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*BIOLOGICAL AND FLOODPLAIN/WETLANDS
ASSESSMENT FOR
ENVIRONMENTAL RESTORATION PROGRAM
OPERABLE UNIT 1071
TAs 0, 19, 26, 73, and 74*

Authors

James Biggs



Los Alamos
NATIONAL LABORATORY

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**BIOLOGICAL AND FLOODPLAIN/WETLAND ASSESSMENT
FOR ENVIRONMENTAL RESTORATION PROGRAM
OPERABLE UNIT 1071, TAs 0, 19, 26, 73, and 74**

by

James R. Biggs

ABSTRACT

The Los Alamos National Laboratory's (LANL) Biological Resource Evaluation Team (BRET) conducted Level 2 (habitat evaluation) and Level 3 (species-specific) surveys during 1991 to provide information for a site characterization plan. The purpose of the field surveys was three-fold: to determine if species protected by the state or federal government were present before soil sampling took place; to determine if sensitive habitats were present; and to gather base line data for future studies on plant and wildlife species in Operable Unit (OU) 1071. The information gathered from the field surveys was compared with habitat requirements of potentially occurring protected species (threatened or endangered).

Vegetation ranged from a Ponderosa Pine-Mixed Conifer series in the western portions of the OU to a Piñon Pine-Juniper series in the lower east portion of the OU. Following a search of the BRET's threatened, endangered, and sensitive (TES) species data base, and after consulting with state and federal agencies, we listed several plant and wildlife species as potentially occurring in the OU. However, we expect only two species, the peregrine falcon and the northern goshawk, to have a moderate-to-high potential for inhabiting the OU. If we monitor the sites and restrict the period of construction, the potential impacts should be minimal to these species and to nonprotected species of both plants and animals in this OU.

EXECUTIVE SUMMARY

During June, August, and September 1991, field surveys were conducted by the Biological Resource Evaluations Team (BRET) of the Environmental Protection Group (EM-8) for Operable Unit (OU) 1071, Technical Areas (TAs) 0, 19, 26, 73, 74. The Environmental Restoration Program of Los Alamos National Laboratory proposes to conduct site characterization studies that consist primarily of soil sampling to determine

In each location to be sampled, we noted all wetlands and floodplains within the survey area using the National Wetland Inventory Maps and field checks. We also noted the characteristics of wetlands, floodplains, and riparian areas using the criteria outlined in the "Federal Manual for Delineating Jurisdictional Wetlands." (Dunke, et al., 1989) However, wetland boundaries were not delineated during these surveys because of their continual fluctuation. Therefore, wetland boundaries will be delineated just before site sampling to ensure that sampling will be outside of the areas that meet the wetland criteria (based on hydrophytic plants, hydric soils, and hydrology). Delineations are valid for only 2 years; therefore they are most effective when done at the time of sampling.

We reviewed biological reports and searched databases containing historical information of any previous surveys within the area to be sampled. This information was reviewed and is summarized in this document as background information that can be used in future ecological risk assessments and pathways analyses. Biological assessments for other OUs adjacent to OU 1071 also contain additional biological information similar to what is given in this report (see Bennett 1992, Biggs 1992, and Dunham 1992).

Scattered locations of varying disturbance are found in OU 1071 and include LANL facilities, a cemetery, shooting and archery ranges, old fields, portions of the Los Alamos Airport, and residential areas. There are also nearby large scale disturbances, such as a major roadway and golf course.

The terrain of OU 1071 is characterized by essentially two types of topographic features: moderately steep to steep canyons and adjacent mesa tops. Major canyon systems in or adjacent to OU 1071 include Los Alamos Canyon, Pueblo Canyon, Bayo Canyon and Rendija Canyon where Level 2 surveys were conducted. Minor additional amounts of information were extracted from surveys conducted in Mortandad and Ten Site Canyons. For purposes of this report, the OU was separated into North, South, East, and West Zones. Level 2 surveys were conducted on south-facing walls, north-facing walls, and/or east-facing walls in each of the zones. Streamside surveys were conducted in Pueblo Canyon. Certain disturbed areas were also surveyed and include an explosives range, near the shooting and archery ranges in Rendija Canyon, and an old field.

The west end of the mesa tops of OU 1071 were primarily within a Ponderosa Pine-Mixed Conifer community that eventually graded into a Piñon-Juniper woodland towards the east. Along north-facing walls, ponderosa pine, and to a lesser degree, other species of the Mixed Conifer community, extend further eastward within the canyons. Piñon pine and one-seed juniper are dominant overstory species in the East Zone with skunkbush sumac, rubber rabbitbrush, and oak as common shrubs and blue grama, black

on the results of this survey and the lack of a perennial flowing stream and associated suitable habitat.

The peregrine falcon occupies steep cliffs that are usually adjacent to canyons. This species has been recorded as nesting or foraging in a portion of Pueblo Canyon with a known aerie (nest site) in that canyon. This area is in the process of being designated a critical habitat for the peregrine falcon through a Memorandum of Agreement with the US Fish and Wildlife Service (USFWS) and the DOE. It is therefore recommended that all activities within the critical habitat (including Pueblo Canyon) be scheduled from September 1 through February 28 to avoid nesting and breeding periods. If sampling within Pueblo Canyon is required outside of this schedule, additional monitoring of the critical habitat will be required, which may result in time restriction adjustments. We will consult with the USFWS as to the proposed restrictions. If it is determined that the peregrine falcon is absent before site sampling, there should be a minimal impact on this species. In addition to these restrictions, BRET requests that it be notified of disturbances other than soil sampling in order to evaluate potential impacts and develop appropriate mitigation measures.

If conducted in accordance with this document, surface sampling and other associated disturbances in this OU should not cause any adverse impacts to any known critical habitat or sensitive area (i.e., wetlands).

1.0 INTRODUCTION

This report documents a biological assessment conducted for the site characterization or "sampling phase" of the Environmental Restoration program for OU 1071, TAs 0, 19, 26, 73, and 74. The Environmental Restoration Program proposes to sample sites within OU 1071 for purposes of characterizing hazardous waste releases and constituents from SWMUs (Aldrich 1992). The sampling will consist of removing soil samples with hand-held auger drills or with auger-mounted heavy machinery. There may also be additional disturbances such as storage tank removal and explosive ordnance detonation. The biological field assessment was conducted and a report prepared primarily for the soil sampling phase to determine the presence or absence of TES species, and floodplains and wetlands. This assessment was also designed to provide base line information on the plant and wildlife communities occurring in the sites to be sampled which will be used in long-term monitoring.

The proposed site sampling was evaluated as to its impact on TES species and floodplains and wetlands.

Additionally, under Section 404 of the Clean Water Act, we must control the degradation of wetlands and floodplains by limiting the discharge of fill into them. The Corp of Engineers oversees fill discharge limits and issues one of two types of permits. Nationwide permits are most commonly issued and apply to areas of less than 10 acres. If the area is greater than 10 acres, individual permits must be issued before activities can be initiated.

In addition to these regulations, DOE Order 5400.1 requires that there be an environmental survey (a "pre-operational" survey) conducted before the startup of a new site, facility, or process that may adversely affect the environment. This survey should begin a minimum of one year, and preferably two years, before the proposed project startup date to allow for evaluation of the biotic communities under varied seasonal changes. These base line data support the "Environmental Setting" portion of the work plans for the site investigation and are also used for evaluating the environmental impacts of corrective measures.

2.0 ENVIRONMENTAL SETTING

2.1 GENERAL SETTING

OU 1071 lies within the boundaries of LANL in Los Alamos, New Mexico. The Laboratory is located in north-central New Mexico approximately 100 miles north of Albuquerque and 35 miles west of Santa Fe (Fig. 1).

The Laboratory is located on the Pajarito Plateau, an apron of volcanic sedimentary rock stretching north-south for 20-25 miles and east-west for 5-10 miles. The 7,500-ft-high plateau slopes gently eastward toward the Rio Grande from the edge of the Jemez Mountains, a complex pile of volcanic rock along the northwest margin of the Rio Grande Rift. At 6200 ft, the plateau slopes steeply, a result of the down-cutting of the Rio Grande, which lies below at 5400 ft. Intermittent streams flowing southeastward have dissected the plateau into a number of finger-like narrow mesas separated by deep canyons.

Geological substrate, Bandelier Tuff, was deposited from volcanic eruptions in the Jemez Mountains about 1.1 to 1.4 million years ago (Environmental Surveillance Group 1988). The tuff overlaps other volcanics that are underlain by the conglomerate of the Puye Formation. This conglomerate intermixes with Chino Mesa basalts along the Rio Grande.

The area is characterized by a semiarid, temperate mountain climate with summer temperatures typically ranging from a low of 50°F to a high in the 80's during a 24-hour period (Bowen 1990). Winter temperatures generally range from the teens to about 50°F during a 24-hour period. The annual precipitation in the vicinity ranges from 13 to 18 inches, with much of it occurring during summer rain showers in July and August. Meteorological conditions during the 1991 field season are summarized in Fig. 2.

2.2 DESCRIPTION OF OU 1071

OU 1071 is located in the north and east portion of the Laboratory (Fig. 3). The OU includes 5 technical areas that are, for the most part, contiguous throughout the Laboratory and the town of Los Alamos. The unit is located in Township 19 North, Range 6 East, sections 1-17 and Township 19 North, Range 7 East, sections 4-9 and 16-20, but may also include portions of additional sections. The Universal Transverse Mercator coordinates for the area are (given for each corner of the OU):

Zone	Easting	Northing
13	380000	3974500
13	390000	3972500
13	391000	3970000
13	380000	3970000

TA-0 consists of scattered locations in the northern portion of current and former Laboratory property, which is now within the town site. It includes the Los Alamos Airport.

TA-19 was previously known as the East Gate Laboratory and is within the boundaries of what is currently known as TA-72. The area is located on the eastern end of East Mesa which is east of the Los Alamos Airport. The East Mesa is bounded on the north by Pueblo Canyon and on the south by a small tributary of Pueblo Canyon. A portion of this TA occurs in Santa Fe County. Elevations at TA-72 are around 6,910 ft.

Former TA-26 is within the boundaries of what is currently designated as TA-73. TA-26 was located on the north boundary of the Laboratory. It was situated south of and adjacent to East Road on the mesa between Los Alamos Canyon and Pueblo Canyon. TA-26 lies at an elevation ranging from about 6,980 ft to 7,060 ft.

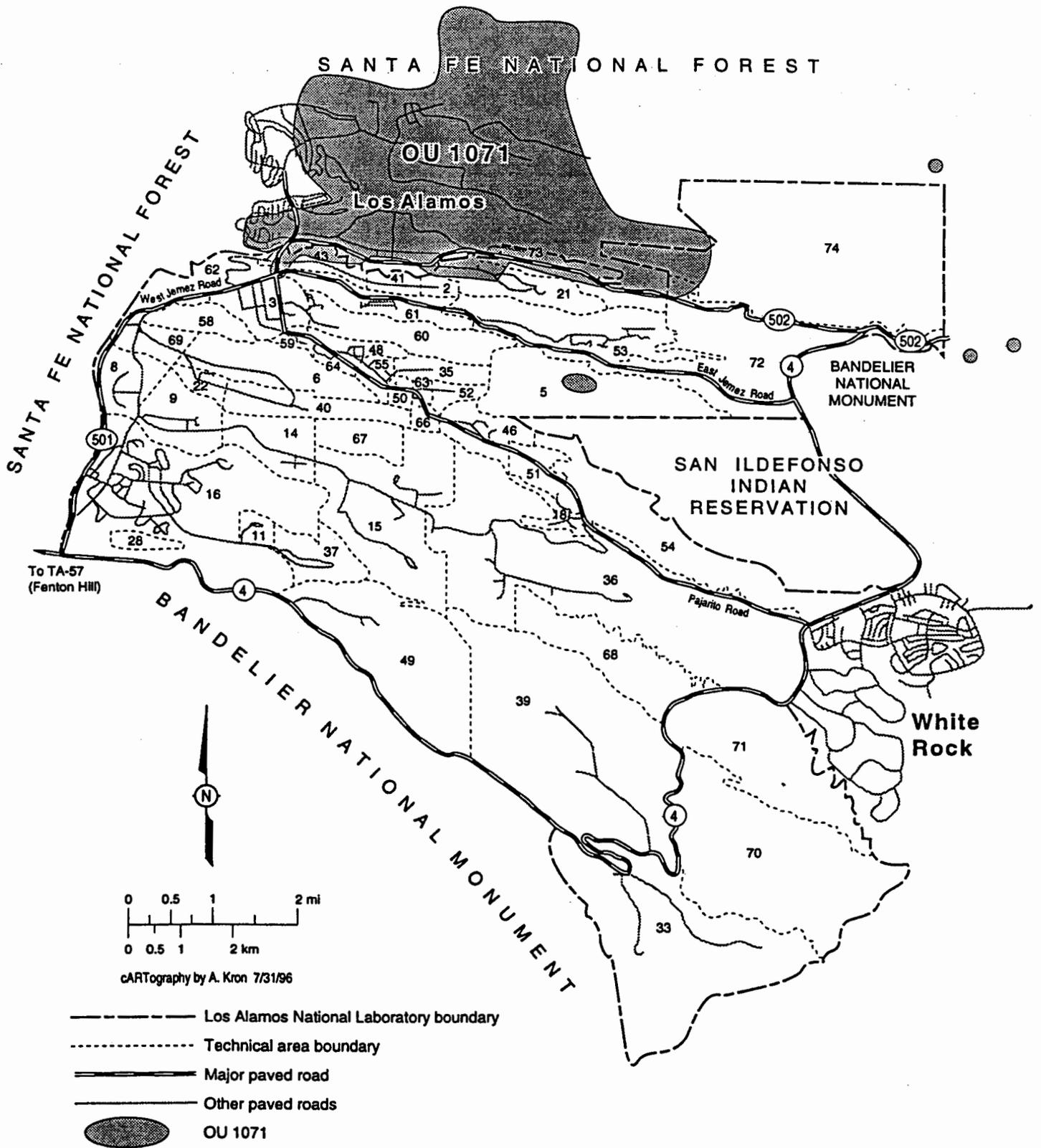


Figure 3. The location of OU 1071 within Los Alamos National Laboratory.

Recovery Act (RCRA). SWMUs at LANL are defined as "any discernable 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). In accordance with the requirements of RCRA, LANL must develop corrective actions for all releases of hazardous waste into the environment.

The Laboratory's Environmental Restoration 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. Additional disturbances associated with the sampling could occur. This assessment focuses primarily on the site soil sampling phase but will discuss the additional disturbances where necessary (see sections 8 and 9). Biological assessments for other phases may be required.

3.2 SWMUs AND PROPOSED SAMPLING

SWMUs are located throughout OU 1071 (Fig. 4) and are associated with the following:

TA-0

- surface impoundments
- used oil container storage area
- decommissioned container storage area
- active container storage area
- Mortandad Canyon landfill
- active landfill
- inactive airport landfill
- North Mesa surface disposal
- Material Disposal Area M
- surface disposal
- mortar impact areas
- western steam plant
- Two-Mile Mesa incinerator
- airport incinerator/surface disposal
- active firing range
- inactive firing range
- waste lines
- active wastewater treatment plants
- decommissioned wastewater treatment plant
- garbage truck and can cleaning
- inactive airport septic systems
- decommissioned septic system

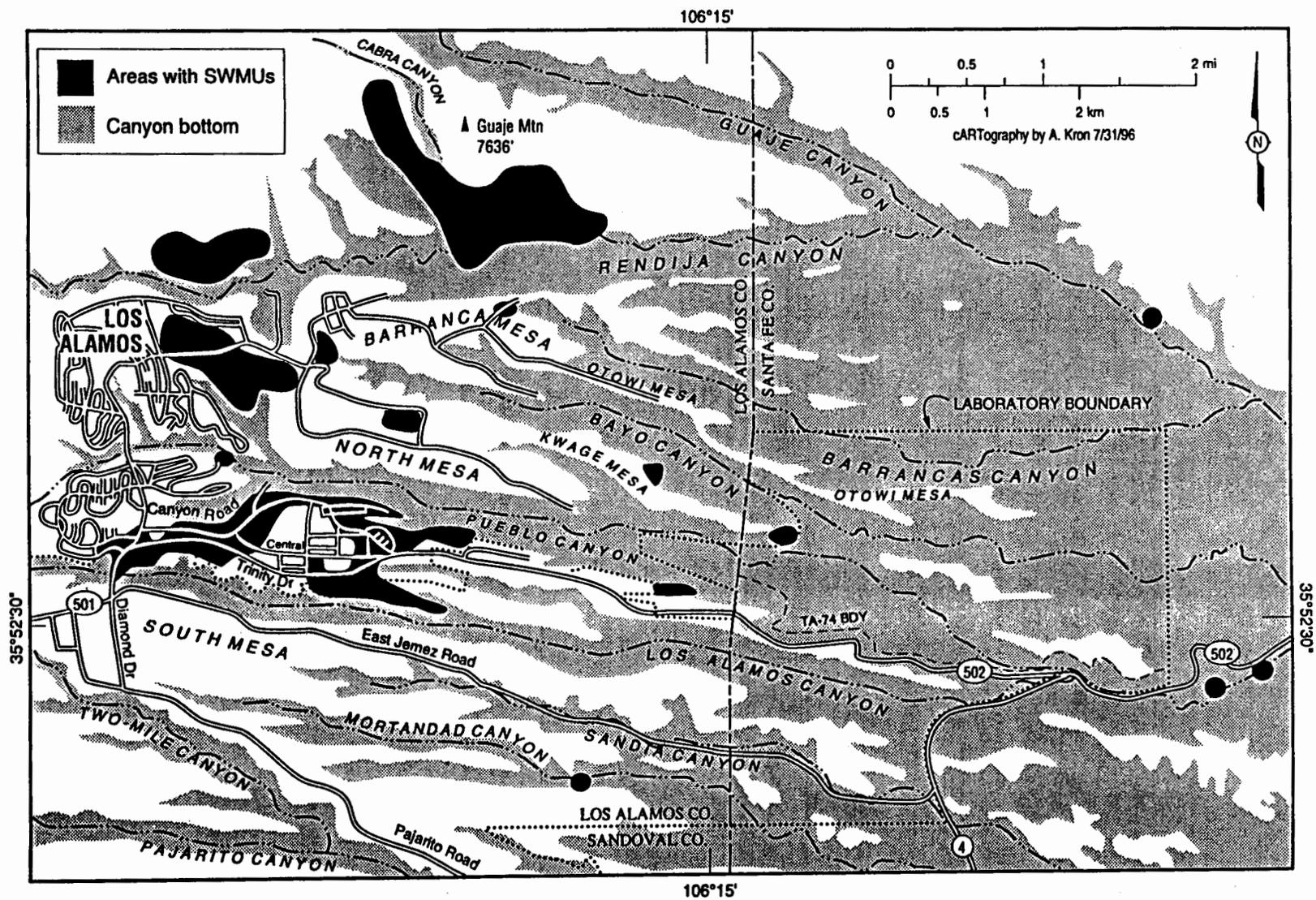


Figure 4. The location of SWMUs within OU 1071.

nearby areas. Appendix B lists those species found in Mortandad Canyon and in habitats similar to what is found in OU 1071.

Table 2: Previous wildlife studies.		
PROJECT	DATE	AUTHORS
The Amphibians and Reptiles of Los Alamos Research Park	1978	Bogart
Environmental Assessment Acid/Middle Pueblo Canyon	1982	Ferenbaugh, et al.
The Ants of Los Alamos County (Hymenoptera: Formicidae)	1986	Mackay, et al.
Mammal Surveys at Waste Disposal Sites	1971	Martin, et al.
Biotic Survey of Liquid Effluent Areas	1977	Miera, et al.
Small Mammal Surveys	1985-86, 1988-89	Morrison
Bird Surveys	1986, 1988	Morrison

4.2.2 Mollusks

No extensive or formal field surveys have been conducted for mollusks within OU 1071.

4.2.3 Reptiles and Amphibians

In 1978, Charles Bogart, a consultant to LANL, surveyed reptiles and amphibians within the Laboratory boundaries. Appendix B lists reptiles and amphibians potentially or actually (confirmed) occurring in OU 1071.

4.2.4 Birds

A list of bird species potentially and actually (confirmed) occurring within or near OU 1071 was extracted from the "Atlas of Breeding Birds of Los Alamos County, New Mexico." (Travis 1992) More specific data on bird species is taken from Morrison (1986 and 1990) who established line transects in several canyons, including Pueblo, Bayo, Mortandad, and Barranca, all of which are within or near the OU. Additional transects

Olinger (1987) noted that habitat along the seismic trench location in the Cabra branch of Rendija Canyon was not suitable for any federally proposed endangered or threatened plant species. Olinger also noted that it could be potential habitat for state protected species if the site wasn't so disturbed.

4.3.2 Wildlife

Foxx and Tierney (1984) conducted a vegetational analysis of Pueblo Canyon to determine if the disturbed sites were suitable for foraging by peregrine falcons. They found that food sources for peregrine falcon prey species were not greatly enhanced by disturbance and that the peregrine falcon was known to nest in lower Pueblo Canyon and forage in middle Pueblo Canyon (Ferenbaugh, et al., 1982).

Johnson (1985a) included two areas within Los Alamos Canyon as suitable nesting sites while he assessed the potential impacts of the firing range on peregrine falcons. Additionally, he identified Pueblo Canyon as providing high- quality, suitable nesting sites, and also reported that peregrine falcons had been observed nesting in Pueblo Canyon and foraging in Los Alamos Canyon.

The environmental assessment prepared by Ferenbaugh, et al. (1982) stated that the Jemez Mountains salamander is known to occur in Los Alamos Canyon and that it could occur in Pueblo Canyon if habitat were suitable. However, this species had not been previously recorded for OU 1071. Table 3 lists documents and previously conducted surveys within or near OU 1071 that contain information on TES species.

PROJECT	AUTHORS
Status of Flora on LANL Property	Foxx and Tierney 1980
Vegetational Analysis—Pueblo Canyon	Foxx and Tierney 1981
Draft EIS Cemetary Tract Land Exchange	U.S. Forest Service
Vegetation Survey Cabra Branch/Rendija Canyon	Foxx 1988
Environmental Assessment Acid/Middle Pueblo Canyon	Ferenbaugh, et al., 1982
Proposed Firing Range Biological Assessment	Johnson 1985a
345kV Ojo Overhead Power Line	Johnson 1985b

map vegetation onto Geographic Information Systems such as ARC-INFO. We classified the following units using Brown (1982) and US Forest Service Habitat Types (Moir and Ludwig 1979; Appendix D): Vegetation Type, Formation Type, Climatic (Thermal) Zone, Biotic Community, Series, Habitat Type, Phase. Definitions for each classification are as follows:

Vegetation Type: Refers to the vegetation established under the existing climate and includes upland and wetland.

Formation Type: Refers to the formations that are vegetative responses to various environmental factors primarily available soil moisture, and includes the following:

Upland	Wetland
Tundra	Wet tundra
Forest and woodland	Forest
Scrubland	Swamp-scrub
Grassland	Marshland
Desertland	Strand
Nonvascular	Submergent

Climatic Zone: Refers to one of the four world climatic zones where minimum temperature is the primary determining factor in separation of formation types. These include Arctic-Boreal, Cold Temperate, Warm Temperate, and Tropical-Subtropical.

Biotic Community: Refers to a unit characterized by a distinct evolutionary history within a formation and centered in a biogeographical region that has a particular precipitation pattern or climatic regime.

Series: Refers to principal plant and animal communities within each biotic community. These are based on distinct climax plant dominants.

Habitat Type: Based on occurrence of a particular dominant species that is local or regional in distribution.

Phase: A detailed data collection to determine codominants, understory species, and other species information.

We used standard ecological techniques in the habitat evaluation to measure cover, density, and frequency of the vegetative component and to calculate importance indexes for each species at the overstory and understory levels. The Importance Indexes given in the vegetation characteristic tables for tree and shrub species are calculated by averaging the relative cover, density, and frequency of each species encountered in the line transects. To obtain the Importance Index for understory species, we averaged only the relative cover and frequency.

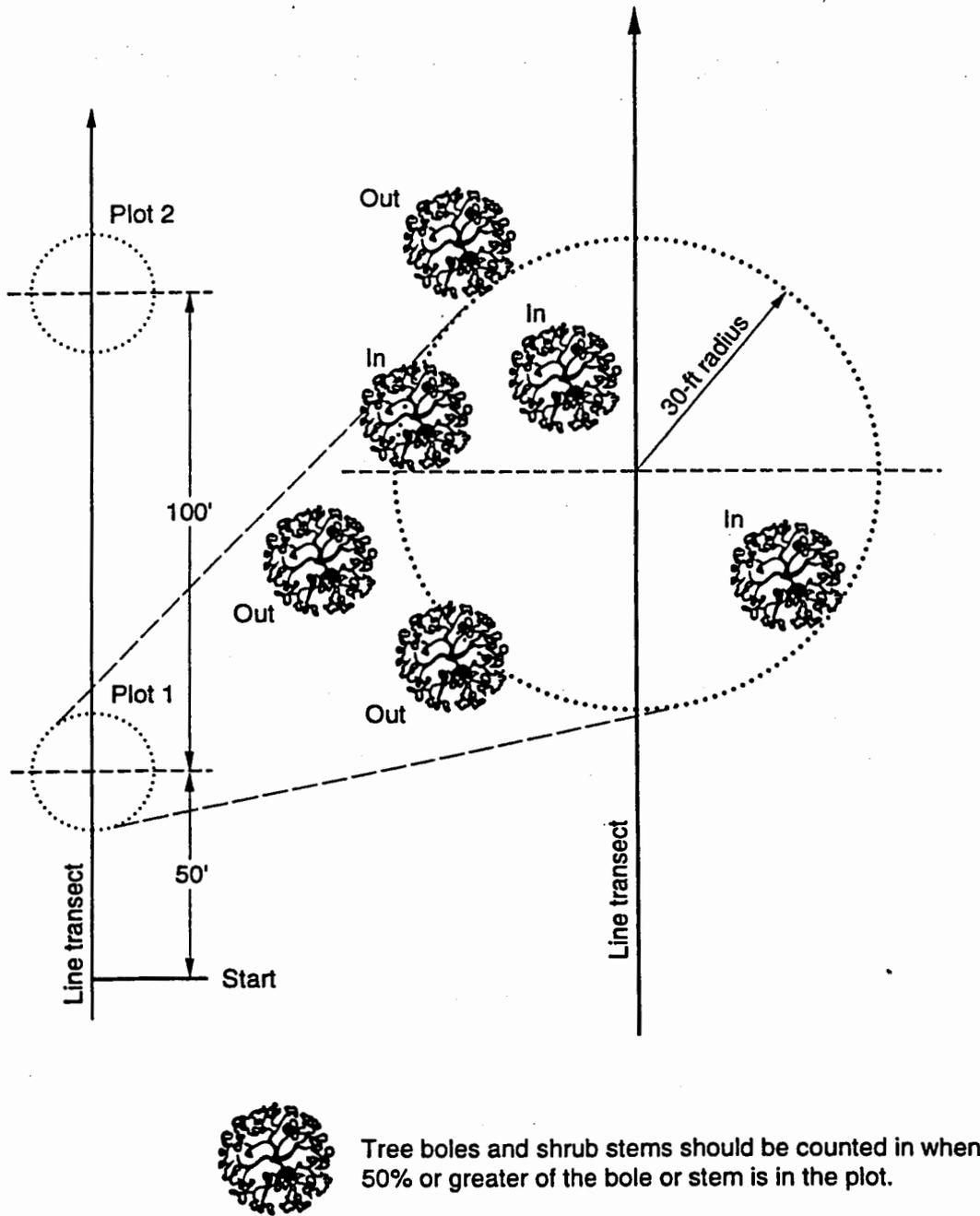
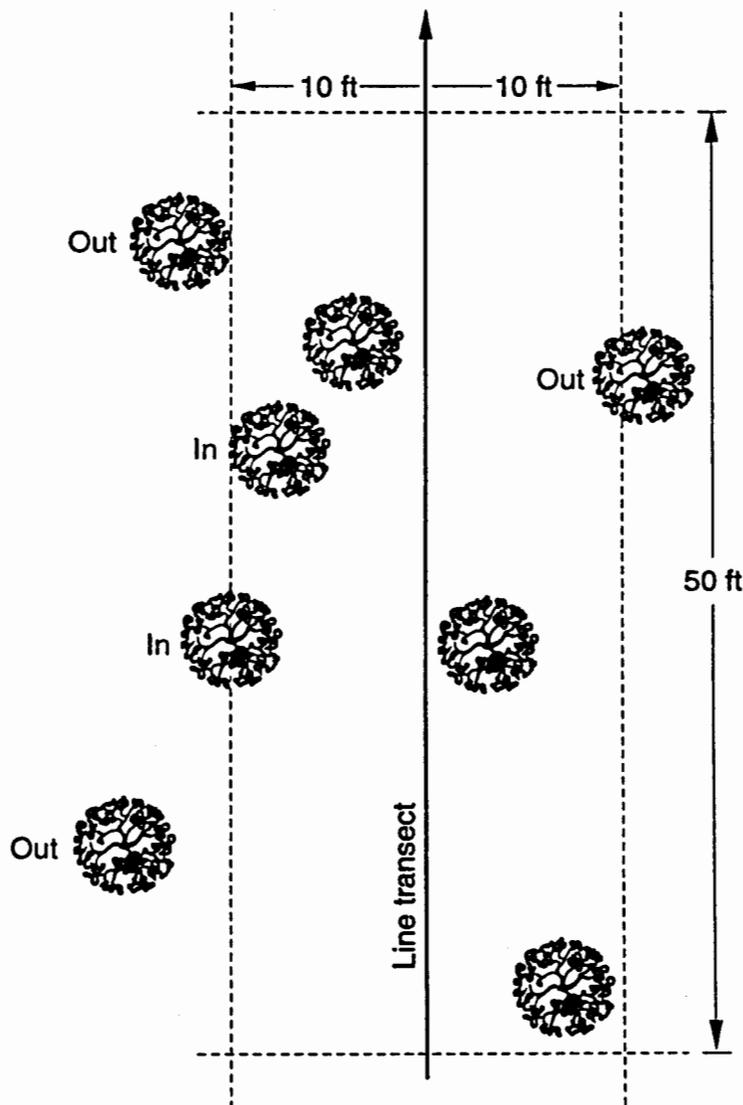


Figure 5. An illustration of the circular plot technique for trees and shrubs.



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

Figure 6. The configuration of a line transect.

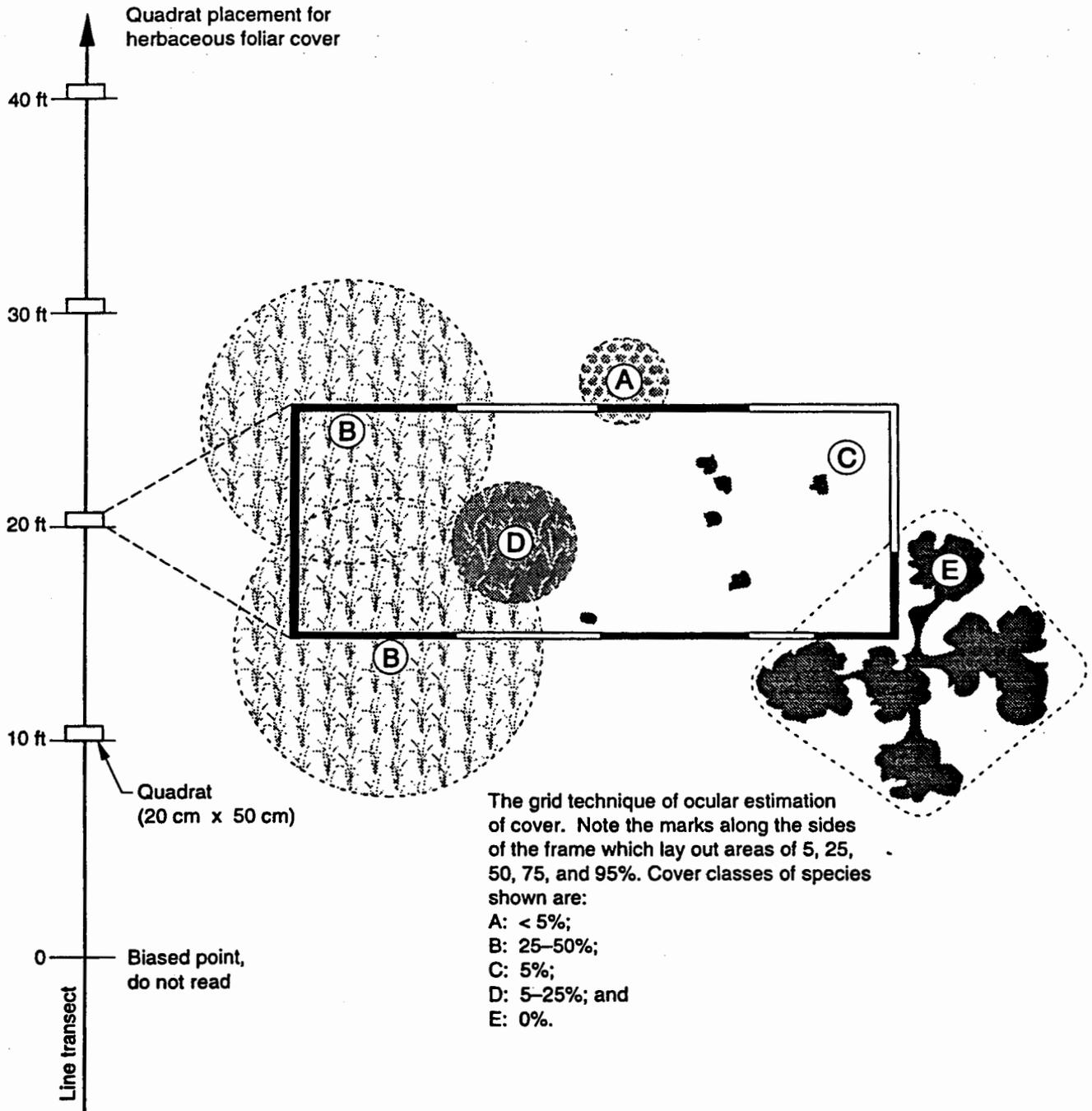


Figure 8. An illustration of the placement and number of quadrats used to estimate overstory and understory foliar cover.

5.3.6 Fish

No fish habitat existed within OU 1071, therefore, no fish surveys were conducted.

5.3.7 TES Species

5.3.7.1 *Peregrine Falcon*

The BRET did not conduct formal field surveys for this species. However, Terrell Johnson, a noted authority, has been subcontracted to develop a habitat management plan for the peregrine falcon. In his document (currently in draft form), Johnson discusses previous surveys and the current status of the species.

5.3.7.2 *Meadow Jumping Mouse*

We conducted meadow jumping mouse surveys in areas with permanent or semi-permanent running water. Jumping mice prefer habitat that consists of riparian vegetation along permanent streams. Tall and dense grasses and forbs should comprise the major part of the vegetation with occasional shrubs. We set traps along the waterway in streamside riparian zones and throughout streamside wet meadow areas. We used snap traps for more efficient trapping. Trapping continued for four consecutive nights or until a jumping mouse was caught. Traps were not baited as capture of a jumping mouse is incidental and we did not want to attract other small mammal species.

6.0 RESULTS

6.1 WETLANDS AND FLOODPLAINS

Floodplains were located in and adjacent to OU 1071. Each of the major canyon systems in OU 1071 should be considered floodplains. Wetlands are located in Pueblo Canyon but within OU 1079 (Biggs 1992) and not in OU 1071.

6.2 LEVEL 1 (RECONNAISSANCE) SURVEYS

We conducted reconnaissance surveys at various locations throughout the OU to determine potential habitats, identify sampling locations, and to determine access for

6.2.1.2 Sensitive Species

Under the Federal Endangered Species Act and state statutes, only plant species that are listed or are candidates for listing are protected. New Mexico has listed those species occurring within the state that are considered rare because of restricted distribution or low numerical density. Since these plants are considered rare, they are

Table 4: TES species potentially occurring in OU 1071.				
SCIENTIFIC NAME	COMMON NAME	STATUS ¹	HABITAT	POTENTIAL FOR OCCURRENCE ²
WILDLIFE				
<i>Buteogallus anthracinus</i>	Common black hawk	SE	Riparian with cottonwood	Low
<i>Cynanthus latirostris</i>	Broad-billed hummingbird	SE	Riparian woodlands	Low
<i>Empidonax trailii</i>	Willow flycatcher	FC, SE	Riparian with cottonwood	Low
<i>Euderma maculatum</i>	Spotted bat	FC, SE	Ponderosa, pinon-juniper, cliffs and rock crevices	Low
<i>Falco peregrinus</i>	Peregrine falcon	FE, SE	Ponderosa-pinon, cliffs and rock outcrops on cliffs	Moderate-High
<i>Haliaeetus leucocephalus</i>	Bald eagle	FE, SE	Riparian near streams and lakes	Low-Moderate
<i>Accipiter gentilis</i>	Northern goshawk	SS	Mixed woodlands	Low-Moderate
<i>Ictinia mississippiensis</i>	Mississippi kite	SE	Shelterbelts and riparian zones of lower Rio Grande and Pecos Valleys. Often around manicured environments.	Low
<i>Abronia bigelovii</i>	Tufted sand verbena	FC, SS	Pinon-juniper, restricted to todilto gypsum	Low
<i>Aletes sessiliflorus</i>	Sessile-flowered false carrot	SS	Pinon-juniper, 6500-8100 ft, rocky canyons and slopes, in basaltic and sandstone areas	Low
<i>Astragalus cyaneus</i>	Cyanic milkvetch	SS	Pinon-juniper, 5500-6500 ft, sandy, gravelly hillsides adjacent to the Rio Grande	Low

Table 4 (cont.)

<p>1 STATUS: FE - Federal Endangered; FC - Federal Candidate; SE - State Endangered; SS - State Sensitive Status Definitions: Federal Endangered: Any species which is in danger of extinction throughout all or a significant portion of its range. Federal Candidate: A species that is proposed for federal listing as endangered or threatened. 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 Wildlife (Group 1): Any wildlife species or subspecies whose prospects of survival or recruitment in New Mexico are in jeopardy. State Endangered Wildlife (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 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.</p>
<p>2 POTENTIAL FOR OCCURRENCE: Low: The potential for this species to occur in the project area is unlikely and/or the potential for impact to this species by the proposed project is unlikely. Moderate: Potential habitat exists for this species and/or species has been observed within project area. However, the potential for impact by the proposed project is unlikely. High: Potential habitat exists for this species and the species has been observed nesting and/or breeding in the project area. The potential for impact to this species from the proposed project is likely if conducted during a sensitive time of the year.</p>

sensitive to long-term or cumulative land-use impacts and are vulnerable to biological or climatic events that could threaten them. The state monitors these species to determine if they should be elevated to endangered status. The following species are listed as state sensitive:

COMMON NAME	SCIENTIFIC NAME
Sessile flowered false carrot	<i>Aletes sessiliflorus</i>
Threadleaf horsebrush	<i>Tetradymia filifolia</i>
Plank's catchfly	<i>Silene plankii</i>
Santa Fe milkvetch	<i>Astragalus feensis</i>
Mathew's woolly milkvetch	<i>Astragalus mollissimus</i>
Taos milkvetch	<i>Astragalus puniceus</i>
Cyanic milkvetch	<i>Astragalus cyaneus</i>
Tufted sand verbena	<i>Abronia bigelovii</i>
Pagosa phlox	<i>Phlox caryophylla</i>
Checker lily	<i>Fritillaria atropurpurea</i>

6.2.1.3 Wildlife

Federally Listed Species: Two endangered and five candidate species met the database search criteria as listed by the USFWS (1990):

	Endangered	
Bald eagle		<i>Haliaeetus leucocephalus</i>
Peregrine falcon		<i>Falco peregrinus</i>

In general, OU 1071 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 Series and the Piñon-Juniper Series. This unit is comprised of mesa tops and several canyon systems. Portions of Barrancas, Guaje, and East Mesas and portions of Rendija Canyon, Pueblo Canyon, Los Alamos Canyon, Barrancas Canyon, Sandia Canyon, and Bayo Canyon are the major systems found within the unit. There are additional minor canyon systems also found within the project area.

We established line intercept and circular plot transects within most of the major canyon systems to evaluate the overstory component and additional transects along lower Los Alamos Canyon to determine components of a riparian zone. Vegetation transects were also established in disturbed fields in Rendija Canyon to obtain information representative of disturbed sites. A further breakdown and discussion of vegetation is given below. For purposes of this document, the OU is divided into east, west, north, and south zones with overstory, shrub, and understory vegetation characteristics discussed for each.

6.3.1 Overstory Evaluation

Following a reconnaissance survey of OU 1071, we placed vegetation transects in general habitats that displayed vegetational differences. Locations in the east, west, north, and south zones each had a different plant composition; each site selected appeared to be representative of the overall habitat of OU 1071. Specific site characteristics (dominant species, relative density, cover, etc.) are discussed and compared when possible.

Vegetation differences were not only observed between the varying elevational gradients but also between the terrain features (north-facing slopes, canyon bottoms, etc.). See Appendix E for raw data summaries for each of the vegetation transects.

6.3.1.1 East Zone

We set up transects at the confluence of Pueblo and Bayo Canyons, along the north- and south-facing slopes and in relatively open terrain. The confluence area appeared to be representative of most of the canyon systems in the east zone of OU 1071.

Ponderosa pine, Douglas fir, and juniper were the dominant overstory plant species along our transects with minor occurrences of limber pine (Table 6). Ponderosa pine and Douglas fir were codominants in upper Pueblo Canyon (importance indexes of 66% and 29%, respectively) and ponderosa pine and juniper were codominants near Guaje Cemetery (importance indexes of 81% and 14%, respectively). Of note in Table 6 is the low relative cover value for juniper near Guaje Cemetery (0.00%) compared to its relative frequency (31%). This is indicative of the low amount of cover associated with juniper compared to trees such as ponderosa pine or fir.

Table 6: Overstory vegetation characteristics of plant species recorded in the West Zone, OU 1071

SPECIES & LOCATION	AVERAGE DBH	RELATIVE COVER	RELATIVE DENSITY	RELATIVE FREQUENCY	IMPORTANCE INDEX
Douglas fir					
Pueblo Canyon	5.75	28.44	25.00	36.07	29.84
Guaje Cemetery	8.20	4.50	2.56	7.69	4.92
Ponderosa pine					
Pueblo Canyon	8.21	71.56	70.83	59.02	67.14
Guaje Cemetery	13.54	95.50	87.18	61.54	81.41
One-seed juniper					
Pueblo Canyon	1.25	0.00	3.33	3.28	2.20
Guaje Cemetery	0.23	0.00	10.26	30.77	13.68
Limber pine					
Pueblo Canyon	16.50	0.00	0.83	1.64	0.82
Guaje Cemetery	-	-	-	-	-

The dash (-) indicates species and/or attribute not recorded for this site.

6.3.1.3 North Zone

We set up vegetation transects in Rendija Canyon on the north-facing slope, east-facing slope, and along the canyon bottom where the terrain is relatively open (near the access road to the firing range and archery range). These areas appeared to be representative of vegetation within and along canyons in the North Zone of OU 1071.

Ponderosa pine was the dominant overstory species in the canyon bottom, along the north-facing slope, and at the old field consisting of importance indexes of 83%, 84%, and 85%, respectively (Table 7). However, piñon pine was the dominant species along the east-facing slope (importance index of 94%). The DBH of ponderosa pine along the north-facing slope was more than twice that of ponderosa pine in the canyon bottom (8.38 in. and 20.91 in., respectively). The old field consisted of a young ponderosa pine

26%) and Douglas fir (important index of 12%). The relative frequencies for juniper and ponderosa pine were similar (42% and 48%, respectively) but ponderosa pine had a much greater relative cover value (79%) than juniper (5%).

Overstory species recorded along the riparian zone in lower Los Alamos Canyon include one-seed juniper, ponderosa pine, Rocky Mountain juniper, and narrowleaf cottonwood (Table 9). One-seed juniper and ponderosa pine were the codominants with important indexes of 30% and 37%, respectively. There were also minor amounts of Douglas fir.

Most of the overstory species found along the riparian zone were also recorded for dry canyons. However, the

Table 8: Overstory characteristics of plant species in the South Zone, OU 1071

SPECIES	AVERAGE DBH	RELATIVE COVER	RELATIVE DENSITY	RELATIVE FREQUENCY	IMPORTANCE INDEX
Douglas fir	5.72	16.84	10.71	9.09	12.22
Ponderosa pine	10.82	78.54	57.14	48.48	61.39
One-seed juniper	1.98	4.62	32.14	42.42	26.40

Table 9: Overstory Characteristics of Plant Species along Riparian Zones in the South Zone, OU 1071

SPECIES	AVERAGE DBH	RELATIVE COVER	RELATIVE DENSITY	RELATIVE FREQUENCY	IMPORTANCE INDEX
One-seed juniper	4.23	41.53	42.86	32.26	30.29
Douglas fir	-	-	2.04	3.23	1.76
Ponderosa pine	8.75	15.75	34.69	35.48	37.24
Rocky Mountain juniper	9.08	15.30	10.20	9.68	11.73
Pifon pine	2.35	1.96	4.08	6.45	4.16
Narrow leaf cottonwood	22.35	25.47	6.12	12.90	14.83

The dash (-) indicates species and/or attribute not recorded for this site

presence of cottonwood is indicative of riparian areas. Although the important index for cottonwood was only 15%, a relative cover value of 25% was the second highest for the overstory species.

Douglas fir and ponderosa pine are dominant overstory species along the north-facing slope of Ten Site Canyon (Table 10) and ponderosa pine and Russian olive are dominant along the canyon bottom (Table 11).

on north-facing slopes. However, the south-facing slope consisted of a slightly greater plant composition than the open terrain. Skunkbush sumac, wavy-leaf oak, and rubber rabbitbrush were codominants on south-facing slopes with common occurrences of four-wing saltbush and gambel oak.

North-facing slopes had different plant dominants and a different diversity of species. Mockorange was the most dominant species (important index of 41%) with gambel oak and mountain mahogany as codominants (important indexes of 25% and 26%, respectively). There were less common occurrences of skunkbush sumac and apache plume.

Table 12: Characteristics of shrub species in the East Zone, OU 1071				
Species location	Relative cover	Relative density	Relative frequency	Importance index
Skunkbush sumac				
n-facing slope	4.82	3.91	16.00	8.24
s-facing slope	20.34	13.93	23.53	19.27
open terrain	28.93	30.35	40.00	32.91
Four-wing saltbush				
n-facing slope	-	-	-	-
s-facing slope	20.34	13.93	23.53	19.27
open terrain	-	-	-	-
Apache plume				
n-facing slope	-	-	-	-
s-facing slope	0.56	0.82	5.88	2.42
open terrain	0.60	0.38	2.09	1.02
Mountain mahogany				
n-facing slope	26.51	15.63	36.00	26.04
s-facing slope	1.69	2.46	8.82	4.32
open terrain	-	-	-	-
Currant				
n-facing slope	-	-	-	-
s-facing slope	1.13	0.82	2.94	1.63
open terrain	-	-	-	-
Big sagebrush				
n-facing slope	-	-	-	-
s-facing slope	-	-	-	-
open terrain	37.34	20.33	26.67	34.78

Species location	Relative cover	Relative density	Relative frequency	Importance index
Barberry				
Pueblo Canyon	0.00	12.31	13.64	8.65
Guaje Cemetary	0.00	-	-	-
Mountain mahogany				
Pueblo Canyon	55.56	52.31	45.45	51.11
Guaje Cemetary	0.00	-	-	-
Gambel oak				
Pueblo Canyon	44.44	13.85	13.64	23.98
Guaje Cemetary	0.00	87.50	75.00	54.17
Skunkbush sumac				
Pueblo Canyon	-	-	-	-
Guaje Cemetary	0.00	12.50	25.00	12.50
Cliffbush				
Pueblo Canyon	0.00	21.54	27.27	16.27
Guaje Cemetary	0.00	-	-	-
The dash (-) indicates species and/or attributes not recorded for this site				

Species & location	Relative cover	Relative density	Relative frequency	Importance index
Skunkbush sumac				
open C. B.	13.58	9.30	22.22	15.03
e-facing slope	27.57	26.85	30.18	28.20
n-facing slope	0.00	100.00	100.00	66.67
old field	-	-	-	-
Mountain mahogany				
open C. B.	-	-	-	-
e-facing slope	35.84	10.18	21.09	22.37
n-facing slope	-	-	-	-
old field	-	-	-	-
Gambel oak				
open C. B.	86.42	86.05	66.67	79.71
e-facing slope	-	-	-	-
n-facing slope	-	-	-	-
old field	-	-	-	-

6.3.2.3 South Zone

DP Canyon was dominated by gambel oak and mountain mohogany with lesser amounts of New Mexico locust and currant. As shown in Table 15, the relative densities for oak (48%) and mountain mohogany (46%) and the relative frequencies (35% and 32%, respectively) were similar. However, of note, is the relative cover values for these species (63% for oak and 30% for mohogany). This shows the broader leaf coverage of oak compared to mohogany. The riparian area of lower Los Alamos Canyon had a similar species composition as DP Canyon but with different dominants (Table 16). New Mexico olive (a species typically associated with riparian areas) was the dominant shrub (important index 51%) with skunkbush sumac a codominant (important index 30%).

Oak is the dominant shrub species along the north-facing slope of Ten Site Canyon and willow and oak are dominants along the canyon bottom (Table 17).

6.3.3 Understory Evaluation

6.3.3.1 East Zone

Blue grama was the dominant understory species in the open terrain of the confluence area (importance index of 46%) with minor occurrences of groundsel, wormwood, golden aster, and needle-and-thread grass (Table 18). These understory species were recorded within the piñon-juniper series.

Blue grama was also the dominant understory species for north-facing slopes and south-facing slopes (important indexes of 40% and 33%, respectively). Bluegrass was also relatively common on north-facing slopes (important index of 15%) with less common occurrences of muhly. In comparison, black grama was a codominant on south-facing slopes (important index of 30%) with less common occurrences of bluegrass.

A variety of other species were also recorded along the transect and are given in Appendix E. Only those species with an importance index of approximately 5% or greater were included in understory tables.

Table 17: Characteristics of shrub species in the South Zone, OU 1071¹

Species location	Relative cover	Relative density	Relative frequency	Importance index
Gambel oak				
n-facing slope	96.73	58.33	44.44	66.38
canyon bottom	33.30	30.97	29.92	31.40
Mountain mahogany				
n-facing slope	0.00	5.09	11.11	5.40
canyon bottom	0.00	17.89	21.59	13.16
New Mexico locust				
n-facing slope	-	-	-	-
canyon bottom	0.56	1.46	10.23	4.10
Willow				
n-facing slope	-	-	-	-
canyon bottom	65.87	41.13	17.42	41.47
Colorado barberry				
n-facing slope	3.63	31.48	22.22	19.11
canyon bottom	-	-	-	-

¹ Information provided in this table is from Dunham 1992.
The dash (-) indicates species and/or attribute not recorded for this site.

Table 18: Characteristics for understory species recorded at the confluence of the East Zone, OU 1071

Species & Location	Relative Cover	Relative Frequency	Importance Index
Bluegrass			
n-facing slope	14.53	14.75	14.64
s-facing slope	4.99	5.13	5.06
open terrain	-	-	-
Spike muhly			
n-facing slope	3.88	6.56	5.22
s-facing slope	-	-	-
open terrain	-	-	-
Black grama			
n-facing slope	-	-	-
s-facing slope	39.52	20.51	30.02
open terrain	-	-	-
Blue grama			
n-facing slope	39.73	39.34	39.54
s-facing slope	34.53	30.77	32.65
open terrain	54.22	37.86	46.04
Wormwood			
n-facing slope	-	-	-
s-facing slope	4.59	8.97	6.53
open terrain	-	-	-

6.3.3.1 North Zone

We set up a transect along the canyon bottom edge (shelf) of Rendija Canyon. The transect was located adjacent to a fence just north of the road. The area was devoid of overstory of shrub species, therefore, we collected only understory data. Blue grama was the dominant species (importance index of 32%) with common occurrences of dropseed and wormwood (Table 20).

Table 20: Characteristics of understory species in the North Zone, OU 1071

Species & Location	Relative Cover	Relative Frequency	Importance Index
Bromegrass			
open canyon bottom	3.46	7.06	5.26
e-facing slope	-	-	-
n-facing slope	-	-	-
old field	16.89	11.76	14.33
open canyon edge	-	-	-
Sedge			
open canyon bottom	65.65	47.06	56.36
e-facing slope	-	-	-
n-facing slope	51.61	60.00	55.81
old field	-	-	-
open canyon edge	-	-	-
Spike muhly			
open canyon bottom	12.07	17.65	14.86
e-facing slope	-	-	-
n-facing slope	19.35	20.00	19.68
old field	-	-	-
open canyon edge	-	-	-
Townsend's daisy			
open canyon bottom	6.33	7.06	6.70
e-facing slope	8.43	6.90	7.67
n-facing slope	-	-	-
old field	-	-	-
open canyon edge	-	-	-
Blue grama			
open canyon bottom	-	-	-
e-facing slope	34.83	31.03	32.93
n-facing slope	-	-	-
old field	-	-	-
open canyon edge	37.67	27.13	32.40
Snakeweed			
open canyon bottom	-	-	-
e-facing slope	5.62	6.90	6.26
n-facing slope	-	-	-
old field	-	-	-
open canyon edge	-	-	-

Table 20 (cont.)

Species & Location	Relative Cover	Relative Frequency	Importance Index
Wormwood (ARCA)			
open canyon bottom	-	-	-
e-facing slope	-	-	-
n-facing slope	-	-	-
old field	18.92	14.71	16.81
open canyon edge	8.82	13.18	11.00
Dropseed			
open canyon bottom	-	-	-
e-facing slope	-	-	-
n-facing slope	-	-	-
old field	-	-	-
open canyon edge	9.23	11.63	10.43
Stickseed			
open canyon bottom	-	-	-
e-facing slope	-	-	-
n-facing slope	-	-	-
old field	-	-	-
open canyon edge	5.97	3.10	4.54
Golden aster			
open canyon bottom	-	-	-
e-facing slope	-	-	-
n-facing slope	-	-	-
old field	12.16	11.76	11.96
open canyon edge	6.66	9.30	7.98
The dash (-) indicates species and/or attribute not recorded for this site or species had less than 5% importance index			

Sedge was the dominant understory species (importance index of 56%) in the open canyon bottom west of the Sportsmans Club in Rendija Canyon. Muhly was common (relative frequency of 18%) along the transect and brome and Townsend's aster were present with less than common occurrence (importance indexes of 5% and 7%, respectively).

Transects to determine understory species were also set up in the explosives area on slightly sloping terrain in Rendija Canyon on a north-facing slope. This area is similar to the open canyon bottom transects and, as a result, had a similar plant composition. Sedge was the dominant plant species (importance index of 56%) with common occurrences of muhly.

The east-facing slope was dominated by blue grama (importance index of 33%). Wormwood (*Artemisia ludoviciana*) was also common along east-facing slopes and had a relative plant cover of 17%. Although sedge dominated the open canyon bottom, it was not found in transects along the east-facing slope.

Table 21 (cont.)

Species & Location	Relative Cover	Relative Frequency	Importance Index
Mountain muhly			
DP Canyon	13.10	2.40	4.50
Riparian area	-	-	19.00
Wheatgrass			
DP Canyon	-	-	-
Riparian area	-	-	19.80
Blue grama			
DP Canyon	-	-	-
Riparian area	-	-	23.50
The dash (-) indicates species and/or attribute not recorded for this site or species had less than 5% importance index			

7.0 DISCUSSION

7.1 LEVEL 2 (HABITAT EVALUATION) SURVEYS

The classification breakdown for both upland and wetland vegetation types for the Pajarito Plateau is given in Appendix D. This listing includes known and potential habitat types and phases based on Brown et al. (1982), Moir and Ludwig (1979), and US Forest Service (ND). 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 "potential" and further studies are necessary to make a complete and accurate determination.

The vegetation surveys indicated that there are primarily two vegetation communities within or adjacent to OU 1071: the Rocky Mountain Montane Conifer Forest community and the Great Basin Conifer Woodland community. These communities can be further separated into series and, more specifically, habitat types.

Based on the species composition of the transects and their locations within the OU, it could be seen that differences in species dominance were associated with differences in topography, such as slope and aspect (north, south, or east). Differences could also be seen in the varying elevational gradients.

7.1.1 Rocky Mountain Montane Conifer Forest

This community consisted of primarily one vegetation series, the Ponderosa Pine with minor characteristics of a Mixed Conifer series in Ten Site Canyon. This community was found in the West, North, and South Zones. The ponderosa pine series can be further divided into habitat types. The ponderosa pine/gambel's oak habitat type

7.2.2.1 *Wildlife*

The northern goshawk has been found on Laboratory property but not within the project area. However, because of existing suitable habitat, there is potential for this species to occupy the area in the future. Impacts and mitigation are provided in sections 8 and 9.

Bald eagles winter along the Rio Grande. Winter roosts have been observed at Cochiti Lake. Mortandad Canyon, upstream from Ancho Canyon and southeast of OU 1071, has some suitable roosting areas but no confirmed roosting sites. Suitable roosting sites consist of large trees with protection from the wind. Within the survey area, there are relatively extensive stands of ponderosa pine intermixed with Douglas fir. However, no bald eagles were seen during the surveys within OU 1071. In addition, there is a more ongoing disturbance because of the townsite of Los Alamos and other nearby large scale disturbances such as the airport.

The willow flycatcher breeds through central New Mexico and occurs statewide in spring and autumn migrations. They usually breed in riparian areas dominated by cottonwoods, willows, and other riparian-associated vegetation, however, this vegetation was sparse in the survey area and was in extremely limited distribution.

The spotted bat is found near standing water in riparian, piñon-juniper, ponderosa pine, and spruce-fir areas. They roost in cliffs or rock crevices. The habitat components required by this species are present in the OU. A small stream channel and associated riparian vegetation are found within and immediately adjacent to the unit, however, there are few open stands of water. Mist-netting conducted in the southwest portion of the Laboratory resulted in no captures of the spotted bat. This species is not expected to forage in this OU but could roost nearby. Mitigation is provided in a latter section.

Mexican spotted owls inhabit forested mountains and canyons with primarily uneven-aged stands and closed canopies. Most of the potential habitat for this species in OU 1071 is either developed or adjacent to developed areas (ie., Barrancas Mesa, the Los Alamos Airport, etc.). In addition, the canopies are, for the most part, open. Potentially higher quality habitat is located outside of OU 1071 along the Jemez Mountains. The Mexican spotted owl is not expected to nest in the OU but there is a remote possibility it could forage in the area. However, the proposed project should not impact this species.

The common black hawk is found in cottonwoods and other woodlands along permanent streams. It has occurred in small numbers in the Rio Grande Valley. This medium-sized raptor is primarily affected by the destruction of riparian zones. Riparian areas are found within Acid and Pueblo Canyons but are both relatively small and limited in their distribution. In addition, these streams are at times intermittently flowing.

Advisory Committee, 1984). No specimens of this cacti were found within the OU during Level 1 (reconnaissance) surveys nor during Level 2 (habitat evaluations) surveys.

Plank's catchfly is found in piñon-juniper habitat with its known distribution within the mountains along the Rio Grande. It's found in crevices and pockets in protected cliff faces of igneous rock. This species has not yet been found in Los Alamos County and was not found during the surveys.

The tufted sand verbena is restricted to todilito gypsum or derivatives of this gypsum in piñon-juniper habitats. It has not been found in Los Alamos County and was not found during the surveys.

The sessile-flowered false carrot inhabits rocky canyons and slopes and is usually found in basaltic or sandstone areas. It was not found during the Level 1 or Level 2 surveys and has not yet been recorded for Los Alamos County.

The threadleaf horsebrush occurs on limestone or highly gypseous soils. This species was not found during the surveys nor has it been recorded for Los Alamos County.

The Santa Fe milkvetch is found on dry slopes of piñon-juniper woodlands. It has not yet been found in Los Alamos County nor was it found during the surveys.

Mathew's woolly milkvetch occurs on open slopes and ridges and occasionally in canyons. It has not been recorded for Los Alamos County nor was it found during the surveys.

The Taos milkvetch inhabits loose soil in open areas of piñon pine and juniper. This species has not been recorded for Los Alamos County nor was it found during the surveys.

The cyanic milkvetch occurs on sandy or gravelly hillsides between 5,500 ft and 6,500 ft. It has not been found in Los Alamos County and was not found during the surveys.

The Pagosa phlox is found on open slopes in mountain woodlands and forests. It has not been recorded for Los Alamos County and was not recorded during the Level 1 or Level 2 surveys.

The checker lily is found in mixed conifer vegetation and has been located in Los Alamos County. However, this species was not found during the Level 2 surveys in OU 1071.

Sandia alumroot inhabits moist rock faces from 8,000 to 12,000 ft in elevation. This species has not been recorded for Los Alamos County nor was it found during the field surveys.

8.0 IMPACTS

Impacts discussed in this section are associated primarily with soil sampling and activities associated with the soil sampling phase. These impacts can, in many cases, be applied to other disturbances. However, to ensure that all activities are reviewed and assessed by BRET, mitigation provided in sec. 9 requests BRET be notified before any disturbance.

8.1 WETLANDS AND FLOODPLAINS

Sampling within the OU may include surface samples to a depth of 6 in. or deep core drilling to a depth of more than 200 ft. Heavy equipment and coring should remain outside of wetlands along OU boundaries. If sampling is to take place 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 cause partial or complete loss of those wetlands.
- Excessive disturbance to the vegetation and the soil surface could result in an alteration of the water flow and/or a widening of the channel.
- Disturbance along the drainages as well as to the steeper slopes could result in an initiation of or increase in soil erosion. This could also cause localized alterations in the existing wetlands.
- Hazardous fuel spills or leaks from vehicles could negatively affect water quality in the riparian zone and could result in changes to vegetation.

8.2 TES SPECIES

Site-characterization activities, which include surface sampling and core drilling, could impact the peregrine falcon and/or its habitat. Although the species has not been recently observed in Pueblo Canyon, excessive damage to potential foraging habitat could affect the densities of associated prey species. In addition, if the peregrine falcon should return to the area before sampling and establish a nest site for breeding, disturbances associated with the sampling could cause the breeding pair to abandon the nest.

If the northern goshawk moves into the project area before sampling, similar impacts could occur.

outside of those designated areas. Delineations should be done within 2 years of the sampling; after 2 years, the delineation is no long valid and must be repeated. Site remediation and erosion control measures shall be implemented when heavy machinery is used within canyon bottoms.

9.2 TES SPECIES

9.2.1 Plants

No mitigation of TES plant species is necessary.

9.2.2 Wildlife

Sampling should take place between September 1 and February 28 to avoid impacting the peregrine falcon. If sampling is to occur outside of these dates, a field survey will be conducted before sampling to verify the presence of the peregrine falcon. If the peregrine falcon is absent, sampling can proceed. If the falcon is present or if presence is suspected, a determination of whether sampling can proceed will be made based on the location of the peregrine falcon and the type and location of the sampling. This could result in avoiding sampling from March 1 to August 15 and in avoiding the area after dark from February 1 to August 30.

Although the northern goshawk has not been observed in the project area, there is potential for its occurrence. Before sampling is begun, a field survey should be conducted to determine its presence or absence. Additional mitigation given for the peregrine falcon shall also apply to the northern goshawk.

Canyon walls (cliffs) should not be disturbed. If this is expected to occur, BRET shall be notified and the area checked for presence of the spotted bat.

9.3 NONPROTECTED SPECIES

9.3.1 Wildlife

Most potential impacts to wildlife species should not be adverse and should result in only temporary avoidance of the sampling sites during periods of actual disturbance. However, if heavy machinery is to be used, the following mitigation measures should further reduce the potential for impact:

We conducted a habitat evaluation (Level 2) survey to determine if the specific requirements of the listed species could be met in the sampling locations. As a result, we determined that a species-specific survey would be necessary for the peregrine falcon and meadow jumping mouse. The meadow jumping mouse was not found during the surveys.

Terrell Johnson was subcontracted to determine the status and to develop a habitat management plan (currently in draft form) for the peregrine falcon. Although the peregrine falcon is not currently present in the project area, it could re-establish itself within or near Pueblo Canyon. Mitigation to avoid impact to the peregrine falcon includes a presampling survey to determine its presence or absence and a sampling outside sensitive periods (March 1 to August 15).

We used the National Wetland Inventory Maps in combination with field checks to record all wetlands and floodplains in OU 1071. We used the criteria outlined in the "Federal Manual for Identifying and Delineating Jurisdictional Wetlands" (Dunke, et al., 1989) to record the characteristics of wetlands, floodplains, and riparian areas. Delineation of wetland boundaries was not completed during these surveys because of the continual changes of wetland systems. However, boundaries will be delineated before sampling to ensure that all sampling is conducted outside areas that meet wetland criteria (hydrophytic plants, hydric soils, and hydrology).

Mitigation measures (or best management practices) to reduce the impacts to nonprotected wildlife and plant species include (1) determining when sampling should be conducted, (2) preventative measures to avoid excessive disturbance to the habitat, and (3) notifying BRET before disturbances other than soil sampling.

11.0 DEFINITIONS

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

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: Plants equally likely to occur in wetlands or nonwetlands (estimated probability 34% to 66%).

Facultative Upland: Plants that usually occur in nonwetlands (estimated probability 67% to 99%), but occasionally are found in wetlands (estimated probability 1% to 33%).

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.

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 discernable unit at which solid wastes have been placed at anytime, whether or not the unit was intended for the management of solid or hazardous wastes.

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

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 in jeopardy. These species are protected by state law.

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 Plant (1): This taxon is listed as threatened or endangered under the provisions of the Federal Endangered Species Act or is being considered under the tenets of the Act.

State Endangered Plant (2): This taxon is rare across its entire range and is of such limited distribution and population size that unregulated collection could have an adverse impact and jeopardize its survival in New Mexico.

State Endangered Plant (3): This taxon may be widespread in its distribution and may occur in adjacent states and Mexico, but because its numbers are being significantly reduced, 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.

Threatened, Endangered, and Sensitive (TES) Species Database: A database constructed by LANL that list and provides information on all state and federal endangered, threatened, and sensitive 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

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Field personnel included Teralene Foxx, BRET Supervisor; Alethea Banar, Undergraduate Research Assistant (UGS); Kathryn Bennett, Environmental Scientist; Dan Dunham, Botanist; Brenda Eduskuty, Graduate Research Assistant (GRA); Gregory Gray, (UGS); Steven Jamison, SARA; Eric Pacheco, (UGS); Robert Raskevitz, Biologist; Delia Raymer, Wildlife Biologist, GRA; and Robert Visel, UGS.

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APPENDICES

**APPENDIX A: PLANT SPECIES POTENTIALLY AND ACTUALLY
(CONFIRMED) OCURRING WITHIN OU 1071.**

FAMILY	SCIENTIFIC NAME	COMMON NAME	INDICATOR STATUS ¹
ACERACEAE	<i>Acer glabrum neomexicanum</i>	New Mexico maple	Facultative
AMARANTHACEAE	<i>Amaranthus retroflexus</i>	Pigweed	
ANACARDIACEAE	<i>Rhus radicans</i>	Poison ivy	
	<i>R. trilobata</i>	Shunkbush sumac	
BERBERIDACEAE	<i>Berberis fendleri</i>	Colorado barberry	
BETULACEAE	<i>Betula occidentalis</i>	Birch	Facultative wetland
BORAGINACEAE	<i>Cryptantha jamesii</i>	James hiddenflower	
	<i>Lithospermum multiflorum</i>	Puccoon	
CACTACEAE	<i>Coryphantha vivipara</i>	Pincushion cactus	
	<i>Opuntia</i> spp.	Prickly Pear Cactus	
CAPPARIDACEAE	<i>Polanisia trachysperma</i>	Clammyweed	
CARYOPHYLLACEAE	<i>Arenaria fendleri</i>	Fendler's sandwort	
CELESTRACEAE	<i>Pachystima myrsinites</i>	Myrtle boxleaf	Facultative
CERATOPHYLLACEAE	<i>Clematis pseudoalpina</i>	Rocky Mountain clematis	
CHENOPODIACEAE	<i>Atriplex canescens</i>	Four-wing saltbush	
	<i>Chenopodium album</i>	Lamb's quarters	
	<i>C. fremontii</i>	Fremont goosefoot	
	<i>C. graveolens</i>	Chenopodium	
	<i>Kochia scoparia</i>	Summer cypress	Facultative
	<i>Salsola iberica</i>	Russian thistle	
COMPOSITAE	<i>Achillea lanulosa</i>	Yarrow	
	<i>Ambrosia coronopifolia</i>	Ragweed	
	<i>Antennaria parvifolia</i>	Pussytoes	
	<i>Artemisia carruthii</i>	Wormwood	
	<i>A. dracunculus</i>	False Tarragon	
	<i>A. franserioides</i>	Ragweed sagebrush	
	<i>A. frigida</i>	Estafiata	
	<i>A. ludoviciana</i>	Wormwood	
	<i>A. tridentata</i>	Big sagebrush	
	<i>Bahia dissecta</i>	Wild chrysanthemum	
	<i>Brickellia</i> spp.	Bricklebush	
	<i>Chrysopsis foliosa</i>	Golden Aster	
	<i>Chrysothamnus nauseosus</i>	Rubber rabbitbrush	
	<i>Cirsium</i> sp.	Thistle	
	<i>Conyza canadensis</i>	Horseweed	Facultative upland
	<i>Erigeron flagellaris</i>	Fleabane	
	<i>E. divergens</i>	Fleabane daisy	
	<i>Eupatorium herbaceum</i>	Throughwort	
	<i>Franseria confertifolia</i>	Bursage	
	<i>Gaillardia pulchella</i>	Firewheel	

Appendix A (cont.)

FAMILY	SCIENTIFIC NAME	COMMON NAME	INDICATOR STATUS ¹
GRAMINEAE	<i>Festuca octoflora</i>	Six-weeks fescue	
	<i>Hilaria jamesii</i>	Galleta	
	<i>Hordeum</i> sp.	Barley	Facultative
	<i>Muhlenbergia montana</i>	Mountain muhly	
	<i>M. torreyi</i>	Ring muhly	
	<i>Oryzopsis asperifolia</i>		
	<i>Oryzopsis hymenoides</i>	Indian ricegrass	Facultative upland
	<i>Phleum pratense</i>	Common timothy	Facultative upland
	<i>Poa fendleriana</i>	Mutton grass	
	<i>Poa</i> spp.	Bluegrass	
	<i>Sitanion hystrix</i>	Bottlebrush squirreltail	
	<i>Sporobolus cryptandrus</i>	Sand dropseed	Facultative upland
	<i>Stipa</i> spp.	Needle and thread	
	LABIATEAE	<i>Monarda pectinata</i>	Ponymint
LEGUMINOSAE	<i>Lupinus caudatus</i>	Lupine	
	<i>Melilotus albus</i>	White sweet clover	Facultative upland
	<i>Melilotus officinalis</i>	Yellow sweet clover	Facultative upland
	<i>Petalostemum</i> spp.	Clover	
	<i>Robinia neomexicana</i>	New Mexico locust	
	<i>Thermopsis pinetorum</i>	Big golden-pea	
	<i>Vicia americana</i>	American vetch	
LILIACEAE	<i>Allium cernuum</i>	Nodding onion	
	<i>Yucca baccata</i>	Banana yucca	
LINACEAE	<i>Linum neomexicana</i>	New Mexico yellow flax	
LOASACEAE	<i>Mentzelia pumila</i>	Stickleaf	
NYCTAGINACEAE	<i>Mirabilis multiflora</i>	Wild four o'clock	
	<i>M. oxybaphoides</i>	Vining four-o'clock	
OLEACEAE	<i>Forestiera neomexicana</i>	New Mexico olive	Facultative upland
ONAGRACEAE	<i>Oenothera</i> spp.	Evening primrose	
PINACEAE	<i>Abies concolor</i>	White fir	
	<i>Picea pungens</i>	Blue spruce	Facultative
	<i>Pinus edulis</i>	Pinon pine	
	<i>P. flexilis</i>	Limber pine	
	<i>P. ponderosa</i>	Ponderosa pine	Facultative upland
	<i>Pseudotsuga menziesii</i>	Douglas fir	
PLANTAGINACEAE	<i>Plantago</i> sp.	Plantain	
POLEMONIACEAE	<i>Ipomopsis aggregata</i>	Skyrocket	
	<i>Ipomopsis longiflora</i>	Blue skyrocket	
POLYGONACEAE	<i>Eriogonum jamesii</i>	Antelope sage	
	<i>E. leptophyllum</i>	Wild buckwheat	

**APPENDIX B: WILDLIFE SPECIES POTENTIALLY AND ACTUALLY
(CONFIRMED) OCCURRING WITHIN OU 1071**

Table 1: Ants potentially and actually occurring in OU 1071			
SUBFAMILY	SCIENTIFIC NAME	HABITAT TYPE	AUTHORITY
DOLICHODERINAE	<i>Acanthomyops latipes</i>	P-R	Walsh
	<i>A. interjectus</i>	PP	Mayr
	<i>Camponotus sansabeanus</i>	P-J and PP	Buckley
	<i>C. vicinus</i>	P-J and PP	Mayr
	<i>Forelius analis</i>	Juniper/sagebrush/riparian	Andre
	<i>Formica argentea</i>	Disturbed	Wheeler
	<i>F. ciliata</i>	P-J	Mayr
	<i>F. densiventris</i>	P-J	Viereck
	<i>F. fusca</i>	P-J	Linnaeus
	<i>F. hewitti</i>	PP-grass	Wheeler
	<i>F. lasioides</i>	P-R	Emery
	<i>F. limata</i>	P-J	Wheeler
	<i>F. neogagates</i>	P-J and disturbed	Emery
	<i>F. obscuripes obscuripes</i>	P-J	Forel
	<i>F. obtusopilosa</i>	P-J	Emery
	<i>F. podzolica</i>	P-J and disturbed	Francoeur
	<i>Lasius alienus</i>	Pinon	Foerster
	<i>L. neoniger</i>	P-R	Emery
	<i>L. pallitarsis</i>	PP	Provancher
	<i>L. sitiens</i>	P-J and PP	Wilson
<i>L. subumbratus</i>	P-R	Viereck	
<i>Myrmecocystus mexicanus</i>	P-J	Wesmael	
<i>Polyergus breviceps</i>	PP	Emery	
<i>Tapinoma sessile</i>	P-J	Mayr	
DORYLINAE	<i>Neivamyrmex nigrescens</i>	P-J	Cresson
MYRMICINAE	<i>Crematogaster cerasi</i>	PP	Fitch
	<i>C. colei</i>	Disturbed	Buren
	<i>Leptothorax crassipilis</i>	P-R	Wheeler
	<i>L. muscorum</i>	PP	Nylander
	<i>L. nitens</i>	Disturbed	Emery
	<i>L. texanus texanus</i>	P-R	Wheeler
	<i>L. tricarinatus</i>	P-R	Emery
	<i>Monomorium minimum</i>	P-J	Buckley
	<i>Myrmecina americana</i>	P-R	Emery
	<i>Myrmica brevispinosa</i>	P-J	Wheeler
	<i>M. emeryana</i>	R-P	Forel
	<i>M. hamulata</i>	P-R	Weber

Appendix B, Table 2 (cont.)

FAMILY	SCIENTIFIC NAME	COMMON NAME
EMBERIZIDAE	<i>Pheucticus melanocephalus</i>	Black-headed grosbeak
	<i>Pipilo chlorurus</i>	Green-tailed towhee
	<i>P. fuscus</i>	Canyon towhee
	<i>P. erythrophthalmus</i>	Rufous-sided towhee
	<i>Piranga flava</i>	Hepatic tanager
	<i>P. ludoviciana</i>	Western tanager
	<i>Poocetes gramineus</i>	Vesper sparrow
	<i>Spizella passerina</i>	Chipping sparrow
	<i>Sturnella neglecta</i>	Western meadowlark
	<i>Vermivora celata</i>	Orange-crowned warbler
	<i>Vermivora virginiae</i>	Virginia's warbler
FALCONIDAE	<i>Falco sparverius</i>	American kestrel
FRINGILLIDAE	<i>C. psaltria</i>	Lesser goldfinch
	<i>Carpodacus cassinii</i>	Cassin's finch
	<i>C. mexicanus</i>	House finch
	<i>Guiraco caerulea</i>	Blue grosbeak
	<i>Hesperiphona vespertina</i>	Evening grosbeak
HIRUNDINIDAE	<i>Loxia curvirostra</i>	Red crossbill
	<i>Hirundo pyrrhonota</i>	Cliff swallow
	<i>Tachycineta thalassina</i>	Violet-green swallow
	<i>Catharus guttatus</i>	Hermit thrush
MUSCICAPIDAE	<i>Myadestes townsendii</i>	Townsend's solitaire
	<i>Polioptila caerulea</i>	Blue-gray gnatcatcher
	<i>Sialis currucoides</i>	Mountain bluebird
	<i>S. mexicana</i>	Western bluebird
	<i>Turdus migratorius</i>	American robin
	PARIDAE	<i>Parus gambeli</i>
<i>P. inornatus</i>		Plain titmouse
PICIDAE	<i>Colaptes auratus</i>	Northern flicker
	<i>Melanerpes formicivorus</i>	Acorn woodpecker
	<i>M. lewis</i>	Lewis' woodpecker
	<i>Picoides villosus</i>	Hairy woodpecker
	<i>P. pubescens</i>	Downy woodpecker
	<i>P. tridactylus</i>	Northern three-toed woodpecker
	<i>Sphyrapicus thyroideus</i>	Williamson's sapsucker
RALLIDAE	<i>Rallus limicola</i>	Virginia rail
SITTIDAE	<i>Certhia americana</i>	Brown creeper
	<i>Sitta carolinensis</i>	White-breasted nuthatch
	<i>S. pygmaea</i>	Pygmy nuthatch
STURNIDAE	<i>Sturnus vulgaris</i>	European starling
TROCHILIDAE	<i>Archilocus alexandri</i>	Black-chinned hummingbird
	<i>Selasphorus platycercus</i>	Broad-tailed hummingbird
	<i>S. rufus</i>	Rufous hummingbird
TROGLODYTIDAE	<i>Catherkes mexicanus</i>	Canyon wren
	<i>Salpinctes obsoletus</i>	Rock wren
	<i>Throamanes bewickii</i>	Bewick's wren

FAMILY	SCIENTIFIC NAME	COMMON NAME	SOURCE
CANIDAE	<i>Canis latrans</i>	Coyote	2
	<i>Vulpus vulpus</i>	Red fox	2
CERVIDAE	<i>Cervus elaphus</i>	Elk	2
	<i>Odocoileus hemionus</i>	Mule deer	2
CRICETIDAE	<i>Clethrionomys gapperi</i>	Boreal redback vole	4
	<i>Neotoma mexicana</i>	Mexican woodrat	1, 2, 4, 5, 6, 7
	<i>Microtus longicaudus</i>	Long-tailed vole	6, 7
	<i>M. montanus</i>	Montane vole	4
	<i>M. pennsylvanicus</i>	Meadow vole	1, 5
	<i>Peromyscus boylii</i>	Brush mouse	4
	<i>P. difficilis</i>	Rock mouse	
	<i>P. leucopus</i>	White-footed mouse	4, 6
	<i>P. maniculatus</i>	Deer mouse	1, 4, 5, 6, 7
	<i>P. trueii</i>	Pinon mouse	1, 5, 6
	<i>Reithrodontomys megalotis</i>	Western harvest mouse	1, 4, 5, 6
	<i>Sigmodon hispidus</i>	Cotton rat	1
ERETHIZONTIDAE	<i>Erethizon dorsatum</i>	Porcupine	2
FELIDAE	<i>Felis concolor</i>	Mountain Lion	2
	<i>Lynx rufus</i>	Bobcat	2
GEOMYIDAE	<i>Thomomys bottae</i>	Bottae's pocket gopher	1, 5
HETEROMYIDAE	<i>Perognathus flavus</i>	Silky pocket mouse	6
	<i>Perognathus intermedius</i>	Rock pocket mouse	6
LEPORIDAE	<i>Sylvilagus audubonii</i>	Desert cottontail	2
	<i>Sylvilagus nuttallii</i>	Nuttall's cottontail	5
	<i>Sylvilagus spp.</i>	Cottontail rabbit	1
MURIDAE	<i>Mus musculus</i>	House mouse	1
MUSTELIDAE	<i>Mustela frenata</i>	Long-tailed weasel	2
	<i>Taxidea taxus</i>	Badger	2
SCIURIDAE	<i>Eutamias minimus</i>	Least chipmunk	1, 4, 5, 7
	<i>E. quadrivittatus</i>	Colorado chipmunk	4, 6, 7
	<i>Sciurus aberti</i>	Abert's squirrel	1, 4, 5
	<i>Spermophilus lateralis</i>	Golden-mantled squirrel	1
	<i>Spermophilus variegatus</i>	Rock squirrel	1, 4, 6
	<i>Tamiasciurus hudsonicus</i>	Red squirrel	4
SORICIDAE	<i>Sorex vagrans</i>	Vagrant shrew	5
	<i>S. nanus</i>	Dwarf shrew	1, 5
	<i>S. palustris</i>	Northern water shrew	4
URSIDAE	<i>Ursus americanus</i>	Black bear	2
VERSPERTILIONIDAE	<i>Eptesicus fuscus</i>	Big brown bat	3
	<i>Lasionycteris noctivagans</i>	Silver-haired bat	3
	<i>Lasiurus cinereus</i>	Hoary bat	3
	<i>M. evotis</i>	Long-eared myotis	3
	<i>M. volans</i>	Long-legged myotis	3

1=Ferenbaugh, et al. 1982; 2=BRET database; 3=BRET (mist netting) 1991;
4=Morrison 1985, '86, '88, '89; 5=Hakonsen 1974; 6=Kent 1986; 7=Martin 1971

Animals

Bird

FAMILY Accipitridae

SCIENTIFIC NAME: *Buteogallus anthracinus*

COMMON NAME: Common black hawk

STATUS: State endangered

FEDERAL/STATE REFERENCE: New Mexico: Endangered (Group 2). First listed 1/24/75 (NMGF Reg. 563).

DISTRIBUTION: Lower elevations in Gila, San Francisco, and Mimbres Drainage. Has also occurred in smaller numbers in Rio Grande Valley.

SPECIFIC REQUIREMENTS: In the Southwest, found in cottonwoods and other woodlands along permanent streams.

HABITAT: Riparian zones

BREEDING HABITAT: Riparian zones

MINIMUM ELEVATION:

MAXIMUM ELEVATION:

THREATS TO TAXON: Destruction of riparian habitat and danger from shooting.

BRIEF KEY DESCRIPTION: Medium-sized raptor, mainly black. Broader wings than the zone-tail. Adults have black bill, dark brown and cere irises, and yellow legs. Length is 500–600 m.

HAS SPECIES PREVIOUSLY BEEN FOUND IN LOS ALAMOS COUNTY? No

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS: None

REFERENCE: NM Dept of Game and Fish, *Handbook of Species Endangered in New Mexico* (1988).

Animals

Bird

FAMILY Falconidae

SCIENTIFIC NAME: *Falco peregrinus*

COMMON NAME: Peregrine falcon

STATUS: Federally endangered

FEDERAL/STATE REFERENCE: New Mexico: 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 occurs statewide in migration and winter.

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

HABITAT: Ponderosa-piñon

BREEDING HABITAT: Ponderosa-piñon

MINIMUM ELEVATION:

MAXIMUM ELEVATION:

THREATS TO TAXON: DDT, destruction of habitat.

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

HAS SPECIES PREVIOUSLY BEEN FOUND IN LOS ALAMOS COUNTY? Yes

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

GENERAL MAP LOCATION: Pueblo Canyon

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

REFERENCE: NM Dept of Game and Fish, Handbook of Species Endangered

Animals

Bird

FAMILY Strigidae

SCIENTIFIC NAME: *Strix occidentalis lucida*

COMMON NAME: Mexican spotted owl

STATUS: Candidate for Federal Register

FEDERAL/STATE REFERENCE: Petition to list the spotted owl, 12-22-89.
Currently, the spotted owl has been proposed to list as threatened by USFWS. The proposal appeared in the Federal Register on 11-04-91.

DISTRIBUTION: New Mexico, Arizona, Texas, Colorado, Utah, and Mexico.

SPECIFIC REQUIREMENTS: The owl inhabits forested mountains and canyons. Its habitat is primarily uneven-aged, multistoried forest with closed canopies..

HABITAT: Mixed conifer

BREEDING HABITAT: Mixed conifer

MINIMUM ELEVATION:

MAXIMUM ELEVATION:

THREATS TO TAXON: Lumbering.

BRIEF KEY DESCRIPTION:

HAS SPECIES PREVIOUSLY BEEN FOUND IN LOS ALAMOS COUNTY? No

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS: None

REFERENCE: Federal Register 50 CFR Part 17, Vol 55:60, 3-28-90.

Animals

Bird

FAMILY Trochilidae

SCIENTIFIC NAME: *Cynanthus latirostris*

COMMON NAME: Broad-billed hummingbird

STATUS: State endangered

FEDERAL/STATE REFERENCE: New Mexico: Endangered (Group 2) 1/24/75
(NMGF Reg. 563).

DISTRIBUTION: Summers in Guadalupe Canyon (Hidalgo County), vagrants near
Los Alamos, Bandelier National Monument, Las Vegas,
Truth Or Consequences, Las Cruces, and Carlsbad Caverns.

SPECIFIC REQUIREMENTS: Riparian woodlands, low-to-moderate elevations.

HABITAT: Riparian zones

BREEDING HABITAT: Riparian zones

MINIMUM ELEVATION:

MAXIMUM ELEVATION:

THREATS TO TAXON: Destruction of habitat.

BRIEF KEY DESCRIPTION: Adult males have orange-red bills. Females and
immatures similar to the violet-crowned hummingbird, but
have small white line behind the eye. Upper parts of the
hummingbird are greenish, the wings are blackish, and feet
and eyes are dark. The tail is slightly forked.

HAS SPECIES PREVIOUSLY BEEN FOUND IN LOS ALAMOS COUNTY? Yes

LA REFERENCE OF OCCURRENCE: NM Dept of Game and Fish, *Handbook of
Species Endangered in New Mexico* (1988).

GENERAL MAP LOCATION: N/A

COMMENTS: None

REFERENCE: NM Dept of Game and Fish, *Handbook of Species Endangered in New
Mexico* (1988).

Animals

Mammal

FAMILY Zapodidae

SCIENTIFIC NAME: *Zapus hudsonius*

COMMON NAME: Meadow jumping mouse

STATUS: State endangered

FEDERAL/STATE REFERENCE: New Mexico: Endangered (Group 2), 7/22/83 (NMGF Reg. 624). Federal (Subspecies "New Mexico" *Z. h. luteus*) notice of review as endangered/threatened.

DISTRIBUTION: Locally in San Juan, Jemez, and Sacramento Mountains in central-northern NM and in the central Rio Grande Valley. Has been recorded once in the Sangre de Cristo Mountains.

SPECIFIC REQUIREMENTS: Confined to holarctic region, mesic habitats, permanent streams, and wet meadows.

HABITAT: Wetlands BREEDING HABITAT: Wetlands

MINIMUM ELEVATION: MAXIMUM ELEVATION:

THREATS TO TAXON: Habitat destruction; grazing.

BRIEF KEY DESCRIPTION: Well-developed hind legs, long tail, jumping ability. Shades of brownish above and whitish below, sides yellow/orange brown. Feet are whitish. Length is 188—216 mm.

HAS SPECIES PREVIOUSLY BEEN FOUND IN LOS ALAMOS COUNTY? Yes

LA REFERENCE OF OCCURRENCE: NMDGF, *Handbook of Species Endangered in NM.*

GENERAL MAP LOCATION: N/A

COMMENTS: Reports for Los Alamos are unsubstantiated or are pre-1960 records.

REFERENCE: NM Dept of Game and Fish, *Handbook of Species Endangered in New Mexico* (1988).

Animals

Mollusk

FAMILY Lymnaea

SCIENTIFIC NAME: *Lymnaea captera*

COMMON NAME: Say's pond snail

STATUS: State endangered

FEDERAL/STATE REFERENCE: New Mexico: Endangered (Group 1), 7/22/83
(NMGF Reg. 624).

DISTRIBUTION: The species is known to occur only in the Cerro la Jara area,
Jemez Mountains (Sandoval County).

SPECIFIC REQUIREMENTS:

HABITAT: Wetlands BREEDING HABITAT: Wetlands

MINIMUM ELEVATION: 3700 ft MAXIMUM ELEVATION: 8600 ft

THREATS TO TAXON: Over grazing, pollution, and development.

BRIEF KEY DESCRIPTION: Medium sized (20 mm), absence of operculum on the
foot, shell is elongated and right spiralled. Spiral length is
greater than the width of the aperture. Color is brown to
brown-gray.

HAS SPECIES PREVIOUSLY 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 in New
Mexico* (1988).

Plants

Cactus

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: None

HABITAT: Piñon-juniper

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 7200

MAXIMUM ELEVATION: 8000

THREATS TO TAXON: Road construction, vandalism, and expansion of city parks.

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

HAS SPECIES PREVIOUSLY BEEN FOUND IN LOS ALAMOS COUNTY? No

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS: None

REFERENCE: NM Native Plants Protection Advisory Committee, 1984.

Plants

Forb

FAMILY Apiaceae

SCIENTIFIC NAME: *Aletes sessiliflorus*, Theobald and Tseng

COMMON NAME: Sessile-flowered false carrot

STATUS: State sensitive

FEDERAL/STATE REFERENCE: None

DISTRIBUTION: McKinley, Rio Arriba, Sandoval, and Taos Counties, New Mexico.

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

HABITAT: Piñon-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 five to nine narrow segments that have three lobes; flowers, tiny pale yellow.

HAS SPECIES PREVIOUSLY BEEN FOUND IN LOS ALAMOS COUNTY? No

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS: None

REFERENCE: NM Native Plants Protection Advisory Committee, 1984.

Plants

Forb

FAMILY Caryophyllaceae

SCIENTIFIC NAME: *Silene plankii*

COMMON NAME: Plank's catchfly

STATUS: State sensitive

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

DISTRIBUTION: Mountains along the Rio Grande.

SPECIFIC REQUIREMENTS: None

HABITAT: Piñon-juniper

BREEDING HABITAT: N/A

MINIMUM ELEVATION:

MAXIMUM ELEVATION:

THREATS TO TAXON: None known.

BRIEF KEY DESCRIPTION: None

HAS SPECIES PREVIOUSLY BEEN FOUND IN LOS ALAMOS COUNTY? No

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

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

REFERENCE: NM Native Plants 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: None

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

SPECIFIC REQUIREMENTS: Dry slopes.

HABITAT: Piñon-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, pea-like, reddish purple.

HAS SPECIES PREVIOUSLY BEEN FOUND IN LOS ALAMOS COUNTY? No

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS: None

REFERENCE: NM Native Plants Protection Advisory Committee, 1984.

Plants

Forb

FAMILY Fabaceae

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

COMMON NAME: Taos milkvetch

STATUS: State sensitive

FEDERAL/STATE REFERENCE: None

DISTRIBUTION: Rio Arriba and Taos Counties, New Mexico.

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

HABITAT: Piñon-juniper

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 7000

MAXIMUM ELEVATION:

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 when ripe.

HAS SPECIES PREVIOUSLY BEEN FOUND IN LOS ALAMOS COUNTY? No

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS: None

REFERENCE: NM Native Plants Protection Advisory Committee, 1984.

Plants

Forb

FAMILY Nyctaginaceae

SCIENTIFIC NAME: *Abronia bigelovii*, Heimerl

COMMON NAME: Tufted sand verbena

STATUS: State sensitive

FEDERAL/STATE REFERENCE: Federal Register, 12/15/80, candidate for federal protection. 1991 Natural Heritage Program Plant List 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 its derivative.

HABITAT: Piñon-juniper

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 6000

MAXIMUM ELEVATION:

THREATS TO TAXON: Gypsum mining.

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

HAS SPECIES PREVIOUSLY BEEN FOUND IN LOS ALAMOS COUNTY? No

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS: None

REFERENCE: NM Native Plants Protection Advisory Committee, 1984.

APPENDIX D: VEGETATION HIERARCHICAL CLASSIFICATION SYSTEM

Hierarchy Order

Vegetation Type
 Formation Type
 Climatic (thermal) Zone
 Biotic Community
 Series
 Habitat Type (association)
 Phase

Definitions

Vegetation Type: The vegetation established under existing climate and includes upland or wetland.

Formation Type: The formations that are vegetative responses to various environmental factors, primarily available soil moisture, and includes the following:

Upland	Wetland
tundra	wet tundra
forest and woodland	forest
scrubland	swamp scrub
grassland	marshland
desert land	strand
nonvascular	submergent

Climatic Zone: One of the four world climatic zones where minimum temperature is the primary determining factor in separation of formation types. These include Arctic-Boreal, Cold Temperate, Warm Temperate, and Tropical-Subtropical.

Biotic Community: A unit characterized by a distinctive evolutionary history within a formation and centered in a biogeographical region that has a particular precipitation pattern or climatic regime.

Series: Principal plant and animal communities within each of the Biotic Communities. These are based on distinctive climax plant dominants.

Habitat Type: The occurrence of particular dominant species that are local or regional in distribution.

Phase: Detailed data collection to determine dominants, understory species, and other species information.

For purposes of BRET application, only those formations, climatic zones, communities, etc., that occur at Los Alamos National Laboratory will be provided in this classification system. For a more complete description of all formations, etc., see Brown (1982) and Moir and Ludwig (1979).

The following classification system is separated into the two vegetation types, upland and wetland. Refer to Appendix D for plant code abbreviations.

Upland Vegetation

Formation
 Climatic Zone
 Community

Abco/Berberis repens HT
 Abco/Erigeron eximius HT
 Abco/Festuca arizonica HT
 Festuca arizonica Phase
 Poa fendleriana Phase
 Quercus gambelii Phase
 Abco/Lathyrus arizonicus HT
 Abco/Robinia neomexicana HT
 Robinia neomexicana Phase
 Carex foenea Phase
 Abco/Symphoricarpos HT
 Pinus ponderosa Phase
 Pinus flexilis Phase
 Abco/Vaccinium myrtillus HT
 Pseudotsuga menziesii Series
 Pseudotsuga menziesii (Psme)/Berberis repens HT
 Psme/Bromus ciliatus HT
 Psme/Festuca arizonica HT
 Typic Phase
 Pinus aristata Phase
 Pinus flexilis Phase
 Populus tremuloides Phase
 Psme/Muhlenbergia montana HT
 Pinus edulis Phase
 Pinus flexilis Phase
 Psme/Quercus gambelii HT
 Quercus gambelii Phase
 Festuca arizonica Phase
 Muhlenbergia virescens Phase
 Psme/Physocarpus monogynus HT
 Pinus flexilis (Pifl) Series
 Pifl/Arctostaphylos uva-ursi HT
 Pinus ponderosa (Pipo) Series
 Pipo/Artemisia arbuscula HT
 Pipo/Arctostaphylos uva-ursi HT
 Pipo/Bouteloua gracilis HT
 Bouteloua gracilis Phase
 Schizachyrium scoparium Phase
 Andropogon hallii Phase
 Artemisia tridentata Phase
 Quercus gambelii Phase
 Pipo/Cowania mexicana HT
 Pipo/Festuca arizonica HT
 Danthonia parryi Phase
 Festuca arizonica Phase
 Quercus gambelii Phase
 Bouteloua gracilis Phase
 Pipo/Muhlenbergia montana HT
 Pipo/Poa HT
 Pipo/Oryzopsis hymenoides HT
 Pipo/Quercus gambelii HT
 Quercus gambelii Phase
 Festuca arizonica Phase
 Pinus edulis Phase

Oak scrub Series
Sumac Series
Mixed Deciduous Series

Grassland Formation

Arctic-Boreal Grassland Climatic Zone
Rocky Mountain Alpine and Subalpine Grassland Community

Sedge-Forb-Grass Series

Cold Temperate Grasslands Climatic Zone

Plains Grassland Community

Blue grama (Bogr) grass Series

Bogr/Western wheatgrass HT

Bogr/Buffalo grass HT

Bogr/Galleta HT

Bogr/Black grama HT

Bogr/Needlegrass HT

Bogr/Winterfat HT

Mixed grama Series

Sideoats grama (Bocu)/Bluestem/Jumo HT

Bocu/Bogr HT Bocu/Black grama HT

Bocu/Curly mesquite HT

Bocu/Metcalf muhly/Jumo HT

Bocu/Bluestem HT

Mixed grama/Jumo HT

Buffalo grass/Blue grama Series

Shrub-Grass Disclimax Series

Great Basin Shrub Grassland Community

Wheatgrass Series

Mixed bunchgrass Series

Rice grass/Galleta Series

Galleta/Rice grass/Jumo HT

Rice grass/Sagebrush Series

Galleta/Sagebrush HT

Western wheatgrass/Sagebrush HT

Sacaton/Saltbush Series

Sacaton/Shadscale/Fourwing HT

Mixed grama/western wheatgrass Series

Mixed grama/Jumo HT

Cheatgrass Disclimax Series

Rocky Mountain Montane Grassland Community

Fescue Series

Thurber fescue/Arizona fescue HT

Arizona fescue/Mountain muhly HT

Mumo/Pine dropseed Series

Carex/Tufted hairgrass Series

Mixed Meadow Series

Rush Series

Fern Series

Iris Disclimax Series

Wetland Vegetation

Formation

Climatic Zone

Community

Cattail Series
Bulrush Series
Rocky Mountain Montane Marshland Community
Rush Series
Great Basin Interior Marshland Community
Rush Series
Saltgrass Series

Strand Formation

Arctic-Boreal Strand Climatic Zone
Rocky Mountain Alpine and Subalpine Stream and
Lake Strand Community
Cold Temperate Strand Climatic Zone
Plains Interior Strand Community
Annual Series
Rocky Mountain Montane Stream and Lake Strand Community
Annual Series
Great Basin Interior Strand Community
Annual Series

**APPENDIX E: PLANT SPECIES CODE LIST AND RAW DATA SUMMARIES
FOR 1991 SURVEYS IN OU 1071.**

Plant Species Code List

Scientific Name	Code	Common Name
<i>Abies concolor</i>	ABCO	White fir
<i>Acer glabrum</i>	ACGL	Maple
<i>Agropyron smithii</i>	AGSM	Western wheatgrass
<i>Agropyron trachycaulum</i>	AGTR	Slender wheatgrass
<i>Agrostis alba</i>	AGAL	Redtop
<i>Allium cernuum</i>	ALCE	Nodding onion
<i>Amaranthus albus</i>	AMAL	White amaranth
<i>Amaranthus retroflexus</i>	AMRE	Pigweed
<i>Andropogon scoparius</i>	ANSC	Little bluestem
<i>Antennaria parvifolia</i>	ANPA	Pussytoes
<i>Arctostaphylos uva-ursi</i>	ARUV	Bearberry
<i>Aristida</i> spp.	ARIX	Three-awn
<i>Artemisia carruthii</i>	ARCA	Wormwood
<i>Artemisia dracuncululus</i>	ARDR	False tarragon
<i>Artemisia frigida</i>	ARFR	Estafiata
<i>Artemisia ludoviciana</i>	ARLU	Wormwood
<i>Artemisia tridentata</i>	ARTR	Big sagebrush
<i>Asclepias turerosa</i>	ASTU	Butterflyweed
<i>Aster hesperius</i>	ASHE	Marsh aster
<i>Aster novae-angliae</i>	ASNO	Aster
<i>Atriplex canescens</i>	ATCA	Four-wing saltbush
<i>Bahia dissecta</i>	BADI	Wild chrysanthemum
<i>Berberis fendleri</i>	BEFE	Colorado barberry
<i>Berberis repens</i>	BERE	Creeping barberry
<i>Betula occidentalis</i>	BEOC	Birch
<i>Blepharoneuron tricholepsis</i>	BLTR	Pine dropseed
<i>Bromus anomalus</i>	BRAN	Nodding brome
<i>Bouteloua curtipendula</i>	BOCU	Sideoats grama
<i>Bouteloua gracilis</i>	BOGR	Blue grama
<i>Bouteloua marginatus</i>	BOMA	Mountain brome
<i>Bromus tectorum</i>	BRTE	Downy chess
<i>Brickellia</i> spp.	BRIX	Bricklebush
<i>Bromus anomalus</i>	BRAN	Nodding brome
<i>Bromus</i> sp.	BROX	Brome grass
<i>Bromus tectorum</i>	BRTE	Downy chess
<i>Calypso bulbosa</i>	CABU	Fairy slipper
<i>Campanula rotundifolia</i>	CARO	Harebell
<i>Carex</i> spp.	CARX	Sedge
<i>Castilleja integra</i>	CAIN	Foothills paintbrush
<i>Cercocarpus montanus</i>	CEMO	Mountain mahogany
<i>Chenopodium album</i>	CHAL	Lamb's quarters

Plant Species Code List (cont.)

Scientific Name	Code	Common Name
<i>Ipomopsis aggregata</i>	IPAG	Desert trumpet
<i>Ipomopsis longiflora</i>	IPLO	Blue skyrocket
<i>Iva</i> spp.		Marsh-elder
<i>Jamesia americana</i>	JAAM	Cliffbush
<i>Juniperus monosperma</i>	JUMO	One-seed juniper
<i>Juniperus scopulorum</i>	JUSC	Rocky Mountain juniper
<i>Kochia scoparia</i>	KOSC	Summer cypress
<i>Koeleria cristata</i>	KOCR	June grass
<i>Liatris punctata</i>	LIPU	Gayfeather
<i>Linum neomexicana</i>	LINE	New Mexico yellow flax
<i>Lithospermum multiflorum</i>	LIMU	Puccoon
<i>Lupinus caudatus</i>	LUCA	Lupine
<i>Lycurus phleoides</i>	LYPH	Timothy grass
<i>Melilotus albus</i>	MEAL	White sweet clover
<i>Melilotus officinalis</i>	MEOF	Yellow sweet clover
<i>Mirabilis multiflora</i>	MIMU	Wild four o'clock
<i>Mirabilis oxybaphoides</i>	MIOX	Vining four o'clock
<i>Monarda menthaefolia</i>	MOME	Horsemint
<i>Monotropa latisquama</i>	MOLA	Pinesap
<i>Muhlenbergia montana</i>	MUMO	Mountain muhly
<i>Muhlenbergia torreyi</i>	MUTO	Ring muhly
<i>Muhlenbergia wrightii</i>	MUWR	Spike muhly
<i>Oenothera</i> sp.	OENX	Evening primrose
<i>Opuntia</i> sp.	OPUX	Prickly pear cactus
<i>Oryzopsis hymenoides</i>	ORHY	Indian rice grass
<i>Oxybaphus linearis</i>	OXLI	Desert four o'clock
<i>Panicum capillare</i>	PACA	Witch grass
<i>Pachystima myrsinites</i>	PAMY	Myrtle boxleaf
<i>Parthenocissus inserta</i>	PAIN	Virginia creeper
<i>Penstemon barbatus</i>	PEBA	Scarlet bugler
<i>Penstemon virgatus</i>	PEVI	Variegated penstemon
<i>Pericome caudata</i>	PECA	Taperleaf
<i>Petalostemum</i> sp.		Clover
<i>Philadelphus microphyllus</i>	PHMI	Mockorange
<i>Phleum pratense</i>	PHPR	Common Timothy
<i>Picea pungens</i>	PIPU	Blue spruce
<i>Pinus edulis</i>	PIED	Piñon pine
<i>Pinus flexilis</i>	PIFL	Limber pine
<i>Pinus ponderosa</i>	PIPO	Ponderosa pine
<i>Polygonum convolvulus</i>	POCO	Black bindweed
<i>Polygonum ramosissimum</i>	PORA	Knotweed
<i>Populus tremuloides</i>	POTR	Quaking aspen

Plant Species Code List (cont.)

Scientific Name	Code	Common Name
<i>Ulmus sp.</i>		Elm
<i>Urtica gracilis</i>	URGR	Stinging nettle
<i>Valeriana acutiloba</i>	VAAC	Valeriana
<i>Verbascum thapsus</i>	VETH	Mullein
<i>Vicia americana</i>	VIAM	American vetch
<i>Viguiera multiflora</i>	VIMU	Showy goldeneye
<i>Yucca baccata</i>	YUBA	Banana yucca

Raw Data Summaries for OU 1071

Pueblo Canyon-near Bayo Confl.. 8/21/91. Understory (CircPl). ✓

Species	Cover	Rel. Plant Cover	Rel. Freq.	Rel. Freq.	Importance Index
Bare Soil	48.13				
Rock	2.78				
Litter	37.25				
BOGR	5.20	42.11	0.58	32.86	37.481
SENECIO	2.18	17.61	0.25	14.29	15.949
THTR	0.55	4.45	0.13	7.14	5.798
HYFI	0.25	2.02	0.03	1.43	1.726
MUTO	0.38	3.04	0.03	1.43	2.233
ARDR	0.50	4.05	0.18	10.00	7.024
ARTR	0.90	7.29	0.10	5.71	6.501
ERIGERON	0.40	3.24	0.10	5.71	4.477
GUSA	0.53	4.25	0.08	4.29	4.268
PORTULACA	0.13	1.01	0.03	1.43	1.220
BADI	0.38	3.04	0.03	1.43	2.233
SPCR	0.38	3.04	0.08	4.29	3.661
CABU	0.03	0.20	0.03	1.43	0.816
PIED	0.40	3.24	0.08	4.29	3.762
LUPINE	0.03	0.20	0.03	1.43	0.816
JUMO	0.03	0.20	0.03	1.43	0.816
PECA	0.13	1.01	0.03	1.43	1.220
Total =	88.15	12.35	100	1.75	100

Pueblo Canyon-near Bayo confluence. 8/21/91. Circular Plots.

Tree Species	Trees Importance Index
JUMO	51.62
PIED	43.97
PIPO	4.42

Shrub Species	Shrubs Importance Index
RHTR	30.45
FONE	0.00
ATCA	0.00
PTTR	0.00
CEMO	0.00
RONE	0.00
CHNA	0.00
QUGA	0.00
PHMI	0.00
YUBA	0.00
GUSA	0.00
ARTR	69.55
QUERCUS	0.00

Total =

Pueblo-Bayo Confluence.. 8/13/91. Circular Plots.

Tree Species	Trees		
	Frequency	Relative Frequency	Importance Index
JUMO	12.00	60.00	62.69
PIED	6.00	30.00	31.53
PIPO	2.00	10.00	5.78
TOTAL	20.00	100.00	100.00

Shrub Species	Shrubs		
	Frequency	Relative Frequency	Importance Index
RHTR	8.00	33.33	35.37
FONE	1.00	4.17	4.70
ATCA	1.00	4.17	1.94
PTTR	0.00	0.00	0.00
CEMO	0.00	0.00	0.00
RONE	0.00	0.00	0.00
CHNA	13.00	54.17	55.95
QUGA	0.00	0.00	0.00
PHMI	0.00	0.00	0.00
YUBA	0.00	0.00	0.00
GUSA	0.00	0.00	0.00
ARTR	0.00	0.00	0.00
QUERCUS	0.00	0.00	0.00
FAPA	1.00	4.17	2.04
Total =	24.00	100.00	100.00

Lower Pueblo. N-facing slope. 8/13/91. Circular Plots.

Tree Species	All Plots:						
	Avg DBH	Cover	Relative Cover	Number Stems	Per Acre Density	Relative Density	Frequency
JUMO	9.55	2.63	7.82	14.00	50	18.18	0.38
PIED	5.56	30.94	92.18	63.00	225	81.82	1.00
PIPO	0.00	0.00	0.00	0.00	0	0.00	0.00
TOTAL		33.56	100	77	275	100	1.38

Shrub Species

RHTR	0.10	0.50	4.82	5.00	18	3.91	0.25
FONE	0.00	0.00	0.00	0.00	0	0.00	0.00
ATCA	0.00	0.00	0.00	0.00	0	0.00	0.00
PTTR	0.00	0.00	0.00	0.00	0	0.00	0.00
CEMO	0.18	2.75	26.51	20.00	71	15.63	0.56
RONE	0.00	0.00	0.00	0.00	0	0.00	0.00
CHNA	0.00	0.00	0.00	0.00	0	0.00	0.00
QUGA	1.66	2.81	27.11	49.00	175	38.28	0.13
PHMI	0.14	4.31	41.57	54.00	193	42.19	0.63
YUBA	0.00	0.00	0.00	0.00	0	0.00	0.00
GUSA	0.00	0.00	0.00	0.00	0	0.00	0.00
ARTR	0.00	0.00	0.00	0.00	0	0.00	0.00
QUERCUS	0.00	0.00	0.00	0.00	0	0.00	0.00
FAPA	0.00	0.00	0.00	0.00	0	0.00	0.00
Total =		10.38	100	128	457	100	1.56

Lower Pueblo. N-facing slope. 8/13/91. Understory (CircPl). ✓

Species	Cover	Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	33.88					
Rock	9.25					
Litter	31.13					
POA		3.75	14.53	0.23	14.75	14.644
MUWR		1.00	3.88	0.10	6.56	5.217
BOGR		10.25	39.73	0.60	39.34	39.536
ARLU		0.50	1.94	0.08	4.92	3.428
PIED		0.13	0.48	0.03	1.64	1.062
OPUNTIA		0.25	0.97	0.05	3.28	2.124
ARDR		0.50	1.94	0.03	1.64	1.789
ALUMROOT		0.03	0.10	0.03	1.64	0.868
CHVI		0.38	1.45	0.05	3.28	2.366
HYRI		0.38	1.45	0.03	1.64	1.546
STIPA		0.03	0.10	0.03	1.64	0.868
MUMO		1.13	4.36	0.05	3.28	3.820
MOSS/LICHEN		7.50	29.07	0.25	16.39	22.732

Total =	74.25	25.80	100	1.53	100	100

Lower Pueblo. S-facing slope. 8/14/91. Understory (CircPl).

Species	Cover	Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	55.92					
Rock	4.50					
Litter	23.08					
BOGR		5.77	34.53	0.40	30.77	32.650
GUSA		0.60	3.59	0.07	5.13	4.361
BOER		6.60	39.52	0.27	20.51	30.017
ARDR		0.77	4.59	0.12	8.97	6.783
BROMUS		0.27	1.60	0.05	3.85	2.721
ERJA		0.68	4.09	0.12	8.97	6.533
RHTR		0.17	1.00	0.02	1.28	1.140
WHITECLOVER		0.02	0.10	0.02	1.28	0.691
UNKNOWN1		0.02	0.10	0.02	1.28	0.691
PENSTEMON		0.02	0.10	0.02	1.28	0.691
ATCA		0.08	0.50	0.02	1.28	0.891
ORHY		0.02	0.10	0.02	1.28	0.691
CHNA		0.25	1.50	0.03	2.56	2.031
POA		0.83	4.99	0.07	5.13	5.059
ANSC		0.42	2.50	0.02	1.28	1.889
CRJA		0.18	1.10	0.05	3.85	2.472
LAMBSQUART		0.02	0.10	0.02	1.28	0.691

Total =	83.5	16.70	100	1.3	100	100

Pueblo Canyon-near Golf course. 8/23/91. Line Intercept.

Species

Trees	Avg DBH	% Cover	Rel. % Cover	% Trees /Acre	Rel. Density	Rel. Freq.	Rel. Freq.	Import Index
PSME	5.75	16.02	28.44	65.34	25.00	1.10	36.07	29.84
PIPO	8.21	40.31	71.56	185.13	70.83	1.80	59.02	67.14
JUMO	1.25	0.00	0.00	8.71	3.33	0.10	3.28	2.20
ACGL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JUSC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIFL	16.50	0.00	0.00	2.18	0.83	0.05	1.64	0.82
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total =		56.33	100	261.36	100	3.05	100	100

Shrubs	% Cover	Rel. % Cover	Stems /Acre	Rel. Density	Rel. Freq.	Rel. Freq.	Import Index
RHTR	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RONC	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BEFE	0.00	0.00	0.00	69.70	12.31	0.15	13.64
CEMO	0.00	0.15	55.56	296.21	52.31	0.50	45.45
QUGA	0.00	0.12	44.44	78.41	13.85	0.15	13.64
QUUN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ELAN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PHMI	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RICE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JAAM	0.00	0.00	0.00	121.97	21.54	0.30	27.27
Total =	0.27	100	366.28	100.00	1.10	100	100

Species	Cover	Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	0.50					
Rock	0.00					
Litter	90.86					
BOGR		1.30	14.90	0.13	11.90	13.402
CAREX		3.88	44.41	0.38	35.71	40.063
BADI		0.53	6.02	0.10	9.52	7.771
PURPLEASTER		1.13	12.89	0.10	9.52	11.209
MUMO		0.25	2.87	0.03	2.38	2.623
HYRI		0.15	1.72	0.05	4.76	3.241
ERJA		0.38	4.30	0.03	2.38	3.339
POTENTILLA		0.13	1.43	0.03	2.38	1.907
ARLU		0.03	0.29	0.03	2.38	1.334
ALLIUM		0.13	1.43	0.03	2.38	1.907
MUWR		0.08	0.86	0.08	7.14	4.001
SIHY		0.03	0.29	0.03	2.38	1.334
LICHENMOSS		0.63	7.16	0.05	4.76	5.963
POA		0.13	1.43	0.03	2.38	1.907
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Total =	91.375	8.73	100	1.05	100	100

✓ Sportsman's Club-behind Rifle Range. East-facing slope. 3.6.91. Circular

Species	Avg DBH	Cover	Relative Cover	No. Stems	Per Acre Density	Relative Density
JUMO	2.10	0.63	3.97	2	9.52	5.58
PIED	5.25	19.75	94.05	33	157.14	91.97
PIPO	9.60	0.42	1.95	1.00	4.76	2.78
TOTAL		21.00	100.00	35.00	171.43	100.00

RHTR	0.10	3.33	27.59	29	138.10	26.85
ATCA	0.10	0.17	1.38	3	14.29	2.78
LIPA	0.05	0.08	0.69	2	9.52	1.83
FAPA	0.10	3.08	25.52	51.00	242.86	47.22
CEMO	0.10	4.33	35.86	11.00	52.38	10.13
RICE	0.10	0.17	1.38	5.00	23.81	4.63
CHNA	0.10	0.92	7.59	7.00	33.33	6.48

Total =		12.08	100.00	108.00	514.29	100.00

Rendiya-southwest of Archery Range. PIPO. 8/7/91. Understory. ✓

Species	Avg DBH	% Cover	Rel. % Cover	Trees/Acre	Rel. Density	Rel. Freq.	Import Freq.	Index
PSME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIPO	4.74	11.80	100.00	87.12	88.89	0.50	66.67	85.19
JUMO	0.10	0.00	0.00	10.89	11.11	0.25	33.33	14.81
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total =		11.80	100	98.01	100	0.75	100	100

Species	Cover	Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	55.15					
Rock	0.77					
Litter	10.63					
BOGR		12.62	37.67	0.54	27.13	32.399
GU SA		0.08	0.23	0.02	0.78	0.502
SPOROBOLUS		3.09	9.23	0.23	11.63	10.430
ARCA		2.95	8.82	0.26	13.18	10.999
CHFO		2.23	6.66	0.18	9.30	7.981
ERIOGONUM		0.18	0.55	0.06	3.10	1.826
POA		0.92	2.76	0.05	2.33	2.541
BIAM		0.09	0.28	0.03	1.55	0.913
ARDR		1.85	5.51	0.14	6.98	6.244
ARFE		0.38	1.15	0.02	0.78	0.962
SPHAERALCEA		0.62	1.84	0.08	3.88	2.857
AMARANTHUS		0.08	0.23	0.02	0.78	0.502
RONE		0.38	1.15	0.02	0.78	0.962
LYPH		0.15	0.46	0.02	0.78	0.617
HYRI		0.08	0.23	0.02	0.78	0.502
COCA		0.15	0.46	0.03	1.55	1.005
ERDI		0.15	0.46	0.02	0.78	0.617
OENATHERA		0.08	0.23	0.02	0.78	0.502
TRDU		0.02	0.05	0.02	0.78	0.411
OPUNTIA		0.15	0.46	0.02	0.78	0.617
LAPPULA		2.00	5.97	0.06	3.10	4.536
AMRE		1.92	5.74	0.05	2.33	4.034
LAMBSQUART		0.77	2.30	0.02	0.78	1.536
LICHEN/MOSS		2.54	7.58	0.11	5.43	6.503
Total =	67	33.49	100	2	100	100

TA00 Explosive's Area Ponderosa Pine understory 8/6/91

Species	Cover	Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	1.00					
Rock	0.40					
Litter	83.07					
BROMUS		0.55	3.46	0.08	7.06	5.259
VIAM		0.28	1.77	0.04	3.53	2.651
CAREX		10.37	65.65	0.53	47.06	56.356
POA		0.08	0.51	0.03	2.35	1.430
MUWR		1.91	12.07	0.20	17.65	14.857
IPAG		0.07	0.42	0.01	1.18	0.799
TOIN		1.00	6.33	0.08	7.06	6.694
ARLU		0.27	1.69	0.04	3.53	2.609
LUPINE		0.01	0.08	0.01	1.18	0.630
ERJA		0.40	2.53	0.07	5.88	4.207
STIPA		0.07	0.42	0.01	1.18	0.799
LICHEN/MOSS		0.80	5.06	0.03	2.35	3.706
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Total =	84.466	15.80	100	1.133	100	100

Calculated Summary Values for Transect DP1 (Overstory)

Species	Average DBH	Percent Cover	Relative Cover	Trees or Stems/ Acre	Relative Density	Frequency	Relative Frequency	Importance Index
TREES								
PSME	5.72	5.25	16.84	13.07	10.71	0.05	9.09	12.22
PIPO	10.82	24.48	78.34	69.70	57.14	0.27	48.48	61.39
JUMO	1.98	1.44	4.62	39.20	32.14	0.23	42.42	26.40
SHRUBS								
QUQA		40.48	62.81	1252.35	47.68	1	35.09	48.52
CEMO		19.59	30.40	1210.97	46.10	0.9	31.58	36.03
RONE		3.22	5	98.01	3.73	0.45	15.79	8.17
RICE		0.78	1.21	43.56	1.66	0.25	8.77	3.88
RHTR		0	0	4.36	0.17	0.10	3.51	1.22
CLEX		0	0	2.18	0.08	0.05	1.75	0.61
JAAM		0.38	0.59	2.18	0.08	0.05	1.75	0.81
BEPE		0	0	13.07	0.5	0.05	1.75	0.75

Calculated Summary Values for Transect LA5 (Understory)

Species	Cover	Plant Cover	Relative Plant Cover	Frequency	Relative Frequency	Importance Index
Bare Soil	8.80					
Rock	3.25					
Litter	74.15					
CARX		0.15	0.92	0.02	1.36	1.138
ARLU		0.04	0.24	0.04	2.72	1.483
PIED		0.05	0.31	0.01	0.68	0.493
TROF		0.01	0.06	0.01	0.68	0.371
FONE		1.23	7.50	0.11	7.48	7.494
BROX		1.06	6.47	0.15	10.20	8.336
POAX		3.65	22.27	0.24	16.33	19.298
AGRX		2.25	13.73	0.10	6.80	10.265
BOGR		4.10	25.02	0.22	14.97	19.991
ARDR		0.89	5.43	0.12	8.16	6.797
RHTR		0.11	0.67	0.03	2.04	1.356
ANPA		0.25	1.53	0.04	2.72	2.123
ERDI		0.05	0.31	0.01	0.68	0.493
JUMO		0.01	0.06	0.01	0.68	0.371
BRTE		0.07	0.43	0.03	2.04	1.234
HEPE		0.01	0.06	0.01	0.68	0.371
SEFE		0.10	0.61	0.02	1.36	0.985
THEX		0.02	0.12	0.02	1.36	0.741
AGAL		0.50	3.05	0.06	4.08	3.566
KOCR		0.05	0.31	0.01	0.68	0.493

TA 52 Ten Site Canyon Bottom, PIPO Understory - Transect 2 10-17/91

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	32.25					
Rock	2.50					
Litter	44.00					
SPCR		2.25	11.63	0.35	24.14	17.88
AGSM		0.00	0.00	0.00	0.00	0.00
TARx		0.00	0.00	0.00	0.00	0.00
AMRE		0.00	0.00	0.00	0.00	0.00
BRIN		15.25	78.81	0.65	44.83	61.82
MEAL		0.60	3.10	0.20	13.79	8.45
RONE Seedling		0.00	0.00	0.00	0.00	0.00
ARLU		0.00	0.00	0.00	0.00	0.00
XAST		0.00	0.00	0.00	0.00	0.00
BRAN		0.00	0.00	0.00	0.00	0.00
PLMA		0.75	3.88	0.15	10.34	7.11
ELCA		0.50	2.58	0.10	6.90	4.74
BADI		0.00	0.00	0.00	0.00	0.00
COCA		0.00	0.00	0.00	0.00	0.00
PAIN		0.00	0.00	0.00	0.00	0.00

Total =	78.75	19.35	100.00	1.45	100.00	100.00

TA 52 Ten Site Canyon Bottom, PIPO Understory - Transect 3 10/17/91

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	21.00					
Rock	3.00					
Litter	40.00					
SPCR		16.00	47.27	0.75	38.46	42.36
AGSM		0.00	0.00	0.00	0.00	0.00
TARx		0.00	0.00	0.00	0.00	0.00
AMRE		0.00	0.00	0.00	0.00	0.00
BRIN		14.60	43.13	0.30	46.15	44.64
MEAL		0.00	0.00	0.00	0.00	0.00
RONE Seedling		0.00	0.00	0.00	0.00	0.00
ARLU		0.00	0.00	0.00	0.00	0.00
XAST		0.00	0.00	0.00	0.00	0.00
BRAN		0.00	0.00	0.00	0.00	0.00
PLMA		0.00	0.00	0.00	0.00	0.00
ELCA		1.50	4.43	0.15	7.69	6.06
BADI		0.00	0.00	0.00	0.00	0.00
COCA		0.25	0.74	0.05	2.56	1.65
PAIN		1.50	4.43	0.10	5.13	4.78

Total =	64.00	33.85	100.00	1.95	100.00	100.00

TA52. Ten Site Canyon. Canyon Bottom-Transect 3 10/17/91

Trees	Avg DBH	% Cover	Rel. % Cover	Trees /Acre	Rel. Density	Freq.	Rel. Freq.	Important Index
PSME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65.0								
PIPO	1.94	64.95	100.00	119.79	100.00	0.50	100.00	100.00
66.8								
2.7								
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44.8								
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total =		64.95	100.00	119.79	100.00	0.50	100.00	100.00
Shrubs		% Cover	Rel. % Cover	Stems /Acre	Rel. Density	Freq.	Rel. Freq.	Important Index
JAAM		0.00	0.00	0.00	0.00	0.00	0.00	0.00
RONE		0.00	0.00	43.56	1.83	0.17	18.18	8.67
BEFE		0.00	0.00	0.00	0.00	0.00	0.00	0.00
CEMO		0.15	0.72	381.15	16.06	0.25	27.27	14.68
QUGA		0.00	0.00	359.37	15.14	0.25	27.27	14.14
QUUN		0.00	0.00	0.00	0.00	0.00	0.00	0.00
ELAN		0.00	0.00	0.00	0.00	0.00	0.00	0.00
SALx		20.55	99.28	1589.94	66.97	0.25	27.27	64.51
FAPA		0.00	0.00	0.00	0.00	0.00	0.00	0.00
RHTR		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total =		20.70	100.00	2374.02	100.00	0.92	100.00	100.00

TA 52. Ten Site Canyon, North Facing Slope - Transect 2 10/16/91

Trees	Avg DBH	% Cover	Rel. % Cover	Trees /Acre	Rel. Density	Freq.	Rel. Freq.	Importan Index
PSME	4.63	41.20	62.85	468.27	84.31	0.25	42.86	63.8
PIPO	6.08	24.35	37.15	87.12	15.69	0.33	57.14	36.8
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total =		65.55	100.00	555.39	100.00	0.58	100.00	100.00
Shrubs		% Cover	Rel. % Cover	Stems /Acre	Rel. Density	Freq.	Rel. Freq.	Importan Index
JAAM		0.00	0.00	119.79	5.09	0.50	22.22	9.10
RONE		0.00	0.00	0.00	0.00	0.00	0.00	0.00
BEFE		0.35	3.63	740.52	31.48	0.50	22.22	19.11
CEMO		0.00	0.00	119.79	5.09	0.25	11.11	5.49
QUGA		9.30	96.37	1372.14	58.33	1.00	44.44	66.30
QUUN		0.00	0.00	0.00	0.00	0.00	0.00	0.00
ELAN		0.00	0.00	0.00	0.00	0.00	0.00	0.00
SALx		0.00	0.00	0.00	0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total =		9.65	100.00	2352.24	100.00	2.25	100.00	100.00

APPENDIX E: LETTERS OF CONCURRENCE

Category 2 candidates

Goat Peak pika (Ochotona princeps nigrescens)
occult little brown bat (Myotis lucifugus occultus)
spotted bat (Euderma maculatum)
loggerhead shrike (Lanius ludovicianus)
northern goshawk (Accipiter gentilis)
Jemez Mountain salamander (Plethodon neomexicanus)
grama grass cactus (Pediocactus papyracanthus)

The endangered peregrine falcon (Falco peregrinus anatum) is known to occur within the OUs 1071 and 1079. Terrell Johnson, a noted authority, has been subcontracted to develop a habitat management plan for the peregrine falcon. The U.S. Fish and Wildlife Service (Service) concurs with the time restrictions delineated on page 3 of the BA for OU 1079, which states, "... all activities resulting in disturbance within "critical habitat" (sensitive habitat) be scheduled from September 1 through February 28 to avoid breeding and nesting periods." No sampling within sensitive habitat should be conducted outside the schedule mentioned above. Additionally, the Service defines "activities resulting in disturbance" to include any activity within the sensitive habitat area including passage through the area.

Mexican spotted owl surveys should be conducted prior to SCP sampling initiation. All activities within ¼ mile of nest or roost sites should be scheduled from August 31 through February 1 to avoid breeding and nesting periods.

On January 30, 1992, the Service received a petition to list the southwestern willow flycatcher (Empidonax traillii extimus). The Service recently completed a status review for this species and must now determine whether listing is warranted.

Category 1 candidate species are those for which the Service has substantial information to support their listing as endangered or threatened. The development and publication of proposed rules for these species are anticipated. Category 2 candidate species are those for which the Service has information indicating that proposing to list is possibly appropriate, but for which substantial data on biological vulnerability or threats are not currently available to support the immediate preparation of such rules. Candidate species have no legal protection under the Endangered Species Act and are included in this document for planning purposes only. However, the Service is concerned and would appreciate receiving any status information that is available or gathered on these species.

All sample extractions will take place in the presence of a Environmental Protection Agency (EPA) monitor. If at any time the monitor determines that air emission levels exceed EPA standards, sampling will be terminated and the SCP Biological Assessment process will be reinitiated.