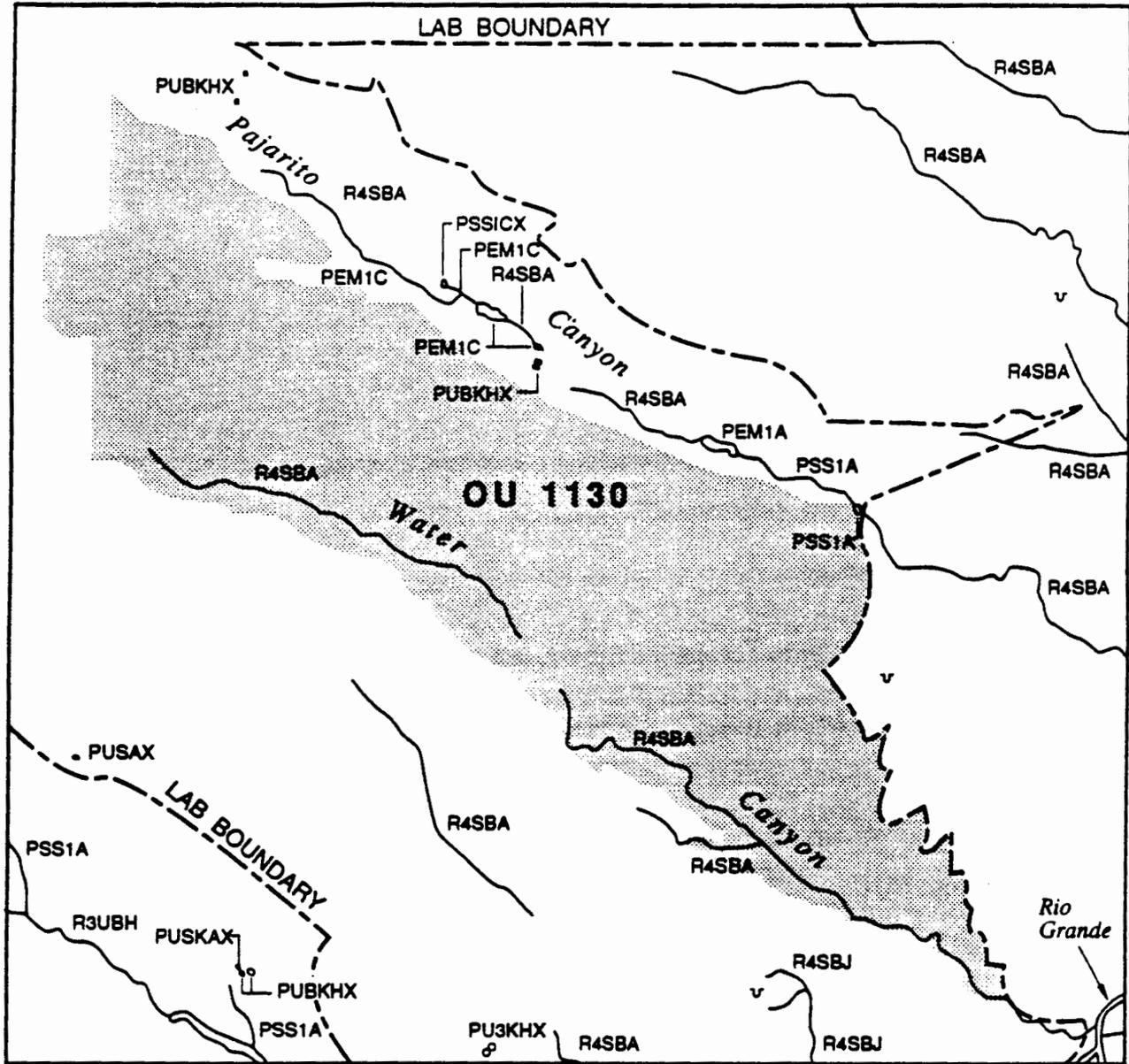


Fig. 11. Locations of wetlands within and surrounding Operable Unit 1130.

Based on the Level 1 surveys, we defined the following vegetation zones and used them as search criteria:

- Ponderosa
- Ponderosa-piñon pine
- Piñon pine-juniper
- Juniper grassland
- Riparian

We reviewed the TES species data base to determine if any threatened, endangered, or sensitive plant or animal species might occur within the vegetation zones of OU 1130 (Table 3). Appendix L provides a printout of the actual data base.

TABLE 3. Listing of Threatened, Endangered, and Sensitive Species for OU 1130

Scientific Name	Common Name	Status*	Habitat	Potential**
ANIMALS				
<i>Accipiter gentilis</i>	Northern goshawk	FC	Ponderosa pine-Gambel's oak; ponderosa	Medium
<i>Ammodramus bairdii</i>	Baird's sparrow	SPG2	Juniper grassland	Low
<i>Falco peregrinus</i>	Peregrine falcon	FE SPG2	Ponderosa-pinon; cliffs and rock crevices	Low
<i>Vireo vicinior</i>	Gray vireo	SPG2	Juniper grassland; juniper-oak	Low
<i>Empidonax traillii extimus</i>	Willow flycatcher	FPE	Riparian; dense willows	Low
<i>Euderma maculatum</i>	Spotted bat	SPG2	Riparian; pinon-juniper; ponderosa; cliffs and rock crevices	Medium
PLANTS				
<i>Mammillaria wrightii</i>	Wright fishhook cactus	SE2	Pinon-juniper; gravelly or sandy hills	Low
<i>Toumeyia papyracantha</i>	Gamma grass cactus	FC SPG1	Pinon-juniper; sandy basalt outcrops	Medium
<i>Aletes sessiliflorus</i>	Sessile-flowered false carrot	SS	Pinon-juniper; rocky canyons and slopes	Low
<i>Silene plankii</i>	Plank's catchfly	SS	Pinon-juniper; crevices and pockets in igneous cliff faces	Low
<i>Astragalus cyaneus</i>	Cyanic milkvetch	SS	Pinon-juniper; sandy or gravelly hillsides	Low
<i>Astragalus feensis</i>	Santa Fe milkvetch	SS	Pinon-juniper; dry slopes	Low

Scientific Name	Common Name	Status*	Habitat	Potential**
<i>Astragalus puniceus</i> var. <i>gertudis</i>	Taos milkvetch	SS	Pinon-juniper; open, loose soil	Low
<i>Abronia bigelovii</i>	Tufted sand verbena	FC SS	Pinon-juniper; Todilto gypsum or its derivatives	Low
<i>Phlox carvophylla</i>	Pagosa phlox	SS	Ponderosa-pinon	Low
<i>Epipactis gigantea</i>	Stream orchid	SE	Seepage slopes; streams and riparian areas	High
<p>*CODES FOR LEGAL STATUS FE = Federally FT = Federally FC = Federal candidate species SE1 = State protected and listed as threatened or endangered under the provisions of Federal Endangered Species Act. SE2 = State protected, rare across its entire range with limited distribution and population size that unregulated collection could jeopardize its survival in New Mexico. SE3 = State protected, widespread in adjacent states or Mexico, but its numbers are being significantly reduced to such a degree that its survival within New Mexico is jeopardized. SPG1 = State protected as a Group 1 species (endangered) SPG2 = State protected as a Group 2 species (threatened) SS = State sensitive</p> <p>**POTENTIAL OF OCCURRENCE High = The species is known to occur in the area Medium = The area has some species habitat components Low = The area does not have species habitat components</p>				

6.2.1 Plants

Federally Listed Species: No federal endangered or threatened plant species were listed as potentially occurring in the OU. However, the following two federal candidate plant species met the search criteria (USFWS 1991b).

Candidate

Santa Fe cholla (*Opuntia viridiflora*)

Grass cactus (*Toumeyia papyracantha*)

State Listed Species: Two plant species listed as state endangered met the search criteria (New Mexico Natural Heritage Program 1991).

Endangered

Wright fishhook cactus (*Mammillaria wrightii*)

Grama grass cactus (*Toumeyia papyracantha*)

Stream orchid (*Epipactis gigantea*)

6.2.2 Sensitive Species

Under the Federal Endangered Species Act and state statutes, only those plant species that are listed or are candidates for listing are protected. New Mexico also lists species occurring within the state that are considered to be rare due to restricted distribution or low numerical density. Because these plants are considered rare, they are sensitive to long-term or cumulative land-use impacts and vulnerable to threatening biological or climatic events. The state monitors these species to determine if they should be elevated to endangered status. The following species occur in the vegetation zones found within OU 1130 and are listed as sensitive by the State:

Cyanic milkvetch (*Astragalus cyaneus*)

Pagosa phlox (*Phlox caryophylla*)

Plank's catchfly (*Silene plankii*)

Santa Fe milkvetch (*Astragalus feensis*)

Sessile-flowered false carrot (*Aletes sessiliflorus*)

Taos milkvetch (*Astragalus puniceus* var *gertudis*)

Tufted sand verbena (*Abronia bigelovii*)

6.2.3 Wildlife

Federally listed species: Two endangered and one candidate species listed by the US Fish and Wildlife Service (1991a-b) met the data base search criteria.

Endangered

Peregrine falcon (*Falco peregrinus*)

Candidate

Northern goshawk (*Accipiter gentilis*)

State listed species: The following species listed as endangered in New Mexico met the search criteria (NMDFG 1988, 1990).

Endangered

Baird's sparrow (*Ammodramus bairdii*)

Peregrine falcon (*Falco peregrinus*)

Gray vireo (*Vireo vicinior*)

Spotted bat (*Euderma maculatum*)

The Migratory Bird Treaty Act (16 USC 703-711) provides federal protection for all wild birds except resident game birds, English sparrows, starlings, and feral pigeons. The Bald Eagle Protection Act further protects eagles, including the golden eagle. These species are protected from collection, maiming, and nest disturbances.

6.3 Level 2 (Habitat Evaluation) Surveys

We established vegetation transects within OU 1130 to evaluate the understory and overstory components. Most of the surveys were conducted within TA 36 near disturbed sites and in canyon bottoms, the major areas of concern. We placed 15 transects to survey a variety of habitat types (Fig. 6).

In general, OU 1130 is located in the Rocky Mountain Montane Conifer Forest and the Great Basin Conifer Woodland communities. More specifically, much of the vegetation within the unit is in the Ponderosa Pine, Piñon-Juniper, and Juniper Grassland series. A further breakdown and discussion of vegetation is given below (see Appendix M for raw data summaries).

6.3.1 Overstory Evaluation

Following a reconnaissance survey of OU 1130, we placed vegetation transects in habitats displaying different plant compositions. Survey sites were selected to sample areas that would undergo site characterization and do not necessarily represent the entire length of the canyon systems. North-facing

and south-facing canyon walls, mesa tops, and canyon bottoms were chosen as representative of the overall habitat of OU 1130. Locations of the overstory transects for trees are listed in the appropriate sections.

Specific site characteristics (e.g., dominant species, density, cover, frequency) are discussed and compared. Every tree species encountered in the overstory transects is listed in the accompanying tables. Complete data from each transect are contained in Appendix M.

6.3.1.1 North-Facing Slopes

Typically, north-facing slopes have denser vegetation than south-facing slopes because of their capacity to retain more moisture. We surveyed north-facing transects near the Minie Site, the junction of Pajarito Road and State Route 4, Water Canyon's intersection with State Route 4 and lower Potrillo Canyon. In TA-36, ponderosa pine and one-seed juniper are the dominant overstory species along the north-facing canyon slopes (Table 4). One transect had a single Rocky Mountain juniper, but this species does not occur in high densities in this or any other area surveyed within OU 1130, and in most cases is not present at all. The single north-facing slope transect surveyed in lower TA 68 contained many ponderosa pine.

Transect	Species	Average DBH	Relative Density	Relative Cover	Relative Frequency	Importance Index
36-1c	One-seed juniper	3.57	39.42	38.44	50.00	42.62
	Piñon pine	5.62	60.58	61.56	50.00	57.38
36-2c	One-seed juniper	6.38	89.47	23.59	60.00	71.25
	Piñon pine	3.50	10.53	17.49	40.00	28.75
36-11c	One-seed juniper	4.73	51.56	32.59	42.86	42.34
	Piñon pine	5.30	46.09	40.48	42.86	43.14
	Ponderosa pine	9.30	2.34	26.93	14.29	14.52
36-14c	One-seed juniper	6.15	46.08	13.52	41.18	37.98
	Rocky Mountain juniper	5.30	0.46	5.00	5.88	5.40
	Piñon pine	4.48	52.53	33.85	41.18	42.52

	Ponderosa pine	22.15	0.92	15.00	11.76	14.10
68-2c	One-seed juniper	1.02	6.58	0.86	15.56	7.67
	Piñon pine	2.00	3.95	0.00	10.37	4.77
	Ponderosa pine	7.33	89.47	99.14	74.07	87.56

Overstory vegetation characteristics of north-facing slopes are given in Table 4.

6.3.1.2 South-Facing Slopes

South-facing slopes are normally drier than adjacent north-facing slopes and thus usually have less vegetative cover. We surveyed south-facing transects near the Eenie Site, the Minie Site, the Ridge Road turn-off, and intersection of Water Canyon and State Route 4. Dominant overstory species are piñon pine, one-seed juniper, and ponderosa pine (Table 5). As on north-facing slopes, ponderosa pine tends to occur in fairly uniform stands.

Table 5. Overstory Vegetation on South-Facing Slopes

Transect	Species	Average DBH	Relative Density	Relative Cover	Relative Frequency	Importance Index
36-2c	One-seed juniper	5.21	42.50	25.92	46.67	38.36
	Piñon pine	5.12	56.88	40.30	46.67	47.95
	Ponderosa pine	12.20	0.62	15.00	6.67	13.69
36-5c	One-seed juniper	4.33	7.32	0.00	14.53	7.26
	Ponderosa pine	7.41	90.24	100.00	78.63	89.32
	Snag	4.30	2.44	0.00	6.84	3.42
36-8c	One-seed juniper	8.96	13.11	33.20	50.00	32.10
	Piñon pine	5.48	86.89	66.80	50.00	67.90
36-10c	One-seed juniper	7.33	75.38	69.89	54.55	66.61
	Piñon pine	5.23	24.62	30.11	45.45	33.39

6.3.1.3 Mesa Tops

Three widely separated mesa tops within TA 36 were surveyed with similar results. Our transects were located near the Minie Site, the Ridge Road turn-off, and the intersection of Pajarito Road and State Route 4. The dominant overstory species were again piñon pine and one-seed juniper (Table 6).

6.3.1.4 Canyon Bottoms

Our transects were located near the Eenie Site, the Ridge Road turn-off, and the intersection of Water Canyon and State Route 4. Species found within the canyon bottoms (Table 7) were similar to those of the north- and south-facing slopes and mesa tops.

6.3.1.5 Riparian Zones

The Pajarito Wetlands is not in the OU boundaries, and there are few, if any, true riparian zones within OU 1130.

Table 6. Overstory Vegetation on Mesa Tops

Transect	Species	Average DBH	Relative Density	Relative Cover	Relative Frequency	Importance Index
36-3c	One-seed juniper	4.87	65.99	57.02	41.67	54.89
	Piñon pine	6.68	29.93	42.98	41.67	38.19
36-6c	One-seed juniper	6.14	77.78	55.00	38.46	46.76
	Piñon pine	7.28	20.00	45.00	38.46	41.70
	Snag	13.05	2.22	0.00	23.08	11.54
36-13c	One-seed juniper	6.44	44.53	39.93	46.15	43.54
	Piñon pine	5.36	55.47	60.07	53.85	56.46

Table 7. Overstory Vegetation in Canyon Bottoms

Transect	Species	Average DBH	Relative Density	Relative Cover	Relative Frequency	Importance Index
36-4c	One-seed juniper	3.97	71.13	49.35	50.00	56.83
	Piñon pine	7.05	28.87	50.65	50.00	43.17
36-7c	One-seed juniper	4.46	15.25	5.50	36.00	20.75
	Piñon pine	1.65	3.39	1.84	8.00	4.92
	Ponderosa pine	8.96	81.36	92.66	56.00	74.33
68-1c	One-seed juniper	4.87	53.85	48.79	44.44	49.03
	Piñon pine	8.00	15.38	15.33	22.22	17.64
	Ponderosa pine	6.63	30.77	35.89	33.33	33.33

6.3.2 Shrubs

While using the line intercept and circular plot techniques to determine the overstory composition, we separated the woody species into trees and shrubs for purposes of analysis. The DBH of trees was recorded while the number of stems were counted for shrubs. Complete data from each transect are contained in Appendix M.

6.3.2.1 North-Facing Slopes

On the north-facing slopes, the shrubs were much more varied than the trees (Table 8). In four of the five transects, squawbush was most numerous in terms of stems/acre, but in most cases its importance index was low due to a low relative cover value.

Table 8. Shrub Species on North-Facing Slopes

Transect	Species	# Stems/ Acre	Relative Density	Relative Cover	Relative Frequency	Importance Index
36-1c	Wavyleaf oak	769	64.94	75.85	40.00	60.26
	Squawbush	6	0.52	0.44	10.00	3.65
	Mountain mahogany	409	34.55	23.71	50.00	36.09
36-2c	Big sagebrush	297	38.03	39.21	40.14	39.67
	Rabbitbrush	2	0.28	0.42	9.86	5.14
	Squawbush	369	47.32	18.54	40.14	29.34
	Four-wing saltbush	112	14.37	41.84	9.86	25.85
36-11c	Oak hybrid	24	25.00	89.47	11.11	41.86
	Big sagebrush	31	31.82	3.51	44.44	26.59
	Squawbush	40	40.91	3.51	33.33	25.92
	Wax currant	2	2.27	3.51	11.11	5.63
36-14c	Apache plume	31	15.38	26.97	6.25	16.20
	Four-wing saltbush	57	28.57	62.92	10.42	33.97
	Squawbush	88	43.96	10.11	12.50	22.19
	Wax currant	24	12.09	0.00	70.83	27.64
68-2c	Gambel oak	3	1.10	0.00	8.97	3.36
	Rabbitbrush	16	5.49	0.00	8.97	4.82
	Squawbush	193	68.13	76.92	64.10	69.72

Transect	Species	# Stems/ Acre	Relative Density	Relative Cover	Relative Frequency	Importance Index
	Wax currant	47	16.48	23.08	8.97	16.18
	New Mexico olive	25	8.79	0.00	8.97	5.92

6.3.2.2 South-Facing Slopes

South-facing slopes are normally drier than adjacent north-facing slopes and thus usually have a lower vegetative cover. The presence of oak and squawbush thickets within three of the four transects masks this general trend (Table 9).

6.3.2.3 Mesa Tops

When compared to both north- and south-facing slopes, the mesa top transects had a lower species diversity and fewer shrub stems (Table 10).

Transect	Species	# Stems/ Acre	Relative Density	Relative Cover	Relative Frequency	Importance Index
36-2c	Big sagebrush	24	50.00	69.86	60.00	59.95
	Squawbush	7	13.64	2.74	20.00	12.13
	Wax currant	18	36.36	27.40	20.00	27.92
36-5c	Wavyleaf oak	385	46.70	100.00	0.25	20.00
	Gambel oak	4	0.44	0.00	6.67	2.37
	Oak hybrid	316	38.33	0.00	53.33	30.55
	Apache plume	7	0.88	0.08	6.67	2.52
	Squawbush	91	11.01	0.00	6.67	5.89
	Mountain mahogany	22	2.64	0.00	6.67	3.10
36-8c	Wavyleaf oak	1150	86.77	41.90	50.00	59.56
	Gambel oak	55	4.18	31.39	10.00	15.19
	Oak hybrid	65	4.87	26.37	10.00	13.75
	Squawbush	9	0.70	0.31	10.00	3.67
	Mountain mahogany	46	3.48	0.03	20.00	7.84
36-10c	Big sagebrush	308	26.82	39.66	12.82	26.43
	Rabbitbrush	2	0.19	0.45	2.56	1.07

Transect	Species	# Stems/ Acre	Relative Density	Relative Cover	Relative Frequency	Importance Index
	Squawbush	723	63.03	14.35	17.95	31.77
	Wax currant	2	0.19	0.45	64.10	21.58
	Four-wing saltbush	112	9.77	45.10	2.56	19.14

Transect	Species	# Stems/ Acre	Relative Density	Relative Cover	Relative Frequency	Importance Index
36-3c	Wavyleaf oak	12	25.00	100.00	50.00	58.33
	Mountain mahogany	37	75.00	0.00	50.00	41.67
36-6c	Wavyleaf oak	40	27.66	93.00	12.50	52.69
	Oak hybrid	31	21.28	0.00	25.00	12.50
	Wax currant	15	10.64	0.00	12.50	6.25
	Mountain mahogany	58	40.43	7.00	50.00	28.57
36-13c	Big sagebrush	92	100.00	100.00	100.00	100.00

6.3.2.4 Canyon Bottoms

The canyon bottoms showed a tremendous variance in number of stems per acre (Table 11).

Transect	Species	# Stems/ Acre	Relative Density	Relative Cover	Relative Frequency	Importance Index
36-4c	Wavyleaf oak	21	25.00	100.00	50.00	58.33
	Mountain mahogany	62	75.00	0.00	50.00	41.67
36-7c	Wavyleaf oak	376	71.60	100.00	66.67	79.42
	Mountain mahogany	56	10.65	0.00	6.67	5.77
	Squawbush	78	14.79	0.00	20.00	11.60
	Apache plume	16	2.96	0.00	6.67	3.21
68-1c	Rabbitbrush	94	2.66	3.74	28.57	11.66
	Squawbush	145	4.09	3.44	7.14	4.89
	Wax currant	18	0.51	0.00	7.14	2.55
	Apache plume	3296	92.75	92.81	57.14	80.90

6.3.2.5 Riparian Zone

The Pajarito Wetlands is not included in the OU boundaries, and there are few, if any, true riparian zones within OU 1130.

6.3.3 Understory Evaluation

Tables list the relative cover, relative frequency, and importance index of all understory species having an importance index value greater than 5.00. Complete data from each transect are contained in Appendix M.

6.3.3.1 North-Facing Slopes

Typically, north-facing slopes have denser vegetation than south-facing slopes because of their capacity to retain more moisture. We surveyed north-facing transects near the Minie Site, lower Potrillo Canyon, the junction of Pajarito Road and State Route 4, and Water Canyon's intersection with State Route 4. Within the four transects, the amount of litter-covered ground and bare soil ranged from 73% to 93%. Blue grama grass is a dominant or codominant understory plant in all transects. Other noteworthy species include golden aster, little bluestem, and tarragon (Table 12). Transect 36-2u had the greatest diversity (29 species) of all understory surveys conducted within OU 1130.

6.3.3.2 South-Facing Slopes

We surveyed south-facing transects near the Eenie Site, the Ridge Road turn-off, the Minie Site, and the intersection of Water Canyon and State

Transect	Species	Relative Cover	Relative Frequency	Importance Index
36-2u	Wormwood	37.30	30.43	33.87
	Blue grama	39.91	26.09	33.00
	Downy chess	24.10	19.57	21.83
	False tarragon	15.49	15.22	15.35

Transect	Species	Relative Cover	Relative Frequency	Importance Index
	Dropseed	8.29	6.52	7.40
	Little bluestem	8.72	3.26	5.99
36-11u	Blue grama	39.30	18.78	29.07
	Little bluestem	11.83	7.51	9.68
	Golden aster	6.44	6.10	6.27
	Bitterweed	5.86	6.10	5.98
	Sand dropseed	6.23	5.16	5.70
	Golden aster	6.44	6.10	6.27
36-14u	Blue grama	12.37	12.24	12.31
	Bluegrass	5.44	6.91	6.17
	Fleabane daisy	3.53	6.91	5.22
68-2u	Blue grama	50.94	33.33	42.14
	Golden aster	8.99	11.11	10.05
	Bluegrass	7.99	9.72	8.86
	Sedge	7.99	8.33	8.16
	Little bluestem	6.99	8.33	7.66
	False tarragon	5.05	8.33	6.69
	Needle and thread grass	4.99	6.94	5.97

Route 4. As in the north-facing slopes, blue grama was the most important understory species (Table 13). Other species varied greatly between transects and included mountain muhly, little bluestem, bitterweed, prickly pear cactus, oak, deervetch, pine dropseed, and sagebrush. The amount of open ground, i.e. bare soil, rock, and litter, ranged from 85 to 97%.

6.3.3.3 Mesa Tops

Our transects were located on three widely separated mesas, near the Minie Site, the Ridge Road turn-off, and the intersection of Pajarito Road and State Route 4. The dominant understory species in all mesa top transects was blue grama which accounted for 47% of the total relative plant cover (Table 14).

Transect	Species	Relative Cover	Relative Frequency	Importance Index
36-1u	Blue grama	52.22	50.00	51.11
	Oak	41.14	12.50	26.81
	Bitterweed	12.38	12.50	12.44
	Mountain muhly	14.39	8.33	11.36
	Prickly pear cactus	12.34	8.33	10.33
	Rock-jasmine	10.28	4.17	7.22
	Snakeweed	4.52	8.33	6.43
	Sedge	8.22	4.17	6.20
	36-5u	Mountain muhly	32.93	37.50
Rock-jasmine		30.51	22.92	26.71
Pine dropseed		12.11	12.50	12.30
Golden aster		5.57	12.50	9.03
36-8u	Blue grama	77.98	58.49	68.24
	Unknown grass	10.69	3.77	7.23
36-10u	Blue grama	60.11	60.00	60.05
	Sagebrush	20.77	6.67	13.72
	Black grama	6.01	8.00	7.01
36-12u	Blue grama	67.81	51.00	59.41
	Deervetch	13.64	20.00	16.82
	Prickly pear cactus	8.26	4.00	6.13
	Pale trumpet	2.47	9.00	5.73

Bitterweed, oak, prickly pear cactus, mountain muhly, and stickseed were important components in at least one transect while being completely absent in others. Snakeweed, an indicator of past disturbance, was present in all three transects. Open ground ranged from 80 to 92%.

6.3.3.4 Canyon Bottoms

Our transects were located near the Eenie Site, the Ridge Road turn-off, and the intersection of Water Canyon and State Route 4. However, the transect near the Eenie Site (36-4u) was incorrectly read, and its

questionable data are not included. The other two transects displayed a remarkable diversity having completely different species lists (Table 15). All species were found in a single transect; there was no

Transect	Species	Relative Cover	Relative Frequency	Importance Index
36-3u	Blue grama	31.81	29.55	30.68
	Oak	25.05	9.09	17.07
	Bitterweed	7.54	9.09	8.32
	Mountain muhly	8.77	6.82	7.79
	Prickly pear cactus	7.52	6.82	7.17
	Rock-jasmine	6.26	4.55	5.40
	36-6u	Blue grama	74.98	40.00
	Bitterweed	14.20	20.00	17.10
	Fleabane daisy	2.66	21.18	11.92
	Mountain muhly	4.57	7.06	5.82
36-13u	Blue grama	59.79	46.70	53.25
	Prickly pear cactus	17.42	13.74	15.58
	Snakeweed	5.27	11.90	8.59
	Stickseed	11.02	3.66	7.34

species overlap. One transect had the second-highest species diversity (24 species) of all those read in OU 1130 while the other one had the lowest (4 species). The high importance indices for transect 36-7u is somewhat misleading since only 2.09% of the ground had any plant cover.

6.3.3.5 Riparian Zone

The Pajarito Wetlands is not included in the OU boundaries, and there are few, if any, true riparian zones within OU 1130.

Transect	Species	Relative Cover	Relative Frequency	Importance Index
36-7u	Mountain muhly	58.37	51.35	49.84
	Sedge	24.40	27.03	23.39
	Golden aster	13.88	18.92	15.04
68-1u	Blue grama	54.01	31.86	42.93

	Golden aster	9.90	5.31	7.60
	Needle and thread grass	6.47	7.08	6.78
	False tarragon	5.42	6.19	5.80
	Scarlet globe mallow	3.80	7.08	5.44

7. DISCUSSION

7.1 Level 2 (Habitat Evaluation) Surveys

The classification breakdown for both upland and wetland vegetation types for the Pajarito Plateau is included in Appendix I. This list includes known and potential habitat types and phases based on Brown et al. (1982), Moir and Ludwig (1979), and USFS (n.d.). No attempt was made to develop new habitat types for this area. If a study area did not fit within one of the designated habitat types previously defined for northern New Mexico, the habitat type was considered to be potential. Further studies would be necessary to make a complete and accurate determination.

The vegetation surveys indicated primarily two vegetation communities within and adjacent to OU 1130: the Rocky Mountain Montane Conifer Forest and the Great Basin Conifer Woodland communities. These communities can be further separated into series and, more specifically, habitat types.

7.1.1 Rocky Mountain Montane Conifer Forest

This community consists of one vegetation series, the Ponderosa Pine. The Ponderosa Pine series can be further divided into two habitat types. The ponderosa pine/wavyleaf oak habitat was surveyed on a south-facing slope near the Eenie Site (36-5c) and in a canyon bottom (36-7c). Hybridized oak, squawbush, mountain mulberry, and rock-jasmine were also fairly abundant in 36-5c. Ponderosa pine-one seed juniper habitat was surveyed in a north-facing slope transect (68-2c). Blue grama was the major understory species, but had a low cover value of 3.64.

7.1.2 Great Basin Conifer Woodland Community

Most of OU 1130 falls within the Great Basin Conifer Woodland community and is characterized within the Piñon-Juniper series. Twelve of our fifteen transects occurred within this series, and all of these occur in the piñon-juniper-blue grama habitat type. There was little shrub understory in the canyon bottoms and on the mesa tops, with cover values ranging from 0.03 to 5.63. Both north- and south-facing slopes had significantly higher amounts of cover with an average value of 13.87. The major shrub species on these slopes were wavyleaf oak, mountain mahogany, big sagebrush, and squawbush. Blue grama was the most important understory plant in all transects dominated by piñon and juniper.

7.2 Level 3 (Species-Specific) Surveys

No protected species were found during the Levels 1 and 2 surveys conducted in OU 1130. However, habitat information from those field surveys was compared to data base information for each species of concern. Previous data and threats to each taxon were also studied. Based on this information, species were dismissed from further consideration or additional surveys were conducted to confirm the presence/absence of the species within the area.

7.2.1 Species Dismissed from Further Consideration

Based on the information gained from the Level 1 and Level 2 field surveys and previously gathered data, the following species are unlikely to occur within OU 1130:

7.2.1.1 Plants

The following species are being dismissed from further consideration because none has been found in OU 1130, they are unlikely to occur in the OU, and there is a low potential for impact from the proposed activity. Table 3 lists the required habitats of each of these species.

The **Wright fishhook cactus** (*Mammillaria wrightii*) occurs on gravelly or sandy hills or plains, desert grasslands, and piñon-juniper zones. Although there is potential habitat for this species with the OU, it has not been found within Los Alamos County nor was it found during our field surveys or previous vegetative studies conducted within this area (see Section 4.0 for previous studies).

The **Santa Fe cholla** (*Opuntia viridiflora*) has been found only in an urban area of Santa Fe County. These plants appear to be strongly associated with south- and west-facing slopes in piñon-juniper woodlands at about 2195 m (7200 ft) (New Mexico Native Plants Protection Advisory Committee 1984). Elevations within Ou 1130 are lower than this and no specimens of this cactus were found within the OU during Level 1 or Level 2 surveys. (This species was deleted from the state list in 1993.)

The **grama grass cactus** (*Toumeyia papyracantha*) occurs in sandy soils within basalt outcrops. It has been found near the White Rock overlook and some habitat in TA 71 may be suitable for this species. No sampling will take place within the boundaries of TA-71.

The **sessile-flowered false carrot** (*Aletes sessiliflorus*) occurs in rocky canyons and slopes, usually in areas of basalt or sandstone. This species is found primarily in south-central New Mexico and has not been reported from Los Alamos County; it has not been found within Los Alamos County nor was it found during our field surveys or previous vegetative studies conducted within this area (see Section 4.0 for previous studies).

Plank's catchfly (*Silene plankii*) grows in piñon-juniper habitat and is known to occur in mountains along the Rio Grande. It is found in crevices and pockets in protected cliff faces of igneous rock. This species has not been found in Los Alamos County nor was it found during our field surveys or previous vegetative studies conducted within this area (see Section 4.0 for previous studies).

The **cyanic milkvetch** (*Astragalus cyaneus*) occurs on sandy or gravelly hillsides within piñon-juniper. Usually growing adjacent to the Rio Grande, this species has not been found in Los Alamos County nor

was it found during our field surveys or previous vegetative studies conducted within this area (see Section 4.0 for previous studies)..

The **Santa Fe milkvetch** (*Astragalus feenis*) is found on dry slopes of piñon-juniper woodlands. It has not yet been reported in Los Alamos County nor was it found during our field surveys or previous vegetative studies conducted within this area (see Section 4.0 for previous studies).

The **Taos milkvetch** (*Astragalus puniceus* var. *gertudis*) is found in loose soil within open areas of piñon pine and juniper. This species has not been recorded for Los Alamos County nor was it found during our field surveys or previous vegetative studies conducted within this area (see Section 4.0 for previous studies).

The **La Jolla prairie clover** (*Dalea scariosa*) inhabits sandy clay banks and bluffs, open sandy areas, and roadsides within juniper grassland habitat. It has not previously been found in Los Alamos County nor was it found during our field surveys or previous vegetative studies conducted within this area (see Section 4.0 for previous studies). (This species was deleted from the state list in 1993.)

The **tufted sand verbena** (*Abronia bigelovii*) is entirely restricted to Todilto gypsum or its derivatives. These soils do not occur within OU 1130.

The **Pagosa phlox** (*Phlox caryophylla*) grows on open slopes in mountain woodlands and forests. It has not been recorded for Los Alamos County nor was it found during our field surveys or previous vegetative studies conducted within this area (see Section 4.0 for previous studies).

The **stream orchid** (*Epipactis gigantea*) has been found within lower Pajarito Canyon. It occurs in seepage slopes and very damp woods. In OU 1330, the areas providing sufficient moisture for stream orchids are restricted to TA 71, and no soil characterization work is scheduled here.

7.2.1.2 Wildlife

Based on extensive bird surveys in Los Alamos County by BRET and others, the following bird species were dismissed from further consideration because they are unlikely to occur in OU 1130.

The **bald eagle** (*Haliaeetus leucocephalus*) winters along the Rio Grande, and winter roosts have been observed at Cochiti Lake. Large trees which are protected from the wind form suitable roosting sites. Although this species was not listed on the TES data base printout, the bald eagle could pass through the OU's southernmost extension. Impact and mitigation measures are not discussed for this species since no site characterization activities are scheduled within TA 71.

Baird's sparrow (*Ammodramus bairdii*) occurs in juniper grassland, but in New Mexico, it primarily occurs on the eastern plains and southern lowlands. It has not been reported from Los Alamos or adjacent counties during previously conducted surveys (Travis 1992).

The **gray vireo** (*Vireo vicinior*) is found in juniper grassland and juniper-oak habitats. The known habitat area nearest to Los Alamos is in the San Juan Valley below Navajo Lake, and the gray vireo has not been found in Los Alamos County.

The **peregrine falcon** (*Falco peregrinus*) establishes breeding territories near cliffs in areas of ponderosa and piñon. Optimal habitat includes large nearby "gulfs" of air which permit peregrines to attack their prey from above. A well-established peregrine nest site exists near the Los Alamos town site. Peregrine foraging areas may extend to 30 km (18 mi) from a nest site, but an estimated 90% of foraging occurs within a radius of 15 km (9 mi). Johnson feels that portions of Ancho and Water Canyons surveyed within the OU are unlikely to receive concentrated use but may provide "moderately attractive foraging habitat for peregrines" (Johnson 1992).

The **Mexican spotted owl** (*Strix occidentalis* var. *lucida*) inhabits mixed-conifer and ponderosa pine-Gambel oak forests in mountains and canyons of the southwestern U.S. and northern Mexico. Its habitat has the following characteristics (USFW 1990):

- high canopy closure
- high stand diversity
- multilayered canopy resulting from an uneven age stand
- large, mature trees
- downed logs
- snags
- stand decadence as indicated by the presence of mistletoe

In addition, spotted owls favor narrow, steep canyons with cool temperatures and little light penetration. For these reasons, spotted owls tend to prefer north-facing slopes (Ligon 1926; Ehrlich et al. 1988).

Johnson (1993) has developed a topographic model of potential spotted owl habitat in New Mexico and has also started developing a similar model to be used for LANL (Johnson, in preparation). Results from initial modeling indicate that three areas within Laboratory boundaries could have potential owl habitat—Twomile Canyon, Los Alamos Canyon, and an area near the junction of Water Canyon and Cañon del Valle. None of these areas are within the boundaries of OU 1130. Vegetation data collected for OU 1130 indicates that habitat there does not meet the requirements for the spotted owl.

The southwestern willow flycatcher (*Empidonax traillii extimus*) breeds in riparian habitats or wetland areas dominated by willows, cottonwoods, tamarisk, or Russian olive (Tibbets et al. 1994). None of the areas within OU 1130 where site characterization is scheduled include riparian or wetlands habitats. (There is riparian habitat in TA-71, but no sampling planned within this TA.)

7.2.2 Species for Which Level 3 Surveys were Conducted

The northern goshawk (*Accipiter gentilis*) nests primarily in dense, mature, or old growth coniferous forests containing trees at least 45.7 cm (18 in.) in diameter (Reynolds 1989). In addition, goshawks

appear to nest within 0.4 km (0.25 mi) of water. Studies by Patricia Kennedy (1987) indicate the highest percentage of nests were in the ponderosa pine/Gambel oak habitat type. The home range of goshawks usually includes a variety of forest conditions.

Goshawk nests have been found on Santa Fe National Forest land in the northwest portion of Los Alamos County and adjacent to LANL property (Sinton and Kennedy 1993; Travis 1992). Goshawk post-fledgling areas and foraging areas are known to overlap LANL (Sinton and Kennedy 1993).

In 1993, Patricia Kennedy surveyed optimal for northern goshawks within LANL boundaries, including all drainages in upper sections of Water Canyon, Pajarito Canyon, and Canon de Valle. No goshawks were observed within the LANL inventory area. However, active territories and nest sites have been found just beyond Laboratory boundaries. The foraging area for this species is approximately 2185 ha (5400 ac) and is located primarily in middle-aged, mature, and old coniferous forest. The areas expected to contain goshawks are in upper canyons which are higher and moister than those found in OU 1130. At least one more year of field surveys are needed to complete the inventory.

The spotted bat (*Euderma maculatum*) is found near standing water in riparian, piñon-juniper, ponderosa pine, and spruce-fir areas. They roost in cliffs or rock crevices. Some required habitat components for this species are present in OU 1130. However, there are few cliffs OU 1130, and open areas of standing water are, for the most part, absent. No spotted bats were captured in mist-net surveys run at several LANL sites, including two locations along the Pajarito Wetlands adjoining OU 1130 (Appendix J). Further surveys will be necessary to confirm the presence or absence of this far-ranging species in OU 1130 and in Los Alamos County.

At present, no sampling is proposed within TA-71, the southeastern portion of which adjoins the Rio Grande River. If sampling is proposed within TA 71, a number of Level 3 surveys will be required. Grama grass cactus and the stream orchid occur within habitat similar to that found in TA-71. The presence/absence of these species must be thoroughly investigated before sampling in TA 71 can be approved.

A **pulmonate snail** in the genus *Oreohelix*, has been found in lower TA-71. Rick Smartt, a snail expert with the New Mexico Museum of Natural History in Albuquerque, has tentatively identified these snails as *Oreohelix subrudis* (cf). Specimens will be sent to Texas A&M University for genetic analysis that will assist in confirming identification. Smartt feels that this is a very unusual population, in that all other Jemez Mountain *Oreohelix* are associated with limestone, while this population is found in basaltic areas (Smartt, personal communication). Although *Oreohelix subrudis* does not appear on the state or federal lists of species of concern, the TA-71 population appears to warrant protective measures. If sampling extends into TA-71, further snail surveys in the basaltic boulder areas will be necessary.

8. IMPACTS

8.1 Wetlands and Floodplains

Impacts to wetlands and floodplains are primarily associated with soil sampling and related disturbances. Sampling may include core drilling to a depth of 15 cm (6 in.) or deep core drilling to a depth of more than 61 m (200 ft). Heavy equipment and coring should remain outside of wetland areas. If sampling or other disturbances occur within or near wetlands or within floodplains, the following impacts could occur:

- Disturbance to the stream channel, or smaller drainages leading into the stream channel, could result in an alteration of existing wetlands, which could lead to partial or complete loss of those wetlands.
- Excessive disturbance to the vegetation and soil surface could result in an alteration of the water flow or a widening of the channel.
- Disturbance along the drainages or on steep slopes could initiate or increase soil erosion. This could also lead to localized alterations in wetlands.
- Hazardous fuel spills or leaks from vehicles could negatively affect water quality in riparian zones and could negatively impact hydrophytic vegetation.

8.2 Threatened, Endangered, and Sensitive Species

Spotted bats have not been detected within LANL boundaries, but all habitat components necessary to support them are present. Impacts to the bats would include destruction of roosting sites (rock crevices). However, very little disturbance to rock crevices is anticipated during site characterization. Most sampling will occur along drainages in OU 1130, not on the slopes.

No goshawks have been discovered in any bird surveys conducted near OU 1130 (Travis 1992). However, some of their habitat components exist within this area. Over 95% of soil sampling in OU 1130 will occur in previously disturbed areas with hand augers. Sampling with hand augers for site characterization should not produce a significant level of disturbance. However, the use of drill rigs in sampling could cause a great increase in noise levels. Impacts to goshawk would include human disturbance and disturbance by heavy equipment during the mating and nesting season (March-September). Canopy or tree removal could decrease nesting and perching habitat and alter habitat for prey species. Removing or disturbing large areas of vegetation could affect prey species availability, which may result in decreased goshawk use of the area.

Impacts to grama grass cactus, the stream orchid, and an unusual pulmonate snail are not discussed because no soil characterization sampling is scheduled for TA 71 where these species might occur.

8.3 Nonsensitive Species

8.3.1 Plants

Heavy machinery could impact topographic features and riparian zones of OU 1130 in the following ways:

- Removal or excessive disturbance to existing vegetative cover could initiate or increase erosion or alter drainage patterns, both within the canyon bottoms (including stream channels) and along the canyon slopes.
- Disturbance or damage to riparian vegetation could result in partial or complete loss of wetlands.

8.3.2 Wildlife

Habitat in OU 1130 is suitable for nesting, foraging, and perching for a variety of bird species, large mammals, and other wildlife species. The majority of site characterization sampling proposed for this OU will occur in previously disturbed areas in association with SWMUs. These areas occur in and around existing facilities, roads, parking lots, and firing site areas that have existing physical and human disturbances. Over 90% of the sampling activity will require the collection of soil samples with hand scoops and other manual methods. Therefore, impacts from such sampling will be extremely small and will not cause an adverse impact. However, excessive disturbance or disturbance during critical periods could result in one or more of the following:

- direct removal of nesting, perching, cover, and similar habitats along the canyon slopes and within riparian zones or canyon bottoms
- nest abandonment by birds causing nest failure
- an interference with critical periods such as breeding
- contamination of wildlife water sources from fuel spills or leaks from vehicles and machinery

9. MITIGATION

If soil characterization sampling extends into TA 71, more surveys will be necessary to ensure that such sampling will not threaten TES species and to delineate wetland and floodplain boundaries there. BRET must be notified as soon as Phase II sampling procedures are defined. Some of the necessary biological fieldwork must be conducted at specific times of the year or over an extended period. Considerable delays may result if sufficient advance notice is not provided. BRET also requests notification before disturbances other than soil sampling are initiated to allow more accurate and effective mitigation measures to be defined.

9.1 Wetlands and Floodplains

Floodplains occur within the OU in canyon bottoms, and isolated wetlands may be present. No impact is expected from surface sampling. However, heavy equipment and coring within a wetland area could discharge fill into the wetland and destroy hydrophytic vegetation. Wetland boundaries will be delineated at the time of sampling, and all sampling must be conducted outside of designated wetlands. These delineations must be done within 2 years of the sampling; after 2 years, the delineation is no longer valid and must be redone.

If heavy equipment is to be used during site characterization, the following measures must be adhered to in order to prevent unnecessary impacts:

- restrict excessive off-road travel that may disturb vegetation and cause erosion
- avoid excessive disturbance to vegetation and the soil surface which could alter the water flow and/or widen the channel
- avoid disturbances along the drainages and steeper slopes which could produce or initiate erosion
- eliminate hazardous fuel spills or leakage from vehicles or sampling machinery
- avoid unnecessary disturbance (i.e. parking areas, equipment storage areas, and off-road travel) to stream-side areas and their surrounding vegetation during travel to sampling sites and sampling

9.2 Threatened, Endangered, and Sensitive Species

9.2.1 Plants

If sampling sites are confined to TAs 36 and 68, no mitigation for TES plant species is necessary. If sampling within TA-71 is proposed, potential impacts to grama grass cactus and stream orchid must be addressed.

9.2.2 Wildlife

If sampling within TA 71 is proposed, potential impacts to an unusual pulmonate snail must be addressed.

9.2.2.1 Spotted bat

There are no known occurrence of the spotted bat in Los Alamos County. However, viable habitat does exist near OU 1130. If equipment larger than hand augers is to be used on rocky slopes, a biologist from ESH-8 must be present prior to sampling to conduct a survey of all rock crevices in the sampling area. If any evidence of bats is found in the sampling area, all sampling with heavy equipment on that slope will be canceled. Any sampling that may alter existing water sources, including vehicular travel through water courses and backfilling of streams, is prohibited without prior approval by BRET personnel. If such an alteration would damage potential spotted bat habitat, it will not be approved.

9.2.2.2 Northern Goshawk

There is no evidence that goshawks nest in OU 1130. However, many of the habitat components required for the goshawk are present, and these birds may forage within the OU. To protect this potential goshawk habitat, sampling with heavy equipment (drill rig) in upper canyon areas must be limited to October through February, leaving the months of March through September free of heavy disturbance. If scheduling requirements mandate that sampling be conducted between March through September, BRET must first conduct broadcast surveys between May 15 and June 30 to determine nest sites and occupancy. If nest sites are found or if the survey is not conducted, sampling for that area cannot begin until October 1. If nest sites are not occupied and goshawks are not found, sampling can be initiated in upper canyon areas.

9.3 Nonsensitive Species

9.3.1 Plants

Site sampling could require revegetation if the loss of vegetation initiates or increases erosion. Survey results indicate that a mixture of native grasses, forbs, and other herbaceous plants can be used to effectively revegetate; consultation with BRET or state or federal agencies would help determine the specific species.

Additional mitigation measures include the following:

- If vegetation is disturbed during sampling, revegetation will be required. BRET will develop a revegetation plan for areas where vegetation has been removed or disturbed.
- BRET must approve tree removal. BRET will determine if the tree(s) are used for nesting and/or if the removal would change the canopy characteristics of the area. If the removal would change the canopy characteristics of the area or if nest trees are found, BRET will not approve the tree removal. (Note: the majority of the proposed activities would not require any tree removal; not more than 10-12 tree are likely to be removed during site characterization.)

9.3.2 Wildlife

Most impacts to wildlife species should not be adverse, as it is projected that only during the period of actual disturbance would wildlife avoid the area. However, if heavy machinery is to be used, the following mitigation measure would further reduce the potential for impact:

Use existing roads. Where there are no roads, cross streams and arroyos in level areas that are dry or less vegetated. Do no drive in wetlands.

BRET must approve all tree removal. BRET will determine if the tree(s) are used for nesting and/or if the removal would change the canopy characteristics of the area. IF tree removal would change the canopy characteristics, of nest trees are found, BRET will not approve the tree removal. (Note: the majority of the proposed activities would not require any tree removal; not more than 10-12 trees are likely to be removed during the characterization.

Disturbances to wintering species should be minor, and the mitigation measure provided would help to reduce the impact to all wildlife species.

10. CONCLUSIONS

We summarized historical information and biological reports of previous site surveys to provide background information on OU 1130. These summaries provided inventory information that may be used in future ecological risk assessments and in pathway analyses. Compiled species lists are contained in the appendices to this report.

We conducted Level 1, 2, and 3 field surveys within and near OU 1130. In addition, the TES species data base was searched for a listing of potential species that could occur within the OU's habitat types. Species on state or federal protection lists known to occur in ponderosa pine, ponderosa-piñon, piñon-juniper, juniper grasslands, or riparian areas of Los Alamos and surrounding counties were identified.

A habitat evaluation survey was conducted to determine if the specific requirements of the species could be met in the project locations. As a result, a number of species of concern were identified. A 1992 bat survey captured no spotted bats in Los Alamos County, but further surveys are necessary to establish its presence or absence. Previous surveys for the peregrine falcon had shown that only marginal habitat was available for it within OU 1130, although Level 3 surveys conducted outside OU 1130 were used to determine its status in the area. There appears to be good foraging habitat for the northern goshawk within the OU, and additional surveys will be required to verify its presence or absence. Surveys for both raptors will be conducted in 1993. Mitigation measures have been included for the species of concern to prevent adverse impacts to their potential habitat.

Within the OU, all wetlands and floodplains were noted using the National Wetland Inventory Maps and field checks. Characteristics of wetlands, floodplains and riparian areas were noted using criteria outlined in the Corps of Engineers Wetlands Delineation Manual (US COE 1987). Delineation of wetland

boundaries was not done during these surveys, but will be conducted just prior to sampling. This will ensure that all sampling is conducted outside of areas meeting wetland criteria.

Mitigation measures (or best management practices) to reduce impacts to nonsensitive plant and wildlife species include

- (1) determining when sampling should be conducted,
- (2) using preventive measures to avoid excessive disturbance to the habitat, and
- (3) notifying BRET before disturbances other than soil sampling are initiated.

11. ACKNOWLEDGMENTS

This study was funded by and completed in cooperation with the Environmental Restoration Program of Los Alamos National Laboratory (LANL).

The study was directed by Teralene Foxx, Project Ecologist for the Biological Resource Evaluations Team (BRET). BRET is included in the Environmental Assessments and Resource Evaluations section of the Environmental Protection Group, ESH-8.

Field personnel included Kathryn Bennett (Field Leader), Environmental Scientist; Saul Cross, botanist, EPA Fellow; Dan Dunham, botanist; Delia Raymer, wildlife biologist (GRA); James Biggs, wildlife biologist; Mary Salisbury, computer support; and Alethea Banar (UGS).

12. DEFINITIONS

Biological Resources Evaluations Team (BRET): Persons within the Environmental Protection Group (ESH-8) responsible for the biological assessments.

Colonizing: A plant that has attributes which enable it to become easily established in areas of environmental disturbance or where is not wanted.

Critical habitat: Any air, land or water area and constituent elements that the loss of would appreciably decrease the likelihood of survival and recovery of a listed species or a distinct segment of its population.

Facultative: Equally likely to occur in wetlands or non wetlands (estimated probability 34-66%).

Facultative Upland: Usually occur in non wetlands (estimated probability 67-99%), but occasionally found in wetlands (estimated probability 1-33%).

Facultative Wetland: Usually occur in wetlands (estimated probability 67-99%), but occasionally found in non wetlands.

Federal Candidate (C1) Species: Taxa for which the USFWS has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species.

Federal Candidate (C2) Species: Taxa for which now in the possession of the USFWS indicates that proposing to list as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threat are not currently available to support proposed rules.

Federally Endangered Species: Any species which is endanger of extinction throughout all or a significant portion of its range.

Federally Proposed as Endangered: Taxa already proposed to be listed as endangered. Proposed species receive the protection of the Endangered Species Act.

Federally Proposed as Threatened: Taxa already proposed to be listed as threatened. Proposed species receive the protection of the Endangered Species Act.

Federally Threatened Species: Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Floodplains: Lowlands adjoining inland and coastal waters and relatively flat areas and flood prone areas of offshore islands including, at a minimum, that area inundated by 1 percent or greater chance of flood in any given year. The base floodplain is defined as the 100-year (1.0 percent) floodplain. The critical action floodplain is defined as the 500 year (0.2 percent) floodplain.

Hydric soil: A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part.

Hydrology: The presence of, distribution of, and circulation of water.

Hydrophyte: Any plant that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; plants typically found in wetlands and other aquatic habitats.

Level 1 Survey: A reconnaissance survey to determine if a proposed project is in a developed Technical Area or otherwise disturbed. Non-quantitative data about the area is obtained.

Level 2 Survey: A detailed quantitative vegetation survey that is used to evaluate critical habitat requirements for a TES species is present at the proposed project area.

Level 3 Survey: A survey aimed at obtaining information on a specific threatened or endangered species, floodplain or wetland.

National Environmental Policy Act (NEPA): A major environmental law which became effective in 1970. The law requires all projects/programs which receive federal funds to be evaluated for environmental impacts.

Nationwide Permits (NWP): Permits issued by the Corps of Engineers that pertain to specific conditions stated in the regulations.

Obligate Upland: Occur in wetlands in another region, but occur almost always (estimated probability >99%) under natural conditions in non wetlands in the region specified. If a species does not occur in wetlands in any region, it is not on the "National List".

Obligate Wetland: Occur almost always (estimated probability >99%) under natural conditions in wetlands.

Riparian: Green-belts along streams, lakes, or other wet areas. These areas are presently marginally protected by State and Federal law but have become of concern.

Solid Waste Management Unit (SWMU): Any discernible unit at which solid wastes have been placed at any time, whether or not the unit was intended for the management of solid or hazardous wastes.

Species Area Curve: Calculated by comparing total number of individual plant species recorded along a transect by total number of plots.

State Endangered Plant: A plant which has been listed on New Mexico's state endangered list. The plant is rare in numbers and/or occurrences and its further existence in the state is threatened without protection.

State Endangered Group 1: Any wildlife species or subspecies whose prospects of survival or recruitment in New Mexico are in jeopardy.

State Endangered Group 2: Any wildlife species or subspecies whose prospects of survival or recruitment in New Mexico are likely to be in jeopardy within the foreseeable future. These species are protected by State law.

State Endangered Plant (E1): The taxon is listed as threatened or endangered under the provisions of the Federal Endangered Species Act, or is considered proposed under the tenets of the act.

State Endangered Plant (E2): The taxon is a rare plant across its entire range and of such limited distribution and population size that unregulated collection could adversely impact it and jeopardize its survival in New Mexico.

State Endangered Plant (E3): The taxon may be widespread in its distribution and may occur in adjacent states or Mexico, but its numbers are being significantly reduced to such a degree that within the foreseeable future the survival of this species in New Mexico is jeopardized.

State Sensitive Plant: A plant species whose numbers or occurrences are low in the state. These species are monitored by the state to see if their status needs to be upgraded to endangered. Currently, state sensitive plants are not protected by state law.

TES Species Data Base: A data base constructed by LANL that lists and provides information on all state and federal endangered/threatened species in Los Alamos County and surrounding counties.

Wetlands: Those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflow, mud flats, and natural ponds.

13. SUMMARY OF PERTINENT REGULATIONS

Executive Order 11990 (Protection of Wetlands) calls for avoidance "to any extent possible, the long and short term adverse impacts associated with the destruction or modification of wetlands...avoid direct or indirect support of new construction in wetlands..."

Executive Order 11998 (Floodplain Management) was initiated to "protect lives and property with the need to restore and preserve natural and beneficial floodplain values...."

National Environmental Policy Act declares a national policy to encourage a productive and enjoyable harmony between man and his environment. Section 102 requires "that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations...."

Section 404 Clean Water Act provides for issuance of "permits", of discharged of dredged or fill materials into navigable waters..." after notice and opportunity for public hearings.

Endangered Species Act (16 USC 1531 et. seq.) declares the intention of Congress to conserve threatened and endangered species and the ecosystems on which those species depend.

Migratory Bird Treaty Act (16 USC 703-711) protects wild birds from collection and maiming. All wild birds are covered by the act except resident game birds, English sparrows, starlings, and feral pigeons.

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Appendix A: Plant Checklist for OU 1130*

FAMILY	SCIENTIFIC NAME	CODE	COMMON NAME
ACERACEAE	<i>Acer glabrum</i>	Acgl	New Mexico maple
	<i>Acer negundo</i>	Acne	Boxelder maple
AMARANTHACEAE	<i>Amaranthus retroflexus</i>	Amre	Pigweed
ANACARDIACEAE	<i>Rhus trilobata</i>	Rhtr	Skunk bush
APOCYNACEAE	<i>Apocynum androsaemifolium</i>	Apan	Spreading dogbane
ASCLEPIADACEAE	<i>Asclepias asperula</i>	Asas	Immortal
	<i>Asclepias subverticillata</i>	Assu	Poison milkweed
	<i>Asclepias tuberosa</i>	Astu	Butterflyweed
BERBERIDACEAE	<i>Berberis fendleri</i>	Befe	Colorado barberry
BORAGINACEAE	<i>Cryptantha fendleri</i>	Crfe	Fendler cryptantha
	<i>Cryptantha jamesii</i>	Crja	James hiddenflower
	<i>Hackelia hirsuta</i>	Hahi	Beggarlice
	<i>Lappula echinata</i>	Laec	Stickseed
	<i>Lappula redowskii</i>	Lare	Stickseed
	<i>Lappula texana</i>	Late	Stickseed
	<i>Lappula sp.</i>	Lapx	Stickseed
	<i>Lithospermum incisum</i>	Liin	Fringed puccoon
	<i>Lithospermum multiflorum</i>	Limu	Puccoon
	CACTACEAE	<i>Echinocereus triglochidiatus</i>	Ectr
<i>Echinocereus viridiflora</i>		Eevi	Strawberry cactus
<i>Opuntia imbricata</i>		Opim	Walkingstick cholla
<i>Opuntia polyacantha</i>		Oppo	Starvation cactus
<i>Opuntia sp.</i>		Opux	Prickly pear cactus
CHENOPODIACEAE	<i>Atriplex canescens</i>	Atca	Fourwing saltbush
	<i>Chenopodium alba</i>	Chal	Lamb's quarters
	<i>Chenopodium graveolans</i>	Chgr	Goosefoot
	<i>Chenopodium leptophyllum</i>	Chle	Goosefoot
	<i>Chenopodium sp.</i>	Chex	Lamb's quarters
	<i>Kochia scoparia</i>	Kosc	Summer cypress
COMPOSITAE	<i>Salsola kali</i>	Saka	Russian thistle
	<i>Achilleu lanulosa</i>	Acla	Western yarrow
	<i>Ambrosia artemisiifolia</i>	Amar	Common ragweed

<i>Ambrosia confertifolia</i>	Amco	Ragweed
<i>Ambrosia coronopifolia</i>	Amco	Ragweed
<i>Antennaria parviflora</i>	Anpa	Pussytoes
<i>Artemisia bigelovii</i>	Arbi	Bigelow sagebrush
<i>Artemisia cana</i>	Arca	Silver sagebrush
<i>Artemisia carruthii</i>	Arca	Wormwood
<i>Artemisia dracunculus</i>	Ardr	False tarragon
<i>Artemisia filifolia</i>	Arfi	Sand sagebrush
<i>Artemisia frigida</i>	Arfr	Estafiata
<i>Artemisia ludoviciana</i>	Arlu	Wormwood
<i>Artemisia tridentata</i>	Artr	Big sagebrush
<i>Aster bigelovii</i>	Asbi	Bigelow aster
<i>Aster hirtifolius</i>	Ashi	Sand aster
<i>Aster novae</i>	Asno	Aster
<i>Bahia dissecta</i>	Budi	Wild chrysanthemum
<i>Berlandiera lyrata</i>	Bely	Lyre leaf
<i>Bidens tenuisecta</i>	Bite	Sticktight
<i>Brickellia californica</i>	Brca	California brickellia
<i>Brickellia sp.</i>	Brix	Bricklebush
<i>Chicorium intybus</i>	Chin	Chickory
<i>Chrysopsis foliosa</i>	Chfo	Golden aster
<i>Chrysopsis villosa</i>	Chvi	Golden aster
<i>Chrysothamnus nauseosus</i>	Chna	Chamisa, Rabbitbrush
<i>Conyza canadensis</i>	Coca	Horseweed
<i>Erigeron canus</i>	Erca	Fleabane
<i>Erigeron divergens</i>	Erdi	Fleabane daisy
<i>Erigeron sp.</i>	Erix	Daisy
<i>Eupatorium herbaceum</i>	Euhe	Thoroughwort
<i>Gaillardia pulchella</i>	Gapu	Firewheel
<i>Grindelia aphanactis</i>	Gaap	Gumweed
<i>Gutierrezia microcephala</i>	Gumi	Snakeweed
<i>Gutierrezia sarothrae</i>	Gusa	Snakeweed
<i>Haplopappus gracilis</i>	Hagr	Goldenweed
<i>Haplopappus spinulosus</i>	Hasp	Spiny goldenweed
<i>Helianthus petiolaris</i>	Hepe	Sunflower

	<i>Helianthus sp.</i>	Helx	Sunflower
	<i>Hymenopappus filifolius</i>	Hyfi	White ragweed
	<i>Hymenoxys argentea</i>	Hyar	Perky Sue
	<i>Hymenoxys richardsonii</i>	Hyri	Bitterweed
	<i>Kuhnia chlorolepsis</i>	Kucl	Kuhnia
	<i>Lactuca sp.</i>	Lacx	Prickly lettuce
	<i>Machaeranthera biglovii</i>	Mabi	Bigelow aster
	<i>Pericome caudata</i>	Peca	Taperleaf
	<i>Psilotrope tagetina</i>	Psta	Paperflower
	<i>Senecio eremophilus</i>	Seer	Groundsel
	<i>Senecio longilobus</i>	Selo	Thread-leaf groundsel
	<i>Senecio multicapitatus</i>	Seinu	Groundsel
	<i>Senecio sp.</i>	Senx	Groundsel
	<i>Stephanomeria tenuifolia</i>	Stte	Skeleton weed
	<i>Taraxicum officinale</i>	Taof	Dandelion
	<i>Thelesperma megapotanicum</i>	Thme	Indian tea
	<i>Thelesperma trifidum</i>	Thtr	Greenthread
	<i>Townsendia exscapa</i>	Toex	Easter daisy
	<i>Tragopogon dubius</i>	Trdu	Salsify, Goatsbeard
	<i>Tragopogon pratensis</i>	Trpr	Salsify
	<i>Viguiera multiflora</i>	Vimu	Showy goldeneye
	<i>Xanthium italicum</i>	Xait	Cocklebur
CONVULVULACEAE	<i>Ipomoea coccinea</i>	Ipcx	Star-glory
CRUCIFERAE	<i>Arabis hirsuta</i>	Arhi	Hairy rockcress
	<i>Capsella bursa-pastoris</i>	Cabu	Shepherd's purse
	<i>Descurania obtusa</i>	Deob	Tansy mustard
	<i>Descurania richardsonii</i>	Deri	Tansy mustard
	<i>Descurania sp.</i>	Desx	Tansy mustard
	<i>Erysium capitatum</i>	Erca	Western wallflower
	<i>Lepidium medium</i>	Leme	Peppergrass
	<i>Lesquerella fendleri</i>	Lefe	Bladderpod
	<i>Sisymbrium altissimum</i>	Sial	Tumble mustard
	<i>Thlaspi alpestre</i>	Thal	Mountain candytuft
CUPRESSACEAE	<i>Juniperus monosperma</i>	Jumo	One-seeded juniper
	<i>Juniperus scopulorum</i>	Jusc	Rocky Mountain juniper

CYPERACEAE	<i>Carex esculentus</i>	Caes	Yellow nut sedge
	<i>Carex spp.</i>	Carx	Sedge
EUPHORBIACEAE	<i>Croton texensis</i>	Crtc	Doveweed
	<i>Euphorbia dentata</i>	Eude	Wild poinsetta
	<i>Euphorbia fendleri</i>	Eufe	Spurge
	<i>Euphorbia serpyllifolia</i>	Euse	Thymeleaf spurge
	<i>Euphorbia sp.</i>	Eupx	Spurge
FAGACEAE	<i>Quercus gambelii</i>	Quga	Gambel oak
	<i>Quercus grisea</i>	Qugr	Gray oak
	<i>Quercus turbinella</i>	Qutu	Shrub live oak
	<i>Quercus undulata</i>	Quun	Wavyleaf oak
	<i>Quercus sp.</i>	Quex	Hybrid oak
FUMARIACEAE	<i>Cordyalis aurea</i>	Coau	Golden smoke
GERANIACEAE	<i>Erodium cicutarium</i>	Erci	Cranesbill
	<i>Geranium caespitosum</i>	Geca	James geranium
GRAMINEAE	<i>Agropyron smithii</i>	Agsm	Western wheatgrass
	<i>Andropogon barbinodis</i>	Anba	Cane bluestem
	<i>Andropogon scoparius</i>	Ansc	Little bluestem
	<i>Aristida adscensionis</i>	Arad	Six-weeks three-awn
	<i>Aristida sp.</i>	Arix	Three-awn
	<i>Blepharoneuron tricholepis</i>	Bltr	Pine dropseed
	<i>Bouteloua curtipendula</i>	Bocu	Side-oats grama
	<i>Bouteloua eriopoda</i>	Boer	Black grama
	<i>Bouteloua gracilis</i>	Bogr	Blue grama
	<i>Bromus anomalous</i>	Bran	Nodding brome
	<i>Bromus frondosus</i>	Brfr	Weeping brome
	<i>Bromus purgans</i>	Brpu	Canada brome
	<i>Bromus sp.</i>	Brox	Brome grass
	<i>Bromus tectorum</i>	Brte	Downy Chess
	<i>Elymus canadensis</i>	Elca	Canada wildrye
	<i>Festuca octiflora</i>	Feoc	Six-weeks fescue
	<i>Festuca sp.</i>	Fesx	Fescue
	<i>Hilaria jamesii</i>	Hija	Galleta
	<i>Koeleria cristata</i>	Kocr	Junegrass

	<i>Muhlenbergia montana</i>	Mumo	Mountain muhly
	<i>Muhlenbergia torreyi</i>	Muto	Ring muhly
	<i>Munroa squarosa</i>	Musq	False buffalo grass
	<i>Oryzopsis hymenoides</i>	Orby	Indian rice grass
	<i>Poa fendleriana</i>	Pofe	Bluegrass
	<i>Poa interior</i>	Poin	Inland bluegrass
	<i>Poa sp.</i>	Poax	Blue grass
	<i>Setaria lutescens</i>	Selu	Bristle grass
	<i>Sitanion hystrix</i>	Sihy	Bottlebrush squirreltail
	<i>Sporobolus contractus</i>	Spco	Spike dropseed
	<i>Sporobolus cryptandrus</i>	Spcr	Sand dropseed
	<i>Sporobolus sp.</i>	Spox	Dropseed
	<i>Stipa comata</i>	Stco	Needle and thread grass
HYDROPHYLLACEAE	<i>Phacelia corrugata</i>	Phco	Scorpionweed
	<i>Phacelia sp.</i>	Phax	Scorpionweed
LABIATAE	<i>Monarda menthaefolia</i>	Mome	Beebalm
	<i>Monarda pectinata</i>	Mope	Ponymint
	<i>Prunella vulgaris</i>	Prvu	Selfheal
LEGUMINOSAE	<i>Astragalus missouriensis</i>	Asmi	Milkvetch
	<i>Astragalus sp.</i>	Astx	Milkvetch
	<i>Lotus wrightii</i>	Lowr	Deervetch
	<i>Lupinus caudatus</i>	Luca	Lupine
	<i>Lupinus kingii</i>	Luki	Lupine
	<i>Lupinus sp.</i>	Lupx	Lupine
	<i>Melilotus alba</i>	Meal	Yellow sweet clover
	<i>Melilotus indicus</i>	Mein	White sweetclover
	<i>Melilotus officinalis</i>	Meof	Yellow wild clover
	<i>Petalostemum candidum</i>	Peca	White prairie clover
	<i>Petalostemum sp.</i>	Petr	Prairie clover
	<i>Robinia neomexicana</i>	Rone	New Mexico locust
	<i>Trifolium sp.</i>	Trix	Clover
	<i>Vicia americana</i>	Viam	American vetch
LILIACEAE	<i>Allium textile</i>	Alte	Onion
	<i>Yucca angustissima</i>	Yuan	Narrowleaf yucca
	<i>Yucca baccata</i>	Yuba	Datil yucca

LINACEAE	<i>Yucca baccata</i>	Yuba	Datil yucca
	<i>Linum lewisii</i>	Lile	Blue flax
	<i>Linum neonexicana</i>	Line	New Mexico yellow flax
LOASACEAE	<i>Mentzelia albicaulis</i>	Meal	White-stemmed blazing star
	<i>Mentzelia pumila</i>	Mepu	Stickleaf
MALVACEAE	<i>Sphaeralcea coccinea</i>	Spco	Red globe mallow
	<i>Sphaeralcea sp.</i>	Sphx	Scarlet globe mallow
NYCTAGINACEAE	<i>Mirabilis linearis</i>	Mili	Four-o'clock
	<i>Mirabilis multiflora</i>	Mimu	Showy four-o'clock
	<i>Mirabilis oxybaphoides</i>	Miox	Vining four-o'clock
	<i>Oxybaphus linearis</i>	Oxli	Desert four-o'clock
OILEACEAE	<i>Forestiera neomexicana</i>	Fonc	New Mexico olive
ONAGRACEAE	<i>Oenothera albicaulis</i>	Oeal	Evening-primrose
	<i>Oenothera coronopifolia</i>	Oeco	Cutleaf evening-primrose
	<i>Oenothera hartwegii</i>	Oecha	Evening-primrose
	<i>Oenothera hookeri</i>	Oeho	Hooker's evening-primrose
	<i>Oenothera procera</i>	Oepr	Yellow evening-primrose
	<i>Oenothera sp.</i>	Oenx	Evening-primrose
OROBANACEAE	<i>Orobanche fasciculata</i>	Orfa	Broomrape
	<i>Orobanche multiflora</i>	Ormu	Broomrape
PINACEAE	<i>Abies concolor</i>	Abco	White fir
	<i>Pinus edulis</i>	Pied	Pinyon pine
	<i>Pinus ponderosa</i>	Pipo	Ponderosa pine
PLANTAGINACEAE	<i>Plantago purshii</i>	Pipu	Woolly Indian wheat
POLEMONIACEAE	<i>Ipomopsis aggregata</i>	Ipag	Scarlet trumpet
	<i>Ipomopsis longiflora</i>	Iplo	Blue gilia
POLYGONACEAE	<i>Eriogonum cernuum</i>	Erce	Skeleton weed
	<i>Eriogonum flagellaris</i>	Erfl	Wild buckwheat
	<i>Eriogonum jamesii</i>	Erja	Antelope sage
	<i>Rumex sp.</i>	Rumx	Dock
POLYPODIACEAE	<i>Cheilanthes feei</i>	Chfe	Fee's lip fern
PORTULACACEAE	<i>Portulaca oleracea</i>	Pool	Common purslane
PRIMULACEAE	<i>Androsace septentrionalis</i>	Anse	Western rock-jasmine
RANUNCULACEAE	<i>Clematis pseudoalpina</i>	Clps	Rocky Mountain clematis
	<i>Delphinium virescens</i>	Devi	Larkspur

ROSACEAE	<i>Thalictrum fendleri</i>	Thfe	Meadowrue
	<i>Cercocarpus montanus</i>	Cemo	Mountain mahogany
	<i>Fallugia paradoxa</i>	Fapa	Apache plume
	<i>Potentilla pulcherrima</i>	Popu	Beauty cinquefoil
	<i>Prunus virginiana</i>	Prvi	Western black chokecherry
RUTACEAE	<i>Rosa woodsii</i>	Rowo	Fendler's rose
	<i>Ptelea trifoliata</i>	Pttr	Narrowleaf hoptree
SALICACEAE	<i>Populus angustifolia</i>	Poan	Narrowleaf cottonwood
SANTALACEAE	<i>Populus fremontii</i>	Pofr	River cottonwood
	<i>Salix exigua</i>	Saex	Sandbar willow
	<i>Comandra pallida</i>	Copa	Bastard toadflaw
SAXIFRAGACEAE	<i>Fendlera rupicola</i>	Feru	Fendler bush
	<i>Heuchera parvifolia</i>	Hepa	Alumroot
SCROPHULARIACEAE	<i>Philadelphus microphyllus</i>	Phmi	Mockorange
	<i>Ribes cerceum</i>	Rice	Wax Current
	<i>Ribes inebrians</i>	Riin	Squaw currant
	<i>Ribes leptanthum</i>	Rile	Trumpet gooseberry
	<i>Castilleja integra</i>	Cain	Indian paintbrush
	<i>Penstemon barbatus</i>	Peba	Scarlet bugler
	<i>Penstemon secundiflorus</i>	Pese	Beard tongue
	<i>Penstemon sp.</i>	Penx	Penstemon, Beardtongue
	<i>Penstemon virgatus</i>	Pevi	Beard tongue
	<i>Verbascum thapsus</i>	Veth	Mullein
SOLANACEAE	<i>Lycium pallidum</i>	Lypa	Pale wolfberry
	<i>Physalis hederifolia</i>	Phhe	Ground cherry
	<i>Physalis neomexicana</i>	Phne	Ground cherry
	<i>Solanum sp.</i>	Solx	Wild potato, Nightshade
	<i>Tamarix gallica</i>	Taga	Tamarisk
TAMARICACEAE	<i>Celtis reticulata</i>	Cere	Western hackberry
ULMACEAE	<i>Valeriana acutiloba</i>	Vaac	Valerian
VALERIANACEAE	<i>Verbena wrightii</i>	Vewr	Wright's vervain
VERBENACEAE	<i>Viola adunca</i>	Viad	Western dog violet
VIOLACEAE	<i>Parthenocissus inserta</i>	Pain	Virginia creeper
VITACEAE	<i>Vitis arizonica</i>	Viar	Canyon grape

* This plant list was compiled from 1992 Level 2 surveys and the previous surveys listed below:

- (1). Water Canyon, firing range survey, Foxx and Tierney (April 1986)
- (2). Potrillo Canyon, large bore gun/sled track survey, Foxx and Tierney, (June 1986)
- (3). lower Ancho Canyon, pulsed power assembly building survey (August 1987)
- (4). Middle and lower Water Canyon and lower canyon rim, *Status of the Flora of the Los Alamos National Environmental Research Park*, Foxx and Tierney (1980)
- (5). Minie Site and Lower Slobbovia, Long-Term Ecological Effects of Exposure to Uranium, Hanson and Miera (1976),
- (6). Water Canyon, endangered species study, Foxx and Tierney (1977-1978)

APPENDIX B

MACROFAUNA OF LOWER SLOBBOVIA (TA-36)
AND THE EF SITE (TA-15)
from Hanson and Miera, 1976

PHYLUM	CLASS	ORDER	FAMILY	NUMBER OF SPECIES
Annelida	Oligochaeta			1
Nematoda				1
Arthropoda	Arachnida	Acarina		25-50
	Arachnida	Araneida		3
	Chilopoda		Lithobiidae	Lithodius?
	Symphyla			1
	Insecta	Thysanura		1
		Diptera	Iapygidae	1
		Collembola	Sminthuridae	1
			Poduridae	1
			Entomobryidae	1
		Psocoptera		1
		Thysanoptera		1-3
		Hemiptera		1-3
		Homoptera	Cicadellidae	1-2
		Homoptera		2-4
		Coleoptera	Elateridae	1
			Staphylinidae	2
			Carabidae	1
			Scarabaeidae	1
			Phynchophoran?	1
			Anthicidae	Notoxus
			Miscellaneous	1-3
		Lepidoptera		2-5
		Diptera	Cecidomyiidae	?
			Phoridae*	
			Tachinidae*	
			Mycetophilidae*	
			Muscidae*	
		Hymenoptera	Formicidae	2
			Tiphiidae	2

*10-15 species for all 4 dipteran families

Appendix C
Potential Ant Species within Operable Unit 1130.

SUBFAMILY	SCIENTIFIC NAME	HABITAT	TYPE	AUTHORITY	
DOLICHODERINAE	<i>Acanthomypos interjectus</i>	Ponderosa		Mayr	
	<i>Brachymyrmex depilis</i>	Ponderosa		Emery	
	<i>C. sansabeanus</i>	P-j and ponderosa	Buckley		
	<i>C. vicinus</i>	P-j and ponderosa	Mayr		
	<i>F. argentea</i>	Disturbed		Wheeler	
	<i>F. neogagates</i>	P-j and disturbed		Emery	
	<i>F. pergandei</i>	Disturbed		Emery	
	<i>F. podzolica</i>	P-j and disturbed		Francoeur	
	<i>F. subnuda</i>	Ponderosa		Emery	
	<i>L. pallitarsis</i>	Ponderosa		Provancher	
	<i>L. sitiens</i>	P-j and ponderosa	Wilson		
	<i>Polyergus breviceps</i>	Ponderosa		Emery	
	MYRMICINAE	<i>Crematogaster cerasi</i>	Ponderosa		Fitch
		<i>C. colei</i>	Disturbed		Buren
		<i>Leptothorax muscorum</i>	Ponderosa		Nylander
		<i>L. nitens</i>	Disturbed		Emery
<i>L. obliquicanthus</i>		Disturbed		Cole	
<i>Monomorium cyaneum</i>		Disturbed		Wheeler	
<i>Pheidole ceres</i>		Ponderosa,			
		Disturbed, and burned ponderosa		Wheeler	
<i>P. wheelerorum</i>		P-j and disturbed		MacKay	
<i>Pogonomyrmex occidentalis</i>		P-j and ponderosa	Cresson		
<i>Solenopsis molesta</i>	P-j and disturbed		Say		

P-j = pinon pine and juniper. Stands of Ponderosa are found in the higher elevations and along the canyon bottoms of OU 1130. Disturbed areas occur along roadways and in testing areas.

Ant species found in Riparian (R) and Ponderosa-Riparian (P-R) habitats similar to those found in OU 1130 .

SUBFAMILY NAME	SCIENTIFIC NAME	HABITAT	AUTHORITY	
MYRMICINAE	<i>Leptothorax crassipilis</i>	R	Wheeler	
	<i>L. muscorum</i>	P-R	Nylander	
	<i>L. nitens</i>	P-R	Emery	
	<i>L. texanus texanus</i>	P-R	Wheeler	
	<i>L. tricarinatus</i>	P-R	Emery	
	<i>Monomorium cyaneum</i>	P-R	Buckley	
	<i>Myrmecina americana</i>	P-R	Emery	
	<i>Myrmica emeryana</i>	P-R	Forel	
	<i>Myrmica hamulata</i>	P-R	Weber	
	<i>Pheidole ceres</i>	P-R	Wheeler	
	<i>P. wheelerorum</i>	P-R	MacKay	
	<i>Pogonomyrmex occidentalis</i>	P-R	Cresson	
	<i>Solenopsis molesta</i>	P-R and R	Say	
	<i>Stenammina occidentale</i>	P-R	M R Smith	
	DOLICHODERINAE	<i>Tapinoma sessile</i>	P-R	Say
		<i>Acanthomyops latipes</i>	P-R	Walsh
		<i>Camponotus laevigatus</i>	P-R	F Smith
		<i>C. vicinus</i>	P-R	Wheeler
		<i>F. densiventris</i>	P-R	Linnaeus
		<i>F. hewitti</i>	P-R	Wheeler
<i>F. lasioides</i>		P-R	Emery	
<i>F. limata</i>		P-R	Wheeler	
<i>F. neorufibarbis</i>		R	Emery	
<i>F. obscuripes obscuripes</i>		P-R	Forel	
<i>F. obscuriventris clivia</i>		P-R	Creighton	
<i>F. occulta</i>		P-R	Francoeur	
<i>F. planipilis</i>		P-R	Creighton	
<i>F. podzolica</i>		P-R	Francoeur	
<i>Lusius alienus</i>		P-R	Foerster	
<i>L. crypticus</i>		P-R	Wilson	
<i>L. flavus</i>		P-R	Fabricius	
<i>L. neoniger</i>		P-R	Emery	
<i>L. niger</i>		P-R	Linnaeus	
<i>L. pallitarsis</i>		P-R	Provancher	
<i>L. subumbratus</i>	P-R	Viereck		
<i>Liometopium apiculatum</i>	P-R	Mayr		
<i>L. luctuosum</i>	P-R	Wheeler		

APPENDIX D

INSECTS OF ANCHO CANYON (HAARMANN 1991)

ORDER	FAMILY	COMMON NAME
COLEOPTERA (beetles)	Buprestidae	Metallic wood boring beetles
	Carabidae	Ground beetles
	Chrysomelidae	Leaf beetles
	Cicindelidae	Tiger beetles
	Elateridae	Click beetles
	Scarabaeidae	Scarab beetles
	Entomobryidae	Springtails
DIPTERA (flies)	Phoridae	Hump-backed flies
	Tachinidae	Tachinid flies
HEMIPTERA (bugs)	Anthocoridae	Minute pirate bugs
	Reduviidae	Assassin bug
HYMENOPTERA (wasps, bees, ants)	Apidae	Carpenter bees Honey bees
	Colletidae	Plasterer bees
	Formicidae	Ants
	Halictidae	Mining bees
	Sphecidae	Sphecid wasps
	Vespidae	Paper wasps
	LEPIDOPTERA (butterflies, moths)	Hesperiidae
Noctuidae		Noctuid moths
Pieridae		Sulfur butterflies
NEUROPTERA (nerve-winged insects)	Mymecoptidae	Antlions
ORTHOPERA (grasshoppers, crickets)	Acrididae	Grasshoppers
	Gryllacrididae	Wingless grasshoppers
	Gryllidae	Crickets
	Mantidae	Mantids
THYSANURA (bristletails)	Machilidae	Jumping bristletails

Appendix E

**Reptiles and Amphibians of OU 1130 and Surrounding Canyons
Found by Charles Bogart (1978-1979)**

FAMILY	SCIENTIFIC NAME	COMMON NAME	LOCATION
AMBYSTOMATIDAE	<i>Ambystoma tigrinum</i>	Tiger salamander	Pajarito Canyon
BUFONIDAE	<i>Bufo punctatus</i>	Red-spotted toad	Pajarito Canyon
	<i>Bufo woodhousei</i>	Woodhouse toad	Pajarito Canyon
COLUBRIDAE	<i>Elphae guttata</i>	Corn snake	Pajarito Canyon
	<i>Thamnophis elegans</i>	Western terrestrial garter snake	Pajarito Canyon
HYLIDAE	<i>Hyla arenicolor</i>	Canyon treefrog	Pajarito Canyon
	<i>Pseudocris triseriata</i>	Striped chorus frog	Pajarito Canyon
IGUANIDAE	<i>Crotophytus collaris</i>	Collared lizard	Water Canyon
	<i>Phrynosoma douglassi</i>	Short-horned lizard	Ancho Canyon
	<i>Sceloporus undulatus</i>	Eastern fence lizard	Throughout LA county from 1640 m to 2500m
	<i>Urosaurus ornatus</i>	Tree lizard	Ancho Canyon
PELOBATIDAE	<i>Scaphiopus multiplicatus</i>	Southern spadefoot	Pajarito Canyon
SCINCIDAE	<i>Eumeces obsoletus</i>	Great Plains skink	Ancho Canyon
TEIIDAE	<i>Cnemidophorus exsanguis</i>	Chihuahuan spotted whiptail	Ancho Canyon
	<i>Cnemidophorus velox</i>	Plateau striped whiptail	Pajarito Canyon
VIPERIDAE	<i>Crotalus atrox</i>	Western diamondback rattlesnake	Ancho Canyon

APPENDIX F

BREEDING BIRDS OF OU 1130
from Atlas of the Breeding Birds of Los Alamos County, New Mexico

FAMILY	SCIENTIFIC NAME	COMMON NAME	NESTING STATUS
ACCIPITRIDAE	<i>Accipiter cooperi</i>	Cooper's hawk	Confirmed
	<i>Buteo jamaicensis</i>	Red-tailed hawk	Confirmed
APODIDAE	<i>Aeronautes saxatalis</i>	White-throated swift	Confirmed
CAPRIMULGIDAE	<i>Chordeiles minor</i>	Common nighthawk	Probable
CATHARTIDAE	<i>Cathartes aura</i>	Turkey vulture	Possible
COLUMBIDAE	<i>Zenaidura macroura</i>	Mourning dove	Probable
CORVIDAE	<i>Aphelocoma coerulescens</i>	Scrub jay	Confirmed
	<i>Corvus corax</i>	Common raven	Confirmed
	<i>Cyanocitta stelleri</i>	Steller's jay	Confirmed
	<i>Gymnorhinus cyanocephalus</i>	Pinon jay	Confirmed
	<i>Chondestes grammacus</i>	Lark sparrow	Confirmed
EMBERIZIDAE	<i>Coccothraustes vespertina</i>	Evening grosbeak	Probable
	<i>Guiraca caerulea</i>	Blue grosbeak	Probable
	<i>Melospiza Melodia</i>	Song sparrow	Probable
	<i>Pheucticus melanocephalus</i>	Black-headed grosbeak	Confirmed
	<i>Pipilo chlorurus</i>	Green-tailed towhee	Possible
	<i>Pipilo erythrophthalmus</i>	Rufous-sided towhee	Confirmed
	<i>Pipilo fuscus</i>	Canyon towhee	Confirmed
	<i>Spizella passerina</i>	Chipping sparrow	Confirmed
FALCONIDAE	<i>Falco sparverius</i>	American kestrel	Confirmed
FRINGILLIDAE	<i>Carduelis psaltria</i>	Lesser goldfinch	Confirmed
	<i>Carpodacus casinii</i>	Cassin's finch	Probable
	<i>Carpodacus mexicanus</i>	House finch	Confirmed
	<i>Loxia curvirostra</i>	Red crossbill	Possible
HIRUNDINIDAE	<i>Hirundo pyrrhonota</i>	Cliff swallow	Probable
	<i>Tachycineta thalassina</i>	Violet-green swallow	Confirmed
ICTERIDAE	<i>Agelaius phoeniceus</i>	Red-winged blackbird	Probable

	<i>Euphagus cyanocephalus</i>	Brewer's blackbird	Confirmed
	<i>Icterus parisorum</i>	Scott's oriole	Confirmed
	<i>Molothrus ater</i>	Brown-headed cowbird	Confirmed
	<i>Sturnella neglecta</i>	Western meadowlark	Possible
MIMIDAE	<i>Mimus polyglottus</i>	Northern mockingbird	Possible
MUSCICAPIDAE	<i>Catharus guttatus</i>	Hermit thrush	Possible
	<i>Myadestes towsendi</i>	Townsend's solitaire	Possible
	<i>Sialia currucoides</i>	Mountain bluebird	Confirmed
	<i>Sialia mexicana</i>	Western bluebird	Confirmed
	<i>Turdus migratorius</i>	American robin	Confirmed
PARIDAE	<i>Parus gambeli</i>	Mountain chickadee	Confirmed
	<i>Parus inornatus</i>	Plain titmouse	Confirmed
	<i>Psaltiriparus minimus</i>	Bushtit	Confirmed
PARULIDAE	<i>Dendroica coronata</i>	Yellow-rumped warbler	Possible
	<i>Dendroica graciae</i>	Grace's warbler	Confirmed
	<i>Dendroica nigrescens</i>	Black-throated warbler	Confirmed
PHASIANIDAE	<i>Callipepla gambelii</i>	Gambel's quail	Confirmed
PICIDAE	<i>Colaptes auratus</i>	Northern flicker	Confirmed
	<i>Picoides villosus</i>	Hairy woodpecker	Confirmed
	<i>Sphyrapicus thyroideus</i>	Williamson's sapsucker	Possible
PLOCEIDAE	<i>Passer domesticus</i>	House sparrow	Confirmed
SITTIDAE	<i>Sitta carolinensis</i>	White-breasted nuthatch	Confirmed
	<i>Sitta pygmaea</i>	Pygmy nuthatch	Confirmed
STRIGIDAE	<i>Bubo virginianus</i>	Great horned owl	Confirmed
	<i>Otus flammeolus</i>	Flammulated owl	Possible
STURNIDAE	<i>Sturnus vulgaris</i>	European starling	Confirmed
SYLVIDAE	<i>Poliopitila melanura</i>	Blue-gray gnatcatcher	Probable
THRAUPIDAE	<i>Piranga flava</i>	Hepatic tanager	Confirmed
	<i>Piranga ludoviciana</i>	Western tanager	Confirmed
TROCHILIDAE	<i>Archilocus alexandri</i>	Black-chinned hummingbird	Confirmed
	<i>Selasphorus platycercus</i>	Broad-tailed hummingbird	Confirmed
TROGLODYTIDAE	<i>Catherpes mexicanus</i>	Canyon wren	Confirmed
	<i>Salpinctes obsoletus</i>	Rock wren	Confirmed
	<i>Thryomanes bewickii</i>	Bewick's wren	Probable
	<i>Troglodytes aedon</i>	House wren	Confirmed
TYRANNIDAE	<i>Empidonax hammondii</i>	Hammond's flycatcher	Possible

	<i>Empidonax oberholseri</i>	Dusky flycatcher	Possible
	<i>Empidonax wrightii</i>	Gray flycatcher	Possible
	<i>Myiarchus cinerascens</i>	Ash-throated flycatcher	Confirmed
	<i>Sayornis saya</i>	Say's phoebe	Confirmed
	<i>Tyrannus vociferans</i>	Cassin's kingbird	Confirmed
VIREONIDAE	<i>Vireo gilvus</i>	Warbling vireo	Possible
	<i>Vireo solitarius</i>	Solitary vireo	Confirmed

APPENDIX G
WINTERING BIRDS OF POTRILLO CANYON
(WENZEL AND KENT, FEBRUARY AND MARCH, 1986)

FAMILY	SCIENTIFIC NAME	COMMON NAME
ACCIPITRIDAE	<i>Buteo jamaicensis</i>	Red-tailed hawk
COLUMBIDAE	<i>Zenaidura macroura</i>	Mourning dove
CORVIDAE	<i>Aphelocoma coerulescens</i>	Scrub jay
	<i>Corvus corax</i>	Common raven
FRINGILLIDAE	<i>Carpodacus mexicanus</i>	House finch
	<i>Junco hyemalis</i>	Dark-eyed junco
	<i>Pipilo erythrophthalmus</i>	Rufus-sided towhee
	<i>Pipilo fuscus</i>	Brown towhee
MELEAGRIDIDAE	<i>Meleagris gallopavo</i>	Wild turkey
PARIDAE	<i>Parus gambeli</i>	Mountain chickadee
	<i>Parus inornatus</i>	Plain titmouse
PICIDAE	<i>Colaptes auratus</i>	Yellow-shafted flicker
	<i>Dendrocopos pubescens</i>	Downy woodpecker
	<i>Dendrocopos villosus</i>	Hairy woodpecker
	<i>Sphyrapicus throideus</i>	Williamson's sapsucker
SITTIDAE	<i>Sitta carolinensis</i>	White-breasted nuthatch
	<i>Sitta pygmaea</i>	Pigmy nuthatch
TROGLODYTIDAE	<i>Catherpes mexicanus</i>	Canyon wren
	<i>Troglodytes aedon</i>	House wren
TURDIDAE	<i>Myadestes townsendi</i>	Townsend's solitaire
	<i>Sialia currucoides</i>	Mountain bluebird
	<i>Sialia mexicana</i>	Western bluebird
	<i>Turdus migratorius</i>	American robin

APPENDIX H: MAMMALS OF OU 1130
(bats also listed in Appendix I)

FAMILY	SCIENTIFIC NAME	COMMON NAME	CANYON or SITE
CANIDAE	<i>Canis latrans</i>	Coyote	Potrillo, Water
	<i>Urocyon cinereoargenteus</i>	Gray fox	
CERVIDAE	<i>Cervus canadensis</i>	Elk	Potrillo, Water
	<i>Odocoileus hemionus</i>	Mule deer	Potrillo, Water
CRICETIDAE	<i>Neotoma</i> sp.	Woodrat	Water
	<i>Peromyscus maniculatus</i>	Deer mouse	Potrillo
	<i>Peromyscus truei</i>	Pinon mouse	Potrillo
	<i>Reithrodontomys megalotis</i>	Western harvest mouse	Minie, Lower Slobbovia
ERETHIZONTIDAE	<i>Erethizon dorsatum</i>	Porcupine	Potrillo, Water
EQUIDAE	<i>Equus caballus</i>	Domestic horse	Potrillo
FELIDAE	<i>Felis concolor</i>	Mountain lion	
	<i>Lynx rufus</i>	Bobcat	
GEOMYIDAE	<i>Thomomys</i> sp.	Pocket gopher	Potrillo, Water
HETEROMYIDAE	<i>Perognathus flavus</i>	Silky pocket mouse	Potrillo
	<i>Perognathus intermedius</i>	Rock pocket mouse	Potrillo
LEPORIDAE	<i>Sylvilagus</i> sp.	Cottontail rabbit	Potrillo, Water, Lower Slobbovia
MUSTELIDAE	<i>Mephitis mephitis</i>	Striped skunk	
	<i>Taxidea taxus</i>	Badger	Potrillo
PROCYONIDAE	<i>Procyon lotor</i>	Raccoon	
SCIURIDAE	<i>Eutamias minimus</i>	Least chipmunk	Potrillo, Water
	<i>Eutamias quadrivittatus</i>	Colorado chipmunk	Potrillo
	<i>Citellus variegatus</i>	Rock squirrel	Water
	<i>Sciurus aberti</i>	Abert's squirrel	Water
URSIDAE	<i>Ursus americanus</i>	Black bear	

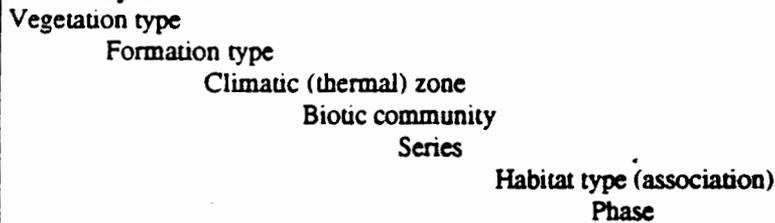
Appendix F was based on information from

- (1). Jim Kent, 1986, small mammal trapping in Potrillo Canyon
- (2). Wenzel and Kent, 1986, observations in Potrillo Canyon
- (3). Colleen Olinger, 1986, observations in lower Water Canyon
- (4). Rudy Archeleta, personal observations (no locations given)
- (5). Joan Morrison, 1986, small mammal trapping in Water Canyon
- (6). Hanson and Miera, 1976, small mammal trapping at Minie Site and Lower Slobbovia

APPENDIX I

PLANT CLASSIFICATION OUTLINE

Hierarchy Order



Definitions

Vegetation type: Vegetation established under existing climate and includes one of two types: Upland and Wetland.

Formation type: Formations that are vegetative responses to various environmental factors, primarily available soil moisture, and include the following:

UPLAND	WETLAND
Tundra	Wet tundra
Forest and woodland	Forest
Scrub land	Swamp-scrub
Grassland	Marshland
Desert	Strand
Non-vascular	Submergent

Climatic zone: One of the four world climatic zones which minimum temperature is the primary determining factor. These include Arctic-Boreal, Cold Temperate, Warm Temperate, and Tropical-Subtropical.

Biotic community: A unit characterized by a distinct evolutionary history within a formation and centered in a biogeographic region with a particular precipitation pattern or climatic regime.

Series: A principal plant-animal community within a biotic community. These are based on distinct climax plant dominants.

Habitat type: An area within a series defined by the occurrence of a particular dominant species of local or regional distribution.

Phase: A sub category established by analyzing detailed data collection to determine codominants, understory, and other associated species.

Only those formations, climatic zones, communities, etc., occurring in LANL will be listed. For a more complete description, see Brown *et al.* (1982). Appendix A explains plant code abbreviations.

APPENDIX J

**Bats of Los Alamos County
(3/D ENVIRONMENTAL SERVICES, SUMMER 1992)**

SCIENTIFIC NAME	COMMON NAME	FEMALE NR	FEMALE RF	MALE	JUV	UNK	TOTAL
<i>Antrozous pallidus</i>	Pallid bat	0	4	4	0	2	10
<i>Eptesicus fuscus</i>	Big brown bat	1	2	7	0	0	10
<i>Lasionycteris noctivagans</i>	Silver-haired bat	0	0	15	0	0	15
<i>Lasiurus cinereus</i>	Hoary bat	0	0	11	0	0	11
<i>Myotis californicus</i>	California myotis	0	2	2	0	0	4
<i>Myotis evotis</i>	Long-eared myotis	2	2	2	0	1	7
<i>Myotis leibii</i>	Small-footed myotis	0	0	5	0	0	5
<i>Myotis thysanodes</i>	Fringed myotis	1	6	4	2	0	13
<i>Myotis volans</i>	Long-legged myotis	1	1	4	1	0	7
<i>Myotis yumanensis</i>	Yuma myotis	0	4	1	0	0	5
<i>Pipistrellus herperus</i>	Western pipistrelle	0	0	1	0	0	1
<i>Plecotus townsendii</i>	Townsend's big-eared bat	0	0	1	0	0	1
<i>Tadarida brasiliensis</i>	Brazilian free-tailed bat	0	1	3	0	1	5

Abbreviations used in Appendix I: Bats of Los Alamos County

- NR = nonreproductive adult female
- RF = reproductive adult female
- MALE = adult male
- JUV = juvenile (male or female)
- UNK = age/sex unknown (escaped from net prior to handling)

APPENDIX K: Plant Checklist for OU 1130 including Indicator Status *

FAMILY	SCIENTIFIC NAME	INDICATOR	COMMON NAME
ACERACEAE	<i>Acer glabrum</i>	NW, FAC	New Mexico maple
	<i>Acer negundo</i>	NW, FAC	Boxelder maple
AMARANTHACEAE	<i>Amaranthus retroflexus</i>	ECO	Pigweed
ANACARDIACEAE	<i>Rhus trilobata</i>	FAC	Skunk bush
APOCYNACEAE	<i>Apocynum androsaemifolium</i>	ECO	Spreading dogbane
ASCLEPIADACEAE	<i>Asclepias asperula</i>	NW	Immortal
	<i>Asclepias subverticillata</i>	ECO, FACU	Poison milkweed
	<i>Asclepias tuberosa</i>	NW	Butterflyweed
BERBERIDACEAE	<i>Berberis fendleri</i>	NW	Colorado barberry
BORAGINACEAE	<i>Cryptantha fendleri</i>	NW	Fendler cryptantha
	<i>Cryptantha jamesii</i>	NW	James hiddenflower
	<i>Hackelia hirsuta</i>		Beggarlice
	<i>Lappula echinata</i>	ECO	Stickseed
	<i>Lappula redowskii</i>	COL	Stickseed
	<i>Lappula texana</i>		Stickseed
	<i>Lappula sp.</i>		Stickseed
	<i>Lithospermum incisum</i>	NW	Fringed puccoon
	<i>Lithospermum multiflorum</i>	NW	Puccoon
	CACTACEAE	<i>Echinocereus triglochidiatus</i>	NW
<i>Echinocereus viridiflora</i>		NW	Strawberry cactus
<i>Opuntia imbricata</i>		ECO	Walkingstick cholla
<i>Opuntia polyacantha</i>		ECO	Starvation cactus
<i>Opuntia sp.</i>			Prickly pear cactus
CHENOPODIACEAE	<i>Atriplex canescens</i>	NW	Fourwing saltbush
	<i>Chenopodium alba</i>	ECO, FAC	Lamb's quarters
	<i>Chenopodium graveolans</i>	COL	Goosefoot
	<i>Chenopodium leptophyllum</i>	NW, FACU	Goosefoot
	<i>Chenopodium sp.</i>		Lamb's quarters
	<i>Kochia scoparia</i>	ECO, FAC	Summer cypress
COMPOSITAE	<i>Salsola kali</i>		Russian thistle
	<i>Achillea lanulosa</i>	ECO	Western yarrow
	<i>Ambrosia artemisiifolia</i>	COL, FACU	Common ragweed

<i>Ambrosia confertifolia</i>		Ragweed
<i>Ambrosia coronopifolia</i>		Ragweed
<i>Antennaria parviflora</i>	NW	Pussytoes
<i>Artemisia bigelovii</i>	NW	Bigelow sagebrush
<i>Artemisia cana</i>	NW, FACW	Silver sagebrush
<i>Artemisia carruthii</i>	NW	Wormwood
<i>Artemisia dracunculus</i>	NW	False tarragon
<i>Artemisia filifolia</i>	ECO	Sand sagebrush
<i>Artemisia frigida</i>	COL.	Estafiata
<i>Artemisia ludoviciana</i>	NW	Wormwood
<i>Artemisia tridentata</i>	ECO	Big sagebrush
<i>Aster bigelovii</i>		Bigelow aster
<i>Aster hirtifolius</i>		Sand aster
<i>Aster novae</i>	COL, FACW	Aster
<i>Buhia dissecta</i>	NW	Wild chrysanthemum
<i>Berlandiera lyrata</i>		Lyre leaf
<i>Bidens tenuisecta</i>		Sticktight
<i>Brickellia californica</i>	NW, FACU	California brickellia
<i>Brickellia sp.</i>		Bricklebush
<i>Chicorium intybus</i>		Chickory
<i>Chrysopsis foliosa</i>		Golden aster
<i>Chrysopsis villosa</i>		Golden aster
<i>Chrysothamnus nauseosus</i>	ECO	Chamisa, Rabbitbrush
<i>Conyza canadensis</i>	ECO, FACU	Horseweed
<i>Erigeron canus</i>	NW	Fleabane
<i>Erigeron divergens</i>	NW	Fleabane daisy
<i>Erigeron sp.</i>		Daisy
<i>Eupatorium herbaceum</i>	NW	Thoroughwort
<i>Gaillardia pulchella</i>		Firewheel
<i>Grindelia aphanactis</i>	NW	Gumweed
<i>Gutierrezia microcephala</i>	ECO	Snakeweed
<i>Gutierrezia sarothrae</i>	ECO	Snakeweed
<i>Haplopappus gracilis</i>	NW	Goldenweed
<i>Haplopappus spinulosus</i>		Spiny goldenweed
<i>Helianthus petiolaris</i>	ECO	Sunflower

	<i>Helianthus sp.</i>		Sunflower
	<i>Hymenopappus filifolius</i>	NW	White ragweed
	<i>Hymenoxys argentea</i>		Perky Sue
	<i>Hymenoxys richardsonii</i>	NW	Bitterweed
	<i>Kuhnia chlorolepsis</i>		Kuhnia
	<i>Lactuca sp.</i>		Prickly lettuce
	<i>Machaeranthera biglovii</i>	NW	Bigelow aster
	<i>Pericome caudata</i>	NW	Taperleaf
	<i>Psilotrope tagetina</i>	NW	Paperflower
	<i>Senecio eremophilus</i>		Groundsel
	<i>Senecio longilobus</i>		Thread-leaf groundsel
	<i>Senecio multicapitatus</i>	NW	Groundsel
	<i>Senecio sp.</i>		Groundsel
	<i>Stephanomeria tenuifolia</i>	NW	Skeleton weed
	<i>Taraxicum officinale</i>	ECO	Dandelion
	<i>Thelesperma megapotamicum</i>	NW	Indian tea
	<i>Thelesperma trifidum</i>		Greenthread
	<i>Townsendia exscapa</i>		Easter daisy
	<i>Tragopogon dubius</i>	ECO	Salisfy, Goatsbeard
	<i>Tragopogon pratensis</i>	ECO	Salsify.
	<i>Viguiera multiflora</i>		Showy goldeneye
	<i>Xanthium italicum</i>		Cocklebur
CONVULVULACEAE	<i>Ipomoea coccinea</i>	FAC	Star-glory
CRUCIFERAE	<i>Arabis hirsuta</i>	NW, FACU	Hairy rockcress
	<i>Capsella bursa-pastoris</i>	ECO, FAC	Shepherd's purse
	<i>Descurania obtusa</i>	NW	Tansy mustard
	<i>Descurania richardsonii</i>	NW	Tansy mustard
	<i>Descurania sp.</i>		Tansy mustard
	<i>Erysium capitatum</i>		Western wallflower
	<i>Lepidium medium</i>		Peppergrass
	<i>Lesquerella fendleri</i>		Bladderpod
	<i>Sisymbrium altissimum</i>	ECO, FAC	Tumble mustard
	<i>Thlaspi alpestre</i>		Mountain candytuft
CUPRESSACEAE	<i>Juniperus monosperma</i>	NW	One-seeded juniper
	<i>Juniperus scopulorum</i>	NW	Rocky Mountain juniper

CYPERACEAE	<i>Carex esculentus</i>		Yellow nut sedge
	<i>Carex spp.</i>		Sedge
EUPHORBIACEAE	<i>Croton texensis</i>	NW	Doveweed
	<i>Euphorbia dentata</i>	ECO	Wild poinsetta
	<i>Euphorbia fendleri</i>	NW	Spurge
	<i>Euphorbia serpyllifolia</i>	ECO	Thymeleaf spurge
	<i>Euphorbia sp.</i>		Spurge
FAGACEAE	<i>Quercus gambelii</i>	NW	Gambel oak
	<i>Quercus grisea</i>	NW	Gray oak
	<i>Quercus turbinella</i>	NW	Shrub live oak
	<i>Quercus undulata</i>	NW	Wavyleaf oak
	<i>Quercus sp.</i>		Hybrid oak
FUMARIACEAE	<i>Cordyalis aurea</i>	COL	Golden smoke
GERANIACEAE	<i>Erodium cicutarium</i>	ECO	Cranesbill
	<i>Geranium caespitosum</i>		James geranium
GRAMINEAE	<i>Agropyron smithii</i>	NW, FAC	Western wheatgrass
	<i>Andropogon barbinodis</i>	NW	Cane bluestem
	<i>Andropogon scoparius</i>	NW	Little bluestem
	<i>Aristida adscensionis</i>	NW	Six-weeks three-awn
	<i>Aristida sp.</i>		Three-awn
	<i>Blepharoneuron tricholepis</i>	NW	Pine dropseed
	<i>Bouteloua curtipendula</i>	NW	Side-oats grama
	<i>Bouteloua eriopoda</i>	NW	Black grama
	<i>Bouteloua gracilis</i>	NW	Blue grama
	<i>Bromus anomalous</i>	NW	Nodding brome
	<i>Bromus frondosus</i>	NW	Weeping brome
	<i>Bromus purgans</i>	NW	Canada brome
	<i>Bromus sp.</i>		Bromegrass
	<i>Bromus tectorum</i>	ECO	Downy Chess
	<i>Elymus canadensis</i>	NW, FAC	Canada wildrye
	<i>Festuca octiflora</i>		Six-weeks fescue
	<i>Festuca sp.</i>		Fescue
	<i>Hilaria jamesii</i>	NW	Galleta
	<i>Koeleria cristata</i>	NW	Junegrass
	<i>Lycrus phleoides</i>	NW	Wolftail

	<i>Muhlenbergia montana</i>	NW	Mountain mubly
	<i>Muhlenbergia torreyi</i>	NW	Ring muhly
	<i>Munroa squarosa</i>	NW	False buffalo grass
	<i>Oryzopsis hymenoides</i>	NW, FACU	Indian rice grass
	<i>Poa fendleriana</i>	NW	Bluegrass
	<i>Poa interior</i>		Inland bluegrass
	<i>Poa sp.</i>		Blue grass
	<i>Setaria lutescens</i>		Bristle grass
	<i>Sitanion hystrix</i>	NW	Bottlebrush squirreltail
	<i>Sporobolus contractus</i>	NW	Spike dropseed
	<i>Sporobolus cryptandrus</i>	NW, FACU	Sand dropseed
	<i>Sporobolus sp.</i>		Dropseed
	<i>Stipa comata</i>	NW	Needle and thread grass
HYDROPHYLLACEAE	<i>Phacelia corrugata</i>	NW	Scorpionweed
	<i>Phacelia sp.</i>		Scorpionweed
LABIATAE	<i>Monarda menthaefolia</i>		Beebalm
	<i>Monarda pectinata</i>	NW	Ponymint
	<i>Prunella vulgaris</i>	NW, FACW	Selfheal
LEGUMINOSAE	<i>Astragalus missouriensis</i>	NW	Milkvetch
	<i>Astragalus sp.</i>		Milkvetch
	<i>Lotus wrightii</i>	NW	Deervetch
	<i>Lupinus caudatus</i>	NW	Lupine
	<i>Lupinus kingii</i>	NW, FAC	Lupine
	<i>Lupinus sp.</i>		Lupine
	<i>Melilotus alba</i>	COL, FACU	Yellow sweet clover
	<i>Melilotus indicus</i>	COL, FACU	White sweetclover
	<i>Melilotus officinalis</i>	COL, FACU	Yellow wild clover
	<i>Petalostemum candidum</i>		White prairie clover
	<i>Petalostemum sp.</i>		Prairie clover
	<i>Robinia neomexicana</i>	NW	New Mexico locust
	<i>Trifolium sp.</i>		Clover
	<i>Vicia americana</i>	NW	American vetch
LILIACEAE	<i>Allium textile</i>	ECO	Onion
	<i>Yucca angustissima</i>	NW	Narrowleaf yucca
	<i>Yucca baccata</i>	ECO	Datil yucca

LIINACEAE	<i>Linum lewisii</i>	NW	Blue flax
	<i>Linum neomexicana</i>		New Mexico yellow flax
LOASACEAE	<i>Mentzelia albicaulis</i>	NW	White-stemmed blazing star
	<i>Mentzelia pumila</i>	NW	Stickleaf
MAI.VACEAE	<i>Sphaeralcea coccinea</i>	NW	Red globe mallow
	<i>Sphaeralcea sp.</i>		Scarlet globe mallow
NYCTAGINACEAE	<i>Mirabilis linearis</i>		Four-o'clock
	<i>Mirabilis multiflora</i>	NW	Showy four-o'clock
	<i>Mirabilis oxybaphoides</i>		Vining four-o'clock
	<i>Oxybaphus linearis</i>	NW, FACU	Desert four-o'clock
OLEACEAE	<i>Forestiera neomexicana</i>	NW, FACU	New Mexico olive
ONAGRACEAE	<i>Oenothera albicaulis</i>	NW	Evening-primrose
	<i>Oenothera coronopifolia</i>	NW	Cutleaf evening-primrose
	<i>Oenothera hartwegii</i>		Evening-primrose
	<i>Oenothera hookeri</i>	NW	Hooker's evening-primrose
	<i>Oenothera procera</i>		Yellow evening-primrose
	<i>Oenothera sp.</i>		Evening-primrose
OROBANACEAE	<i>Orobanche fasciculata</i>	NW	Broomrape
	<i>Orobanche multiflora</i>	NW	Broomrape
PINACEAE	<i>Abies concolor</i>	NW	White fir
	<i>Pinus edulis</i>	NW	Pinyon pine
	<i>Pinus ponderosa</i>	NW, FACU	Ponderosa pine
PLANTAGINACEAE	<i>Plantago purshii</i>	NW	Wooly Indian wheat
POLYMONIACEAE	<i>Ipomopsis aggregata</i>	NW	Scarlet trumpet
	<i>Ipomopsis longiflora</i>	NW	Blue gilia
POLYGONACEAE	<i>Eriogonum cernuum</i>	NW	Skeleton weed
	<i>Eriogonum flagellaris</i>		Wild buckwheat
	<i>Eriogonum jamesii</i>	NW	Antelope sage
	<i>Rumex sp.</i>		Dock
POLYPODIACEAE	<i>Cheilanthes feei</i>	NW	Fee's lip fern
PORTULACACEAE	<i>Portulaca oleracea</i>	ECO, FAC	Common purslane
PRIMULACEAE	<i>Androsace septentrionalis</i>	NW, FAC	Western rock-jasmine
RANUNCULACEAE	<i>Clematis pseudoalpina</i>		Rocky Mountain clematis
	<i>Delphinium virescens</i>	ECO	Larkspur
	<i>Thalictrum fendleri</i>	NW, FACU	Meadowrue

ROSACEAE	<i>Cercocarpus montanus</i>	NW	Mountain mahogany
	<i>Fallugia paradoxa</i>	NW	Apache plume
	<i>Potentilla pulcherrima</i>		Beauty cinquefoil
	<i>Prunus virginiana</i>	NW	Western black chokecherry
	<i>Rosa woodsii</i>	NW, FACU	Fendler's rose
RUTACEAE	<i>Ptelea trifoliata</i>	FACU	Narrowleaf hoptree
SALICACEAE	<i>Populus angustifolia</i>	NW, FACW	Narrowleaf cottonwood
	<i>Populus fremontii</i>	NW, FAC	River cottonwood
	<i>Salix exigua</i>	NW	Sandbar willow
SANTALACEAE	<i>Comandra pallida</i>		Bastard toadflaw
SAXIFRAGACEAE	<i>Fendlera rupicola</i>	NW	Fendler bush
	<i>Heuchera parvifolia</i>	NW	Alumroot
	<i>Philadelphus microphyllus</i>	NW	Mockorange
	<i>Ribes cerceun</i>	NW	Wax Current
	<i>Ribes inebrians</i>		Squaw currant
	<i>Ribes lephanthum</i>	NW	Trumpet gooseberry
SCROPHULARIACEAE	<i>Castilleja integra</i>	NW	Indian paintbrush
	<i>Penstemon barbatus</i>	NW	Scarlet bugler
	<i>Penstemon secundiflorus</i>	NW	Beard tongue
	<i>Penstemon sp.</i>		Penstemon, Beardtongue
	<i>Penstemon virgatus</i>	NW, FACU	Beard tongue
	<i>Verbascum thapsus</i>	ECO	Mullein
SOLANACEAE	<i>Lycium pallidum</i>	NW	Pale wolfberry
	<i>Physalis hederifolia</i>	NW	Ground cherry
	<i>Physalis neomexicana</i>		Ground cherry
	<i>Solanum sp.</i>		Wild potato, Nightshade
TAMARICACEAE	<i>Tamarix gallica</i>		Tamarisk
ULMACEAE	<i>Celtis reticulata</i>	NW, FACU	Western hackberry
VALERIANACEAE	<i>Valeriana acutiloba</i>		Valerian
VERBENACEAE	<i>Verbena wrightii</i>	NW	Wright's vervain
VILOCEAE	<i>Viola adunca</i>	NW, FAC	Western dog violet
VITACEAE	<i>Parthenocissus inserta</i>		Virginia creeper
	<i>Vitis arizonica</i>	NW, FAC	Canyon grape

* INDICATOR CODES

NW = Non-weedy

Col = Colonizing

FAC = Facultative plants which are equally likely to occur in wetlands or nonwetlands

FACU = Facultative upland plants which usually occur in nonwetlands

UPL = Obligate upland plants which almost always occur in nonwetlands

ECO = Economic

FACW = Facultative wetland plants which usually occur in wetlands

OBL = Obligate wetland plants which almost always occur in wetlands

APPENDIX L

TES Species Printout for OU 1130

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| ANIMALS |
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BIRD

FAMILY ACCIPITRIDAE

SCIENTIFIC NAME: *Accipiter gentilis*

COMMON NAME: NORTHERN GOSHAWK

STATUS: CANDIDATE FOR FEDERAL REGISTER

FEDERAL/STATE REFERENCE: CURRENTLY, CANDIDATE FOR FEDERAL LISTING, FEDERAL REGISTER, 1991, VOL. 56, NO. 225, PP.58810.

DISTRIBUTION:

SPECIFIC REQUIREMENTS: DENSE, MATURE, OR OLD GROWTH CONIFEROUS FOREST.

HABITAT: PONDEROSA

BREEDING HABITAT: PONDEROSA

MINIMUM ELEVATION: 0

MAXIMUM ELEVATION: 0

THREATS TO TAXON: LOGGING

BRIEF KEY DESCRIPTION: A LARGE ROBUST HAWK WITH A LONGISH TAIL, ROUNDED WINGS. CROWN AND CHECK BLACKISH; BROAD WHITE STRIPE OVER THE EYE. UNDER PARTS PALE GRAY, FINELY BARRED. SIZE = 20-26".

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: YES

LA REFERENCE OF OCCURRENCE: KENNEDY, P.L., 1987

GENERAL MAP LOCATION:

COMMENTS: STUDIES BY PAT KENNEDY INDICATE THE HIGHEST PERCENTAGE OF NEST WERE IN PONDEROSA PINE/GAMBEL'S OAK, PONDEROSA PINE/GRAY OAK, AND MIXED CONIFER (ABIES CONCOLOR-PSEUDOTSUGA MENZIESII-PINUS PONDEROSA/QUERCUS GAMBELII) HABITAT TYPES.

REFERENCE: KENNEDY, P.L., 1987, FED.REGISTER, 1991, VOL.56, NO.225

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| ANIMALS |
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BIRD

FAMILY EMBERIZINAE

SCIENTIFIC NAME: *Ammodramus bairdii*

COMMON NAME: BAIRD'S SPARROW

STATUS: ^{State} ~~FEDERALLY~~-ENDANGERED

FEDERAL/STATE REFERENCE: New Mexico Endangered (Group 2). First Listed
01/24/75 (NMGF Reg. 563).

DISTRIBUTION: Occurs in migration in the eastern plains and
southern lowlands, mainly in autumn with vagrants
elsewhere.

SPECIFIC REQUIREMENTS: In New Mexico, can be found in desert
grasslands-prairies-mountain meadows up to 3600 m.

HABITAT: JUNIPER-GRASSLAND BREEDING HABITAT: JUNIPER-GRASSLAND

MINIMUM ELEVATION: 0 MAXIMUM ELEVATION: 0

THREATS TO TAXON: HABITAT LOSS AND ALTERATIONS

BRIEF KEY DESCRIPTION: Buffy-orange color on its streaked face and crown.
The upper parts are light brown, variously spotted
with blackish and edged with buffy, breast
streaked black.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS:

REFERENCE: NM DEPT. OF GAME AND FISH, HANDBOOK OF SPECIES ENDANGERED.

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| ANIMALS |
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IRD

FAMILY FALCONIDAE

SCIENTIFIC NAME: Falco Peregrinus

COMMON NAME: PEREGRINE FALCON

STATUS: FEDERALLY-ENDANGERED

FEDERAL/STATE REFERENCE: NM: Endangered (group 1), 1/24/75, (NM Reg. 563);
Federal "American", F.p. antum, Endangered 6/2/70;
Tundra F.P. tundrius, Threatened 3/20/84.

DISTRIBUTION: New Mexico subspecies "American" breeds locally in mountainous areas, and it occurs in migration and winter statewide.

SPECIFIC REQUIREMENTS: Breeding territories center on cliffs that are wooded/forested habitats.

HABITAT: PONDEROSA-PINON BREEDING HABITAT: PONDEROSA-PINON

MINIMUM ELEVATION: 0 MAXIMUM ELEVATION: 0

THREATS TO TAXON: DDT, DESTRUCTION OF HABITAT

BRIEF KEY DESCRIPTION: Typical falcon, long pointed wings and long tails, moderate size, 380-500 mm in length, wingspan 1.0-1.5 m, gray above, whitish below, tail is dark gray.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: YES

LA REFERENCE OF OCCURRENCE: LA-6898-PR, PP.94

GENERAL MAP LOCATION: PUEBLO CANYON

REMARKS: Two young males seen in the spring of 1990.

REFERENCE: NM DEPT. OF GAME AND FISH, HANDBOOK OF SPECIES ENDANGERED

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| ANIMALS |
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MAMMAL

FAMILY VESPERTILIONIDAE

SCIENTIFIC NAME: *Euderma maculatum*

COMMON NAME: SPOTTED BAT

STATUS: STATE-ENDANGERED

FEDERAL/STATE REFERENCE: New Mexico :Endangered (Group 2), 01/09/88 (NMGF Reg. 657). Federal: Notice of review as endangered/threatened.

DISTRIBUTION: Rio Grande Valley westward, occurring regularly in the Jemez Mountains and on Mt. Taylor. Records also at Ghost Ranch and Lake Roberts.

SPECIFIC REQUIREMENTS: Riparian, Pinon-juniper, ponderosa, spruce-fir. Roost in cliffs or rock cervices. Needs a good source of water, a small area of standing water to slow moving water. Key food is moths.

HABITAT: MULTIPLE

BREEDING HABITAT: MULTIPLE

MINIMUM ELEVATION: 0

MAXIMUM ELEVATION: 0

THREATS TO TAXON: POSSIBLY PESTICIDES

BRIEF KEY DESCRIPTION: Upperparts are black with large white, roughly circular spots on the shoulders and another at the base of the tail, plus a small patch at the posterior base of each ear. Has very large ears (45-50 mm). Ears are naked, pinkish-red in color.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS: Note: Habitat can be varied--Riparian, Ponderosa, Spruce-Fir and Pinon Juniper.

REFERENCE: NM DEPT. OF GAME AND FISH, HANDBOOK OF SPECIES ENDANGERED.

+-----+
| PLANTS |
+-----+

ACTUS

FAMILY CACTACEAE

SCIENTIFIC NAME: *Opuntia clavata*, Engelm.

COMMON NAME: DAGGER-THORN CHOLLA

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE:

DISTRIBUTION: Bernalillo, Cibola, Dona Ana, Guadalupe, Lincoln, Otero, Rio Arriba, Sandoval, San Miguel, Santa Fe, Socorro, Torrance, and Valencia Counties, New Mexico.

SPECIFIC REQUIREMENTS:

HABITAT: JUNIPER-GRASSLAND BREEDING HABITAT: N/A

MINIMUM ELEVATION: 6000 MAXIMUM ELEVATION: 8000

THREATS TO TAXON: NONE KNOWN

BRIEF KEY DESCRIPTION: Low mat-forming cholla, forming clumps up to 1 m in diameter; stems numerous club-shaped joints; tubercles large, each bearing cluster of white spines; flowers green.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

REMARKS:

REFERENCE: NM NATIVE PLANTS PROTECTION ADVISORY COMMITTEE, 1984.

PLANTS

CACTUS

FAMILY CACTACEAE

SCIENTIFIC NAME: *Toumeyia papyracantha*; (Engelm.) Britt. & Rose

COMMON NAME: GRAMMA GRASS CACTUS

STATUS: STATE-ENDANGERED

FEDERAL/STATE REFERENCE: Federal Register, 15 December 1980, candidate for federal protection. Currently listed as a 2C in the Federal Register--still should be considered in mangement activities.

DISTRIBUTION: Bernalillo, Cibola, Dona Ana, Grant, Los Alamos, Otero, Rio Arriba, Sandoval, Santa Fe, Socorro, Torrance, and Valencia counties, New Mexico.

SPECIFIC REQUIREMENTS: Usually found in basalt outcrops and where the soil is sandy.

HABITAT: PINON-JUNIPER

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 5000

MAXIMUM ELEVATION: 7300

THREATS TO TAXON: OVERCOLLECTION, OVERGRAZING AND URBANIZATION.

BRIEF KEY DESCRIPTION: Stems solitary ribbed, 2.5 - 20 cm tall; cantral spines short, straight; flowers white, not spreading; fruit round, tan, dry; flowers from April to June.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: YES

LA REFERENCE OF OCCURRENCE:

GENERAL MAP LOCATION:

COMMENTS:

REFERENCE: NM NATIVE PLANT PROTECTION ADVISORY COMMITTEE, 1984.

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| PLANTS |
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FORB

FAMILY ASTERACEAE

SCIENTIFIC NAME: *Tetradymia filifolia*, Greene

COMMON NAME: THREADLEAF HORSEBRUSH

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE:

DISTRIBUTION: Lincoln, Otero, Sandoval, Socorro, and Valencia.

SPECIFIC REQUIREMENTS: Limestone or highly gypseous soils.

HABITAT: PINON-JUNIPER BREEDING HABITAT: N/A

MINIMUM ELEVATION: 6000 MAXIMUM ELEVATION: 7000

FEEDS TO TAXON: NONE KNOWN

BRIEF KEY DESCRIPTION: Much-branched grayish shrub (1 m tall); leaves narrow and 1-2 in. long, often with hairs; flowers heads very narrow, yellow, with 4 flowers; rays absent.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE:

GENERAL MAP LOCATION:

COMMENTS:

REFERENCE: NM NATIVE PLANT PROTECTION ADVISORY COMMITTEE, 1984

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| PLANTS |
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FORB

FAMILY CARYOPHYLLACEAE

SCIENTIFIC NAME: *Silene plankii*, Hitchc. & Maguire

COMMON NAME: PLANK'S CATCHELY

STATUS: STATE PRIORITY ONE

FEDERAL/STATE REFERENCE: Federal Register, 15 December 1980, candidate for federal protection. 1991 NM Natural Heritage Program working plant list indicates status change to a 3C---no longer under consideration for federal listing.

DISTRIBUTION: Bernalillo, Dona ana, Sandoval, Sierra, and Socorro counties, New Mexico.

SPECIFIC REQUIREMENTS: Cervices and pockets in protected cliff faces of igneous rock.

HABITAT: PINON-JUNIPER BREEDING HABITAT: N/A

MINIMUM ELEVATION: 5000 MAXIMUM ELEVATION: 6000

THREATS TO TAXON: BROWSED BY BIG HORN SHEEP.

BRIEF KEY DESCRIPTION: Low, clumped perinnial, wooly rootstock, 10-15 cm tall, finely hairy, glandular sticky near flowers, stem leaves in 5-8 pr, lance shaped; flowers scarlet-few.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS:

REFERENCE: NM NATIVE -PLANT PROTECTION ADVISORY COMMITTEE, 1984.

PLANTS

FORB

FAMILY FABACEAE

SCIENTIFIC NAME: *Astragalus feensis* M.E. Jones

COMMON NAME: SANTA FE MILKVETCH

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE:

DISTRIBUTION: Bernalillo, Santa Fe, and Torrance Counties, New Mexico.

SPECIFIC REQUIREMENTS: Dry slopes.

HABITAT: PINON-JUNIPER

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 5000

MAXIMUM ELEVATION: 6500

THREATS TO TAXON: NONE KNOWN

BRIEF KEY DESCRIPTION: Loosely tufted; stems spreading upward, 10 cm long; leaves long, pinnately compound, 7-19 obovate blunt leaflets; flowers pealike, reddish purple.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS:

REFERENCE: NEW MEXICO NATIVE PLANTS PROTECTION ADVISORY COMMITTEE, 1984

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| PLANTS |
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FORB

FAMILY FABACEAE

SCIENTIFIC NAME: *Astragalus mollissimus* Torr. var. *mathewsii* (Wats)

COMMON NAME: MATHEW'S WOOLLY MILK-VETCH

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE:

DISTRIBUTION: Cibola, McKinley, Santa Fe, and Sandoval counties,
New Mexico.

SPECIFIC REQUIREMENTS: Open slopes and ridges in pinyon pine forest, but
sometimes in canyons.

HABITAT: PINON-JUNIPER

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 5000

MAXIMUM ELEVATION: 6000

THREATS TO TAXON: NONE KNOWN

BRIEF KEY DESCRIPTION: Perennial herb, stems silkly-hairy, tufted to 15
cm; leaves pinnately compound, blunt leaflets;
flowers pea-like, long pale purple or
yellow-purple; pod curved.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS:

REFERENCE: NM NATIVE PLANTS PROTECTION ADVISORY COMMITTEE, 1984

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| PLANTS |
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ORB

FAMILY FABACEAE

SCIENTIFIC NAME: *Dalea scariosa* Wats.

COMMON NAME: LA JOLLA PRAIRIE CLOVER

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE: federal register, 15 Dec. 1980, removed
consideration from federal protection---3C.

DISTRIBUTION: Bernalillo, Sandoval, Socorro, and Valencia
counties, New Mexico.

SPECIFIC REQUIREMENTS: Sandy clay banks and bluffs, open sandy areas and
roadsides, desert grassland or junipers.

HABITAT: JUNIPER-GRASSLAND BREEDING HABITAT: N/A

MINIMUM ELEVATION: 4900 MAXIMUM ELEVATION: 5030

THREATS TO TAXON: HIGHWAY RIGHTS-OF-WAY GRADING AND HOUSING DEVELOPMENT.

BRIEF KEY DESCRIPTION: Stems spreading long; leaves bright green, long
pinnately compound into thick-textured leaflets;
flowers pea-like, petals pink, pink-purple; pod
long.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

REMARKS:

REFERENCE: NM NATIVE PLANTS PROTECTION ADVISORY COMMITTEE, 1984.

ENDANGERED SPECIES PRINTOUT FOR LOS ALAMOS COUNTY

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| PLANTS |
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FORB

FAMILY ORCHIDACEAE

SCIENTIFIC NAME: *Epipactis gigantea*

COMMON NAME: HELLEBORINE ORCHID

STATUS: STATE-ENDANGERED

FEDERAL/STATE REFERENCE:

DISTRIBUTION: Montana to British Columbia, southern to western
Texas, New Mexico and California.

SPECIFIC REQUIREMENTS: Damp woods, seepage slopes, springs, streams and
riparian areas.

HABITAT: RIPARIAN ZONES BREEDING HABITAT: N/A

MINIMUM ELEVATION: 6000 MAXIMUM ELEVATION: 8500

THREATS TO TAXON:

BRIEF KEY DESCRIPTION: STEMS ALONG STEM. STEMS TO 2 1/2 FT. LEAVES TO
15 CM, OVAL. SEPALS GREENISH, PETALS PURPLE, LIP
MARKED WITH PURPLE LINES.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: YES

LA REFERENCE OF OCCURRENCE: FOXX, T.S., 1984

GENERAL MAP LOCATION: SPRING IN WHITE ROCK CANYON

COMMENTS:

REFERENCE: FOXX, T.S. & HOARD, D, 1984, NM DEPART. OF NATURAL RES., 1993

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| PLANTS |
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ORB

FAMILY NYCTAGINACEAE

SCIENTIFIC NAME: *Abronia bigelovii*, Heimerl

COMMON NAME: TUFTED SAND VERBENA

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE: Federal Register, 15 Dec. 1980, Candidate for federal protection. 1991 Natural Heritage plant checklist indicates status changed to 3C---no longer in consideration for protection.

DISTRIBUTION: Sandoval, Santa Fe, and Rio Arriba Counties, New Mexico.

SPECIFIC REQUIREMENTS: This species is entirely restricted to todilto gypsum or the derivative of.

HABITAT: PINON-JUNIPER

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 6000

MAXIMUM ELEVATION: 0

THREATS TO TAXON: GYPSUM MINING.

BRIEF KEY DESCRIPTION: Tufted perennial herb, stems short; leaves mostly at the base, linear to oblong; flowers stems erect, clusters of flowers at top, pink tube-small white lobes.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

REMARKS:

REFERENCE: NM NATIVE PLANTS PROTECTION ADVISORY COMMITTEE, 1984.

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| PLANTS |
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FORB

FAMILY FABACEAE

SCIENTIFIC NAME: *Astragalus puniceus* Osterh. var. *gertudis* (Green)

COMMON NAME: TAOS MILK-VETCH

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE:

DISTRIBUTION: Rio Arriba and Taos counties, New Mexico.

SPECIFIC REQUIREMENTS: On open, loose soil among pinyon and juniper.

HABITAT: PINON-JUNIPER

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 7000

MAXIMUM ELEVATION: 0

THREATS TO TAXON: NONE KNOWN

BRIEF KEY DESCRIPTION: Perennial herb, stems spreading; leaves pinnately compound, oval leaflets; flowers pea-like, pale to bright pink; pod spreading, fleshy when green, red spotted-ripe.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS:

REFERENCE: NM NATIVE PLANTS PROTECTION ADVISORY COMMITTEE, 1984.

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| PLANTS |
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ORB

FAMILY FABACEAE

SCIENTIFIC NAME: *Astragalus kentrophyta* Gray var. *neomexicanus*

COMMON NAME: SPINY-LEAF MILK-VETCH

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE:

DISTRIBUTION: Bernalillo, Cibola, McKinley, San Juan, Sandoval,
Santa Fe, and Valencia Counties, New Mexico.

SPECIFIC REQUIREMENTS: Gullied bluffs, badlands, dunes and roadsides.

HABITAT: JUNIPER-GRASSLAND BREEDING HABITAT: N/A

MINIMUM ELEVATION: 5300 MAXIMUM ELEVATION: 6900

THREATS TO TAXON:

BRIEF KEY DESCRIPTION: Low bushy, branched at the base, stems 4-30 cm tall; leaves stiff, pickly and green; petals whitish; pod egg shaped; flowers from June to September.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

REMARKS:

REFERENCE: NEW MEXICO NATIVE PLANTS PROTECTION ADVISORY COMMITTEE, 1984

PLANTS

FORB

FAMILY FABACEAE

SCIENTIFIC NAME: *Astragalus cyaneus*, Gray

COMMON NAME: CYANIC MILK-VETCH

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE:

DISTRIBUTION: Adjacent to the Rio Grande in Bernalillo, Rio Arriba, Santa Fe, and Taos Counties New Mexico.

SPECIFIC REQUIREMENTS: Sandy or gravelly hillsides.

HABITAT: PINON-JUNIPER

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 5500

MAXIMUM ELEVATION: 6500

THREATS TO TAXON: NONE KNOWN

BRIEF KEY DESCRIPTION: Low, tufted, covered with grayish hairs, stems to 6 cm; leaves 6-18cm, pinnately compiound, with 15-29 elliptic leaflets; flowers pea-like, pinkish-purple.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS:

REFERENCE: NM NATIVE PLANTS PROTECTION ADVISORY COMMITTEE, 1984.

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| PLANTS |
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DRB

FAMILY CARYOPHYLLACEAE

SCIENTIFIC NAME: *Silene plankii*

COMMON NAME: PLANK'S CATCHELY

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE: Was a candidate for Federal Register, ruled a 3C.
No longer proposed.

DISTRIBUTION: Mountains along the Rio Grande.

SPECIFIC REQUIREMENTS:

HABITAT: PINON-JUNIPER

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 0

MAXIMUM ELEVATION: 0

THREATS TO TAXON: NONE KNOWN

BRIEF KEY DESCRIPTION:

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE:

GENERAL MAP LOCATION:

REMARKS: Similar in appearance to other species in our
area.

REFERENCE: TIERNERY, G.D., 1987

PLANTS

FORB

FAMILY APIACEAE

SCIENTIFIC NAME: *Aletes sessiliflorus*, Theobald and Tseng

COMMON NAME: SESSILE-FLOWERED FALSE CARROT

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE:

DISTRIBUTION: Mckinley, Rio Arriba, Sandoval, and Taos Counties.

SPECIFIC REQUIREMENTS: Rocky canyons and slopes, usually in basaltic or sandstone areas.

HABITAT: PINON-JUNIPER

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 6500

MAXIMUM ELEVATION: 8100

THREATS TO TAXON: NONE KNOWN

BRIEF KEY DESCRIPTION: Densely tufted perennial, 10-20 cm tall; leaves bright green, long pinnately divided into 5-9 narrow segments that have 3 lobes; flowers tiny pale yellow.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE:

GENERAL MAP LOCATION:

COMMENTS:

REFERENCE: NM NATIVE PLANT PROTECTION ADVISORY COMMITTEE, 1984

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| PLANTS |
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ACTUS

FAMILY CACTACEAE

SCIENTIFIC NAME: *Opuntia viridiflora*, Britt. and Rose.

COMMON NAME: SANTA FE CHOLLA

STATUS: STATE-ENDANGERED

FEDERAL/STATE REFERENCE: Federal register as a C2. Information obtained
from the 1991 natural Heritage Program Plant List.

DISTRIBUTION: Santa Fe County, New Mexico.

SPECIFIC REQUIREMENTS:

HABITAT: PINON-JUNIPER

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 7200

MAXIMUM ELEVATION: 8000

THREATS TO TAXON: ROAD CONSTRUCTION, VANDALISM, EXPANSION OF CITY PARKS.

BRIEF KEY DESCRIPTION: Low-growing, branched shrub; stems cylindric,
30-100 cm tall; spines variable in number; flowers
not open widely, pink with green/yellow outside.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

REMARKS:

REFERENCE: NM NATIVE PLANTS PROTECTION ADVISORY COMMITTEE, 1984.

PLANTS

CACTUS

FAMILY CACTACEAE

SCIENTIFIC NAME: *Mammillaria wrightii*, Engelm.

COMMON NAME: WRIGHT FISHHOOK CACTUS

STATUS: STATE-ENDANGERED

FEDERAL/STATE REFERENCE: Listed as an E2 for state status on nm Natural Heritage Program plant list 2/06/90. State Rank Date 12/22/89.

DISTRIBUTION: Bernalillo, Catron, Dona Ana, Guadalupe, Lincoln, McKinley, Sandoval, Santa Fe, Socorro, Torrance, and Valencia Counties in New Mexico.

SPECIFIC REQUIREMENTS: Gravey hills or sandy hills or plains, desert grassland to pinyon-juniper.

HABITAT: PINON-JUNIPER BREEDING HABITAT: N/A

MINIMUM ELEVATION: 3000 MAXIMUM ELEVATION: 7000

THREATS TO TAXON: POPULATIONS DECLINING - OVERCOLLECTION, HABITAT ALTERATION.

BRIEF KEY DESCRIPTION: Stems solitary, 10 cm tall and 5 cm wide; spines 10-15/cluster, outer spines tan or gray, central ones reddish and hooked; flowers pink-purple with yellowish tinge.

HAS THE SPECIES PREVIOUS BEEN FOUND IN LOS ALAMOS COUNTY?: NO
LA REFERENCE OF OCCURRENCE: N/A
GENERAL MAP LOCATION: N/A

COMMENTS:

REFERENCE: NM NATIVE PLANTS PROTECTION ADVISORY COMMITTEE, 1984.

APPENDIX M

**Tables of Calculated Parameters
for Each Plant Species
Found within the Transects**

Water Canyon near State Route
Canyon bottom 68-1u

600 feet
9/28/92

Species	REL		REL	IMPORT		
	PLANT COVER	PLANT COVER			FREQ	FREQ
BARE SOIL	73.32					
ROCK	2.17					
LITTER	1.19					
MOSS/LICHEN	1.42					
SOIL CRUST	0.01					
BOGR		11.84	54.01	0.60	31.86	42.93
ARDR		0.19	0.84	0.07	3.54	2.19
TRIX		0.00	0.01	0.02	0.88	0.45
SPCO		0.83	3.80	0.13	7.08	5.44
FESX		0.25	1.15	0.07	3.54	2.34
PLPU		0.01	0.02	0.05	2.65	1.34
CHVI		2.17	9.90	0.10	5.31	7.60
ARDR		1.19	5.42	0.12	6.19	5.80
STCO		1.42	6.47	0.13	7.08	6.78
PENX		0.01	0.02	0.05	2.65	1.34
BRTE		1.00	4.57	0.05	2.65	3.61
HEPE		0.00	0.01	0.02	0.88	0.45
ERIX		0.50	2.30	0.08	4.42	3.36
POAX		0.17	0.76	0.03	1.77	1.27
FAPA		0.50	2.28	0.08	4.42	3.35
ERDI		0.08	0.38	0.02	0.88	0.63
TRDU		0.08	0.38	0.02	0.88	0.63
CHFE		0.08	0.38	0.02	0.88	0.63
SAKA		0.08	0.38	0.02	0.88	0.63
VETH		0.25	1.14	0.03	1.77	1.46
ARLO		0.50	2.28	0.07	3.54	2.91
GAPU		0.18	0.84	0.03	1.77	1.30
CHFO		0.50	2.28	0.07	3.54	2.91
LOWR		0.08	0.38	0.02	0.88	0.63
TOTAL:	78.11	21.91	100	1.88	100	100

South of Pajarito Wetlands
 Mesa top
 9/19/92

700 feet
 36-13u

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	44.43					
ROCK	2.64					
LITTER	30.57					
SOIL CRUST	8.50					
MOSS/LICHENS	1.14					
BOGR		7.43	59.67	0.73	50.50	55.08
POAX		0.14	1.16	0.04	2.97	2.06
GUSA		0.65	5.21	0.17	11.88	8.54
LOWR		0.50	4.01	0.07	4.95	4.48
OPUX		2.14	17.22	0.20	13.86	15.54
ERDI		0.00	0.01	0.01	0.99	0.50
ARTR		0.07	0.57	0.01	0.99	0.78
IPLO		0.08	0.64	0.10	6.93	3.79
PIED		0.08	0.61	0.06	3.96	2.28
LARE		1.36	10.90	0.04	2.97	6.93
	87.29	12.45	100.00	1.44	100.00	100.00

Lower Potrillo Canyon
 North-facing slope
 9/27/92

700 feet
 36-11u

Species	Cover	Plant Cover	Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	64.56					
ROCK	0.71					
LITTER	23.00					
MOSS/LICHEN	0.07					
SOIL CRUST	4.00					
BOGR		3.46	45.15	0.49	36.56	40.85
ARLO		0.07	0.93	0.01	1.08	1.00
ANSC		1.00	13.06	0.14	10.75	11.91
LUCA		0.09	1.12	0.03	2.15	1.63
GUSA		0.07	0.93	0.01	1.08	1.00
EUSE		0.01	0.19	0.01	1.08	0.63
HYRI		0.44	5.78	0.10	7.53	6.66
CHFO		0.50	6.53	0.10	7.53	7.03
ARDR		0.33	4.29	0.10	7.53	5.91
OPUX		0.07	0.93	0.01	1.08	1.00
IPLO		0.01	0.19	0.01	1.08	0.63
SPCR		0.50	6.53	0.07	5.38	5.95
HYFL		0.21	2.80	0.04	3.23	3.01
PECA		0.30	3.92	0.07	5.38	4.65
ARTR		0.21	2.80	0.03	2.15	2.47
PENX		0.14	1.87	0.03	2.15	2.01
LOWR		0.01	0.19	0.01	1.08	0.63
ERJA		0.07	0.93	0.01	1.08	1.00
EUHE		0.07	0.93	0.01	1.08	1.00
MEAL		0.07	0.93	0.01	1.08	1.00
Total =	92.34	7.66	100	1.33	100	100

North of Potrillo Canyon
South-facing slope

700 feet
36-8u

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	41.84					
ROCK	18.57					
LITTER	36.93					
CARX		0.00	0.16	0.04	5.66	2.91
GRASSA		0.07	2.67	0.01	1.89	2.28
GRASSB		0.29	10.69	0.03	3.77	7.23
BOGR		2.08	77.98	0.44	58.49	68.24
ERJA		0.00	0.05	0.01	1.89	0.97
OPUX		0.07	2.67	0.01	1.89	2.28
QUEX		0.01	0.27	0.07	9.43	4.85
PENX		0.07	2.78	0.04	5.66	4.22
CRJA		0.00	0.05	0.01	1.89	0.97
PIED		0.04	1.60	0.04	5.66	3.63
ARLU		0.01	0.53	0.01	1.89	1.21
BRAN		0.01	0.53	0.01	1.89	1.21
Total =	97.34	2.67	100.00	0.76	100.00	100.00

East of Ridge Road turn
Mesa top
6/4/92

500 feet
36-6U

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	60.43					
LITTER	19.81					
BOGR		14.82	74.98	0.68	40.00	57.49
HYRI		2.81	14.20	0.34	20.00	17.10
OPPO		0.00	0.01	0.02	1.18	0.59
ERDI		0.53	2.66	0.36	21.18	11.92
MUMO		0.90	4.57	0.12	7.06	5.82
VETH		0.00	0.01	0.02	1.18	0.59
PLPU		0.10	0.52	0.04	2.35	1.43
GUSA		0.40	2.02	0.06	3.53	2.78
PIED		0.10	0.51	0.02	1.18	0.84
SPCR		0.10	0.51	0.02	1.18	0.84
ARIX		0.00	0.01	0.02	1.18	0.59
Total =	80.24	19.76	100.00	1.70	100.00	100.00

Riparian, Eerie 36-4u
 Number of feet in this transect = 1

500 l

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	41.20					
ROCK	4.00					
LITTER	36.68					
ROSA		2.90	16.00	11.00	19.30	17.65
PAIN		1.10	6.07	3.00	5.26	5.67
BROX		0.12	0.66	3.00	5.26	2.96
AGAL		0.30	1.66	4.00	7.02	4.34
SAGE		8.90	49.12	17.00	29.82	39.47
BEFE		2.50	13.80	5.00	8.77	11.28
QUGA		1.00	5.52	3.00	5.26	5.39
PRME		0.70	3.86	3.00	5.26	4.56
RONE		0.10	0.55	2.00	3.51	2.03
MOME		0.40	2.21	4.00	7.02	4.61
RICE		0.10	0.55	2.00	3.51	2.03
Total =	81.88	18.12	100.00	57.00	100.00	100.00

East of Minie Site
North-facing slope

600 feet
36-2u
Rel.

Species	Cover	Plant Cover	Plant Cover	Rel. Freq.	Rel. Freq.	Importance Index
BARE SOIL	73.30					
VETH		0.00	0.01	0.02	0.93	0.55
ARLO		0.08	0.31	0.02	0.72	0.51
SPOX		1.25	4.69	0.10	4.31	4.50
BRTE		3.67	13.74	0.30	12.92	13.33
DESX		0.42	1.56	0.02	0.72	1.14
KOSC		0.00	0.01	0.02	0.72	0.36
ERDI		0.59	2.20	0.17	7.18	4.69
BADI		0.01	0.02	0.05	2.15	1.09
CHNA		0.17	0.62	0.02	0.72	0.67
TRDU		0.09	0.32	0.03	1.44	0.88
ARCA		5.67	21.23	0.47	20.10	20.67
ARDR		2.34	8.75	0.23	10.05	9.40
GUSA		0.00	0.01	0.02	0.72	0.36
STCO		0.75	2.81	0.07	2.87	2.84
PLPU		0.00	0.01	0.02	0.72	0.36
QUGX		0.83	3.12	0.02	0.72	1.92
HYAR		0.42	1.56	0.02	0.72	1.14
MUMO		0.83	3.12	0.02	0.72	1.92
ANSC		1.33	4.99	0.05	2.15	3.57
LUCA		0.92	3.43	0.03	1.44	2.43
GAPU		0.08	0.31	0.02	0.72	0.51
BOGR		5.92	22.17	0.40	17.23	19.70
LINE		0.01	0.02	0.05	2.15	1.09
CRJA		0.08	0.31	0.02	0.72	0.51
OPUX		0.25	0.94	0.02	0.72	0.83
AGSM		0.33	1.25	0.05	2.15	1.70
CHFO		0.25	0.94	0.05	2.15	1.55
TROF		0.17	0.62	0.02	0.72	0.67
HYRI		0.25	0.94	0.03	1.44	1.19
Total =	73.30	26.71	100	2.32	100.00	100.08

Minie Site 700 feet
 South-facing ridge 36-1u

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	55.55					
ROCK	2.25					
LITTER	35.57					
BOGR		2.12	31.81	0.60	38.71	35.26
MUMO		0.58	8.77	0.10	6.45	7.61
ARLU		0.08	1.25	0.05	3.23	2.24
BADI		0.00	0.03	0.05	3.23	1.63
OPUX		0.50	7.52	0.10	6.45	6.98
HYRI		0.50	7.54	0.15	9.68	8.61
GUSA		0.18	2.76	0.10	6.45	4.60
CHFO		0.08	1.25	0.05	3.23	2.24
HYFL		0.02	0.25	0.05	3.23	1.74
CARX		0.33	5.01	0.05	3.23	4.12
ARCA		0.17	2.51	0.05	3.23	2.87
ANSE		0.42	6.26	0.05	3.23	4.74
QUEX		1.67	25.05	0.15	9.68	17.36
Total =	93.37	6.65	100	1.55	100	100

South of Minie
Northwest mesa top

600 feet
36-3u

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	54.22					
ROCK	2.25					
LITTER	35.57					
BOGR		2.12	31.81	0.22	29.55	30.68
MUMO		0.58	8.77	0.05	6.82	7.79
ARLU		0.08	1.25	0.03	4.55	2.90
BADI		0.00	0.03	0.03	4.55	2.29
OPUX		0.50	7.52	0.05	6.82	7.17
HYRI		0.50	7.54	0.07	9.09	8.32
GUSA		0.18	2.76	0.05	6.82	4.79
CHFO		0.08	1.25	0.03	4.55	2.90
HYFL		0.02	0.25	0.03	4.55	2.40
CARX		0.33	5.01	0.03	4.55	4.78
ARCA		0.17	2.51	0.03	4.55	3.53
ANSE		0.42	6.26	0.03	4.55	5.40
QUEX		1.67	25.05	0.07	9.09	17.07
Total =	92.03	6.65	100.00	0.73	100.00	100.00

Benie Site
 South-facing slope

600 feet
 36-5u

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	21.21					
ROCK	19.83					
LITTER	53.31					
ANSE		2.10	30.51	0.18	22.92	26.71
MUMO		2.27	32.93	0.30	37.50	35.21
BLTR		0.83	12.11	0.10	12.50	12.30
CHFO		0.38	5.57	0.10	12.50	9.03
BADI		0.03	0.48	0.03	4.17	2.33
ERDI		0.02	0.24	0.02	2.08	1.16
OPUX		0.50	7.26	0.02	2.08	4.67
AGGE		0.42	6.05	0.02	2.08	4.07
FESX		0.17	2.42	0.02	2.08	2.25
ECTR		0.17	2.42	0.02	2.08	2.25
Total =	94.34	6.88	100.00	0.80	100.00	100.00

East of Ridge Road Turn-off 700 feet
 Canyon bottom 36-7u

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	2.51					
ROCK	22.86					
LITTER	72.50					
MOSS/LICHEN	0.07					
MUMO		1.22	58.37	0.19	51.35	49.84
CARX		0.51	24.40	0.10	27.03	23.39
CHFO		0.29	13.88	0.07	18.92	15.04
IPAG		0.07	3.35	0.01	2.70	3.32
Total =	97.87	2.09	100.00	0.37	100.00	100.00

Lower Potrillo Canyon
 South-facing slope
 9/27/92

700 feet
 36-10u

Species	Cover	Plant Cover	Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	45.29					
ROCK	19.64					
LITTER	20.93					
STCO		0.43	3.28	0.06	5.33	4.31
BOGR		7.86	60.11	0.64	60.00	60.05
SIHY		0.07	0.55	0.01	1.33	0.94
IPLO		0.00	0.00	0.00	0.00	0.00
ARDR		0.07	0.55	0.01	1.33	0.94
CHNA		0.00	0.00	0.00	0.00	0.00
ARTR		2.71	20.77	0.07	6.67	13.72
SPCO		0.29	2.19	0.03	2.67	2.43
ASBI		0.07	0.55	0.01	1.33	0.94
GUSA		0.21	1.64	0.04	4.00	2.82
BOER		0.79	6.01	0.09	8.00	7.01
ORHY		0.14	1.09	0.03	2.67	1.88
THWR		0.00	0.00	0.00	0.00	0.00
ERJA		0.36	2.73	0.06	5.33	4.03
VETH		0.07	0.55	0.01	1.33	0.94
Total =	85.86	13.07	100.00	1.07	100	100

Lower Potrillo Canyon
 South-facing slope
 9/9/92

700 feet
 36-12u

Species	Cover	Plant Cover	Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	45.86					
LITTER	34.82					
SOIL CRUST	4.14					
MOSS/LICHENS	0.43					
BOGR		9.97	67.81	0.73	51.00	59.41
POAX		0.21	1.46	0.03	2.00	1.73
MUTO		0.14	0.97	0.01	1.00	0.99
LOWR		2.00	13.64	0.29	20.00	16.82
ARTR		0.00	0.01	0.01	1.00	0.50
SENX		0.07	0.49	0.01	1.00	0.74
IPLO		0.36	2.47	0.13	9.00	5.73
GUSA		0.29	1.94	0.03	2.00	1.97
ERDI		0.14	0.97	0.03	2.00	1.49
OPUX		1.21	8.26	0.06	4.00	6.13
HYRI		0.07	0.50	0.03	2.00	1.25
BADI		0.00	0.02	0.03	2.00	1.01
ERJA		0.21	1.46	0.04	3.00	2.23
Total =	85.25	14.70	100.00	1.43	100.00	100.00

Pajarito Canyon 700 feet
 North-facing slope 36-14u
 9/10/92

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	34.36					
ROCK	0.07					
LITTER	55.36					
MOSS/LICHENS	1.79					
SOIL CRUST	2.50					
BOGR		3.00	12.37	0.56	12.24	12.31
POAX		1.29	5.44	0.31	6.91	6.17
CARX		0.21	0.79	0.10	2.20	1.49
GUSA		0.07	0.31	0.10	2.20	1.25
ERDI		0.72	3.53	0.31	6.91	5.22
BADI		0.21	0.93	0.13	2.83	1.88
IPLO		0.00	0.07	0.10	2.20	1.14
ERJA		0.14	0.62	0.11	2.51	1.56
ARDR		0.07	0.31	0.10	2.20	1.25
FAPA		0.07	0.31	0.10	2.20	1.25
HYRI		0.14	0.62	0.11	2.51	1.56
ARTR		0.00	0.07	0.10	2.20	1.14
ARLU		0.00	0.07	0.10	2.20	1.14
Total =	94.07	5.95	100.00	4.55	100.00	100

Lower Water Canyon
North-facing slope

600 feet
68-2u

Species	Cover	Plant Cover	Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	2.57					
LITTER	90.26					
ANSC		0.50	6.99	0.09	8.33	7.66
BOGR		3.64	50.94	0.34	33.33	42.14
POAX		0.57	7.99	0.10	9.72	8.86
CARX		0.57	7.99	0.09	8.33	8.16
KOCA		0.14	2.00	0.03	2.78	2.39
ARLU		0.14	2.00	0.03	2.78	2.39
ARDR		0.36	5.05	0.09	8.33	6.69
CHFO		0.64	8.99	0.11	11.11	10.05
STCO		0.36	4.99	0.07	6.94	5.97
AGSM		0.07	1.00	0.01	1.39	1.19
MOPE		0.00	0.02	0.01	1.39	0.70
SIHY		0.14	2.00	0.03	2.78	2.39
IPAG		0.00	0.02	0.01	1.39	0.70
1U		0.00	0.02	0.01	1.39	0.70
Total =	92.83	7.15	100.00	1.03	100.00	100

	#Stems	#Stems Per Acre	Rel Density	AVG DBH	%Cover	Rel. Cover	%Freq.	Rel. Freq.	Import Index
Trees									
JUMO	17	37.36	89.47	6.38	23.59	82.51	0.43	60.00	71.25
PIED	2	4.40	10.53	3.50	5.00	17.49	0.29	40.00	28.75
TOTAL:	19	41.76	100.00	9.88	28.59	100.00	0.71	100.00	100.00
Shrubs									
QUUN	55	169.23	36.91	0.22	15.00	49.89	0.20	12.50	33.10
QUGA	29	89.23	19.46	0.38	8.33	27.72	0.60	37.50	28.20
RHTR	55	169.23	36.91	0.01	6.70	22.29	0.60	37.50	32.20
CEMO	10	30.77	6.71	0.01	0.03	0.10	0.20	12.50	6.44
Total =	149.00	458.46	100.00	0.62	30.06	100.00	1.60	100.00	100.00

Transect 36-2c
450 feet
Circular plot

Minie Site
North-facing slope

	#Stems	#Stems Per Acre	Rel Density	AVG DBH	%Cover	Rel. Cover	%Freq.	Rel. Freq.	Import Index
Trees									
JUMO	100	219.78	46.08	6.15	13.52	26.68	1.00	41.18	37.9
JUSC	1	2.20	0.46	5.30	5.00	9.87	0.14	5.88	5.4
PIED	114	250.55	52.53	4.48	17.15	33.85	1.00	41.18	42.5
PIPO	2	4.40	0.92	22.15	15.00	29.60	0.29	11.76	14.1
TOTAL:	217.00	476.92	100.00	38.08	50.67	100.00	2.43	100.00	100.0
Shrubs									
FAPA	14	30.77	15.38	0.02	0.33	26.97	0.43	6.25	16.2
ARTR	26	57.14	28.57	0.98	0.78	62.92	0.71	10.42	33.9
RHTR	40	87.91	43.96	0.02	0.13	10.11	0.86	12.50	22.1
RICE	11	24.18	12.09	0.04	0.00	0.00	4.86	70.83	27.6
Total =	91.00	200.00	100.00	1.06	1.24	100.00	6.86	100.00	100.0

Transect 36-4c
250 feet
Circular plot

Eenie Site
Canyon bottom

	#Stems	#Stems Per Acre	Rel Density	AVG DBH	%Cover	Rel. Cover	%Freq.	Rel. Freq.	Import Index
Trees									
JUMO	70.00	215.38	77.78	6.14	21.88	0.55	1.00	38.46	46.76
PIED	18.00	55.38	20.00	7.28	17.86	0.45	1.00	38.46	41.70
SNAG	2.00	6.15	2.22	0.28	0.00	0.00	0.60	23.08	11.54
TOTAL:	90.00	276.92	100.00	13.70	39.74	100.00	2.60	100.00	100.00
Shrubs									
QUUN	13.00	40.00	27.66	0.21	1.30	0.93	0.20	12.50	52.60
QUEX	10.00	30.77	21.28	0.02	0.00	0.00	0.40	25.00	12.50
RICE	5.00	15.38	10.64	0.02	0.00	0.00	0.20	12.50	6.25
CEMO	19.00	58.46	40.43	0.02	0.10	0.07	0.80	50.00	28.50
Total =	47.00	144.62	100.00	0.27	1.40	ERR	1.60	100.00	100.00

Transect 36-6c
450 feet
Circular plot

East of Ridge Road turn-off
Mesa top

	#Stems	#Stems Per Acre	Rel Density	AVG DBH	%Cover	Rel. Cover	%Freq.	Rel. Freq.	Import Index
Trees									
JUMO	8.00	24.62	13.11	8.96	7.87	33.20	1.00	50.00	32.10
PIED	53.00	163.08	86.89	5.48	15.84	66.80	1.00	50.00	67.90
TOTAL =	61.00	187.69	100.00	14.45	23.71	100.00	2.00	100.00	100.00
Shrubs									
QUUN	374	1150.76	86.77	0.03	13.35	41.90	1	50.00	59.56
QUGA	18	55.38	4.18	0.09	10.00	31.39	0.2	10.00	15.19
QUEX	21	64.61	4.87	0.16	8.40	26.37	0.2	10.00	13.75
RHTR	3	9.23	0.70	0.07	0.10	0.31	0.2	10.00	3.67
CEMO	15	46.15	3.48	0.01	0.01	0.03	0.4	20.00	7.84
TOTAL =	431.00	1326.15	100.00	0.35	31.86	100.00	2.00	100.00	100.00

Transect 36-8c
450 feet
Circular plot

North of Potrillo Canyon
South-facing slope

	#Stems	#Stems Per Acre	Rel Density	AVG DBH	%Cover	Rel. Cover	%Freq.	Rel. Freq.	Import Index
Trees									
JUMO	66	145.05	51.56	4.73	8.07	32.59	0.86	42.86	42.3
PIED	59	129.67	46.09	5.30	10.02	40.48	0.86	42.86	43.1
PIPO	3	6.59	2.34	9.30	6.67	26.93	0.29	14.29	14.5
TOTAL:	128	281.32	100.00	19.33	24.76	100.00	2.00	100.00	100.0
Shrubs									
QUEX	11	24.18	25.00	0.02	2.55	89.47	0.14	11.11	41.8
ARTR	14	30.77	31.82	0.53	0.10	3.51	0.57	44.44	26.5
RHTR	18	39.56	40.91	0.24	0.10	3.51	0.43	33.33	25.9
RICE	1	2.20	2.27	0.10	0.10	3.51	0.14	11.11	5.6
Total =	44.00	96.70	100.00	0.89	2.85	100.00	1.29	100.00	100.0

Transect 36-11c
650 feet
Circular plot

Lower Potrillo Canyon
North-facing slope

	#Stems	#Stems Per Acre	Rel Density	AVG DBH	%Cover	Rel. Cover	%Freq.	Rel. Freq.	Import Index
Trees									
JUMO	61	134.07	44.53	6.44	10.47	39.93	0.86	46.15	43.5
PIED	76	167.03	55.47	5.36	15.75	60.07	1.00	53.85	56.4
TOTAL:	137.00	301.10	100.00	11.81	26.22	100.00	1.86	100.00	100.0
Shrubs									
ARTR	42	92.31	100.00	0.10	5.77	100.00	0.71	100.00	100.0
Total =	42.00	92.31	100.00	0.10	5.77	100.00	0.71	100.00	100.0

Transect 36-13c
650 feet
Circular plot

South of Pajarito Wetlands
Mesa top

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	%Cover	Rel. %Cover	Freq.	Rel. Freq.	Importance Index
Trees									
JUMO	5.00	15.56	6.58	1.02	0.17	0.86	0.21	15.56	7.67
PIED	3.00	9.33	3.95	2.00	0.01	0.00	0.14	10.37	4.77
PIPO	68.00	211.58	89.47	7.33	19.76	99.14	1.00	74.07	87.56
TOTAL:	76.00	236.47	100.00	10.35	19.93	100.00	1.35	100.00	100.00

Species	#Stems	#Stems Per Acre	Rel. Density	%Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Shrubs								
QUGA	1.00	3.11	1.10	0.00	0.00	0.07	8.97	3.36
CHNA	5.00	15.56	5.49	0.00	0.00	0.07	8.97	4.82
RHTR	62.00	192.91	68.13	0.14	76.92	0.50	64.10	69.72
RICE	15.00	46.67	16.48	0.04	23.08	0.07	8.97	16.18
FONE	8.00	24.89	8.79	0.00	0.00	0.07	8.97	5.92
Total =	91.00	283.14	100.00	0.19	100.00	0.78	100.00	100.00

Transect 68-2c
700 feet
Line intercept

Lower Water Canyon
North-facing slope

	#Stems	#Stems Per Acre	Rel Density	AVG DBH	%Cover	Rel. Cover	%Freq.	Rel. Freq.	Import Index
Trees									
JUMO	100	219.78	46.08	6.15	13.52	26.68	1.00	41.18	37.9
JUSC	1	2.20	0.46	5.30	5.00	9.87	0.14	5.88	5.4
PIED	114	250.55	52.53	4.48	17.15	33.85	1.00	41.18	42.5
PIPO	2	4.40	0.92	22.15	15.00	29.60	0.29	11.76	14.1
TOTAL:	217.00	476.92	100.00	38.08	50.67	100.00	2.43	100.00	100.0
Shrubs									
FAPA	14	30.77	15.38	0.02	0.33	26.97	0.43	6.25	16.2
ARTR	26	57.14	28.57	0.98	0.78	62.92	0.71	10.42	33.9
RHTR	40	87.91	43.96	0.02	0.13	10.11	0.86	12.50	22.1
RICE	11	24.18	12.09	0.04	0.00	0.00	4.86	70.83	27.6
Total =	91.00	200.00	100.00	1.06	1.24	100.00	6.86	100.00	100.0

Transect 36-14c
650 feet
Circular plot

South of Pajarito Wetlands
North-facing slope

	#Stems	#Stems Per Acre	Rel Density	AVG DBH	%Cover	Rel. Cover	%Freq.	Rel. Freq.	Import Index
Trees									
JUMO	68.00	149.45	42.50	5.21	11.51	25.92	1.00	46.67	38.3
PIED	91.00	200.00	56.88	5.12	17.89	40.30	1.00	46.67	47.9
PIPO	1.00	2.20	0.62	12.20	15.00	33.79	0.14	6.67	13.6
TOTAL:	160.00	351.65	100.00	22.53	44.39	100.00	2.14	100.00	100.0
Shrubs									
ARTR	11.00	24.18	50.00	0.12	2.55	69.86	0.43	60.00	59.9
RHTR	3.00	6.59	13.64	0.03	0.10	2.74	0.14	20.00	12.1
RICE	8.00	17.58	36.36	0.01	1.00	27.40	0.14	20.00	27.9
Total =	22.00	48.35	100.00	0.16	3.65	100.00	0.71	100.00	100.0

Transect 36-12c
650 feet
Circular plot

Lower Potrillo Canyon
South-facing slope

	#Stems	#Stems Per Acre	Rel Density	AVG DBH	%Cover	Rel. Cover	%Freq.	Rel. Freq.	Import Index
Trees									
JUMO	49	107.69	75.38	7.33	16.50	69.89	0.86	54.55	66.6
PIED	16	35.16	24.62	5.23	7.11	30.11	0.71	45.45	33.3
TOTAL:	65	142.86	100	12.56	23.61	100.00	1.57	100	10
Shrubs									
ARTR	140	307.69	26.82	0.44	8.79	39.66	0.71	12.82	26.4
CHNA	1	2.20	0.19	0.10	0.10	0.45	0.14	2.56	1.0
RHTR	329	723.08	63.03	0.00	3.18	14.35	1.00	17.95	31.7
RICE	1	2.20	0.19	0.10	0.10	0.45	3.57	64.10	21.5
ATCA	51	112.09	9.77	0.01	10.00	45.10	0.14	2.56	19.1
Total =	522.00	1147.25	100.00	0.65	22.18	100.00	5.57	100.00	100.0

Transect 36-10c
650 feet
Circular plot

Lower Potrillo Canyon
South-facing slope

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	%Cover	Rel. %Cover	Freq.	Rel. Freq.	Importan Inde
Trees									
JUMO	9.00	28.00	15.25	4.46	1.67	5.50	0.64	36.00	18.9
PIED	2.00	6.22	3.39	1.65	0.56	1.84	0.14	8.00	4.4
PIPO	48.00	149.35	81.36	8.96	28.14	92.66	1.00	56.00	76.6
TOTAL:	59.00	183.57	100.00	15.07	30.37	100.00	1.79	100.00	100.0

Species	#Stems	#Stems Per Acre	Rel. Density	%Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Shrubs								
QUUN	121.00	376.48	71.60	5.63	100.00	0.71	66.67	79.42
CEMO	18.00	56.01	10.65	0.00	0.00	0.07	6.67	5.77
RHTR	25.00	77.79	14.79	0.00	0.00	0.21	20.00	11.60
FAPA	5.00	15.56	2.96	0.00	0.00	0.07	6.67	3.21
Total =	169.00	525.83	100.00	5.63	100.00	1.07	100.00	100.00

Transect 36-7c
700 feet
Line intercept

East of Ridge Road turnoff
Canyon bottom

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	%Cover	Rel. %Cover	Freq.	Rel. Freq.	Importan Index
Trees									
JUMO	3.00	10.89	7.32	4.33	0.00	0.00	0.17	14.29	7
PIPO	37.00	134.31	90.24	7.41	28.48	100.00	0.92	78.57	89
SNAG	1.00	3.63	2.44	4.30	0.00	0.00	0.08	7.14	3
TOTAL:	41.00	148.83	100.00	16.04	28.48	100.00	1.17	100.00	100

Species	#Stems	#Stems Per Acre	Rel. Density	%Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Shrubs								
QUUN	106.00	384.78	46.70	0.63	100.00	0.25	20.00	55.57
QUGA	1.00	3.63	0.44	0.00	0.00	0.08	6.67	2.37
QUEX	87.00	315.81	38.33	0.00	0.00	0.67	53.33	30.55
FAPA	2.00	7.26	0.88	0.00	0.00	0.08	6.67	2.52
RHTR	25.00	90.75	11.01	0.00	0.00	0.08	6.67	5.89
CEMO	6.00	21.78	2.64	0.00	0.00	0.08	6.67	3.10
Total=	227.00	824.01	100.00	0.63	100.00	1.25	100.00	100.00

Transect 36-5c
600 feet
Line intercept

Eenie Site
South-facing slope

	#Stems	#Stems Per Acre	Rel Density	AVG DBH	%Cover	Rel. Cover	%Freq.	Rel. Freq.	Import Index
Trees									
JUMO	97.00	298.46	65.99	4.87	23.44	57.02	1.00	41.67	54.8
PIED	44.00	135.38	29.93	6.68	17.67	42.98	1.00	41.67	38.1
SNAG	6.00	18.46	4.08	0.46	0.00	0.00	0.40	16.67	6.9
TOTAL:	147.00	452.31	100.00	12.01	41.10	100.00	2.40	100.00	100.0
Shrubs									
QUUN	4.00	12.31	25.00	0.03	0.03	100.00	0.40	50.00	58.3
CEMO	12.00	36.92	75.00	0.02	0.00	0.00	0.40	50.00	41.6
Total =	16.00	49.23	100.00	0.04	0.03	100.00	0.80	100.00	100.0

Transect 36-3c
450 feet
Circular plot

Minie Site
Northwest mesa top

	#Stems	#Stems Per Acre	Rel Density	AVG DBH	%Cover	Rel. Cover	%Freq.	Rel. Freq.	Import Index
Trees									
JUMO	41.00	126.15	39.42	3.57	8.75	38.44	1.00	50.00	42.6
PIED	63.00	193.85	60.58	5.62	14.01	61.56	1.00	50.00	57.3
TOTAL:	104.00	320.00	100.00	9.20	22.76	100.00	2.00	100.00	100.0
Shrubs									
QUUN	250.00	769.23	64.94	0.10	8.64	75.85	0.80	40.00	60.2
RHTR	2.00	6.15	0.52	0.10	0.05	0.44	0.20	10.00	3.6
CEMO	133.00	409.23	34.55	0.10	2.70	23.71	1.00	50.00	36.0
Total =	385.00	1184.62	100.00	0.30	11.39	100.00	2.00	100.00	100.0

Transect 36-1c
450 feet
Circular plot

Minie Site
North-facing slope