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Biological Assessment for
Environmental Restoration Program,
Operable Unit 1111,
TA-6, -7, -22, -40, -58, and -62.*

Authors: *Mary Salisbury*



Los Alamos

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Biological Assessment for Environmental
Restoration Program, Operable Unit 1111,
TA-6, -7, -22, -40, -58, and -62*

Mary Salisbury

Los Alamos
National Laboratory
Los Alamos, New Mexico 87544

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**BIOLOGICAL ASSESSMENT
FOR
ENVIRONMENTAL RESTORATION PROGRAM
OPERABLE UNIT 1111
TA-6, -7, -22, -40, -58, & -62**

**Los Alamos National Laboratory
Los Alamos, New Mexico**

**Prepared by: Mary Salisbury, ESH-8
Biological Resource Evaluations Team
Environmental Assessments and Resource Evaluations
Environmental Protection Group, ESH-8
May 1994 Draft**

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**BIOLOGICAL ASSESSMENT
FOR ENVIRONMENTAL RESTORATION PROGRAM
OPERABLE UNIT 1111, TA-6, 7, 22, 40, 58, & 62**

by: Mary Salisbury

ABSTRACT

The Los Alamos National Laboratory's Biological Resource Evaluation Team (BRET) conducted Level 2 (habitat evaluation) and Level 3 (species-specific) surveys during the summer of 1992 to provide information for a site-characterization plan that will include soil samples using hand-held and heavy equipment augers. The purpose of the surveys was threefold: 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 baseline data for future studies on plant and wildlife species in Operable Unit (OU) 1111. The information gathered from the field surveys was compared with habitat requirements of potentially occurring protected species (threatened or endangered) for the purpose of compliance with the Federal Endangered Species Act, New Mexico's endangered species laws, and the Floodplain and Wetland Executive Orders 11990 and 11988.

Survey data indicated that potential habitat existed in OU 1111 for northern goshawk, meadow jumping mouse, Mexican spotted owl, spotted bat, Jemez Mountains salamander, wood lily and Helleborine orchid. Although the presence of these species has not been confirmed, mitigation measures are required to ensure no adverse impacts affect these species should they be present in this area.

BRET used the National Wetland Inventory Maps and field checks to record all floodplains and wetlands. Wetland boundary delineation will be conducted prior to site characterization.

Information has been provided to aid in revegetating any area disturbed by site characterization activities. This includes any disturbance caused by off-road vehicular travel.

EXECUTIVE SUMMARY

During the summer months of 1992, field surveys were conducted by the Biological Resource Evaluations Team (BRET) of the Environmental Protection Group (ESH-8) for Operable Unit (OU) 1111, Technical Areas (TAs) 6, 7, 22, 40, 58, and 62. The Environmental Restoration (ER) Program of Los Alamos National Laboratory (LANL) has proposed to conduct site characterization studies, which consist primarily of soil sampling, to determine the nature and extent of hazardous waste releases from Solid Waste Management Units (SWMUs).

The purpose of the surveys was threefold. The first was to determine the presence or lack of presence, prior to site characterization sampling, of any state or federally listed threatened, endangered, or sensitive plant or wildlife species or their critical habitats within the OU boundaries. Second, surveys were conducted to identify the presence or lack of presence of any sensitive areas, such as floodplains and wetlands, that are present within the sites to be sampled, as well as the extent of such areas, and their general characteristics. The third purpose was to provide additional plant and wildlife species data to help define the habitat types within the OU. Data from these surveys will provide further baseline information about the biological components of the sites chosen for site characterization sampling. The data will also aid in determining pre-sampling conditions

that maybe used to compare data collected at the same locations in future similar studies. Furthermore, this information is necessary to support National Environmental Policy Act (NEPA) documentation and possible subsequent determination of a Categorical Exclusion for the site characterization sampling plan.

These surveys were conducted to meet compliance with the Federal Endangered Species Act of 1973; the New Mexico Wildlife Conservation Act (WCA); the New Mexico Endangered Plant Species Act (EPSA); Federal Executive Order's 11990, "Protection of Wetlands"; and 11988, "Floodplain Management"; Department Of Energy (DOE) Order 10 CFR 1022 and finally, DOE Order 5400.1.

BRET conducted a habitat evaluation survey (Level 2) after searching an ESH-8 database containing the habitat requirements for all state and federally listed threatened, endangered, and sensitive (TES) plant and animal species known to occur within the boundaries of LANL and surrounding areas. Level 2 surveys were conducted using a combination of line transects and Daubenmire plots. These techniques are designed to gather data on the percentage of cover, density, and frequency of both understory and overstory components of the plant community.

The habitat information gathered during field surveys was compared with the habitat requirements for each species of concern identified in the database search. If habitat requirements were not met for any species of concern, then no further surveys were conducted and the site was considered cleared with no expected impact to state or federally listed species. If habitat requirements were met, site-specific surveys for the species of concern were conducted. The species specific surveys were conducted in accordance with pre-established survey protocols, which often require certain meteorological or seasonal conditions to complete.

In each location to be sampled, all wetlands and floodplains within the survey area were noted using the National Wetland Inventory Maps followed by field checks. Characteristics of wetlands, floodplains, and riparian areas are noted using criteria outlined in the "Federal Manual For Delineating Jurisdictional Wetlands". However, wetland boundaries were not delineated during these surveys due to their continual fluctuation. Boundary delineation of wetlands, if present, will be conducted just prior to site sampling to ensure that disturbance will be outside of areas that meet the wetland criteria (based on hydrophytic plants, hydric soils and hydrology). Delineations are valid for only two years, and are therefore most effective when done at time of sampling.

Databases containing historical information and biological reports of any previous surveys within or near the area to be sampled were reviewed and are summarized within this document to provide background information concerning the site. These summaries provide inventory information that can be used in future ecological risk assessments and pathways analysis.

The canyon systems within OU 1111 are relatively undisturbed; however, there are locations of varying disturbance on the mesa tops which include roads, drainage's, cleared fields, and LANL facilities.

The terrain of OU 1111 has essentially two types of topographic features: moderately steep to steep canyons and the adjacent mesa top. The canyon systems include Los Alamos, Two-Mile and Pajarito Canyons. Level 2 surveys were conducted on the north-facing slopes and canyon bottom of Los Alamos Canyon, on the

south-facing slopes and canyon bottom of Pajarito Canyon and both the north and south facing slopes and the canyon bottom of Two-Mile Canyon. The top of Two-Mile Mesa was also surveyed within TAs-6, -7 -22, and -40.

This OU was primarily within a ponderosa pine/mixed conifer community. Overstory species found on the mesa top included one-seed juniper, Gambel oak, thinleaf alder, and aspen. Water-birch and Rocky Mountain maple were noted within canyon bottoms and on slopes. Common shrub or midstory species consisted of Gamble oak, Fendler barberry, chokecherry, Fendler's rose, New Mexico locust and mountain mahogany, with willow and cliffbush noted within canyon bottoms and on slopes. Mountain muhly was the dominant understory species within most transects, while redtop and rush were noted frequently within stream channels and on slopes.

A TES database search indicated that potential species of concern for this OU (based on habitat and/or known occurrences) are the northern goshawk, common black hawk, bald eagle, Mississippi kite, peregrine falcon, broad-billed humming bird, willow flycatcher, spotted bat, meadow jumping mouse, Mexican spotted owl, Say's pond snail, wood lily, checker lily, Helleborine orchid, Pagosa phlox, Sandia alumroot, and Jemez Mountains salamander. As a result of a habitat evaluation of the OU, seven of these species appear to have a moderate to high potential for occurrence in the area: the northern goshawk, meadow jumping mouse, spotted bat, Mexican spotted owl, wood lily, Helleborine orchid and the Jemez Mountains salamander. The results of the field habitat evaluations indicate that the habitat elements needed for these species are present.

The northern goshawk has been recorded as nesting outside the Laboratory boundary near OU-1111. It is anticipated that the goshawk will utilize parts of this OU for hunting purposes. Excessive damage to potential foraging habitat could affect densities of potential prey species therefore causing harm to young and nest abandonment.

The spotted bat occupies caves and rock crevices in piñon-juniper-woodland, ponderosa pine forests, mixed conifer forests, and riparian areas. Pajarito Canyon has potentially suitable habitat requirements for this species. No adverse impact to the spotted bat (if present) should occur as long as small caves and rock crevices are not disturbed, and the water source within the canyon is not altered.

Although the meadow jumping mouse has not been found within OU 1111, suitable habitat components for this species are present. Mitigation measures include the avoidance of excessive vegetation removal around stream areas, and the notification of BRET 60 days prior to sampling adjacent to stream channels for a determination of the necessity of site specific surveys can be made. If a survey is required, it must be conducted during the rainy season (optimal time being July); sampling cannot proceed until the survey is complete.

The Mexican spotted owl has been found within Los Alamos County in the past. The spotted owl utilizes the same habitat as the northern goshawk. It is anticipated that the spotted owl could utilize parts of this OU for nesting/hunting purposes. Mitigation includes the minimization of ground disturbance, and limiting the use of heavy equipment and tree removal to minimize damage of suitable habitat.

The Jemez Mountains salamander has been found within Los Alamos County in the past and potential habitat exists within this OU for the salamander. BRET must be notified 60 days prior to sampling to evaluate the need for a salamander survey. NOTE: Due to strict state survey protocols, salamander surveys can only be conducted in the summer months after several days of heavy rain (July or August). Activity will not be permitted on canyon slopes or bottoms when soil moisture is high. When possible downed logs should remain in place. Limit heavy equipment use to minimize topsoil disturbance, and avoid the removal of forest litter in potential salamander habitat.

Although the wood lily was not found during vegetation surveys within this OU, it has been found in Los Alamos County, but it is rare. If extensive sampling is conducted within riparian areas, BRET must be notified to determine if a site-specific survey will be necessary. If heavy equipment or vehicles will be taken off established roads (paved or dirt), BRET must be notified to conduct a "walk through" to determine the presence or absence of the species.

The Helleborine orchid was not found during vegetation surveys. However potential habitat exists within the upper Pajarito Canyon areas where seeps, springs and streams are present. If heavy equipment or vehicles will be taken off established roads (paved or dirt), BRET must be notified to conduct a "walk through" to determine the presence or absence of the species.

Surface sampling of this OU should not cause any adverse impacts to any known critical habitat or sensitive areas if conducted in accordance with guidelines contained in this document. However, should release of contaminants rise above the predetermined action level, workers must cease operations, shut down the site, and reassess the sampling procedure.

1. INTRODUCTION

This biological assessment was conducted for the site characterization plan or "sampling phase" of the Environmental Restoration (ER) Program for OU 1111, TA-6, -7, -22, -40, -58, and -62 to determine presence of TES species, and floodplains and wetlands. It is also designed to provide baseline information on the plant and wildlife communities occurring at the sites to be sampled for use in long-term monitoring.

The Environmental Restoration Program proposes to sample areas within OU 1111 for purposes of characterizing particular sites. The sampling will consist of removing soil samples by way of hand-held augers and drills or by using auger-mounted heavy machinery.

The proposed site sampling was evaluated as to its impact on TES species and floodplains and wetlands. This was conducted in accordance with the 1973 Federal Endangered Species Act (ESA), the New Mexico Wildlife Conservation Act (WCA), the New Mexico Endangered Plant Species Act (EPSA), Federal Floodplain and Wetland Executive Orders (EOs) 11990 and 11988, Department of Energy (DOE) Order 5400.1 (Environmental Compliance), 10 CFR 1022, and the National Environmental Policy Act (NEPA).

Section 7 of the Federal (ESA) requires all federal agencies to ensure that their activities or programs will not jeopardize the continued existence of a federally listed threatened or endangered species or its

designated critical habitat (if applicable). New Mexico's WCA and EPSA also require federal agencies to ensure that their activities and programs will not jeopardize species that are state protected. Implementation of Section 7, as well as New Mexico's WCA and EPSA, is done within the framework of NEPA.

There are three possible outcomes of a biological assessment for TES species:

1. There are no TES species utilizing habitat within the proposed project area;
2. There are TES species utilizing habitat within the proposed project area, but there are no expected adverse impacts to the species; or
3. There are TES species utilizing habitat within the proposed project area and adverse impacts to the species are expected to occur as a result of the proposed project.

If the proposed project is expected to jeopardize a listed species, we will initiate consultation with the appropriate state and/or federal agency which could result in modifications, alternatives, or complete abandonment of the proposed project to avoid impacting a protected species.

Two executive orders provide protection for floodplains and wetlands. Executive Order 11988, "Floodplain Management", calls for protection of floodplains, and mandates that potential effects of any federally funded action in a floodplain be evaluated for impact to the environment and potential health and safety problems arising from any construction on the floodplain. Executive Order 11990, "Protection of Wetlands", requires all federally funded agencies to issue or amend procedures to ensure wetlands be protected from loss and/or degradation.

Code of Federal Regulations 10 CFR 1022 outlines the procedures for DOE compliance with the executive orders and provides the means for public review of floodplain and wetland impacts. The CFR requires that all DOE actions will be assessed for impacts to floodplains and wetlands. This CFR does not include a specific minimum size for the wetland. Public review of potential impacts is provided through NEPA documentation or Federal Register Notification. If floodplains or wetlands could potentially be impacted, a floodplain and wetland assessment must be conducted to determine if the impacts would be considered adverse.

Additionally, under Section 404 of the Clean Water Act, the degradation of wetlands and floodplains are also controlled by limiting the discharge of fill into these sensitive areas. The Corp. of Engineers (COE) oversees fill discharge limits and issues two types of permits depending on the size of the floodplain or wetland to be impacted. Nationwide permits apply to areas where the impact is less than ten acres. If the impact is greater than ten acres, individual permits must be issued on a case by case basis before activities can be initiated.

In addition to the previously discussed regulations, DOE Order 5400.1 requires an environmental survey (a "pre-operational" survey) prior to the start-up of a new site, facility, or process which has the potential for adverse environmental impact. The survey should begin no less than one year, and preferably two years, before the proposed project start-up date to evaluate the biotic communities under varied seasonal changes. These baseline data support the "Environmental Setting" portion of the work plans for site investigation and are also an important aspect for the evaluation of environmental impacts of the corrective measures.

2. PROJECT DESCRIPTION

2.1 Background

Research activities conducted at LANL since its inception, have resulted in the formation of a large number of SWMUs. SWMUs at LANL are defined as "any discernible unit in which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste" (LANL, 1990). These SWMUs are located at various technical areas throughout the 43 square-mile facility and consist of various contaminants released from Laboratory facilities.

The US Environmental Protection Agency (EPA) is the regulatory authority in charge of SWMUs and derives its authority through the Resource Conservation and Recovery Act (RCRA). In accordance with the requirements of RCRA, LANL must develop corrective actions for all released hazardous waste material into the environment.

The ER Group, EM-13 is the responsible party for the development and implementation of 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 (LANL, 1990).

This Biological Assessment has been prepared for use with the site characterization phase. Biological Assessments for other phases may be required.

2.2 Solid Waste Management Units and Proposed Sampling

SWMUs are located throughout the TAs in OU 1111 and are associated with the following:

- TA-6, -7, -22, -40, -58, & -62
- Active Septic Systems
- Decommissioned Septic Systems
- Disposal Pits
- Active Firing Sites
- Inactive Firing Sites
- Decommissioned Tanks
- Sumps and Dry Wells
- Materials Disposal Area F
- Outfalls
- Active Container Storage Areas
- Decommissioned Container Storage Areas
- Burning Areas
- Landfill
- Surface Disposal
- Active Explosives Storage Areas
- Decommissioned Explosives Storage Areas

Sampling of the SWMUs will be primarily in areas judged most likely to contain contaminants of concern on the basis of archival information, and the professional judgment of the OU work plan team and the sampling teams in the field. The locations of samples will be determined by field surveys, and the locations will be situated to maximize the possibility of finding contaminants if they are present. Sampling may include

collecting surface soil samples, soil and rock cores, chips or cores of asphalt and concrete, swipes, and liquid and sludge samples.

No significant release of contaminants into the environment is expected to occur during sampling. However, should release of contaminants rise above the predetermined action levels, workers must cease operations, shut down the site, and reassess sampling.

3. ENVIRONMENTAL SETTING

3.1 General Setting

OU 1111 lies within the boundaries of LANL in Los Alamos County, New Mexico. The Laboratory is located in north-central New Mexico approximately 100 mi (160 km) by road north of Albuquerque and 45 mi (72 km) northwest of Santa Fe (Fig. 1).

The Laboratory is located on the Pajarito Plateau on the east-central edge of the Jemez Mountains. These mountains are formed by a complex pile of volcanic rocks along the northwest margin of the Rio Grande rift in north-central New Mexico. The plateau, which forms an apron of volcanic sedimentary rocks along the eastern flank of the mountains, is aligned approximately north-south and is about 20 to 25 mi (32 to 40 km) in length and 5 to 10 mi (8 to 12 km) wide. The plateau slopes gently eastward from an elevation of about 7500 ft (2250 m) near the mountains toward the Rio Grande where it terminates at an elevation of about 6200 ft (1860 m) in steep slopes formed by the down-cutting of the Rio Grande which lies at 5400 ft (1520 m). The plateau has been dissected into a number of narrow mesas by southeast-trending intermittent streams.

The apron-like plateau at the base of the mountains extends into finger-like 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 (LANL 1988). The tuffs overlap other volcanics which are underlain by the conglomerate of the Puye Formation (LANL 1988). 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 50°F to 70°F and 80°F during a 24 hour period (Bowen 1990). Winter temperatures generally range from the teen's to about 50°F during a 24 hour period. The annual precipitation in the vicinity of Los Alamos ranges from 13 to 18 inches with much of it occurring during summer rain showers in July and August. Meteorological conditions during the 1992 field season are summarized in Fig. 2.

3.2 Description of OU 1111

OU 1111 includes approximately 24 acres in the northwestern portion of LANL site (Fig. 3). The OU includes TA-6, -7, -22, -40, -58, and -62. The OU is located on the Pajarito Plateau on the flanks of the Jemez Mountains. This OU is bounded by Pajarito Canyon and Laboratory land on the south, Laboratory land to the east, private land to the north and U.S. Forest Service land on the west. Two-Mile Canyon joins Pajarito Canyon at the eastern border of the OU. The western boundary of the OU is almost parallel to the Pajarito Fault. The unit is located in Township 19 North, Range 6 East, Sections 17, 18, 19, 20, 21, 27, 28 and 29. This is only an

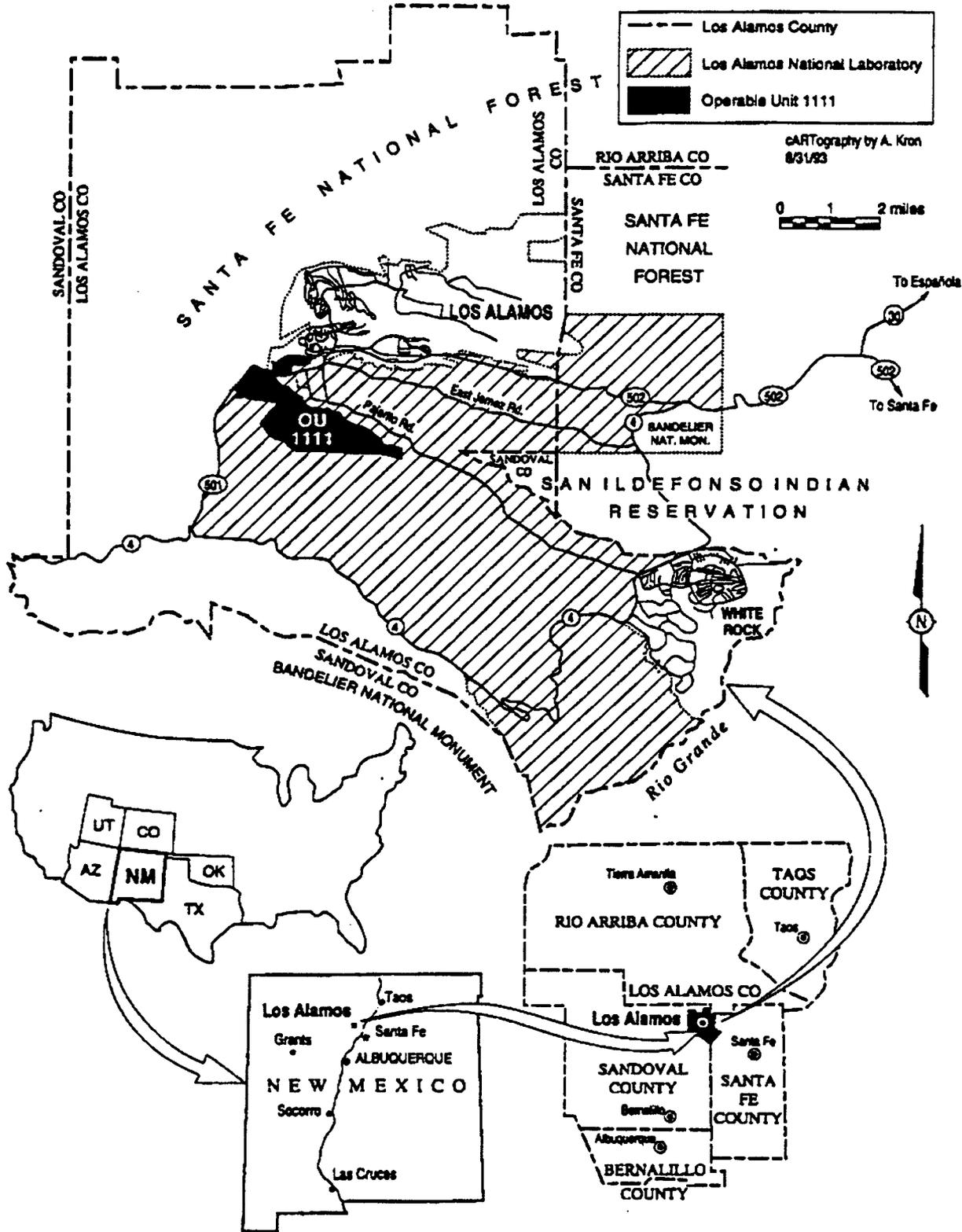


Fig. 1. Location of Los Alamos National Laboratory.

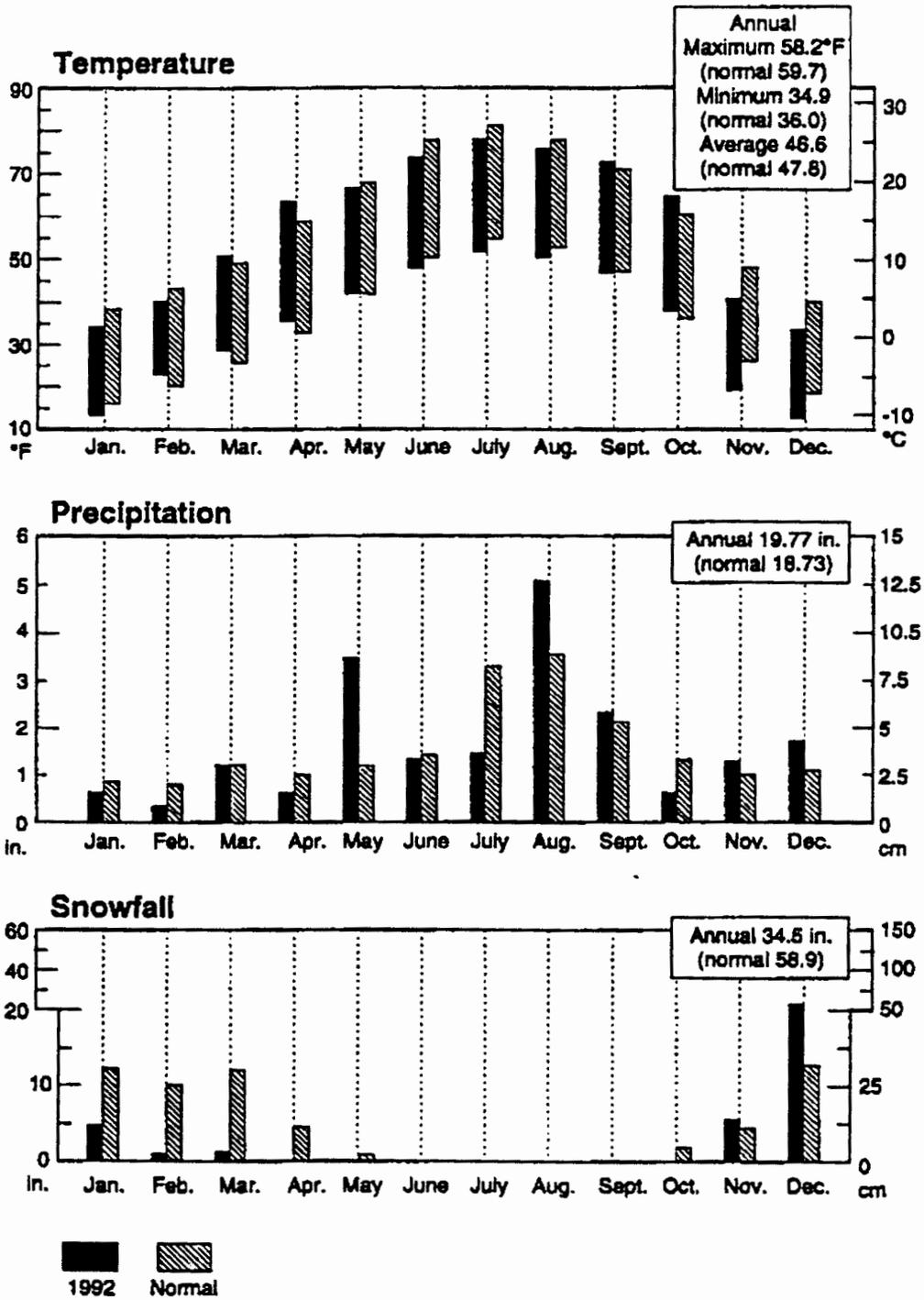


Fig. 2. Meteorological conditions for 1992 at Los Alamos, NM (elevation 7425 ft.).

SANTA FE NATIONAL FOREST

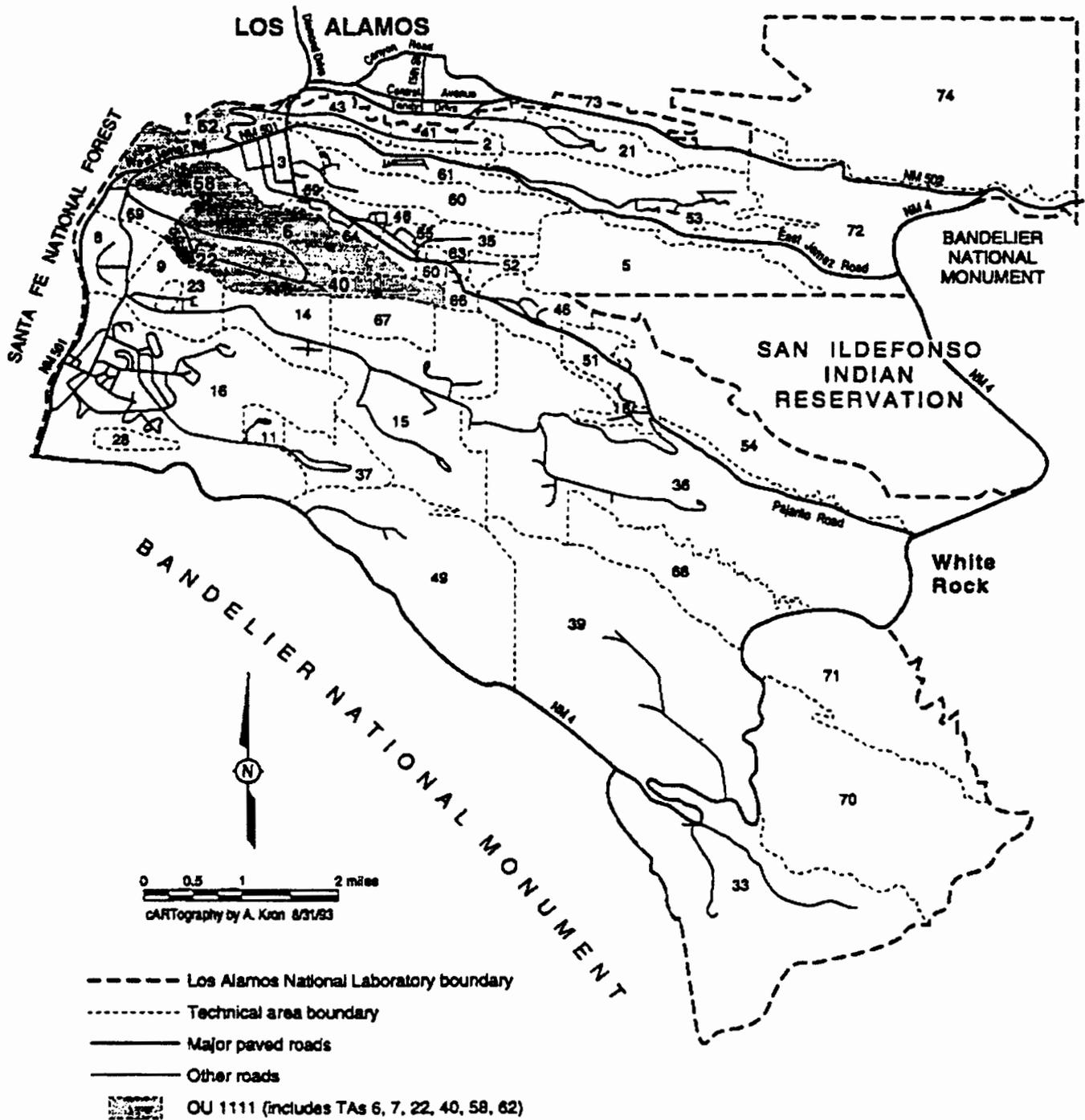


Fig. 3. Location of Operable Unit 1111.

approximation, all or portions of these sections may be included. UTM coordinates for the area are:

ZONE	EASTING	NORTHING
NE	379,000	3,971,000
NW	378,000	3,970,000
SW	380,000	3,968,600
SE	383,000	3,968,300

TA-6, -7, -58, and -62 contain minimal current Laboratory operations. TA-58 (Two-Mile Mesa North Site) and TA-62 (Northwest Site) were established in 1989 from acreage taken from surrounding technical areas. They are buffer areas between Laboratory operations and Forest Service lands to the west and private lands to the north.

The OU is predominantly mesa tops with elevations ranging from approximately 6660 to 7250 ft (2030 to 2210 m), with canyon elevations ranging from 6050 to 7160 ft (1844 to 2182 m). The topography is varied, ranging from steep slopes and cliff areas to a broad, moderately-sloping mesa top.

The OU is underlain by welded Bandelier tuff, with soils consisting of Corjo loam, Tocal very fine sandy loam, rock outcrop, Pogna fine sandy loam, fine Typic Eutroboralfs, and Seaby loam (Nyhan et al., 1978).

The potentiometric surface of the main aquifer in the Los Alamos area lies between 6000 to 6400 ft (1829 to 1951 m) above sea level for this OU. Over 900 feet (274 m) of unsaturated tuff and volcanic rock separate the surface from the aquifer. The unsaturated conditions limit the potential for infiltration and downward flow rates, little effect on moisture content is seen below 15 ft (4.6 m) due to precipitation (IT, 1987).

4. PREVIOUS STUDIES

Prior to the 1992 surveys, several site-specific studies had been completed within or immediately adjacent to OU 1111. These studies include information gathered at sites of proposed Laboratory activities for threatened and endangered species, and from vegetation and wildlife baseline and inventory data.

Much of the species information in this section is extrapolated for use only as a general description of the biological make-up of the project area. The most recent vegetation surveys were necessary to determine more complete and accurate information on plant and wildlife species for the proposed sampling sites.

4.1 Previous Vegetation Studies

Several vegetation analysis and surveys have been conducted within portions of the canyons and mesa tops of OU 1111 (Table 1). The surveys include previous Environmental Assessments of Material Disposal Area F and several proposed projects within OU 1111. All these studies and surveys were conducted after 1979 and prior to 1992. A complete checklist of plant species identified during these surveys, in addition to the most recent field surveys, is given in APPENDIX B.

TABLE 1. Documents and Surveys Previously Completed Containing Information on Plant Species Within or Near OU 1111.

REPORT/SURVEY	DATE	AUTHOR(s)
Wood lily survey	1979	Kosiewicz
Floristic Composition & Plant Succession on Near-Surface Radioactive Waste Disposal Facilities in the Los Alamos National Laboratory	1982	Foxx and Tierney
Wood lily survey	1984	Foxx and Tierney
Status of the Flora of Los Alamos National Environmental Research Park, Vol. 1	1980	Foxx and Tierney
Status of the Flora of Los Alamos National Environmental Research Park, Vol. 2	1984	Foxx and Tierney
Status of the Flora of Los Alamos National Environmental Research Park, Vol. 3	1985	Foxx and Tierney

4.2 Previous Wildlife Studies

Several studies and surveys describing the fauna in the vicinity have been conducted within or adjacent to the OU (Table 2). These studies are discussed below with species lists provided in APPENDIX C.

TABLE 2. Documents Previously Completed Containing Information on Wildlife Species Within or Near OU 1111

PROJECT	DATE	AUTHORS
Movements of mule deer on the Los Alamos National Environmental Research Park	1979	Eberhardt and White
Biotelemetry studies on elk	1981	White
Jemez salamander surveys	1985	Schmitt <i>et al.</i>
The ants of Los Alamos County (<i>Hymenoptera: Formicidae</i>)	1986	MacKay, <i>et al.</i>
Goshawk study	1987	Kennedy
Endangered Species Report for Seismic Trench Study	1991	Edeskuty and Bennett
Atlas of breeding birds of Los Alamos County	1991	Travis
Comparison of small mammal species diversity near outfalls, natural streams, dry canyons (Interdepartmental report)	1992	Raymer and Biggs
Survey for bats in the Los Alamos National Environmental Research Park, with special emphasis on the spotted bat, <i>Euderma Maculatum</i>	1992	3D Environmental Services, Inc.

4.2.1 Mammals

4.2.1.1 Small Mammals

APPENDIX C lists those species captured at study sites within this OU and species visually observed or captured in related studies.

4.2.1.2 Large Mammals

Studies conducted by White (1981) defined the wintering and summering range of elk. Entries into the Wildlife Observation Database maintained by ESH-8 indicate that deer and elk have occasionally been observed within or near this OU. No large mammal surveys have been conducted in OU 1111. Mammal species observations were made during field activities by visual sightings, tracks and scat are listed in APPENDIX C.

4.2.2 Birds

No systematic surveys have been conducted for birds within OU 1111. A list of bird species potentially and actually (confirmed) occurring within or near OU 1111 was extracted from the "Atlas of Breeding Birds of

Los Alamos County, New Mexico", Travis (1991). APPENDIX C lists potentially occurring bird species in the vicinity of OU 1111.

4.2.3 Reptiles and Amphibians

No systematic surveys of reptiles or amphibians were undertaken within OU 1111. However, any species encountered during field work was recorded. If possible, with the exception of rattlesnakes, the animals were captured by hand, identified, photographed, weighed, measured, and then released. All identifications were made using Stebbins (1985). APPENDIX C lists species visually observed during field activities within OU 1111.

4.2.4 Mollusks (Snails and Bivalves)

No extensive or formal field surveys have been conducted for mollusks within OU 1111; however field observations are listed in APPENDIX C.

4.2.5 Fish

There are no suitable fish habitats located within OU 1111, therefore no fish species are expected to occur in this unit. Due to flow patterns and sources of water for the area (ephemeral runoff and spring-fed marshes), these waters are not expected to support fish.

4.2.6 Insects

No extensive or formal field surveys have been conducted for ground-dwelling or aquatic insects within OU 1111. However, a list of ants, which could occur within this OU can be determined by "The Ants of Los Alamos County, New Mexico", MacKay 1986 (APPENDIX C).

4.3. Previous Threatened, Endangered, and Sensitive Species Studies

A search of the TES database for this OU listed several species on the state or federal threatened, endangered or sensitive species which have the potential of occurring within this OU (APPENDIX D). Listed species included the wood lily, checker lily, Helleborine orchid, Pagosa phlox, Sandia alumroot, northern goshawk, common black hawk, bald eagle, Mississippi kite, peregrine falcon, broad-billed humming bird, willow flycatcher, spotted bat, meadow jumping mouse, Mexican spotted owl, Say's pond snail and the Jemez Mountains salamander. Previous studies and surveys of several of these species have been conducted throughout the Laboratory and Los Alamos County.

4.3.1 Vegetation

4.3.1.1 Wood Lily

No species specific surveys have been conducted within OU 1111 for this plant. However, the wood lily has been found within Los Alamos County. This species has been recorded in upper Pajarito Canyon in ponderosa pine to mixed-conifer areas by Kosiewicz in 1979.

4.3.1.2 Checker Lily

No species specific surveys have been conducted within OU 1111 for this plant. However, the Checker Lily was observed within Los Alamos County in 1987 by G. D. Tiernery.

4.3.1.3 Helleborine Orchid

No species specific surveys have been conducted within OU 1111 for this plant. However, the Helleborine orchid has been found within Los Alamos County. This species was recorded at the spring in White Rock Canyon by Foxx in 1984.

4.3.1.4 Pagosa Phlox

No species specific surveys have been conducted within OU 1111 for the Pagosa phlox. This species has not been previously observed within Los Alamos County.

4.3.1.5 Sandia Alumroot

No species specific surveys have been conducted within OU 1111 for the Sandia Alumroot. This species has not been previously observed within Los Alamos County.

4.3.2 Wildlife

4.3.2.1 Northern Goshawk

No previous species specific studies for the northern goshawk have been conducted within this OU. However this species has been observed within Los Alamos County in 1987.

4.3.2.2 Common Black Hawk

No species specific surveys have been conducted within OU 1111 for the common black hawk. This species has not been previously observed within Los Alamos County.

4.3.2.3 Bald Eagle

No species specific surveys have been conducted within OU 1111 for the bald eagle. This species has been observed in Los Alamos County within Ancho Canyon in 1991 and 1992.

4.3.2.4 Mississippi Kite

No species specific surveys have been conducted within OU 1111 for the Mississippi kite. This species has not been previously observed within Los Alamos County.

4.3.2.5 Peregrine Falcon

No species specific surveys have been conducted within OU 1111 for the peregrine falcon. This species has been observed within Los Alamos County. Two young males were sited within Pueblo Canyon in the spring of 1991.

4.3.2.6 Broad-Billed Humming Bird

No species specific surveys have been conducted within OU 1111 for the broad-billed hummingbird. This species has been observed within Los Alamos County.

4.3.2.7 Willow Flycatcher

No species specific surveys have been conducted within OU 1111 for the willow flycatcher. This species has not been previously observed within Los Alamos County.

4.3.2.8 Spotted Bat

No spotted bat surveys have been conducted within this OU. However, in 1991 and 1992 surveys were conducted at the permanent pond at TA-8 and 9 within the adjacent OU 1157. Information from these surveys has been incorporated into this report.

4.3.2.9 Mexican Spotted Owl

No species specific surveys have been conducted within OU 1111 for the Mexican spotted owl. This species has been previously observed within Los Alamos County.

4.3.2.10 Meadow Jumping Mouse

No previous species specific studies for the meadow jumping mouse have been conducted within Los Alamos County. This species has not been observed within Los Alamos County.

4.3.2.11 Say's Pond Snail

No species specific surveys have been conducted within OU 1111 for the Say's pond snail. This species has not been previously observed within Los Alamos County.

4.3.2.12 Jemez Mountains Salamander

No species specific surveys have been conducted within OU 1111 for the Jemez Mountains salamander. This species has previously been observed within Los Alamos County.

4.4 Previous Wetland Studies

The Environmental Protection Agency (EPA) has required a determination of all wetlands within the watershed of lands owned by the DOE/LANL for the LANL/DOE RCRA and the Hazardous and Solid Waste Act (HSWA) part B Permit. Consequently, a project to map and characterize those wetlands was undertaken in 1990. The wetlands mapping was done by the United States Fish and Wildlife Service (USFWS) in accordance with the National Wetlands Inventory (NWI). The inventory includes all wetlands and deep water habitats throughout the United States, including rivers, lakes, streams, marshes, bogs and ponds. In cooperation with other federal and state agencies, private organizations, and individuals, the USFWS developed a wetland definition for conducting an inventory of the nation's wetlands. This definition was published in the "Classification of Wetlands and Deep Water Habitats of the United States" (Cowardin, et al. 1979). In the NWI, wetlands are defined as "lands transitional between aquatic and terrestrial systems where the water table is usually at or near the surface, or the land is covered by shallow water." In addition, the definition requires that the land support predominantly hydrophytes and that the substrate is drained hydric soils (Dunke, et al. 1989).

The NWI maps are broad in scope and are intended only to provide guidance but not proprietary jurisdiction. The method for classification is a hierarchical system and is based solely on aerial photography (Fig. 4). The NWI aerial maps typically reflect conditions during the specific year and season they were taken.

4.5 Previous Floodplains Studies

Under existing permit requirements, the EPA stipulates that facilities regulated by the RCRA must delineate all 100-year floodplain elevations within their boundaries. McLin did floodplain computational mapping using the COE's computer-based Flood Hydrograph Package (HEC-1) and HEC-2 (McLin 1992). HEC-1 generates storm hydrographs at selected channel locations within each ungaged watershed, and HEC-2 defines the floodplain (Fig. 5). McLin used the approach to define the 100-year, 6-hour design storm event for Los Alamos. OU 1111 is situated within the Pajarito Canyon Watershed with a total basin area of 11.36 square miles. The total 24-hour runoff volume (acre-feet) corresponding to individual 6-hour storm events was 186.

4.6 Previous Outfall Studies

In 1991, a Laboratory-wide survey was conducted at National Pollution Discharge Elimination System (NPDES) outfalls. Twelve outfalls within OU 1111 were noted (Table 3). Effluent from five outfalls drain into Pajarito Canyon, and Two-Mile Canyon, while only two outfalls drain onto Two-Mile Mesa. At the time of the survey water was not flowing at all outfalls.

TABLE 3: NPDES Outfalls Surveyed In OU 1111

TA NO.	NPDES ID NO.	NEAR BLDG.	TYPE EFFLUENT	CANYON FLOW ENTER
3	03A-009	1538	Treated cooling water	Two-Mile
22	06A-078	34	Photo waste	Two-Mile Mesa
22	128-128	91	Printed circuit board	Two-Mile
40	04A-101	9	Non-contact cooling water	Two-Mile Mesa
40	05A-154	41	HE discharge	Two-Mile
40	06A-079	4	Photo waste	Pajarito
40	06A-080	5	Photo waste	Pajarito
40	06A-081	8	Photo waste	Pajarito
40	06A-082	12	Photo waste	Pajarito
40	06A-099	23	Photo waste	Two-Mile
40	06A-100	15	Photo waste	Pajarito
59	03A-098	2	Treated cooling water	Two-Mile

5. METHODOLOGY

BRET conducted three levels of surveys to determine the presence or absence of species of concern or of sensitive habitats that could be impacted by the site characterization sampling.

5.1 Level 1 Reconnaissance Surveys

The Level 1 reconnaissance survey is the initial survey conducted to determine placement location of

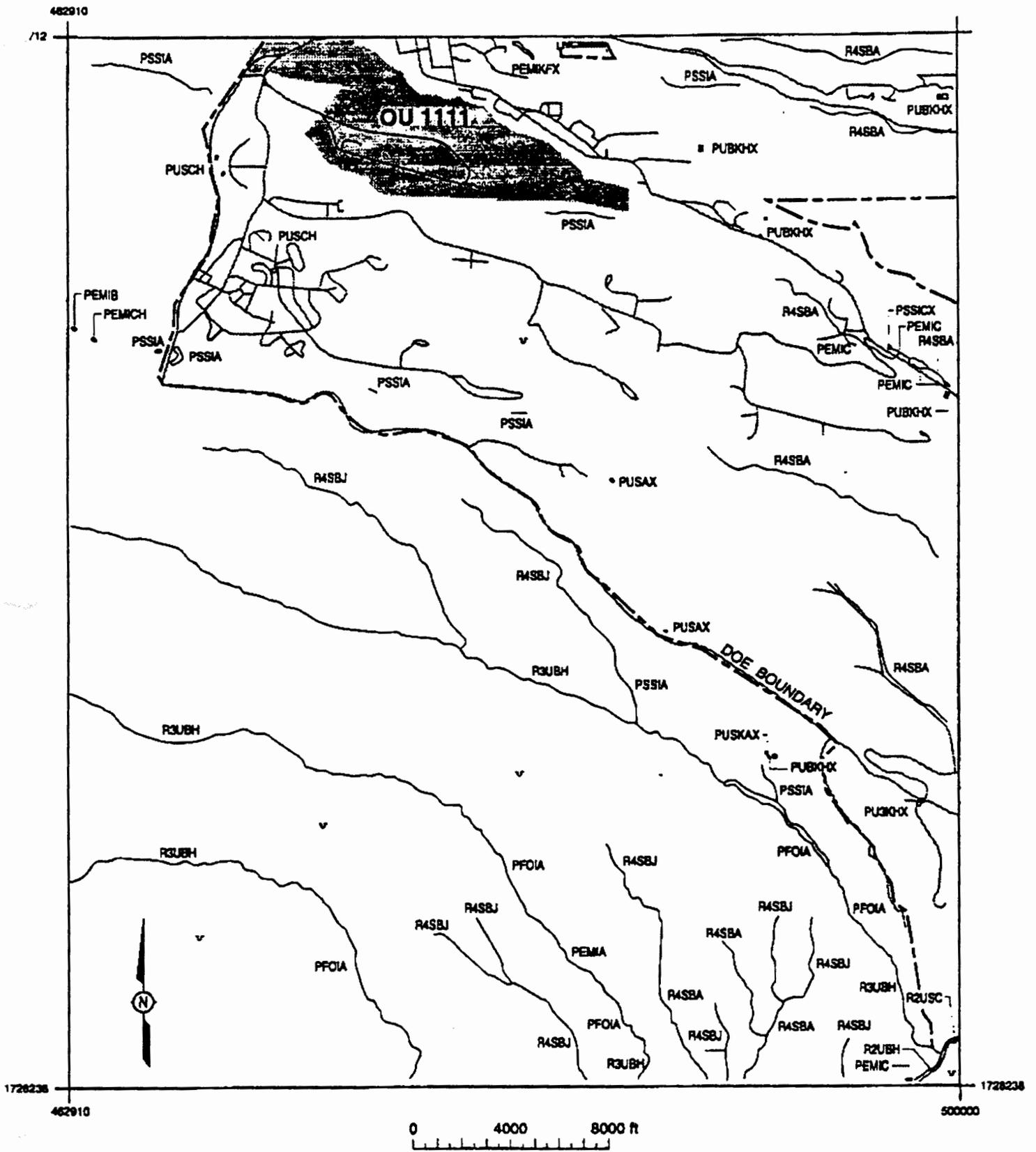


Fig. 4. National Wetland Inventory map for OU 1111.

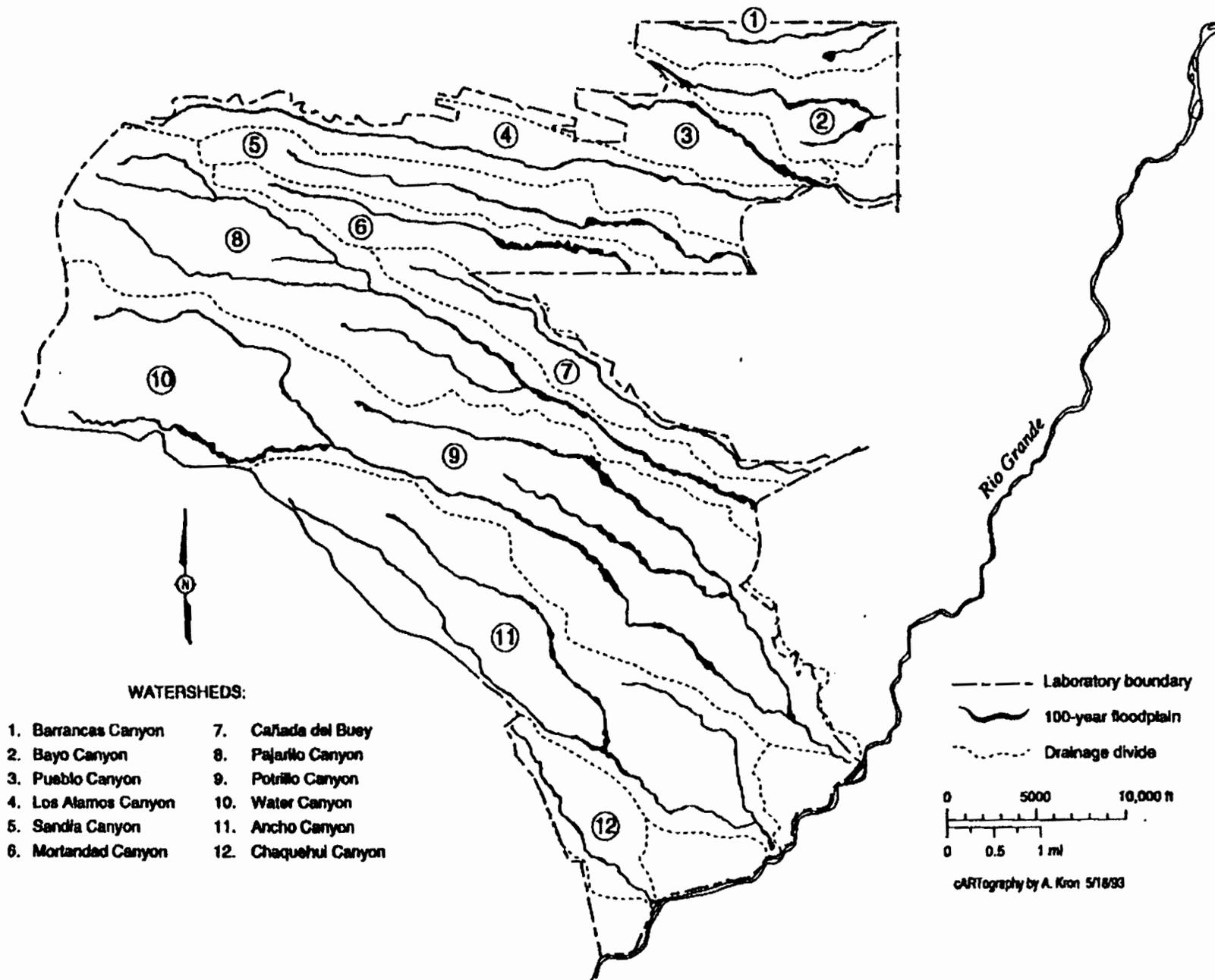


Fig. 5. 100-year floodplain map for Los Alamos National Laboratory.

line transects, the extent of potential impact, the presence or absence of water or floodplains, and the presence or absence of disturbance.

After the initial field reconnaissance, we searched the TES species database developed by BRET. The database contains the latest information concerning individual TES species occurring in Los Alamos and surrounding counties as supplied through the New Mexico Department of Game and Fish, New Mexico Energy and Minerals and Natural Resources Department, New Mexico Native Plants Protection Advisory Committee (1984), and the USFWS (50 CFR 17.11 and 17.12). The habitat match generated a listing of state and federally threatened, endangered, candidate and sensitive species which could potentially occur within the OU (APPENDIX D).

5.2 Level 2 Habitat Evaluation Surveys

Based on the results of the Level 1 survey, a Level 2 habitat evaluation survey was conducted. The use of Level 2 surveys was deemed necessary due to portions of the canyon walls and canyon bottoms being relatively undisturbed and therefore potential habitat for TES species.

After generating a list of species of concern, a Level 2 survey was conducted to quantitatively measure the habitat, document the habitat parameters, and to determine if habitat parameters for any known sensitive species were present. The habitat evaluation can also be used for environmental settings to develop habitat evaluation procedures and to provide baseline information on the biotic communities. Once data from the vegetation transects was collected, a hierarchical classification system was used to group species information into "mapping units." This provided the base line information used to map vegetation onto Geographic Information Systems such as ARC-INFO. The following units were classified using Brown, *et al.* (1982) and USFS Habitat Types (Moir and Ludwig 1979; see also APPENDIX E): Vegetation Type, Formation Type, Climatic (Thermal) Zone, Biotic Community, Series, Habitat Type, and Phase. Definitions for each classification are as follow:

Vegetation Type: Vegetation established under existing climate; includes upland or wetland.

Formation Type: Vegetative responses to various environmental factors, primarily available soil moisture; includes the following:

<u>Upland</u>	<u>Wetland</u>
Tundra	Wet Tundra
Forest and Woodland	Forest
Scrub land	Swamp scrub
Grass land	Marshland
Desert land	Strand
Non-vascular	Submergent

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

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

Series: Principal plant and animal communities within each biotic community. These are based on distinct climax plant dominates.

Habitat Type: Occurrence of a particular dominate species that is local or regional in distribution.

Phase: Data collection used in determining co-dominates, understory species, and other species information.

Standard ecological techniques in the habitat evaluation were used to measure cover, density, and frequency of the vegetative component and to calculate importance indexes for each species in the overstory and understory components. The importance indexes given in the 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, only the relative cover and frequency are averaged.

5.2.1 Overstory Evaluations

Circular plot and line intercept techniques were used to measure the overstory components of the forest, woodland, and riparian communities.

Circular plots were used primarily in multi-stemmed piñon-juniper woodlands and along some riparian zones. The line intercept method was used primarily in taller, single-stemmed overstory habitats, such as ponderosa pine communities and riparian zones.

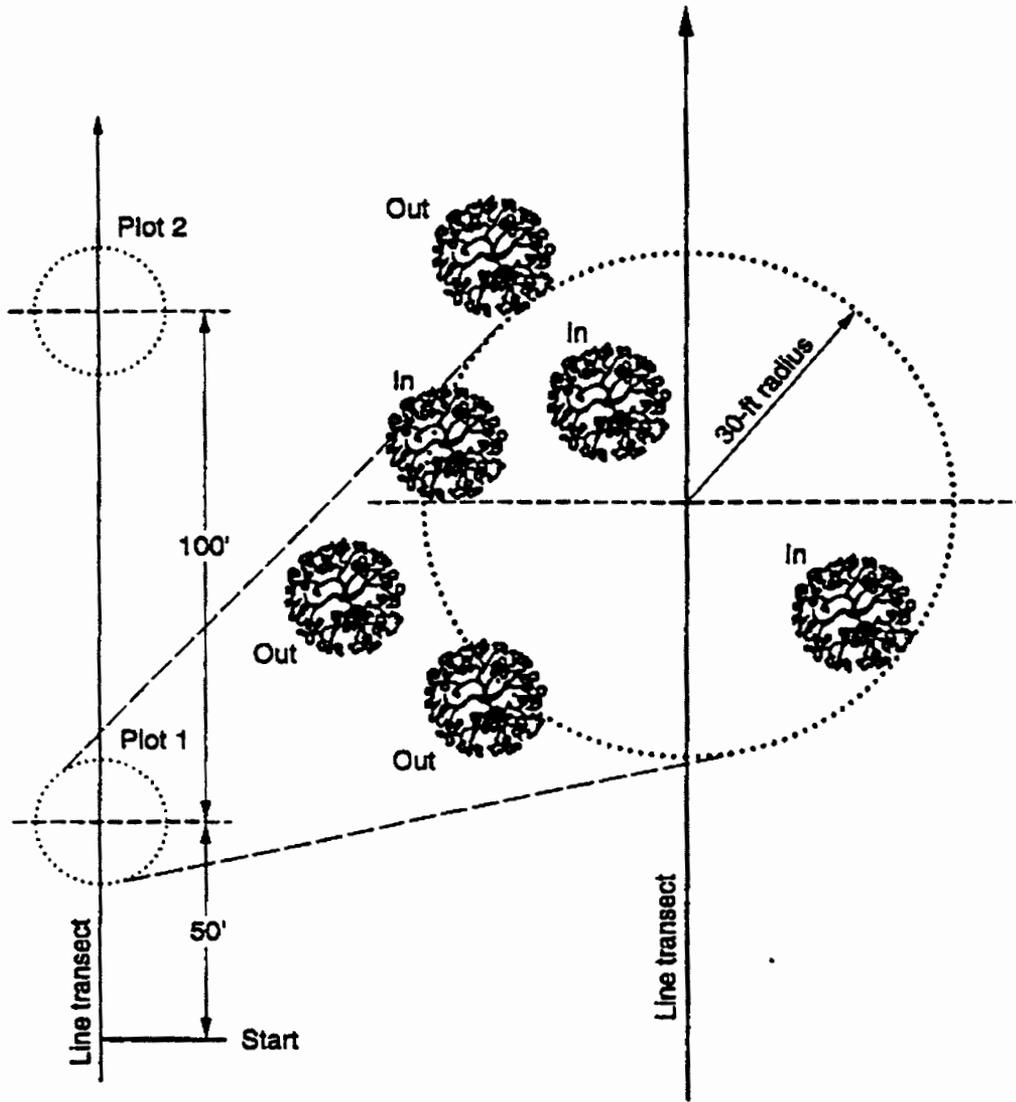
The total length of each transect was based on a "species area curve" or when a maximum of 1000 ft was reached. The species area curve was calculated by comparing the total number of individual plant species recorded along a transect with the total number of plots along the same transect. The total length of the transect is then considered adequate when the curve becomes relatively level. Base upon previous experience, a total of 1000 ft was deemed an adequate length without plotting a species area curve.

5.2.1.1 Circular Plots

The circular plot technique (Fig. 6) was used to measure the overstory components in most riparian zones and woodlands. A transect line was placed within the habitat that was to be evaluated (max. 1000 ft.). Circular plots were established every 100 ft along the transect starting at the first 50 ft mark. All trees within a 30 ft radius of the center point of the transect line were measured. Multi-stemmed trees (such as piñon and juniper) were measured for basal diameter; all single-stemmed trees (such as ponderosa pine) were measured at diameter at breast height (DBH). We determined cover of species by dividing the circle into four equal subplots and estimating the individual species' cover within each of the subplots.

5.2.1.2 Line Intercept

The line intercept method (Fig. 7) was used to measure single-stemmed overstory components within some riparian zones and most taller woodlands (i.e., ponderosa pine, mixed-conifer). For this method a transect line was placed within the habitat to be evaluated and separated into 50 ft quadrats. All trees and shrubs within

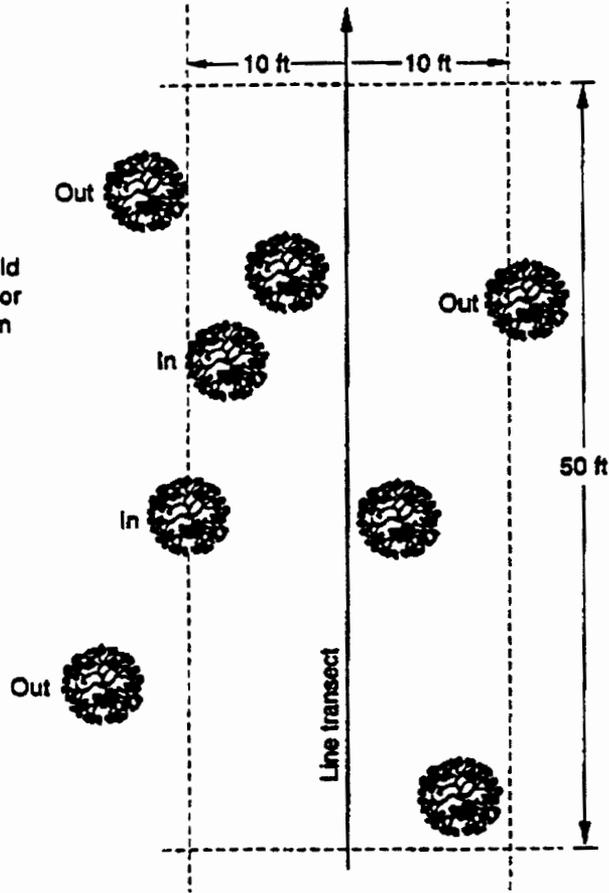


Tree boles and shrub stems should be counted in when 50% or greater of the bole or stem is in the plot.

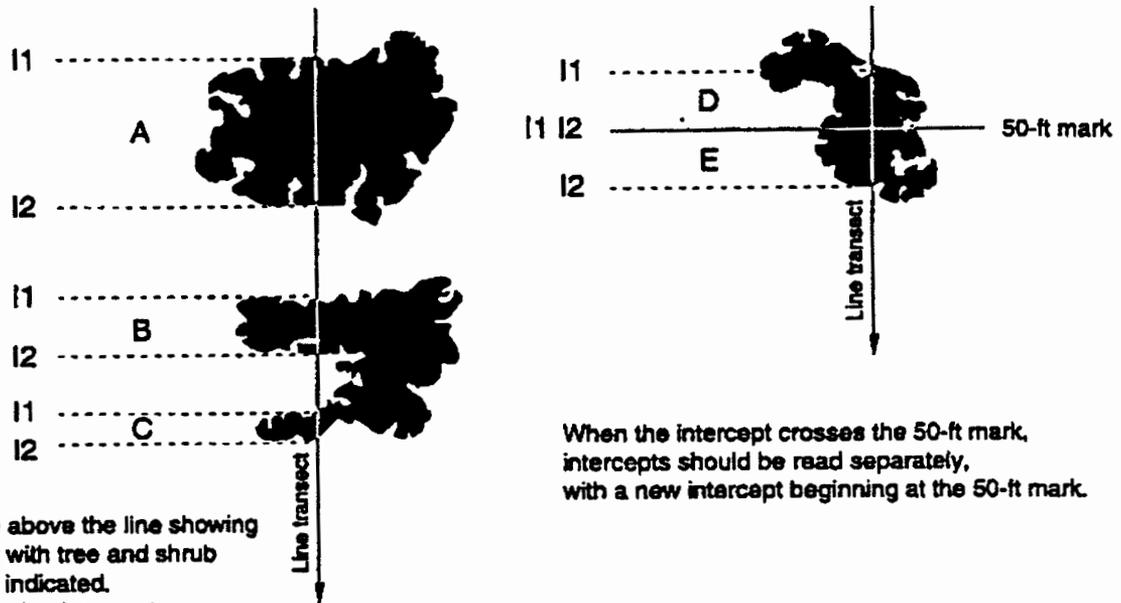
Fig. 6. Circular plot method diagram for trees and shrubs.

(a)

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



(b)



View from above the line showing a transect with tree and shrub intercepts indicated.
I1 = beginning intercept
I2 = ending

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

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

10 ft either side of the transect line and equal to or greater than 3 ft in height were recorded. Any species overlapping the transect line was also measured to estimate canopy cover. The canopy cover was measured from the point at which it first crossed the transect line to the point where it terminated coverage along the line without any breaks of the canopy in-between (Fig. 8). If the canopy extends into the next 50 ft section, then the measurement is counted separately in the two sections. When the canopy cover is overlapping, the canopy cover measurement for each particular species can include more than one individual as long as both are the same species. A species area curve, or maximum of 1000 ft transect, was also used.

5.2.2 Understory

The quadrat method was used with a Daubenmire plot of 20 x 50 cm (7.87 x 19.69 in), to measure the cryptogamic and herbaceous layer, the percent bare soil, litter, and woody species less than 3 ft tall (Daubenmire 1959). Visual estimates of foliar cover were used to determine percent cover and species composition. Quadrats were placed every 10 ft along the line transect established for overstory evaluation and read until a maximum of 1000 ft had been reached for a single transect.

All plants were identified using Martin and Hutchins (1980), Foxx and Hoard (1984). When necessary, voucher specimens were collected and archived in the ESH-8 Herbarium. Questionable identifications that were taken to the University of New Mexico (UNM) Herbarium for confirmation.

5.3 Level 3 (Species Specific) Surveys

5.3.1 Vegetation

Based on the results of the Level 1 and Level 2 surveys and on consultation with experts, no formal Level 3 surveys were conducted for a specific species. Level 2 surveys were used as presence or absence for plant species.

5.3.2 Mammals

5.3.2.1 Small Mammals

Nocturnal small mammal live-trapping sessions were conducted in OU 1111 for Pajarito and Los Alamos Canyons. Capture-release methods were used in order to obtain a species list for this area in conjunction with a survey for the meadow jumping mouse. In Pajarito Canyon a trapping grid was established consisting of 210 traps set in 2 lines running in the canyon bottom on either side of the stream for 164 ft (50 m) each. Trap stations were spaced 33 ft (10 m) apart with three traps at each station. All studies used ventilated aluminum 9 x 3 x 12 in. Sherman live traps baited with sweet feed. Traps were baited in late afternoon and set on a level surface under cover for protection from exposure to heat and precipitation. Traps were left open over night to capture animals, then checked as early the next morning as possible. Information on species, sex, body weight, tail and body length were recorded for each capture. The animal was then released at their capture site. The grid was run for only one week at any given time. When necessary, voucher specimens of small mammals were taken for identification purposes. Species captured are listed in APPENDIX C.

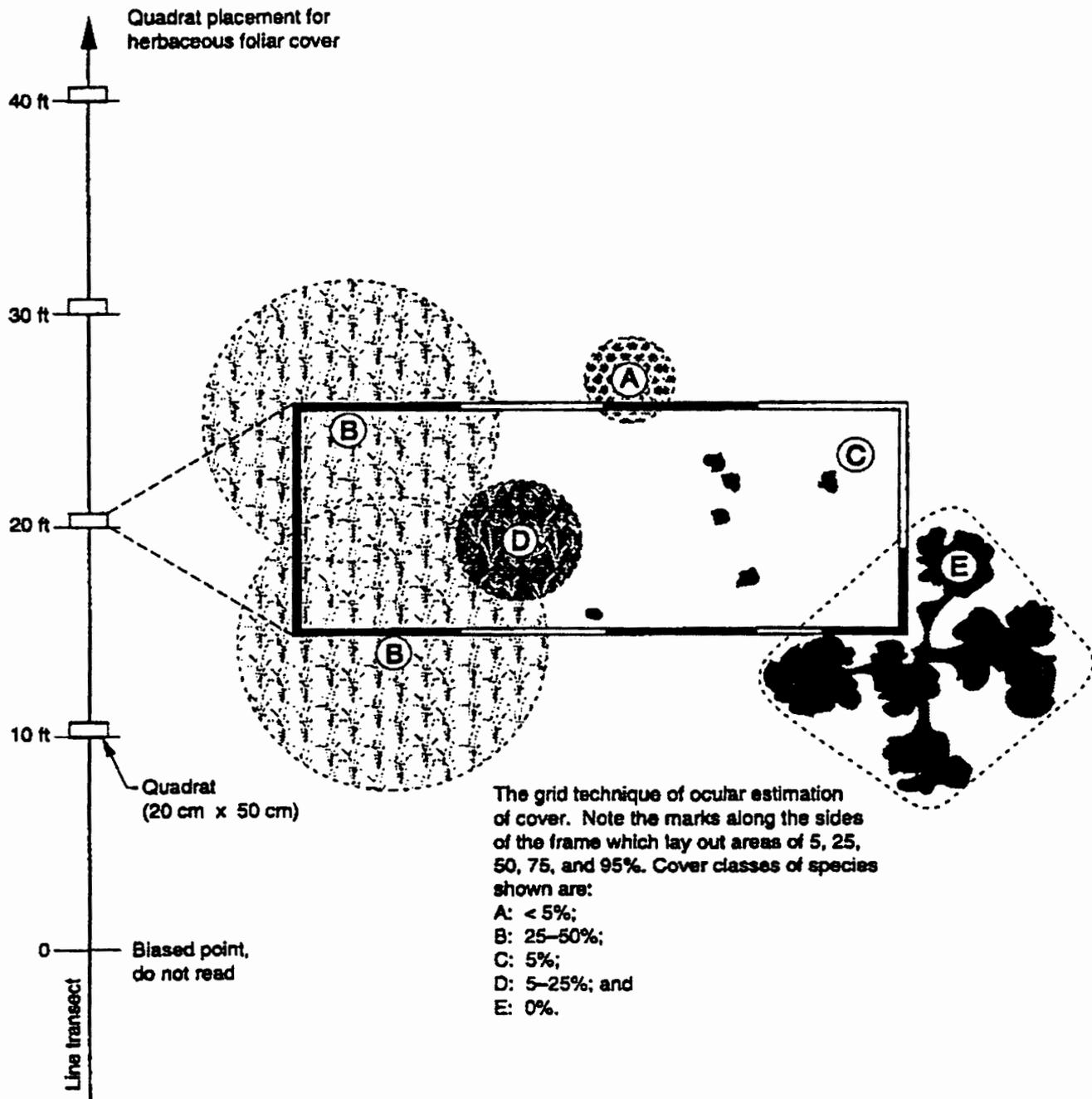


Fig. 8. Location of quadrats for understory transects of herbaceous foliar cover, and the grid technique of ocular estimation of cover (from Daubermire 1973).

5.3.3 Threatened, Endangered, and Sensitive Species

5.3.3.1 Northern Goshawk

No formal field surveys were conducted for this species by BRET. However, Patricia Kennedy of the Department of Fishery and Wildlife Biology at Colorado State University (CSU) was sub-contracted to conduct nesting surveys for the northern goshawk.

Conspecific vocalizations were broadcast at intervals of 656 ft (200m) along a transect route. All visual and vocal response to the broadcast were recorded. All areas that had response to the broadcast were surveyed on foot using procedures described by Reynolds (1982). If a nest site was not located during the first search, vocalizations were re-broadcast in the area for a minimum of three times. Each vocalization occurred at least one week apart. If goshawks repeated responses to the vocalizations but no nest sites were located it was assumed that the area represented a nesting territory that was occupied but not active.

5.3.3.2 Spotted Bat

Bat surveys were conducted using mist nets. Because this method is not specific to spotted bats, a general inventory on bat species was collected at the time of the mist-netting sessions (APPENDIX C).

In June of 1991, rabies-immunized researchers from the UNM conducted mist netting. A net (8 ft high) was set up for one night at dusk and run for several hours after midnight. The net was closely monitored and checked every few minutes to determine if any bats were caught. When a bat was caught, it was carefully removed from the net by holding the bat gently, and pulling net strands away from the body and wings.

To prevent unnecessary handling and possible injury to the bats, they were not weighed, measured or marked during the survey. Researchers made identifications using Whitaker (1980) and Burt and Grossenheider (1980).

In July of 1992, 3D/Environmental Services, Inc. conducted mist-netting in several Laboratory locations. Netting was conducted for two nights at the 1991 survey location. Two thirty ft high nets were set the first night and one thirty foot high net was set the second night. Nets were opened at dusk and monitored from 2:00 a.m. and dawn. Bat species, sex, age, reproductive status, forearm length, direction of flight and capture time were identified and recorded.

5.3.3.3 Meadow Jumping Mouse

A survey for this species was conducted simultaneously with the small mammal survey in upper Pajarito Canyon. The same procedure was followed that is used in live-small mammal capture sessions with two additional traps at every station to increase the density by two to four times (Morrison 1990). The meadow jumping mouse is not attracted to bait, and therefore the number of traps should be increased to increase the chances of capture when live trapping is conducted.

5.4 Floodplain and Wetland Assessment Techniques

5.4.1 Wetlands

A detailed survey for wetlands was not conducted within this OU. However, guidelines established by U.S. COE for wetland delineation were reviewed for potential wetland areas and USFW maps were examined to

locate potential wetlands within this OU. Potential areas were then surveyed for hydrophytic vegetation, hydric soils and hydrology. No delineation of wetlands has been performed at the present time.

5.4.2 Floodplains

Potential floodplains for this OU were identified using floodplain maps generated by McLin (1992). These maps indicate the base floodplain or 100-year floodplain for LANL.

6. RESULTS

6.1 Level 1 (Reconnaissance) Survey

Reconnaissance surveys were conducted at Pajarito Canyon, Two-Mile Mesa, and Two-Mile Canyon to determine potential habitats, identify sampling locations, and to determine access for conducting field surveys. All sampling locations were readily accessible, either by vehicle or a relatively brief walk.

We reviewed the TES database which contains information based on previously documented occurrences and existing habitat, to determine whether the potential for any TES plant and animal species habitat within the project area. APPENDIX D provides a printout of the actual database.

Based on the Level 1 surveys, the following plant communities were defined and used for search criteria:

Mixed conifer
Ponderosa pine
Wetland
Riparian

Although these community delineations may differ from habitats discussed in later sections, they include all habitat types identified in this document.

6.1.1 Vegetation

6.1.1.1 Federally Listed Species

Under the Federal ESA and state statutes (US Fish and Wildlife Service 1991), only those species that are listed, or are candidates for listing, are protected. No federal endangered or threatened plant species were listed as potentially occurring in the OU.

6.1.1.2 State Listed Species

The following plant species was listed as state endangered:

Endangered	Scientific Name
Wood lily	<i>Lilium philadelphicum var. andium</i>
Helleborine orchid	<i>Epipactis gigantea</i>

6.1.1.3 State Sensitive Species

New Mexico has listed those species occurring within the state that are considered rare because of restricted distribution or low numerical density. These rare plants are sensitive to long-term or cumulative land

use impacts, and are vulnerable to biological or climatic events. These species are monitored by the state to determine if they should be elevated to endangered status. The following species are listed as state sensitive for OU-1111:

State Sensitive	Scientific Name
Checker lily	<i>Fritillaria atropurpurea</i>
Pagosa phlox	<i>Phlox caryophylla, Wherry</i>
Sandia alumroot	<i>Heuchera pulchella</i>

6.1.2 Wildlife

6.1.2.1 Federally Listed Species

The following six species were listed for OU-1111 as either a federal candidate, threatened or endangered:

Species	Listing	Scientific Name
Northern goshawk	Candidate	<i>Accipiter gentilis</i>
Bald eagle	Endangered	<i>Haliaeetus leucocephalus</i>
Mexican spotted owl	Threatened	<i>Strix occidentalis lucida</i>
Peregrine falcon	Endangered	<i>Falco peregrines</i>
Willow flycatcher	Proposed	<i>Empidonax traillii</i>

6.1.2.2 State Listed Species

Species for OU-1111 listed as endangered in the state of New Mexico are as follows:

Endangered	Scientific Name
Bald eagle	<i>Haliaeetus leucocephalus</i>
Peregrine falcon	<i>Falco peregrines</i>
Common black hawk	<i>Buteogallus anthracinus</i>
Mississippi kite	<i>Ictinia mississippiensis</i>
Broad-billed hummingbird	<i>Cyananthus latirostris</i>
Spotted bat	<i>Euderma maculatum</i>
Meadow jumping mouse	<i>Zapus hudsonius</i>
Say's pond snail	<i>Lymnaea caeperata</i>
Jemez Mountains salamander	<i>Plethodon neomexicanus</i>

6.1.2.3 Other Wildlife Laws

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

6.2 Level 2 (Habitat Evaluation) Surveys

We established vegetation transects in Pajarito Canyon, Two-Mile Canyon and Two-Mile Mesa to evaluate the understory and overstory components of the following general habitats and locations:

LOCATION	HABITAT
Two-Mile Canyon	north-facing slope
	canyon bottom
Pajarito Canyon	south-facing slope
	canyon bottom
Two-Mile Mesa	mesa top

In general, OU 1111 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 characterized as being in the Ponderosa Pine Series and the Piñon-Juniper Series with varying vegetation complexes found throughout each. This unit comprises primarily of two canyon systems and a mesa. Pajarito Canyon and Two-Mile Canyon are the major systems found in the unit. Line intercept and circular plot transects were established within both systems to evaluate the overstory and understory components. A further breakdown and discussion of vegetation is given below (see APPENDIX F for raw data summaries).

Following a Level 1 survey of OU 1111, vegetation transects were placed in general habitats that displayed vegetation differences. North-facing slopes, south-facing slopes, canyon bottoms, and mesa tops each had a different vegetative composition; each site selected appeared to be representative of the overall habitat of the OU. Specific site characteristics (dominant species, relative density, cover, etc.) are discussed and comparisons made when possible.

Transect locations were relative to one-another within the OU, and did not necessarily represent the entire length of the canyon systems. All transect locations remained the same for both overstory and understory for this OU.

Within Two-Mile Canyon only one transect was established, behind TA-59 on the north-facing slope. Two transects were run in the canyon bottom: the first was at the northern head of Two-Mile Canyon and the second was approximately in the mid-portion of the canyon behind TA-59.

Five transects were run in Pajarito Canyon; two in TA-22, two in TA-40, and one in TA-67. Two of the transects were run on the south-facing slope. The first transect was below TA-22 while the second was below TA-40. Three transects were completed in the canyon bottom of Pajarito Canyon. The three transects ranged in elevation and order, from TA-22 at the highest, TA-40 at the middle and TA-67 at the lowest.

Seven transects were conducted on Two-Mile Mesa, one in TA-22, two in the TA-6, and four in TA-40. The transect in TA-22 was conducted south of the road leading into the technical area. The first transect in TA-6 was located west of Material Disposal Area F and the second was located within a drainage channel north of the road. The first transect in TA-40 was conducted within the drainage south of building 1. The second transect was conducted on the slope above the first transect. The third transect was conducted across the road, northeast of building 1 and the fourth transect was conducted along a dirt road northwest of building 1.

6.2.1 Overstory Trees

For purposes of determining overstory content in line intercepts and circular plots, we separated woody species into trees and shrubs. An overstory species was classified as a tree if its height was three foot or greater with a DBH of greater than four inches.

6.2.1.1 Two Mile Canyon: North-Facing Slope

Typically, north-facing slopes are more densely vegetated than south-facing slopes and other terrain aspects because of their capacity to retain more moisture. White fir, Douglas fir, ponderosa pine and limber pine were the four species noted. Douglas fir had the highest frequency 29.8%, while white fir had the highest relative cover, 46%. Limber pine had the lowest relative frequency and relative cover (12.77% and 7.61%, respectively). Snags were also noted along the north-facing slope at a relative frequency of less than 5% (Table 4)

6.2.1.2 Two-Mile Canyon: Canyon Bottom

A total of seven species were recorded between the two transects (Table 4). The dominant species changed from ponderosa pine in the first transect to Douglas fir and white fir within the second transect. Thinleaf alder was only recorded within the first transect, while ponderosa pine, limber pine, white fir, Douglas fir, Rocky Mountain maple and Gambel oak were recorded within both.

Seven species were recorded within the first transect. The dominant species was ponderosa pine with a relative frequency of 23.1%. However, white fir had the highest relative cover (26.3%). White fir and Douglas fir had the next highest frequency at 19.23% each. Other species noted within this transect were limber pine, Rocky Mountain maple, thinleaf alder and Gambel oak.

Six species were recorded within the second transect. White fir and Douglas fir were the dominant species in frequency (29.2% each) and cover (23.34% and 23.36% respectively). Rocky Mountain maple was noted with a relative cover of less than 10% but with no actual individuals within the transect. Other species noted within this transect were ponderosa pine and limber pine.

6.2.1.3 Pajarito Canyon: South-Facing Slope

In the two south-facing slope transects, five species were recorded, with three species common in both transects (Table 5). Ponderosa pine was the dominant species in both transects and had the highest relative frequencies and relative covers. The other common species were Douglas fir and one-seed juniper. White fir and Gambel oak were only recorded within the first transect.

Within the first transect, ponderosa pine appeared most frequently with a relative frequency of 50% and a relative cover of 54.23%. Both one-seed juniper and Gambel oak appeared with a relative frequency of 16.67%. However Gambel oak had no cover within the transect. Douglas fir and white fir were also recorded within this transect with relative frequencies of 12.50% and 4.17% respectively.

TABLE 4. Overstory Vegetation Characteristics of Tree Canopy Layer Species Recorded in Operable Unit 1111, Two-Mile Canyon.

SPECIES	TRANSECTS		
	TA-59, North- Facing Slope	TA-3, Canyon Bottom	TA-59, Canyon Bottom
		Transect 1	Transect 2
Ponderosa Pine (<i>Pinus ponderosa</i>)			
Average DBH	6.44	6.94	6.04
Relative Cover (%)	14.09	17.55	20.39
Relative Density (%)	14.40	30.85	6.90
Relative Frequency (%)	27.66	23.08	16.67
Importance Index (%)	18.71	23.83	14.65
Limber Pine (<i>Pinus flexilis</i>)			
Average DBH	5.86	5.15	8.06
Relative Cover (%)	7.61	16.03	18.85
Relative Density (%)	6.86	6.38	6.03
Relative Frequency (%)	12.77	15.38	12.50
Importance Index (%)	9.08	12.60	12.46
White Fir (<i>Abies concolor</i>)			
Average DBH	5.55	3.94	6.03
Relative Cover (%)	45.97	15.04	23.34
Relative Density (%)	38.30	11.70	30.17
Relative Frequency (%)	27.66	19.23	29.17
Importance Index (%)	37.31	15.32	27.56
Douglas Fir (<i>Pseudotsuga menziesii</i>)			
Average DBH	2.99	4.62	5.72
Relative Cover (%)	32.34	26.29	23.36
Relative Density (%)	39.76	41.49	25.86
Relative Frequency (%)	29.79	19.23	29.17
Importance Index (%)	33.96	29.00	26.13
Rocky Mountain Maple (<i>Acer glabrum</i>)			
Average DBH		0.00	0.75
Relative Cover (%)		9.99	5.56
Relative Density (%)		0.00	25.86
Relative Frequency (%)		3.85	0.00
Importance Index (%)		4.61	10.47
Thinleaf Alder (<i>Alnus tenuifolia</i>)			
Average DBH		0.55	
Relative Cover (%)		5.10	
Relative Density (%)		2.13	
Relative Frequency (%)		3.85	
Importance Index (%)		3.69	

TABLE 4. Continued

SPECIES	TRANSECTS		
	TA-59, North-facing Slope	TA-3, Canyon Bottom	TA-59, Canyon Bottom
		Transect 1	Transect 2
Gambel Oak (<i>Quercus gambelii</i>)			
Average DBH		4.54	4.57
Relative Cover (%)		9.99	8.50
Relative Density (%)		7.45	5.17
Relative Frequency (%)		15.38	12.50
Importance Index (%)		10.94	8.72
Snag			
Average DBH	7.60		
Relative Cover (%)	0.00		
Relative Density (%)	0.69		
Relative Frequency (%)	2.13		
Importance Index (%)	0.94		

TABLE 5: Overstory Vegetation Characteristics of Tree Canopy Layer Species Recorded in Operable Unit 1111, Pajarito Canyon.

SPECIES	TRANSECTS				
	TA-22, Stream Channel	TA-40, Stream Channel	TA-67, Stream Channel	TA-22, South-facing Slope	TA-40, South-facing Slope
	Transect 1	Transect 2	Transect 3	Transect 1	Transect 2
Rocky Mountain Maple (<i>Acer glabrum</i>)					
Average DBH		0.10			
Relative Cover (%)		5.00			
Relative Density (%)		1.92			
Rel. Frequency (%)		9.09			
Importance Index (%)		5.89			
Douglas Fir (<i>Pseudotsuga menziesii</i>)					
Average DBH	5.76	2.79	0.94	6.63	0.11
Relative Cover (%)	9.10	20.01	10.90	0.75	0.18
Relative Density (%)	6.92	28.21	17.95	3.90	11.11
Rel. Frequency (%)	18.75	36.36	13.33	12.50	23.08
Importance Index (%)	11.41	30.41	14.06	5.90	11.55
Ponderosa Pine (<i>Pinus ponderosa</i>)					
Average DBH	13.58	7.85	11.84	8.08	7.29
Relative Cover (%)	20.00	7.50	52.67	54.23	37.76
Relative Density (%)	5.81	1.28	56.41	74.05	86.11
Rel. Frequency (%)	21.88	9.09	40.00	50.00	69.23
Importance Index (%)	15.51	6.79	49.69	72.62	84.96
Limber Pine (<i>Pinus flexilis</i>)					
Average DBH	30.70	5.40			
Relative Cover (%)	30.00	5.00			
Relative Density (%)	0.53	0.64			
Rel. Frequency (%)	3.13	9.09			
Importance Index (%)	10.64	5.47			
White Fir (<i>Abies concolor</i>)					
Average DBH	311.10	5.36	2.66	3.40	
Relative Cover (%)	19.11	13.33	36.01	1.03	
Relative Density (%)	43.90	4.49	19.23	2.59	
Rel. Frequency (%)	31.26	9.09	33.33	4.17	
Importance Index (%)	31.05	10.45	29.53	2.85	
Water Birch (<i>Betula occidentalis</i>)					
Average DBH	159.00	1.16			
Relative Cover (%)	16.88	24.17			
Relative Density (%)	37.56	63.46			
Rel. Frequency (%)	12.50	27.27			
Importance Index (%)	21.98	40.98			

TABLE 5. Continued.

SPECIES	TRANSECTS				
	TA-22, Stream Channel	TA-40, Stream Channel	TA-67, Stream Channel	TA-22, South-facing Slope	TA-40, South-facing Slope
	Transect 1	Transect 2	Transect 3	Transect 1	Transect 2
One-Seed Juniper (<i>Juniperus monosperma</i>)					
Average DBH	0.10			2.19	0.10
Relative Cover (%)	0.10			1.80	0.00
Relative Density (%)	0.53			9.09	2.78
Rel. Frequency (%)	3.13			16.67	7.69
Importance Index (%)	1.25			9.62	3.49
Aspen (<i>Populus tremuloides</i>)					
Average DBH	45.40				
Relative Cover (%)	11.00				
Relative Density (%)	4.75				
Rel. Frequency (%)	9.38				
Importance Index (%)	8.16				
Gambel Oak (<i>Quercus gambelii</i>)					
Average DBH	84.60		4.28	4.71	
Relative Cover (%)	13.33		0.00	0.00	
Relative Density (%)	8.98		5.13	10.37	
Rel. Frequency (%)	15.63		6.67	16.67	
Importance Index (%)	12.39		3.93	9.01	
Pifion Pine (<i>Pinus edulis</i>)					
Average DBH			0.10		
Relative Cover (%)			0.42		
Relative Density (%)			1.28		
Rel. Frequency (%)			6.67		
Importance Index (%)			2.79		

Three species were noted within the second transect. Ponderosa pine was the dominant overstory species with a relative frequency of 69.23% and a relative cover of 37.76%. Douglas fir and one-seed juniper were also encountered within this transect, with relative frequencies of 23.08% and 7.69% respectively.

6.2.1.4 Pajarito Canyon: Canyon Bottom

Ten different species were recorded within all the transects in Pajarito Canyon bottom (Table 5). Three species occurred within all three transects: Douglas fir, ponderosa pine and white fir. Two species, one-seed juniper and aspen occurred only at the TA 22 transect.

At TA-22, white fir occurred most frequently (31.3% relative frequency). Ponderosa pine, Douglas fir, gamble oak and water birch were also present with relative frequencies ranging from 10 to 25%. While aspen, limber pine, and one-seed juniper had relative frequencies of less than 10%.

At TA-40, Douglas fir and water birch were present with a frequency of 36.36 and 27.27% respectively, while Rocky Mountain maple, ponderosa pine, limber pine, and white fir had relative frequencies of less than 10%.

At the TA-67 transect, ponderosa pine and white fir occurred most with a relative frequency of 40 and 33.33% respectively.

6.2.1.5 Two-Mile Mesa: Mesa Top

Eight species were recorded within the seven transects on Two-Mile mesa for OU-1111 (Table 6). One-seed juniper and ponderosa pine were the only two species recorded within all seven transects. Ponderosa pine was the most frequently recorded species within six of the seven transects, with Gambel oak the most frequent in the second transect at TA-6. Thinleaf alder was only recorded within the second transect of TA-6 with a relative frequency of less than 5%. Douglas fir, Gambel oak, aspen, limber pine and white fir were recorded within two or more transects.

Three species were noted within the transect at TA-22: ponderosa pine, one-seed juniper and white fir. ponderosa pine had the highest relative frequency (81.25%) with one-seed juniper and white fir having relative frequencies 12.60% and 6.25% respectively.

Three species were recorded within the first transect a TA-6; ponderosa pine occurred most frequently with a relative frequency of 87.50%, with one-seed juniper and Douglas fir each occurring with a relative frequency of 6.25%.

Within the second transect of TA-6 Gambel oak had the highest frequency of 21.88%, while aspen had the highest percent relative cover (25.26%). Douglas fir, aspen, and white fir were next highest in frequency (18.75% each). Limber pine, ponderosa pine, thinleaf alder, and one-seed juniper were also recorded with relative frequencies of less than 10%.

Five species were recorded within the first transect at TA-40. Ponderosa pine was noted most frequently with a relative frequency of 40% and a relative cover of 49%. Douglas fir, one-seed juniper, Gambel

TABLE 6. Overstory Vegetation Characteristics of Tree Canopy Layer Species Recorded in Operable Unit 1111, Two-Mile Mesa

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1 Transect 1	TA-40, Above Drainage S. of Bldg. 1 Transect 2	TA-40, Across from Bldg. 1 Transect 3	TA-40, Dirt Road Along Mesa Top Transect 4	TA-6 West of MDAF Transect 1	TA-6 Drainage North of Road Transect 2	TA-22 Mesa Transect 1
One-Seed Juniper (<i>Juniperus monosperma</i>)							
Average DBH	0.57	0.10	0.79	1.82	3.70	0.10	0.73
Relative Cover (%)	3.65	0.00	0.00	2.56	2.21	6.49	0.00
Relative Density (%)	4.43	2.78	6.92	38.67	0.41	4.92	7.41
Relative Frequency (%)	12.00	7.41	13.79	23.81	6.25	3.13	12.50
Importance Index (%)	6.69	3.40	6.91	21.68	2.95	4.85	6.64
Ponderosa Pine (<i>Pinus ponderosa</i>)							
Average DBH	5.30	7.37	5.92	8.55	5.59	6.62	4.98
Relative Cover (%)	49.00	92.47	100.00	97.44	97.79	3.31	100.00
Relative Density (%)	75.95	91.67	89.23	61.33	99.18	2.73	90.74
Relative Frequency (%)	40.00	74.07	68.97	76.19	87.50	9.38	81.25
Importance Index (%)	54.98	86.07	86.07	78.32	94.83	5.14	90.66
Douglas Fir (<i>Pseudotsuga menziesii</i>)							
Average DBH	3.42	6.83	0.10		5.50	4.91	
Relative Cover (%)	21.05	4.90	0.00		0.00	15.40	
Relative Density (%)	8.86	4.17	1.54		0.41	21.31	
Relative Frequency (%)	24.00	14.81	6.90		6.25	18.75	
Importance Index (%)	17.97	7.96	2.81		2.22	18.49	
Gamble Oak (<i>Quercus gambellii</i>)							
Average DBH	4.41					4.54	
Relative Cover (%)	15.78					20.31	
Relative Density (%)	4.43					3.830	
Relative Frequency (%)	12.00					21.88	
Importance Index (%)	10.74					15.34	

TABLE 6. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Aspen (<i>Populus tremuloides</i>)							
Average DBH	0.10					4.63	
Relative Cover (%)	10.52					24.26	
Relative Density (%)	5.06					57.38	
Relative Frequency (%)	4.00					18.75	
Importance Index (%)	6.53					33.46	
Ponderosa Pine Snag							
Average DBH	14.25		12.47				
Relative Cover (%)	0.00		0.00				
Relative Density (%)	1.27		2.31				
Relative Frequency (%)	8.00		10.34				
Importance Index (%)	3.09		4.22				
Limber Pine (<i>Pinus flexilis</i>)							
Average DBH		7.00				7.38	
Relative Cover (%)		2.63				11.36	
Relative Density (%)		1.39				2.19	
Relative Frequency (%)		3.70				6.25	
Importance Index (%)		2.57				6.60	
Thinleaf Alder (<i>Alnus tenuifolia</i>)							
Average DBH						0.10	
Relative Cover (%)						0.13	
Relative Density (%)						1.64	
Relative Frequency (%)						3.13	
Importance Index (%)						1.63	

TABLE 6. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
<i>White Fir (Abies concolor)</i>							
Average DBH						6.23	7.30
Relative Cover (%)						18.74	0.00
Relative Density (%)						6.01	1.85
Relative Frequency (%)						18.75	6.25
Importance Index (%)						14.50	2.70

oak and aspen were the other species noted within this transect. Ponderosa pine snags were also noted with a relative frequency of less than 10%.

Four species were noted within the second transect at TA-40. Ponderosa pine had a relative frequency of 74.1% and a relative cover of 92.47%. One-seed juniper, Douglas fir and limber pine were also noted within this transect.

Within the third transect of TA-40, three species were noted. Ponderosa pine had a relative frequency of 68.97% and a relative cover of 100%. One-seed juniper and Douglas fir were noted with relative frequencies of 13.79% and 6.9% respectively. Ponderosa pine snags were also noted with a relative frequency of 10.34%.

Only two species were noted within the fourth transect at TA-40. One-seed juniper and ponderosa pine had relative frequencies of 76.19% and 23.81% respectively.

6.2.2 Overstory Shrubs

For purposes of determining overstory content in line intercepts and circular plots, we separated woody species into trees and shrubs. An overstory species was classified as a shrub if its height was less than three feet with a DBH of less than four inches.

6.2.2.1 Two-Mile Canyon: North-Facing Slope

Seven species were recorded within this transect (Table 7). Gambel oak occurred most frequently with a relative frequency of 41.2% and a relative cover of 97.8%. Wax currant, mountain mahogany and Fendler barberry were present with relative frequencies between 10% and 20%. Cliffbush, tumbleweed and snowberry also appeared within the transect but had relative frequencies of less than 10%.

6.2.2.2 Two-Mile Canyon: Canyon Bottom

Thirteen plant species were noted between the two transects (Table 7). Wax currant had the highest relative frequency within both transects. Seven species were common to both transects, Gambel oak, wax currant, Fendler barberry, Fendler's rose, New Mexico locust, and striped coralroot. Wild raspberry was only noted within the first transect while, tumbleweed, Mogollon vetch, skunkbush, willow and chokecherry, were only noted within the second transect.

Eight plant species were recorded within the first transect. Wax currant had the highest frequency of 56.9%, while Gambel oak had the highest present relative cover of 30%. Other species recorded were Fendler barberry, cliffbush, striped coralroot and wild raspberry all with relative frequencies of less than 10%.

Twelve plant species were recorded within the second transect of Two-Mile Canyon bottom. Wax currant had the highest relative frequency (45%), while willow had the highest relative cover (22.17%). Other species recorded were Gambel oak, Fendler barberry, tumbleweed, Mogollon vetch, skunkbush, Fendler's rose, New Mexico locust, chokecherry, striped coralroot, and wild raspberry.

TABLE 7. Overstory Vegetation Characteristics of Shrub Canopy Layer Species Recorded in Operable Unit 1111, Two-Mile Canyon.

SPECIES	TRANSECTS		
	TA-59. North-	TA-3,	TA-59,
	facing Slope	Canyon Bottom	Canyon Bottom
		Transect 1	Transect 2
Gambel Oak (<i>Quercus gambelii</i>)			
Stems Per Acre	497.83	428.21	169.23
Relative Cover (%)	97.76	29.94	15.51
Relative Density (%)	61.54	18.03	7.06
Relative Frequency (%)	41.18	11.76	8.75
Importance Index (%)	66.82	19.91	10.44
Wax Currant (<i>Ribes cereum</i>)			
Stems Per Acre	90.23	215.38	294.51
Relative Cover (%)	1.50	4.94	6.05
Relative Density (%)	11.15	9.07	12.28
Relative Frequency (%)	11.76	56.86	45.00
Importance Index (%)	8.14	23.63	21.11
Mountain Mahogany (<i>Cercocarpus montanus</i>)			
Stems Per Acre	59.12		
Relative Cover (%)	0.00		
Relative Density (%)	7.31		
Relative Frequency (%)	17.65		
Importance Index (%)	8.32		
Fendler Barberrry (<i>Berberis fendleri</i>)			
Stems Per Acre	140.01	169.23	13.19
Relative Cover (%)	0.75	2.71	0.13
Relative Density (%)	17.31	7.13	0.55
Relative Frequency (%)	20.59	5.88	2.50
Importance Index (%)	12.88	5.24	1.06
Cliffbush (<i>Jamesia americana</i>)			
Stems Per Acre	12.45	1051.28	848.35
Relative Cover (%)	0.00	12.82	13.66
Relative Density (%)	1.54	44.28	35.38
Relative Frequency (%)	2.94	7.84	8.75
Importance Index (%)	1.49	21.65	19.26
Tumbleweed (<i>amaranthus albus</i>)			
Stems Per Acre	6.22		19.78
Relative Cover (%)	0.00		9.59
Relative Density (%)	0.77		0.82
Relative Frequency (%)	2.94		2.50
Importance Index (%)	1.24		4.30

TABLE 7. Continued

SPECIES	TRANSECTS		
	TA-59, North-facing Slope	TA-3, Canyon Bottom	TA-59, Canyon Bottom
		Transect 1	Transect 2
Snowberry (<i>Symphoricarpos oreophilus</i>)			
Stems Per Acre	3.11		
Relative Cover (%)	0.00		
Relative Density (%)	0.38		
Relative Frequency (%)	2.94		
Importance Index (%)	1.11		
Mogollon Vetch (<i>Vicia leucophaea</i>)			
Stems Per Acre			37.36
Relative Cover (%)			0.13
Relative Density (%)			1.56
Relative Frequency (%)			2.50
Importance Index (%)			1.40
Skunkbush (<i>Rhus trilobata</i>)			
Stems Per Acre			6.59
Relative Cover (%)			0.13
Relative Density (%)			0.27
Relative Frequency (%)			2.50
Importance Index (%)			0.97
Willow (<i>Salix spp.</i>)			
Stems Per Acre			674.73
Relative Cover (%)			22.17
Relative Density (%)			28.14
Relative Frequency (%)			8.75
Importance Index (%)			19.69
Fendler's Rose (<i>Rosa woodsii</i>)			
Stems Per Acre		61.54	13.19
Relative Cover (%)		1.51	0.42
Relative Density (%)		2.59	0.55
Relative Frequency (%)		7.84	3.75
Importance Index (%)		3.98	1.57
New Mexico Locust (<i>Robinia neomexicana</i>)			
Average DBH (%)		7.69	4.40
Relative Cover (%)		0.14	3.84
Relative Density (%)		0.32	0.18
Relative Frequency (%)		3.92	1.25
Importance Index (%)		1.46	1.76

TABLE 7. Continued

SPECIES	TRANSECTS		
	TA-59, North-facing Slope	TA-3, Canyon Bottom Transect 1	TA-59, Canyon Bottom Transect 2
Chokecherry (<i>Prunus virginiana</i>)			
Stems Per Acre			156.04
Relative Cover (%)			4.95
Relative Density (%)			6.51
Relative Frequency (%)			7.50
Importance Index (%)			6.32
Striped Coralroot (<i>Corallorhiza striata</i>)			
Stems Per Acre		182.05	94.51
Relative Cover (%)		24.48	15.98
Relative Density (%)		7.67	3.94
Relative Frequency (%)		1.96	1.25
Importance Index (%)		11.37	7.06
Wild Raspberry (<i>Rubus stingosus</i>)			
Stems Per Acre		256.41	
Relative Cover (%)		23.32	
Relative Density (%)		10.80	
Relative Frequency (%)		1.96	
Importance Index (%)		12.03	
Shrub			
Stems Per Acre		2.56	
Relative Cover (%)		0.14	
Relative Density (%)		0.11	
Relative Frequency (%)		1.96	
Importance Index (%)		0.74	
Unknown 1			
Stems Per Acre			65.93
Relative Cover (%)			7.46
Relative Density (%)			2.75
Relative Frequency (%)			5.00
Importance Index (%)			5.07

6.2.2.3 Pajarito Canyon: South-Facing Slope

Gambel oak was the only shrub noted within the TA-22 transect with a relative cover of 100% (Table 8). Gambel oak was the dominant species within the TA-40 transect with a relative frequency of 41.7%. Other species recorded within the TA-40 transect were chokecherry, rose and cliffbush with relative frequencies of 8.33%, 16.67% and 33.33% respectively.

6.2.2.4 Pajarito Canyon: Canyon Bottom

Eighteen species were noted throughout the three transects within Pajarito Canyon bottom (Table 8). Two species were common within all three transects; Gambel oak and Fendler barberry. Of the two species Gambel oak was the dominant species within the TA-22 and TA-40 transects.

Eleven species were recorded in the TA-22 transect. Gambel oak and cliffbush were the dominant species with relative frequencies of 22%. Cliffbush had the highest relative cover (31.8%). Fendler barberry and gooseberry were also common with relative frequencies of 17.1% and 14.6% respectively. Other species recorded within this transect were chokecherry, wild rose, snowberry, wax currant, Fendler's rose, mountain

Six species were recorded within the TA-40 transect. Gambel oak and chokecherry were the dominant species with a relative frequencies of 26.67%. Willow had the highest relative cover (56.9%). Other species noted within this transect were Fendler's barberry, wild rose and cliffbush all with relative frequencies of less than 10%

Eleven species were noted within the TA-67 transect. Wax currant was the dominant species recorded with a relative frequency of 42.6% while water birch had the highest relative cover of 45.4%. Western box elder had the next highest relative frequency (12.77%). Other species recorded include Western virgin's Bower, water birch, Virginia creeper, New Mexico locust, oak, Gambel oak, willow and Fendler barberry.

6.2.2.5 Two-Mile Mesa: Mesa Top

A total of twelve shrub species were noted within the seven transects on Two-Mile Mesa top (Table 9). Shrub species were noted within only six of the seven transects. Gambel Oak, the only species noted within those six transects, had the highest relative frequency.

Three shrub species were noted within the transect at TA-22. Gambel oak had the highest relative frequency (50%), gooseberry had the highest relative cover (100%). No cover was noted for Gambel oak or Fendler barberry within this transect.

No shrub species were noted within the first transect at TA-6. However, six shrub species were noted within the second transect at TA-6. Gambel oak and cliffbush had the highest relative frequencies (25.9% each) and cliffbush had the highest relative cover (35.3%). Chokecherry and Fendler barberry were also common (relative frequencies of 18.5% and 14.8% respectively). New Mexico locust and wild rose had relative frequencies of less than 10%.

TABLE 8. Overstory Vegetation Characteristics of Shrub Canopy Layer Species Recorded in Operable Unit 1111, Pajarito Canyon.

SPECIES	TRANSECTS				
	TA-22, Stream Channel	TA-40, Stream Channel	TA-67, Stream Channel	TA-22, South-facing Slope	TA-40, South-facing Slope
	Transect 1	Transect 2	Transect 3	Transect 1	Transect 2
Gambel Oak (<i>Quercus gambelii</i>)					
Stems Per Acre (%)	92.46	178.02	35.90	627.99	196.02
Relative Cover (%)	26.29	22.98	9.34	100.00	40.11
Relative Density (%)	3.64	18.82	2.18	100.00	14.33
Relative Frequency (%)	21.95	26.67	6.38	100.00	41.67
Importance Index (%)	17.29	22.82	5.97	100.00	32.04
Willow (<i>Salix spp.</i>)					
Stems Per Acre (%)		359.34	787.18		
Relative Cover (%)		56.85	9.45		
Relative Density (%)		37.98	40.14		
Relative Frequency (%)		13.33	8.33		
Importance Index (%)		36.05	19.31		
Chokecherry (<i>Prunus virginiana</i>)					
Stems Per Acre (%)	75.38	68.13			26.14
Relative Cover (%)	13.80	6.36			3.39
Relative Density (%)	2.96	7.20			1.91
Relative Frequency (%)	7.32	26.67			8.33
Importance Index (%)	8.03	13.41			4.54
Fendler Barberry (<i>Berberis fendleri</i>)					
Stems Per Acre (%)	327.69	4.40	389.74		
Relative Cover (%)	13.21	0.17	4.44		
Relative Density (%)	12.88	0.46	23.71		
Relative Frequency (%)	17.07	6.67	8.51		
Importance Index (%)	14.39	2.43	12.22		
Wild Rose (<i>Rosa</i>)					
Stems Per Acre (%)	4.62	2.20			8.71
Relative Cover (%)	0.24	0.17			28.25
Relative Density (%)	0.18	0.23			0.64
Relative Frequency (%)	4.88	6.67			16.67
Importance Index (%)	1.77	2.36			15.18
Cliffbush (<i>Jamesia americana</i>)					
Stems Per Acre (%)	1840.15	334.07			1136.92
Relative Cover (%)	31.80	13.47			28.25
Relative Density (%)	72.35	35.31			83.12
Relative Frequency (%)	21.95	20.00			33.33
Importance Index (%)	42.03	22.93			48.23

TABLE 8. Continued

SPECIES	TRANSECTS				
	TA-22, Stream Channel	TA-40, Stream Channel	TA-67, Stream Channel	TA-22, South-facing Slope	TA-40, South-facing Slope
	Transect 1	Transect 2	Transect 3	Transect 1	Transect 2
Snowberry (<i>Symphoricarpos oreophilus</i>)					
Stems Per Acre (%)	1.54				
Relative Cover (%)	0.37				
Relative Density (%)	0.06				
Relative Frequency (%)	2.44				
Importance Index (%)	0.95				
Gooseberry (<i>Ribes inerme</i>)					
Stems Per Acre (%)	170.77				
Relative Cover (%)	13.16				
Relative Density (%)	6.71				
Relative Frequency (%)	14.63				
Importance Index (%)	11.50				
Wax Currant (<i>Ribes cereum</i>)					
Stems Per Acre (%)	15.38		41.03		
Relative Cover (%)	0.37		0.11		
Relative Density (%)	0.60		2.50		
Relative Frequency (%)	2.44		42.55		
Importance Index (%)	1.14		15.05		
Fendler's Rose (<i>Rosa woodsii</i>)					
Stems Per Acre (%)	1.54		5.13		
Relative Cover (%)	0.37		0.11		
Relative Density (%)	0.06		0.31		
Relative Frequency (%)	2.44		2.13		
Importance Index (%)	0.95		0.85		
Mountain Mahogany (<i>Cercocarpus montanus</i>)					
Stems Per Acre (%)	10.77				
Relative Cover (%)	0.05				
Relative Density (%)	0.42				
Relative Frequency (%)	2.44				
Importance Index (%)	0.97				
Wild Raspberry (<i>Rubus stigosus</i>)					
Stems Per Acre (%)	3.08				
Relative Cover (%)	0.37				
Relative Density (%)	0.12				
Relative Frequency (%)	2.44				
Importance Index (%)	0.98				

TABLE 8. Continued

SPECIES	TRANSECTS				
	TA-22, Stream Channel	TA-40, Stream Channel	TA-67, Stream Channel	TA-22, South-facing Slope	TA-40, South-facing Slope
	Transect 1	Transect 2	Transect 3	Transect 1	Transect 2
Western Virgin's Bower (<i>Clematis ligusticifolia</i>)					
Stems Per Acre (%)			2.56		
Relative Cover (%)			0.11		
Relative Density (%)			0.16		
Relative Frequency (%)			2.13		
Importance Index (%)			0.80		
Water Birch (<i>Betula occidentalis</i>)					
Stems Per Acre (%)			53.85		
Relative Cover (%)			45.44		
Relative Density (%)			3.28		
Relative Frequency (%)			2.13		
Importance Index (%)			16.95		
Virginia Creeper (<i>Parthenocissus inserta</i>)					
Stems Per Acre (%)			0.00		
Relative Cover (%)			0.11		
Relative Density (%)			0.00		
Relative Frequency (%)			2.13		
Importance Index (%)			0.75		
New Mexico Locust (<i>Robinia neomexicana</i>)					
Stems Per Acre (%)			2.56		
Relative Cover (%)			1.14		
Relative Density (%)			0.16		
Relative Frequency (%)			2.13		
Importance Index (%)			1.14		
Box Elder Maple (<i>Acer negundo</i>)					
Stems Per Acre (%)			305.13		
Relative Cover (%)			13.40		
Relative Density (%)			18.56		
Relative Frequency (%)			12.77		
Importance Index (%)			14.91		
Oak (<i>Quercus</i>)					
Stems Per Acre (%)			20.51		
Relative Cover (%)			12.52		
Relative Density (%)			1.25		
Relative Frequency (%)			6.38		
Importance Index (%)			6.72		

TABLE 9. Overstory Vegetation Characteristics of Shrub Canopy Layer Species Recorded in Operable Unit 1111, Two-Mile Mesa

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Gambles Oak (<i>Quercus gambellii</i>)							
Shrubs Per Acre (%)	518.46	222.16	121.97	235.22		239.56	94.45
Relative Cover (%)	43.40	71.89	0.00	100.00		26.57	0.00
Relative Density (%)	60.61	74.45	43.75	100.00		6.96	17.03
Relative Frequency (%)	33.33	40.00	61.11	100.00		25.93	50.00
Importance Index (%)	45.78	62.11	34.95	100.00		19.82	22.34
Fendler's Rose (<i>Rosa woodsii</i>)							
Shrubs Per Acre (%)	18.46						
Relative Cover (%)	6.19						
Relative Density (%)	2.16						
Relative Frequency (%)	6.67						
Importance Index (%)	5.01						
New Mexico Locust (<i>Robinia neomexicana</i>)							
Shrubs Per Acre (%)	41.54		2.18			43.96	
Relative Cover (%)	4.21		0.00			14.91	
Relative Density (%)	4.86		0.78			1.28	
Relative Frequency (%)	20.00		5.56			7.41	
Importance Index (%)	9.69		2.11			7.86	
Mountain Mahogany (<i>Cercocarpus montanus</i>)							
Shrubs Per Acre (%)	43.08	28.31	17.42				
Relative Cover (%)	12.03	0.00	0.00				
Relative Density (%)	5.04	9.49	6.25				
Relative Frequency (%)	16.67	25.71	5.56				
Importance Index (%)	11.24	11.73	3.94				

TABLE 9. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1 Transect 1	TA-40, Above Drainage S. of Bldg. 1 Transect 2	TA-40, Across from Bldg. 1 Transect 3	TA-40, Dirt Road Along Mesa Top Transect 4	TA-6 West of MDAF Transect 1	TA-6 Drainage North of Road Transect 2	TA-22 Mesa Transect 1
Fendler Barberry (<i>Berberis fendleri</i>)							
Shrubs Per Acre (%)	203.08					323.08	62.23
Relative Cover (%)	15.96					10.23	0.00
Relative Density (%)	23.74					9.38	10.99
Relative Frequency (%)	16.67					14.81	16.67
Importance Index (%)	18.79					11.48	9.22
Cliffbush (<i>Jamesia americana</i>)							
Shrubs Per Acre (%)	15.38					2529.67	
Relative Cover (%)	0.36					35.34	
Relative Density (%)	1.80					73.45	
Relative Frequency (%)	3.33					25.93	
Importance Index (%)	1.83					44.91	
Currant (<i>Ribes spp.</i>)							
Shrubs Per Acre (%)	15.38						
Relative Cover (%)	17.86						
Relative Density (%)	1.80						
Relative Frequency (%)	3.33						
Importance Index (%)	7.66						
Apache Plume (<i>Fallugia paradoxa</i>)							
Shrubs Per Acre (%)		34.85	137.21				
Relative Cover (%)		28.11	0.00				
Relative Density (%)		11.68	49.22				
Relative Frequency (%)		17.14	27.78				
Importance Index (%)		18.98	25.67				

TABLE 9. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Wax Currant (<i>Ribies cereum</i>)							
Shrubs Per Acre (%)		10.89					
Relative Cover (%)		0.00					
Relative Density (%)		3.65					
Relative Frequency (%)		11.43					
Importance Index (%)		5.03					
Wild Rose (<i>Rosa</i>)							
Shrubs Per Acre (%)		4.36				8.79	
Relative Cover (%)		0.00				0.17	
Relative Density (%)		1.46				0.26	
Relative Frequency (%)		5.71				7.41	
Importance Index (%)		2.39				2.61	
Chokecherry (<i>Prunus virginiana</i>)							
Shrubs Per Acre (%)						298.90	
Relative Cover (%)						12.77	
Relative Density (%)						8.68	
Relative Frequency (%)						18.52	
Importance Index (%)						13.32	
Gooseberry (<i>Ribes inerme</i>)							
Shrubs Per Acre (%)							407.60
Relative Cover (%)							100.00
Relative Density (%)							71.98
Relative Frequency (%)							33.33
Importance Index (%)							68.44

Seven species were noted within the first transect at TA-40. Gambel oak and New Mexico locust had the highest relative frequencies (33.3% and 20.% respectively). Mountain mahogany and Fendler barberry were also common with relative frequencies of 16.7% each. Fendler's rose, cliffbush and currant all had a relative frequency of less than 10%.

Five species were recorded within the second transect at TA-40. Gambel oak had the highest relative frequency (61.1%). Apache plume and wax currant were the next highest in frequency (17.2% and 11.4% respectively). Wild rose and wax currant were present with a less than 10% relative frequency.

Four species were present within the third transect at TA-40. Gambel oak had the highest relative frequency (61.11%). Apache plume had a relative frequency of 27.8%. New Mexico locust and mountain mahogany were present with a less than 10% relative frequency. No species cover was recorded within this transect.

The only species noted within the fourth transect in TA-40 was Gambel Oak which had 100% relative frequency and relative cover.

6.2.3 Understory

6.2.3.1 Two-Mile Canyon: North-Facing Slope

A total of 24 species were identified within this transect (Table 10). Four species of grass were identified within the understory of this transect. Mountain muhly had the highest relative frequency (13.7%), while little bluestem, pine dropseed and nodding brome had a relative frequency of 1.6% each. Seven forb species were noted; pussytoes had a relative frequency of 6.5%, while yarrow, goosegrass, northern bedstraw, Canada violet, beardtongue, and wild chrysanthemum had relative frequencies of less than 5%. Eight species of shrub were noted within the understory, all with relative frequencies of less than 5%. Three tree species Douglas fir, white fir and limber pine were noted, but with relative frequencies of less than 2.5%.

6.2.3.2 Two-Mile Canyon: Canyon Bottom

A total of 57 species were identified within these two transects (Table 10). Moss and Lichen were noted within both transects. Four species of grass were noted within both transects, red top had the highest relative frequency within both transects. The relative frequencies were consistently higher within the first transect compared with the second transect for little bluestem, nodding brome, and bluegrass. Mountain muhly, junegrass, timothy, bottlebrush squirreltail, and sand dropseed were noted only within the first transect, while smooth brome and brome grass were only noted within the second transect.

Six forb species were identified within both transects: pussytoes, yarrow, goosegrass, wild strawberry, wild buckwheat, and white clover. Most species had a relative frequency of less than 5%.

Six shrub species were identified within both transects: mountain lover, Fendler barberry, Gambel oak, Fendler's rose, wild raspberry and cliffbush. Gambel oak had the highest relative frequency in the first transect and mountain lover in the second transect (6.1% and 7.1% respectively). Two

TABLE 10. Understory Vegetation Characteristics of Plant Species Recorded in OU-1111, Two-Mile Canyon.

SPECIES	TRANSECTS		
	TA-59, North-facing Slope	TA-3, Canyon Bottom	TA-59, Canyon Bottom
		Transect 1	Transect
Moss/Lichen			
Relative Cover (%)	29.77	7.69	15.24
Relative Frequency (%)	16.94	4.27	10.64
Importance Index (%)	23.35	5.98	12.94
Little Bluestem (<i>Andropogon scoparius</i>)			
Relative Cover (%)	5.45	0.26	0.01
Relative Frequency (%)	1.61	0.61	0.71
Importance Index (%)	3.53	0.43	0.36
Nodding Brome (<i>Bromus anamolus</i>)			
Relative Cover (%)	0.02	6.16	0.87
Relative Frequency (%)	1.61	4.88	0.71
Importance Index (%)	0.82	5.52	0.79
Mountain Muhly (<i>Muhlenbergia montana</i>)			
Relative Cover (%)	6.51	1.03	
Relative Frequency (%)	13.71	1.22	
Importance Index (%)	10.11	1.12	
Bluegrass (<i>Poa spp.</i>)			
Relative Cover (%)		8.49	1.76
Relative Frequency (%)		7.32	0.71
Importance Index (%)		7.90	0.79
Red Top (<i>Agrostis alba</i>)			
Relative Cover (%)		34.38	12.62
Relative Frequency (%)		14.63	9.93
Importance Index (%)		24.51	11.27
Pine Dropseed (<i>Blepharoneuron tricholepis</i>)			
Relative Cover (%)	2.48		
Relative Frequency (%)	1.61		
Importance Index (%)	2.05		
Bromegrass (<i>Bromus spp.</i>)			
Relative Cover (%)			21.31
Relative Frequency (%)			7.09
Importance Index (%)			14.20
Smooth Brome (<i>Bromus inermis</i>)			
Relative Cover (%)			4.78
Relative Frequency (%)			0.71
Importance Index (%)			2.75

TABLE 10. Continued

SPECIES	TRANSECTS		
	TA-59, North-facing Slope	TA-3, Canyon Bottom Transect 1	TA-59, Canyon Bottom Transect 2
<i>Juncgrass (Koeleria cristata)</i>			
Relative Cover (%)		1.03	
Relative Frequency (%)		1.22	
Importance Index (%)		1.12	
<i>Timothy (Phleum pratense)</i>			
Relative Cover (%)		0.51	
Relative Frequency (%)		0.61	
Importance Index (%)		0.56	
<i>Bottlebrush Squirreltail (Sitanion hystrix)</i>			
Relative Cover (%)		0.26	
Relative Frequency (%)		0.61	
Importance Index (%)		0.43	
<i>Agrostis (Agrostis spp.)</i>			
Relative Cover (%)		0.26	
Relative Frequency (%)		1.22	
Importance Index (%)		0.74	
<i>Sand Dropseed (Blepharoneuron tricholepis)</i>			
Relative Cover (%)		0.51	
Relative Frequency (%)		0.61	
Importance Index (%)		0.56	
<i>Pussytoes (Antennaria parvifolia)</i>			
Relative Cover (%)	5.00	0.26	0.87
Relative Frequency (%)	6.45	0.61	0.71
Importance Index (%)	5.72	0.43	0.79
<i>Yarrow (Achillea lanulosa)</i>			
Relative Cover (%)	1.50	0.77	0.87
Relative Frequency (%)	3.23	1.22	1.42
Importance Index (%)	2.36	0.99	1.14
<i>Goosegrass (Galium aparine)</i>			
Relative Cover (%)	0.01	1.03	0.05
Relative Frequency (%)	0.81	1.22	4.26
Importance Index (%)	0.41	1.13	2.15
<i>Northern Bedstraw (Galium boreale)</i>			
Relative Cover (%)	0.01		0.43
Relative Frequency (%)	0.81		0.71
Importance Index (%)	0.41		0.57

TABLE 10. Continued

SPECIES	TRANSECTS		
	TA-59, North-facing Slope	TA-3, Canyon Bottom Transect 1	TA-59, Canyon Bottom Transect 2
<i>Canada Violet (Viola canadensis)</i>			
Relative Cover (%)	0.99	3.60	
Relative Frequency (%)	1.61	6.10	
Importance Index (%)	1.30	4.85	
<i>Beardtongue (Penstemon spp)</i>			
Relative Cover (%)	0.54	2.32	
Relative Frequency (%)	4.03	3.66	
Importance Index (%)	2.28	2.99	
<i>Wild Strawberry (Fragaria americana)</i>			
Relative Cover (%)		1.84	0.47
Relative Frequency (%)		8.54	3.55
Importance Index (%)		5.19	2.01
<i>Wild Buckwheat (Eriogonum spp.)</i>			
Relative Cover (%)		0.26	0.45
Relative Frequency (%)		1.22	2.13
Importance Index (%)		0.74	1.29
<i>White Clover (Trifolium repens)</i>			
Relative Cover (%)		0.01	0.90
Relative Frequency (%)		0.61	3.55
Importance Index (%)		0.31	2.22
<i>Wild Chrysanthemum (Bahia dissecta)</i>			
Relative Cover (%)	0.50		
Relative Frequency (%)	0.81		
Importance Index (%)	0.65		
<i>Aster (Machaeranthera spp.)</i>			
Relative Cover (%)		0.77	
Relative Frequency (%)		0.61	
Importance Index (%)		0.69	
<i>Bricklebush (Brickellia grandiflora)</i>			
Relative Cover (%)		0.26	
Relative Frequency (%)		0.61	
Importance Index (%)		0.43	
<i>White Sweet Clover (Melilotus albus)</i>			
Relative Cover (%)		2.35	
Relative Frequency (%)		5.49	
Importance Index (%)		3.92	

TABLE 10. Continued

SPECIES	TRANSECTS	
	TA-59, North-facing Slope	TA-3, Canyon Bottom TA-59, Canyon Bottom
	Transect 1	Transect 2
Trailing Fleabane (<i>Erigeron flagellaris</i>)		
Relative Cover (%)	0.77	
Relative Frequency (%)	1.22	
Importance Index (%)	0.99	
Horse-mint (<i>Monarda methaefolia</i>)		
Relative Cover (%)	0.51	
Relative Frequency (%)	1.22	
Importance Index (%)	0.87	
Mullein (<i>Verbascum thapsus</i>)		
Relative Cover (%)	1.80	
Relative Frequency (%)	1.83	
Importance Index (%)	1.82	
Big Golden Pea (<i>Thermopsis pinetorum</i>)		
Relative Cover (%)	2.05	
Relative Frequency (%)	1.22	
Importance Index (%)	1.64	
Peppergrass (<i>Lepidium medium</i>)		
Relative Cover (%)	1.29	
Relative Frequency (%)	1.22	
Importance Index (%)	1.25	
Rippleseed Plantain (<i>Plantago major</i>)		
Relative Cover (%)	0.26	
Relative Frequency (%)	1.22	
Importance Index (%)	0.74	
Louisiana Wormwood (<i>Artemisia ludoviciana</i>)		
Relative Cover (%)	0.26	
Relative Frequency (%)	1.22	
Importance Index (%)	0.74	
Thistle (<i>Cirsium spp.</i>)		
Relative Cover (%)	0.51	
Relative Frequency (%)	0.61	
Importance Index (%)	0.56	
James Geranium (<i>Geranium caespitosum</i>)		
Relative Cover (%)	0.26	
Relative Frequency (%)	0.61	
Importance Index (%)	0.43	

TABLE 10. Continued

SPECIES	TRANSECTS		
	TA-59, North-facing Slope	TA-3, Canyon Bottom	TA-59, Canyon Bottom
		Transect 1	Transect 2
<i>Curlyleaf Dock (Rumex crispus)</i>			
Relative Cover (%)		0.26	
Relative Frequency (%)		0.61	
Importance Index (%)		0.43	
<i>Tall Clinquefoil (Potentilla arguta)</i>			
Relative Cover (%)		0.26	
Relative Frequency (%)		0.61	
Importance Index (%)		0.43	
<i>Goatsbeard (Tragopogon spp.)</i>			
Relative Cover (%)		0.26	
Relative Frequency (%)		1.22	
Importance Index (%)		0.74	
<i>Common Dandelion (Taraxacum officinale)</i>			
Relative Cover (%)			0.43
Relative Frequency (%)			0.71
Importance Index (%)			0.57
<i>Mountain Lover (Pachystima myrsinites)</i>			
Relative Cover (%)	4.00	1.80	4.80
Relative Frequency (%)	7.26	3.05	7.09
Importance Index (%)	5.63	2.42	5.95
<i>Fendler Barberry (Berberis fendleri)</i>			
Relative Cover (%)	1.01	0.77	0.88
Relative Frequency (%)	3.23	1.22	2.13
Importance Index (%)	2.12	1.00	1.50
<i>Gambel Oak (Quercus gambelii)</i>			
Relative Cover (%)	12.91	6.16	1.74
Relative Frequency (%)	8.87	6.10	1.42
Importance Index (%)	10.89	6.13	1.58
<i>Fendler Meadow rue (Thalictrum fendleri)</i>			
Relative Cover (%)	0.99		7.00
Relative Frequency (%)	0.81		7.80
Importance Index (%)	0.90		7.40
<i>Wax Currant (Ribies cereum)</i>			
Relative Cover (%)	7.94	0.51	
Relative Frequency (%)	4.84	0.61	
Importance Index (%)	6.39	0.56	

TABLE 10. Continued

SPECIES	TRANSECTS		
	TA-59, North- facing Slope	TA-3, Canyon Bottom	TA-59, Canyon Bottom
		Transect 1	Transect 2
Fendler's Rose (<i>Rosa woodsii</i>)			
Relative Cover (%)		0.26	0.01
Relative Frequency (%)		0.61	3.55
Importance Index (%)		0.43	2.65
Wild Raspberry (<i>Rubus stingsosus</i>)			
Relative Cover (%)		2.06	3.48
Relative Frequency (%)		1.83	2.84
Importance Index (%)		1.94	3.16
Cliffbush (<i>Jamesia americana</i>)			
Relative Cover (%)		0.00	1.30
Relative Frequency (%)		0.00	1.42
Importance Index (%)		0.00	1.36
New Mexico Locust (<i>Robinia neomexicana</i>)			
Relative Cover (%)		0.01	
Relative Frequency (%)		0.61	
Importance Index (%)		0.31	
Gooseberry (<i>Ribes inerme</i>)			
Relative Cover (%)			0.02
Relative Frequency (%)			1.42
Importance Index (%)			0.72
Poison Ivy (<i>Rhus radicans</i>)			
Relative Cover (%)			1.31
Relative Frequency (%)			2.13
Importance Index (%)			1.72
Chokecherry (<i>Prunus virginiana</i>)			
Relative Cover (%)			0.02
Relative Frequency (%)			1.42
Importance Index (%)			0.72
Apache Plume (<i>Fallugia paradoxa</i>)			
Relative Cover (%)	2.00		
Relative Frequency (%)	4.03		
Importance Index (%)	3.02		
Bearberry (<i>Arctostaphylos uva-ursi</i>)			
Relative Cover (%)	8.92		
Relative Frequency (%)	4.84		
Importance Index (%)	6.88		

TABLE 10. Continued

SPECIES	TRANSECTS		
	TA-59, North-facing Slope	TA-3, Canyon Bottom	TA-59, Canyon Bottom
		Transect 1	Transect 2
Mountain Mahogany (<i>Cercocarpus montanus</i>)			
Relative Cover (%)	1.49		
Relative Frequency (%)	0.81		
Importance Index (%)	1.15		
Striped Coralroot (<i>Corallorhiza striata</i>)			
Relative Cover (%)		2.83	0.43
Relative Frequency (%)		1.83	0.71
Importance Index (%)		2.33	0.57
Sedge (<i>Carex spp.</i>)			
Relative Cover (%)	4.98	0.51	0.03
Relative Frequency (%)	8.06	1.22	2.84
Importance Index (%)	6.52	0.87	1.44
Inland Rush (<i>Juncus interior</i>)			
Relative Cover (%)			0.87
Relative Frequency (%)			0.71
Importance Index (%)			0.79
Western Virgin's Bower (<i>Clematis ligusticifolia</i>)			
Relative Cover (%)		1.54	
Relative Frequency (%)		1.22	
Importance Index (%)		1.38	
Virginia Creeper (<i>Parthenocissus inserta</i>)			
Relative Cover (%)			1.77
Relative Frequency (%)			2.84
Importance Index (%)			2.30
Douglas Fir (<i>Pseudotsuga menziesii</i>)			
Relative Cover (%)	1.50	0.77	0.02
Relative Frequency (%)	2.42	1.22	1.42
Importance Index (%)	1.96	1.0	0.72
White Fir (<i>Abies concolor</i>)			
Relative Cover (%)	0.50		
Relative Frequency (%)	0.81		
Importance Index (%)	0.65		
Limber Pine (<i>Pinus flexilis</i>)			
Relative Cover (%)	0.99		
Relative Frequency (%)	0.81		
Importance Index (%)	0.90		

TABLE 10. Continued

SPECIES	TRANSECTS		
	TA-59, North-facing Slope	TA-3, Canyon Bottom Transact 1	TA-59, Canyon Bottom Transect 2
Ponderosa Pine (<i>Pinus ponderosa</i>)			
Relative Cover (%)		0.26	
Relative Frequency (%)		0.61	
Importance Index (%)		0.43	
Forb 1			
Relative Cover (%)			4.36
Relative Frequency (%)			4.96
Importance Index (%)			4.66
Grass 1			
Relative Cover (%)			8.73
Relative Frequency (%)			7.09
Importance Index (%)			7.91
Shrub 1			
Relative Cover (%)			2.17
Relative Frequency (%)			0.71
Importance Index (%)			1.44

species, wax currant and New Mexico locust were only noted within the first transect and had relative frequencies of less than 1%. Three species, gooseberry, poison ivy and chokecherry were identified only within the second transect and had relative frequencies of less than 5%.

Sedge was identified within both transects with relative frequencies of 1.22% and 2.84% respectively, while inland rush was noted only within the second transect with a relative frequency of less than 1%. Vines were noted within both transects: western virgin's bower in the first and Virginia creeper within the second. Trees were also noted within the understory of both transects: Douglas fir was in both transects with a relative frequency of less than 2%, while ponderosa pine was only in the first transect with a relative frequency of less than 1%.

6.2.3.3 Pajarito Canyon: South-Facing Slope

A total of fourteen species were identified within the two transects located on the canyon's south-facing slope (Table 11). Three species of grass were recorded within both transects: bluegrass, mountain muhly, and little blue stem. Mountain muhly had the highest relative frequency in the first transect while little blue stem had the highest within the second transect (57.1% and 42.6% respectively).

No forbs were identified within the first transect while six forbs were identified within the second transect: wild strawberry, James geranium, Louisiana wormwood, pussytoes, notchleaf butterweed and parry spurge.

Sedge was identified within both transects with a relative frequency of 9.52% and 6.38% respectively.

Two shrub species, Fendler barberry and Gambel oak were identified within the first transect. Gambel oak had a relative frequency of 14.29% and Fendler Barberry had less than 5%. No shrub species were noted within the second transect.

A tree species, one-seed juniper was only within the first transect, with a relative frequency of 2.38%.

6.2.3.4 Pajarito Canyon: Canyon Bottom

Thirty-seven species were identified within the three transects conducted in the canyon bottom (Table 11). Moss was noted within all three transects and had the highest relative cover in the second transect. (46.60%).

No single species of grass appeared within all three transects. Species recorded consisted of bluegrass, mountain muhly, mutton grass, red top, and brome grass.

No single species of forb appeared within all three transects. Species recorded within the first transect consisted of James geranium, Louisiana wormwood, pussytoes, western dog violet, chiming bells, Canada violet, thistle, yarrow, cutleaf coneflower, yellow salsify, clover, willoweed, inland rush, and sedge. Two species, tobacco root and cowherb were only noted within the second transect. Three species, mullein, violet, and big golden pea were only noted within the third transect.

TABLE 11: Understory Vegetation Characteristics of Plant Species Recorded in Operable Unit 1111, Pajarito Canyon.

SPECIES	TRANSECTS				
	TA-22, Stream Channel	TA-40, Stream Channel	TA-67, Stream Channel	TA-22, South-facing Slope	TA-40, South-facing Slope
	Transect 1	Transect 2	Transect 3	Transect 1	Transect 2
Moss					
Relative Cover (%)	5.39	46.60	6.04		
Relative Frequency (%)	4.83	12.73	1.08		
Importance Index (%)	5.11	29.66	3.56		
Bluegrass (<i>Poa spp.</i>)					
Relative Cover (%)			10.27	0.03	0.02
Relative Frequency (%)			9.68	4.76	2.13
Importance Index (%)			9.97	2.40	1.08
Mountain Muhly (<i>Muhlenbergia montana</i>)					
Relative Cover (%)	2.44			65.48	18.51
Relative Frequency (%)	3.40			57.14	19.15
Importance Index (%)	2.92			61.31	18.83
Bromegrass (<i>Bromus spp.</i>)					
Relative Cover (%)	0.71		6.04		
Relative Frequency (%)	5.83		6.45		
Importance Index (%)	3.27		6.25		
Little Blue Stem (<i>Andropogon scoparius</i>)					
Relative Cover (%)				10.31	70.19
Relative Frequency (%)				4.76	42.55
Importance Index (%)				7.53	56.37
Mutton Grass (<i>Poa fendleriana</i>)					
Relative Cover (%)	2.21				
Relative Frequency (%)	4.85				
Importance Index (%)	3.53				
Big Blue Stem (<i>Andropogon gerardii</i>)					
Relative Cover (%)				6.87	
Relative Frequency (%)				2.38	
Importance Index (%)				4.63	
Red Top (<i>Agrostis alba</i>)					
Relative Cover (%)		1.49	40.46		
Relative Frequency (%)		3.64	27.96		
Importance Index (%)		2.56	34.21		
Wild Strawberry (<i>Fragaria americana</i>)					
Relative Cover (%)	1.04		0.72		0.02
Relative Frequency (%)	3.40		2.15		2.13
Importance Index (%)	2.22		1.44		1.08

TABLE 11. Continued.

SPECIES	TRANSECTS				
	TA-22, Stream Channel	TA-40, Stream Channel	TA-67, Stream Channel	TA-22, South-facing Slope	TA-40, South-facing Slope
	Transect 1	Transect 2	Transect 3	Transect 1	Transect 2
James Geranium (<i>Geranium casepitosum</i>)	0.24			0.02	
Relative Cover (%)	0.97			2.13	
Relative Frequency (%)	0.61			1.08	
Importance Index (%)					
Galium (<i>Galium spp.</i>)					
Relative Cover (%)	0.21		8.82		
Relative Frequency (%)	1.46		17.20		
Importance Index (%)	0.83		13.01		
Fendler Meadow rue (<i>Thalictrum fendleri</i>)					
Relative Cover (%)	0.40		16.43		
Relative Frequency (%)	1.46		13.98		
Importance Index (%)	0.93		15.20		
Louisiana Wormwood (<i>Artemisia ludoviciana</i>)					
Relative Cover (%)	0.04			0.07	
Relative Frequency (%)	0.49			6.38	
Importance Index (%)	0.26			3.23	
Pussytoes (<i>Antennaria parvifolia</i>)					
Relative Cover (%)	0.84			3.72	
Relative Frequency (%)	1.94			8.51	
Importance Index (%)	1.39			6.11	
Common Dandelion (<i>Taraxacum officinale</i>)					
Relative Cover (%)	0.46		0.24		
Relative Frequency (%)	3.88		2.15		
Importance Index (%)	2.17		1.20		
Western Dog Violet (<i>Viola adunca</i>)					
Relative Cover (%)	0.08				
Relative Frequency (%)	1.46				
Importance Index (%)	0.77				
Chiming Bells (<i>Mertensia lanceolata</i>)					
Relative Cover (%)	0.20				
Relative Frequency (%)	0.49				
Importance Index (%)	0.34				
Canada Violet (<i>Viola Canadensis</i>)					
Relative Cover (%)	0.41				
Relative Frequency (%)	1.94				
Importance Index (%)	1.17				

TABLE 11. Continued

SPECIES	TRANSECTS				
	TA-22, Stream Channel	TA-40, Stream Channel	TA-67, Stream Channel	TA-22, South-facing Slope	TA-40, South-facing Slope
	Transect 1	Transect 2	Transect 3	Transect 1	Transect 2
Thistle (<i>Cirsium spp.</i>)					
Relative Cover (%)	0.20				
Relative Frequency (%)	0.49				
Importance Index (%)	0.34				
Yarrow (<i>Achillea lanulosa</i>)					
Relative Cover (%)	0.54				
Relative Frequency (%)	5.34				
Importance Index (%)	2.94				
Cutleaf Coneflower (<i>Rudbeckia laciniata</i>)					
Relative Cover (%)	0.40				
Relative Frequency (%)	0.49				
Importance Index (%)	0.44				
Yellow Salsify (<i>Tragopogon dubius</i>)					
Relative Cover (%)	0.24				
Relative Frequency (%)	0.97				
Importance Index (%)	0.61				
Notchleaf Butterweed (<i>Senecioo fendleri</i>)					
Relative Cover (%)					0.05
Relative Frequency (%)					6.38
Importance Index (%)					3.22
Willowweed, Fireweed (<i>Epilobium spp.</i>)					
Relative Cover (%)	0.20				
Relative Frequency (%)	0.97				
Importance Index (%)	0.59				
Parry Spurge (<i>Chamaesyce parryi</i>)					
Relative Cover (%)					2.46
Relative Frequency (%)					4.26
Importance Index (%)					3.36
Clover (<i>Melilotus spp.</i>)					
Relative Cover (%)	0.44				
Relative Frequency (%)	1.46				
Importance Index (%)	0.95				
Mullein (<i>Verbascum thapsus</i>)					
Relative Cover (%)			0.60		
Relative Frequency (%)			1.08		
Importance Index (%)			0.84		

TABLE 11. Continued.

SPECIES	TRANSECTS				
	TA-22, Stream Channel	TA-40, Stream Channel	TA-67, Stream Channel	TA-22, South-facing Slope	TA-40, South-facing Slope
	Transect 1	Transect 2	Transect 3	Transect 1	Transect 2
Tobacco Root (<i>Valeriana capitata</i>)					
Relative Cover (%)		0.81			
Relative Frequency (%)		3/64			
Importance Index (%)		2.22			
Violet (<i>Viola spp.</i>)					
Relative Cover (%)			1.93		
Relative Frequency (%)			4.30		
Importance Index (%)			3.12		
Gray Valerian (<i>Valeriana acutiloba</i> Rydb.)					
Relative Cover (%)		3.38			
Relative Frequency (%)		5.45			
Importance Index (%)		4.42			
Big Golden Pea (<i>Thermopsis pinetorum</i>)					
Relative Cover (%)			2.54		
Relative Frequency (%)			4.30		
Importance Index (%)			3.42		
Horsetail (<i>Equisetum spp.</i>)					
Relative Cover (%)	0.40				
Relative Frequency (%)	1.46				
Importance Index (%)	0.93				
Rocky Mountain Clematis (<i>Clematis pseudoalpina</i>)					
Relative Cover (%)	0.00		0.97		
Relative Frequency (%)	0.49		4.30		
Importance Index (%)	0.24		2.63		
Inland Rush (<i>Juncus interior</i>)					
Relative Cover (%)	8.59		0.60		
Relative Frequency (%)	8.74		1.08		
Importance Index (%)	8.66		0.84		
Sedge (<i>Carex spp.</i>)					
Relative Cover (%)	3.83			6.87	4.92
Relative Frequency (%)	6.80			9.52	6.38
Importance Index (%)	5.32			8.20	5.65
Fendler Barberry (<i>Berberis fendleri</i>)					
Relative Cover (%)	0.40		0.12	0.03	
Relative Frequency (%)	2.91		1.08	2.38	
Importance Index (%)	1.66		0.60	1.21	

TABLE 11. Continued

SPECIES	TRANSECTS				
	TA-22, Stream Channel	TA-40, Stream Channel	TA-67, Stream Channel	TA-22, South-facing Slope	TA-40, South-facing Slope
	Transect 1	Transect 2	Transect 3	Transect 1	Transect 2
Poison Ivy (<i>Rhus radicans</i>)					
Relative Cover (%)			4.23		
Relative Frequency (%)			3.23		
Importance Index (%)			3.73		
Currant (<i>Ribes spp.</i>)					
Relative Cover (%)		2.70			
Relative Frequency (%)		3.64			
Importance Index (%)		3.17			
Wax Currant (<i>Ribes cereum</i>)					
Relative Cover (%)		4.05			
Relative Frequency (%)		3.64			
Importance Index (%)		3.84			
Snowberry (<i>Symphoricarpos oreophilus</i>)					
Relative Cover (%)		0.81			
Relative Frequency (%)		3.64			
Importance Index (%)		2.22			
Wild Raspberry (<i>Rubus stingsosus</i>)					
Relative Cover (%)	0.20				
Relative Frequency (%)	0.97				
Importance Index (%)	0.59				
Gamble Oak (<i>Quercus gambelii</i>)					
Relative Cover (%)				10.34	
Relative Frequency (%)				14.29	
Importance Index (%)				12.31	
One-Seeded Juniper (<i>Juniperus monosperma</i>)					
Relative Cover (%)				0.03	
Relative Frequency (%)				2.38	
Importance Index (%)				1.21	
Unknown Forb					
Relative Cover (%)	0.40				
Relative Frequency (%)	0.49				
Importance Index (%)	0.44				
Unknown Species					
Relative Cover (%)				0.03	
Relative Frequency (%)				2.38	
Importance Index (%)				1.21	

TABLE 11. Continued

SPECIES	TRANSECTS				
	TA-22, Stream Channel	TA-40, Stream Channel	TA-67, Stream Channel	TA-22, South-facing Slope	TA-40, South-facing Slope
	Transect 1	Transect 2	Transect 3	Transect 1	Transect 2
Grass 1					
Relative Cover (%)		16.90			
Relative Frequency (%)		21.82			
Importance Index (%)		19.36			
Unknown Grass					
Relative Cover (%)	13.97				
Relative Frequency (%)	25.24				
Importance Index (%)	19.60				

6.2.3.5 Two-Mile Mesa: Mesa Top

Seventy-one different species were identified within the seven transects run on Two-Mile Mesa (Table 12). Moss and Lichen were noted within only three of the seven transects. Moss and Lichen had the highest relative cover in the first transect at TA-6 and the highest of all plant species within that transect.

Two species of grass, mountain muhly and bluegrass were noted within all seven transects. Mountain muhly had the greatest relative frequency, relative cover and importance index of the two species within all but one transect.

Other grass species noted within the seven transects were: little bluestem, bromgrass, big bluestem, western wheatgrass, blue grama, American vetch, alfalfa, needle-grass, pine drop seed, bottlebrush squirreltail and red top.

No, forb species appeared within all seven transects. However, two species appeared within four transects, common dandelion and Louisiana wormwood. Other forb species noted within the seven transects were: beardtongue, wormwood, James geranium, pussytoes, wild strawberry, yarrow, big golden-pea, leafy golden aster, Townsend's aster, thistle, notchleaf butterweed, notchleaf butterweed, Indian paintbrush, perky sue, flax, spreading fleabane, desert trumpet, clover, evening primrose, hairy golden aster, wild chrysanthemum, false tarragon, parry spurge, yellow cut-leaf, nodding onion, geranium, stinging nettle, Fendler meadow rue, chicory, antelope sage, and summer cypress.

Four sedge and rush species were noted within the seven transects. Sedge was noted in all seven transects of Two-Mile Mesa. The highest relative cover for sedge and rushes specie (24.56%) was noted within the third transect of TA-40.

No shrub species appeared within all seven transects. Nine species were noted in six of the seven transects of Two-Mile Mesa. The fourth transect in TA-40 had no shrub species noted. The shrub species noted within the seven transects were: Fendler barberry, oak seedling, bearberry, Apache plume, wild rose, New Mexico locust, chokecherry, wild raspberry, and snakeweed.

No tree species appeared within all seven transects. Tree species only noted in the third transect at TA-40, the second transect at TA-6 and in the transect at TA-22. Tree species noted were ponderosa pine, piñon pine, and Douglas fir.

6.3 Level 3 (Species Specific) Surveys

6.3.1 Mammals

6.3.1.1 Small Mammals

During 1992, a total of ten species of small mammals were captured within Los Alamos and Pajarito Canyon for this OU. Within Pajarito Canyon, four species were captured: long-tailed vole, mountain vole, white-footed mouse, and deer mouse. Six species were captured and identified within Los Alamos Canyon: Colorado chipmunk, brush mouse, deer mouse, western harvest mouse, mountain vole

TABLE 12. Understory Vegetation Characteristics of Plant Species Recorded in Operable Unit 1111, Two-Mile Mesa Continued.

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Moss/Lichen							
Relative Cover (%)	2.49				40.09	10.75	
Relative Frequency (%)	2.33				14.81	5.20	
Importance Index (%)	2.41				27.45	7.97	
Mountain Muhly (<i>Muhlenbergia montana</i>)							
Relative Cover (%)	13.53	51.55	63.43		34.37	4.87	60.79
Relative Frequency (%)	11.63	56.25	43.14	54.74	35.19	4.05	41.90
Importance Index (%)	12.58	53.90	53.28	28.18	34.78	4.46	51.35
				41.46			
Bluegrass (<i>Poa spp.</i>)							
Relative Cover (%)	8.19	1.13	0.02		1.92	5.07	0.32
Relative Frequency (%)	7.75	0.00	1.96	11.65	5.56	6.94	0.95
Importance Index (%)	7.97	0.56	0.99	9.55	3.74	6.01	0.64
				10.60			
Little Bluestem (<i>Andropogon scoparius</i>)							
Relative Cover (%)	6.41	29.86			11.46	3.65	
Relative Frequency (%)	4.65	18.75			14.81	2.31	
Importance Index (%)	5.53	24.30			13.14	2.98	
Bromegrass (<i>Bromus spp.</i>)							
Relative Cover (%)	0.01				0.65	18.26	0.26
Relative Frequency (%)	0.78				3.70	20.23	3.81
Importance Index (%)	0.39				2.18	19.24	2.03

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
<i>Agrostis (Agrostis spp.)</i>							
Relative Cover (%)			0.69			8.52	0.06
Relative Frequency (%)			7.84			3.47	0.95
Importance Index (%)			4.27			5.99	0.51
<i>Big Bluestem (Andropogon gerardii)</i>							
Relative Cover (%)			9.06				
Relative Frequency (%)			1.96				
Importance Index (%)			5.51				
<i>Western Wheatgrass (Agropyron smithii)</i>							
Relative Cover (%)				0.34			0.32
Relative Frequency (%)				2.27			0.95
Importance Index (%)				1.31			0.64
<i>Blue Grama (Bouteloua gracilis)</i>							
Relative Cover (%)				22.63			25.29
Relative Frequency (%)				13.18			18.10
Importance Index (%)				17.90			21.69
<i>American Vetch (Vicia americana)</i>							
Relative Cover (%)				0.00			
Relative Frequency (%)				0.45			
Importance Index (%)				0.23			

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Alfalfa (<i>Medicago sativa</i>)							
Relative Cover (%)							0.70
Relative Frequency (%)							1.90
Importance Index (%)							1.30
Needle-grass (<i>Stipa spp</i>)							
Relative Cover (%)						2.84	
Relative Frequency (%)						4.05	
Importance Index (%)						3.44	
Pine Drop Seed (<i>Blepharoneuron tricholepis</i>)							
Relative Cover (%)		8.73					
Relative Frequency (%)		0.00					
Importance Index (%)		4.37					
Bottlebrush Squirreltail (<i>Sitanion hystrix</i>)							
Relative Cover (%)					065		
Relative Frequency (%)					3.70		
Importance Index (%)					2.18		
Red Top (<i>Agrostis alba</i>)							
Relative Cover (%)	1.07						
Relative Frequency (%)	3.10						
Importance Index (%)	2.09						

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Common Dandelion (<i>Taraxacum officinale</i>)							
Relative Cover (%)	1.15			0.01		0.20	0.06
Relative Frequency (%)	4.65			0.91		0.58	0.95
Importance Index (%)	2.90			0.46		0.39	0.51
Louisiana Wormwood (<i>Artemisia ludoviciana</i>)							
Relative Cover (%)	0.08	2.25	0.63	0.17			
Relative Frequency (%)	1.55	0.00	2.94	0.91			
Importance Index (%)	0.81	1.13	1.78	0.54			
Beardtongue (<i>Penstemon spp.</i>)							
Relative Cover (%)		0.56		0.03			0.45
Relative Frequency (%)		0.00		0.45			2.86
Importance Index (%)		0.28		0.24			1.65
Cinquefoil (<i>Potentilla spp.</i>)							
Relative Cover (%)	1.79			3.34			1.47
Relative Frequency (%)	5.43			4.09			5.71
Importance Index (%)	3.61			3.71			3.59
Wormwood (<i>Artemisia carruthii</i>)							
Relative Cover (%)				2.61	0.65		0.89
Relative Frequency (%)				13.18	3.70		5.71
Importance Index (%)				7.90	2.18		3.30

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
<i>James Geranium (Geranium caespitosum)</i>							
Relative Cover (%)	0.01	0.28					0.06
Relative Frequency (%)	0.78	0.00					0.95
Importance Index (%)	0.39	0.14					0.51
<i>Pussytoes (Antennaria parvifolia)</i>							
Relative Cover (%)	0.73		1.21			0.61	
Relative Frequency (%)	3.10		0.98			1.16	
Importance Index (%)	1.91		1.09			0.88	
<i>Wild Strawberry (Fragaria americana)</i>							
Relative Cover (%)	1.79					3.24	
Relative Frequency (%)	1.55					6.94	
Importance Index (%)	1.67					5.09	
<i>Yarrow (Achillea lanulosa)</i>							
Relative Cover (%)	0.36					2.03	
Relative Frequency (%)	1.55					4.05	
Importance Index (%)	0.96					3.04	
<i>Big Golden-Pea (Thermopsis pinetorum)</i>							
Relative Cover (%)	6.05					2.64	
Relative Frequency (%)	5.43					4.62	
Importance Index (%)	5.74					3.63	

TABLE 12.: Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1 Transect 1	TA-40, Above Drainage S. of Bldg. 1 Transect 2	TA-40, Across from Bldg. 1 Transect 3	TA-40, Dirt Road Along Mesa Top Transect 4	TA-6 West of MDAF Transect 1	TA-6 Drainage North of Road Transect 2	TA-22 Mesa Transect 1
<i>Leafy Golden Aster (Chrysopsis foliosa)</i>							
Relative Cover (%)				0.59			0.06
Relative Frequency (%)				5.91			0.95
Importance Index (%)				3.25			0.51
<i>Bitterweed (Hymenoxys richardsonii)</i>							
Relative Cover (%)				0.50	0.01		
Relative Frequency (%)				1.36	1.85		
Importance Index (%)				0.93	0.93		
<i>Townsend's Aster (Townsendia incana)</i>							
Relative Cover (%)					5.09	0.81	
Relative Frequency (%)					7.41	0.58	
Importance Index (%)					6.25	0.69	
<i>Tall Lupine (Lupinus caudatus)</i>							
Relative Cover (%)			0.64				0.62
Relative Frequency (%)			3.92				0.95
Importance Index (%)			2.28				0.64
<i>Thistle (Cirsium spp.)</i>							
Relative Cover (%)		0.28				0.81	
Relative Frequency (%)		0.00				1.73	
Importance Index (%)		0.14				1.27	

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Notchleaf Butterweed (<i>Senecio fendleri</i>)							
Relative Cover (%)		0.56	0.02				
Relative Frequency (%)		6.25	1.96				
Importance Index (%)		3.41	0.99				
Indian Paintbrush (<i>Scirpus schaffneri</i>)							
Relative Cover (%)			10.88				5.75
Relative Frequency (%)			7.84				5.71
Importance Index (%)			9.36				5.73
Perky Sue (<i>Hymenoxys argentea</i>)							
Relative Cover (%)				0.27			
Relative Frequency (%)				2.73			
Importance Index (%)				1.50			
Dock/Sorrel (<i>Rumex spp.</i>)							
Relative Cover (%)	0.44						
Relative Frequency (%)	3.10						
Importance Index (%)	1.77						
Flax (<i>Linaceae</i>)							
Relative Cover (%)				0.00			
Relative Frequency (%)				0.91			
Importance Index (%)				0.46			

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Spreading Fleabane (<i>Erigeron divergens</i>)							
Relative Cover (%)				0.84			
Relative Frequency (%)				3.64			
Importance Index (%)				2.24			
Desert Trumpet (<i>Ipomopsis aggregata</i>)							
Relative Cover (%)			0.62				
Relative Frequency (%)			1.96				
Importance Index (%)			1.29				
Clover (<i>Melilotux spp.</i>)							
Relative Cover (%)	0.01						
Relative Frequency (%)	0.78						
Importance Index (%)	0.39						
Evening Primrose (<i>Oenothera spp.</i>)							
Relative Cover (%)				0.00			
Relative Frequency (%)				0.45			
Importance Index (%)				0.23			
Hairy Golden Aster (<i>Chrysopsis villosa</i>)							
Relative Cover (%)			6.70				
Relative Frequency (%)			13.73				
Importance Index (%)			10.21				

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Wild Chrysanthemum (<i>Bahia dissecta</i>)							
Relative Cover (%)				0.20			
Relative Frequency (%)				1.36			
Importance Index (%)				0.78			
False Tarragon (<i>Artemisia dracunculus</i>)							
Relative Cover (%)				0.84			0.51
Relative Frequency (%)				2.73			3.81
Importance Index (%)				1.78			2.16
Parry Spurge (<i>Chamaesyce parryi</i>)							
Relative Cover (%)		1.41					
Relative Frequency (%)		12.50					
Importance Index (%)		6.95					
Yellow Cut-Leaf (<i>Rudbeckia laciniata</i>)							
Relative Cover (%)				0.00			
Relative Frequency (%)				0.45			
Importance Index (%)				0.23			
Nodding Onion (<i>Allium cernuum</i>)							
Relative Cover (%)					2.55		
Relative Frequency (%)					3.70		
Importance Index (%)					3.12		

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
<i>Geranium (Geranium spp.)</i>							
Relative Cover (%)						0.61	
Relative Frequency (%)						1.16	
Importance Index (%)						0.88	
<i>Gallium (Gallium spp.)</i>							
Relative Cover (%)						1.42	
Relative Frequency (%)						2.89	
Importance Index (%)						2.15	
<i>Stinging Nettle (Urtica gracilis)</i>						0.20	
Relative Cover (%)						0.58	
Relative Frequency (%)						0.39	
Importance Index (%)							
<i>Fendler Meadow rue (Thalictrum fendleri)</i>							
Relative Cover (%)						0.41	
Relative Frequency (%)						0.58	
Importance Index (%)						0.49	
<i>Chicory (Cichorium intybus)</i>							
Relative Cover (%)			0.02				
Relative Frequency (%)			1.96				
Importance Index (%)			0.99				

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Antelope Sage (<i>Eriogonum jamesii</i>)							
Relative Cover (%)					1.27		
Relative Frequency (%)					1.85		
Importance Index (%)					1.56		
Summer Cypress (<i>Kochia scoparia</i>)							
Relative Cover (%)						0.61	
Relative Frequency (%)						0.58	
Importance Index (%)						0.59	
Rippleseed Plantain (<i>Plantago major</i>)							
Relative Cover (%)						0.20	
Relative Frequency (%)						0.58	
Importance Index (%)						0.39	
Buttercup (<i>Clematis</i>)							
Relative Cover (%)						2.03	
Relative Frequency (%)						2.31	
Importance Index (%)						2.17	
Cacti (<i>Opuntia</i> spp.)							
Relative Cover (%)		0.28					
Relative Frequency (%)		0.00					
Importance Index (%)		0.14					

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
<i>Sedge (Carex spp.)</i>							
Relative Cover (%)	24.56	2.25	5.45	0.5	0.01	0.41	0.38
Relative Frequency (%)	17.05	6.25	5.88	1.36	1.85	0.58	1.90
Importance Index (%)	20.81	4.25	5.66	0.93	0.93	0.49	1.14
<i>Inland Rush (Juncus interior)</i>							
Relative Cover (%)	4.27					13.18	2.23
Relative Frequency (%)	4.65					3.47	0.95
Importance Index (%)	4.46					8.32	1.59
<i>Cattail (Typha latifolia)</i>							
Relative Cover (%)	0.36					0.61	
Relative Frequency (%)	0.78					1.16	
Importance Index (%)	0.57					0.88	
<i>Horsetail (Equisetum spp.)</i>							
Relative Cover (%)						0.41	
Relative Frequency (%)						1.16	
Importance Index (%)						0.78	
<i>Fendler Barberry (Berberis fendleri)</i>							
Relative Cover (%)	2.14					6.10	
Relative Frequency (%)	1.55					8.09	
Importance Index (%)	1.84					7.09	

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Oak Seeding (<i>Quercus</i>)							
Relative Cover (%)			0.60			0.41	
Relative Frequency (%)			0.98			0.58	
Importance Index (%)			0.79			0.49	
Bearberry, Kinnikinnik (<i>Arctostaphylos uva-ursi</i>)							
Relative Cover (%)						0.41	
Relative Frequency (%)						0.58	
Importance Index (%)						0.49	
Apache Plume (<i>Fallugia paradoxa</i>)							
Relative Cover (%)		0.56					
Relative Frequency (%)		0.00					
Importance Index (%)		0.28					
Wild Rose (<i>Rosa</i>)							
Relative Cover (%)						1.10	
Relative Frequency (%)						2.31	
Importance Index (%)						1.66	
New Mexico Locust (<i>Robinia neomexicana</i>)							
Relative Cover (%)						0.20	
Relative Frequency (%)						0.58	
Importance Index (%)						0.39	

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
<i>Chokecherry (Prunus virginiana)</i>							
Relative Cover (%)						1.62	
Relative Frequency (%)						2.31	
Importance Index (%)						1.97	
<i>Wild Raspberry (Rubus stingsosus)</i>							
Relative Cover (%)						3.04	
Relative Frequency (%)						2.89	
Importance Index (%)						2.97	
<i>Snakeweed (Gutierrezia sarothrae)</i>					1.27		
Relative Cover (%)					1.85		
Relative Frequency (%)					1.56		
Importance Index (%)							
<i>Ponderosa Pine Seedling (Pinus ponderosa)</i>							
Relative Cover (%)			0.02				
Relative Frequency (%)			1.96				
Importance Index (%)			0.99				
<i>Piñon Pine (Pinus edulis)</i>							
Relative Cover (%)							0.06
Relative Frequency (%)							0.95
Importance Index (%)							0.51

TABLE 12. Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Douglas Fir (<i>Pseudotsuga menziesii</i>)							
Relative Cover (%)						0.41	
Relative Frequency (%)						0.58	
Importance Index (%)						0.49	
Unknown 1							
Relative Cover (%)				0.00			
Relative Frequency (%)				0.43			
Importance Index (%)				0.23			
Unknown 2							
Relative Cover (%)				0.17			
Relative Frequency (%)				1.36			
Importance Index (%)				0.77			
Unknown 3							
Relative Cover (%)				0.55			
Relative Frequency (%)				4.09			
Importance Index (%)				2.32			
Unknown Grass							
Relative Cover (%)	24.57						
Relative Frequency (%)	17.83						
Importance Index (%)	21.20						

TABLE 12: Continued

SPECIES	TRANSECTS						
	TA-40, Drainage S. of Bldg. 1	TA-40, Above Drainage S. of Bldg. 1	TA-40, Across from Bldg. 1	TA-40, Dirt Road Along Mesa Top	TA-6 West of MDAF	TA-6 Drainage North of Road	TA-22 Mesa
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 1	Transect 2	Transect 1
Unknown							
Relative Cover (%)			0.01				
Relative Frequency (%)			0.98				
Importance Index (%)			0.50				
Forb 2							
Relative Cover (%)		0.28					
Relative Frequency (%)		0.00					
Importance Index (%)		0.14					
Unknown Grass 1							
Relative Cover (%)						2.43	
Relative Frequency (%)						1.16	
Importance Index (%)						1.71	

and longtail vole. The deer mouse, long-tailed vole, and mountain vole were recorded within both canyons. Deer mice had the highest capture rate within both canyons.

6.3.2 Threatened, Endangered and Sensitive Species

6.3.2.1 Northern Goshawk

In 1987, studies conducted by Dr. Patricia Kennedy, Dept. of Fishery and Wildlife Biology, CSU, identified the occurrence of the northern goshawk within Los Alamos County. In 1993, Kennedy conducted a Laboratory-wide species-specific survey. A nest site was located along the border of this OU within National Forest Lands. Kennedy indicates that the highest percentage of nests were in the Ponderosa Pine/Gambel Oak, Ponderosa Pine/Gray Oak, and Mixed Conifer habitat types.

6.3.2.2 Spotted Bat

Bat surveys were conducted using mist nets. Because this method is not specific to spotted bats, a general inventory on bat species was collected at the time of the mist-netting sessions (APPENDIX C).

In July 1992, 3D/Environmental Services, Inc., conducted mist-netting in several Laboratory locations. Netting was conducted for two nights at the 1991 survey location. Two thirty-foot high nets were set the first night and only one thirty-foot high net was set the second night. Nets were opened at dusk and monitored from 2:00 a.m. until dawn. Bat species, sex, age, reproductive status, forearm length, direction of flight and capture time were identified and recorded. At present the spotted bat has not been found on Laboratory property.

6.3.2.3 Meadow Jumping Mouse

In 1992 a survey for this species was conducted simultaneously with the small mammal survey in Upper Pajarito Canyon. The same procedure was followed that is used in live-small mammal capture sessions with two additional traps at every station to increase the density. No meadow jumping mice were captured within this OU during mammal tapping

6.4 Identification of Floodplains and Wetlands

6.4.1 Identification of Wetlands

Both floodplains and wetlands were located within OU 1111. Both Pajarito and Two-Mile Canyon bottoms should be considered floodplains.

Potential wetlands exist on Two-Mile Mesa and within Pajarito Canyon. Plant species associated with hydric soils were found within both locations. Cattails, sedges, rushes and grasses associated with wetlands were noted in a marshy area within TA-22 east of building 91. This area receives moisture from two outfalls (EPA-128-128 and EPA-06A-078).

Recorded (historical) data, aerial photographs and field observations indicate a wetland hydrology, within the stream channel of Pajarito Canyon southwest of building 91.

6.4.2 Identification of Floodplanes

The canyons within OU-1111, Two-Mile, Pajarito and Los Alamos Canyons have been identified as floodplanes. Two-Mile and Pajarito Canyons are within the Pajarito Canyon Water Shed while Los Alamos Canyon is within the Los Alamos Canyon Water Shed.

7. DISCUSSION

7.1 Level 2 (Habitat Evaluation) Survey

The classification breakdown for both upland and wetland vegetation types for the Pajarito Plateau is given in APPENDIX E. This list includes known and potential habitat types and phases based on Brown, *et al.* (1982), Moir and Ludwig (1979), and USFS (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." Further studies are necessary to make a complete and accurate determination.

The vegetation surveys indicated primarily two vegetation communities present within or adjacent to OU 1111: the Rocky Mountain Montane Conifer Forest and the Rocky Mountain Riparian-Deciduous Forest community. These communities can be further separated into vegetation series, habitat types and in some cases, phases.

Based on the species composition of the transects and the locations of transects within the OU, it could be seen that differences in species dominance were associated with differences in topographic features. The following are descriptions of the vegetation communities, their vegetation series, habitat types and phases, if applicable.

7.1.1 Rocky Mountain Montane Conifer Forest Community

This community consisted of three vegetation series, white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*). Within the white fir series, two habitat types were noted. The white fir/gamble oak habitat type was found on the north-facing slope of lower Two-Mile Canyon. White fir/New Mexico locust habitat was found in the upper Pajarito Canyon of this OU. In the Douglas fir series only one habitat was noted. A Douglas fir/ fringed brome habitat type was found within the steam channel of Two-Mile Canyon. The ponderosa pine series, contained three habitat types. A ponderosa pine/blue grama grass habitat type was noted in the lower portion of Pajarito Canyon and the south-facing slope of mid-Pajarito Canyon (TA-40) for this OU. A ponderosa pine/mountain muhly habitat type was found on Two-Mile Mesa at TA-22 and TA-6, and a ponderosa pine/Gambel oak habitat type in the mountain muhly phase was found on Two-Mile Mesa at TA-40 and on the south-facing slope of upper-Pajarito Canyon of this OU.

7.1.2 Rocky Mountain Riparian Forest Community

6.4.2 Identification of Floodplanes

The canyons within OU-1111, Two-Mile, Pajarito and Los Alamos Canyons have been identified as floodplanes. Two-Mile and Pajarito Canyons are within the Pajarito Canyon Water Shed while Los Alamos Canyon is within the Los Alamos Canyon Water Shed.

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7.1.2 Rocky Mountain Riparian Forest Community

This community consisted of two vegetation series, Boxelder maple/Mixed Deciduous and Russian Olive. The Boxelder Maple/Mixed Deciduous series was found mid-Pajarito Canyon (TA-40) for this OU. The Russian Olive series was found on Two-Mile Mesa at the drainage in TA-6.

7.2 Level 3 (Species-Specific) Surveys

We compared habitat information collected from the Level 1 and 2 field surveys to the habitat information in the database for each TES species for the potential of occurring within the project area, the threats to the taxon, and previous data. Based on that information, species were either dismissed from further consideration or additional surveys (Level 3) were conducted to confirm presence or absence of the species within that habitat.

7.2.1 Species Dismissed from Further Consideration

Based on the information gained from the Level 1 and Level 2 field surveys and previous data, we concluded that the following species are not present in this OU, or are not expected to be impacted by the proposed project:

7.2.1.1 Vegetation

None of the following species have been previously recorded for OU 1111. Due to the low potential for occurrence within this site, the following species are being dismissed from further consideration:

Checker lily can be found within mixed conifer habitat. Although this species had been observed in Los Alamos County in the past, it was not found within OU 1111 during Level 1 and 2 surveys. This species is not expected to be present within OU 1111.

Pagosa phlox is found in ponderosa-piñon habitat on open slopes of open woods in mountains. The highest elevation this species is known to occur at is 7500 ft. This species has never been found in Los Alamos and was not observed during Level 2 surveys. This species is not expected to be present in OU 1111.

Sandia Alumroot has been previously found within Bernalillo, Sandoval, San Miguel, Sierra, Socorro and Torrance Counties but not within Los Alamos County. This species is a cliff-loving plant that occurs in mixed conifer at a minimum elevation of 8000 ft. The highest elevation within OU 1111 is 7900 ft. This species was not observed during Level 1 and 2 surveys and is not expected to be present within OU 1111.

7.2.1.2 Wildlife

The common black hawk occurs at lower elevations in the Gila, San Francisco, and Mimbres drainage's. This species requires cottonwoods and other riparian woodlands along permanent streams. The common black hawk is not expected to be in this OU due to the lack of suitable cottonwood and riparian woodland habitat. This species of hawk has never been observed within Los Alamos County.

The bald eagle occurs near streams and lakes and occasionally riparian areas. There are no lakes or major stream channels or riparian areas in this OU are limited in size and extent. Although

potential roosting sites have been noted within Laboratory land, the bald eagle is not expected to occur within this OU.

Mississippi kite has never been identified within Los Alamos County. The kite generally inhabits the lower Rio Grande and Pecos Valleys in riparian zones and sheltered belts with permanent streams. They are also common around manicured environments such as parks and golf courses. Riparian areas in this OU are limited in size and extent.

Peregrine falcon has been found in the past on Laboratory land within Los Alamos Canyon and Pueblo Canyon. This species occurs in ponderosa-piñon areas and requires steep cliffs in wooded or forested habitats for breeding. The terrain in OU 1111 is not suitable for this species and therefore the peregrine falcon is not expected to be found in this OU.

Broad-billed hummingbird is found within riparian woodlands often characterized by cottonwood, sycamore, or white oak, and breeds primarily in the southern part of the state of New Mexico. They have been identified in the riparian woodlands of Bandelier National Monument and occasionally occur near Los Alamos as vagrants. The riparian areas in OU 1111 do not fulfill this species' habitat requirements for a riparian woodland.

Willow flycatcher breeds through central New Mexico and is seen statewide only in spring and autumn migrations. In breeding season, it is confined to riparian woodlands dominated by cottonwoods. A dominant cottonwood habitat does not exist within the boundary of OU 1111. Therefore the presence of the willow flycatcher is not expected within this OU.

Say's pond snail is known to occur only in the Cerro la Jara area of the Jemez Mountains in Sandoval County which is the key habitat area in the state. The Say's pond snail is found in vegetated ditches, marshes, streams, and ponds that are seasonally dry or in areas of perennial water. It is not expected to occur in Los Alamos County.

7.2.2 Species for Further Consideration

Based on the Level 1 and 2 surveys and data collected from previous studies, habitat requirements for the wood lily, Helleborine orchid, northern goshawk, spotted bat, meadow jumping mouse, Mexican spotted owl and the Jemez Mountains salamander were found to exist within this OU. Where possible, species-specific surveys were conducted to help determine if these species were present within this OU.

7.2.2.1 Vegetation

Wood lily has been found in Rio Arriba, Sandoval, San Miguel and Santa Fe Counties in addition to Los Alamos County. This species is found in ponderosa pine to mixed-conifer forests in moist areas in elevations of 6,000 to 10,000 ft. The wood lily was not found during Level 1 and 2 vegetation surveys but is known to occur within the upper Pajarito Canyon area. There is a potential for this species to occur within the project area.

The Helleborine orchid has been found from British Columbia to Montana, southern to western Texas, New Mexico, and California. The orchid's habitat consists of damp woods, seepage slopes, springs, streams, and riparian areas within the 6000 to 8500 ft elevation range. The Helleborine orchid was not found during level 1 and 2 vegetation surveys, however this species has been found within Los Alamos County. There is a potential for this species to occur within the project area.

7.2.2.2 Wildlife

The northern goshawk breeds in ponderosa pine and has been found within the western boundary of Los Alamos County. The upper portion of Pajarito Canyon, in OU-1111 is within the potential hunting and breeding grounds for this species.

The spotted bat is found in piñon-juniper, ponderosa pine, mixed conifer and riparian habitats. This species requires a source of water with standing pools and roost sites such as caves in cliffs or rock crevices. Suitable roost sites were present in portions of Pajarito Canyon; open water sources are somewhat limited and include a narrow flowing stream. Mist-net surveys on Laboratory land were conducted for this species. No spotted bats were captured. In addition, surveys conducted in lower Pajarito Canyon (1992) resulted in no captures. This does not necessarily suggest the spotted bat does not occur in the OU.

The meadow jumping mouse inhabits mesic habitats, permanent streams and wet meadows and it breeds in wetland areas. This species has been recorded for Los Alamos County in the past. The meadow jumping mouse has a small potential for occurring within upper Pajarito Canyon riparian areas. One survey was conducted for the meadow jumping mouse in this OU in 1992; however no captures were made possibly due to surveying at a less than optimal time of the season. Therefore there is a potential for the meadow jumping mouse to occur within this OU.

The Mexican spotted owl is distributed throughout New Mexico, Arizona, Texas, Colorado, Utah, and Mexico and has been observed within Los Alamos County. This species inhabits forested mountains and canyons. Owls habitat is primarily mixed conifer or ponderosa pine/Gambel oak forests of uneven-aged, multi-storied stands. These stands should have closed canopies, large mature trees, stand decadence, broken tree tops, standing dead trees, and fallen logs (US Fish and Wildlife Service, 1990). No formal survey has been conducted for the Mexican spotted owl within this OU. Due to the absence of survey data the potential for occurrence of the spotted owl cannot be determined.

The Jemez Mountains Salamander has been reported within Los Alamos County. The salamander requires moist talus slopes, rocks or downed, decayed conifer trunks with moderate to heavy overstory covers in mixed conifer forests. The canyon bottoms and slopes of this OU have potential habitat for this species.

7.3 Wetland and Floodplain Assessments

7.3.1 Wetland Survey

No wetlands appear on the NWI Map for this OU. However, the springs and perennial reaches of the stream below the springs within Pajarito Canyon met wetland criteria. Vegetation surveys of the cattail pond in TA-22 east of building 91 met wetland criteria.

7.3.2 Floodplain

Pajarito, Two-Mile and Los Alamos Canyons have been identified as possessing floodplains within TA-6, -22, and -40. Since all facilities are on the mesa top and not within the floodplain, floodplains should not present any problems with sampling.

Riparian zones are generally associated with floodplains. In arid regions of the Southwest, these zones have a higher diversity of plants and animals, providing cover, food and breeding areas. Riparian zones are characterized by an abundance of deciduous and moisture-loving species. Although not protected by law, best management practices within these zones should be followed.

8.0 IMPACTS

8.1 Non-sensitive Species

8.1.1 Vegetation

Due to the diversity of topographic features and existing riparian zones in the project area, the potential use of heavy machinery, could result in the following impacts:

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

8.1.2 Wildlife

Due to the suitable nesting, foraging, perching, etc. habitat within this OU for a variety of bird species, and the suitable foraging and wintering areas for large mammals (in addition to suitable habitat for other wildlife species), excessive disturbance or disturbance during critical periods could result in one or a combination of the following:

- Direct removal of nesting, perching, cover, and similar habitats, both along the canyon slopes and within the riparian zones and canyon bottoms.
- Nest abandonment by birds which could result in nest failure.
- Excessive noise or other disturbance during critical times such as the breeding period for wildlife species, could result in loss of young.
- Contamination of wildlife water sources from fuel spills or leaks from vehicles, machinery, etc. could result in illness and possible mortality of wildlife species.
- Elk and deer migration routes may be temporarily altered by excessive noise or disturbance from heavy vehicle and equipment use within areas with migration routes.

8.2 Threatened, Endangered, and Sensitive Species

8.2.1 Vegetation

8.2.1.1 Wood Lily

The wood lily may be disturbed by site characterization activities, including surface sampling and core drilling, which could cause potential loss of habitat due to cumulative impacts from erosion..

8.2.2 Wildlife

8.2.2.1 Northern Goshawk

Northern goshawk habitat may be disturbed by site characterization activities through loss of nesting trees and foraging habitat. Excessive damage to potential foraging habitat could affect densities of associated prey species, which could result in a decreased use of the area by the goshawk. The removal of nesting trees will decrease the potential for future nesting within this area. During mating and breeding season (March through October) noise from heavy equipment could disturb mating and nesting hawks.

8.2.2.2 Spotted Bat

Use of heavy equipment in canyon bottoms and slopes could destroy potential bat habitat. The removal of caves in cliffs and rock crevices could reduce the available spotted bat habitat. Soil erosion and fuel spills could adversely impact nearby streams or water sources.

8.2.2.3 Meadow Jumping Mouse

Sampling conducted within delineated wetlands could disturb meadow jumping mouse habitat. Removal of vegetation or backfilling of stream channels could damage riparian or wetland areas, which could reduce breeding and foraging habitat.

8.2.2.4 Mexican Spotted Owl

Site characterization activities may disturb Mexican spotted owl habitat through loss of nesting trees and foraging habitat. Excessive damage to potential foraging habitat could affect densities of associated prey species, which could result in a decreased use of the area by the goshawk. The removal of nesting trees will decrease the potential for future nesting within this area. During mating and breeding season (March through October) noise from heavy equipment could disturb mating and nesting owls.

8.2.2.5 Jemez Mountains Salamander

Site characterization activities may affect Jemez Mountains salamander habitat. Excessive disturbance of topsoil or removal of forest litter to canyon slopes and bottoms could result in destruction of potential habitat for this species.

8.3 Wetlands and Floodplains

Sampling within the OU may include surface samples deep core drilling and soil samples for excavation. No impact is expected to floodplains or wetlands from surface sampling. However, if heavy equipment is used, sampling should remain outside of the delineated wetland. If sampling is to take place within or near wetlands or within floodplain, the following impacts could occur:

- Disturbance to the stream channel or smaller drainage, leading into the stream channel could result in an alteration of existing wetlands causing partial or complete loss of those wetlands.
- Excessive disturbance to vegetation and the topsoil around wetlands could result in an alteration of the water flow and/or widening of the stream channel.
- Disturbance along drainage and steep slopes could result in the initiation or increased soil erosion or localized alterations in the existing wetlands.
- Hazardous fuel spills or leakage from vehicles could adversely affect water quality in the riparian zones and could result in negative changes to vegetation within these areas.

9. MITIGATION

No significant release of contaminants into the environment is expected to occur during sampling. However, should release of contaminants rise above the predetermined action levels, workers must cease operations, shut down the site, and reassess sampling.

9.1 Non-Sensitive Species

9.1.1. Vegetation

Sampling and subsequent corrective actions could require mitigation of a site by revegetation if loss of vegetation is expected to initiate or increases erosion. Survey results indicate that a mixture of native grasses, forbs, and other herbaceous plants could be used for revegetation. Species listed in Section 6.2.3 represent a few of the species that could be used. Further consultation with BRET or state or federal agencies can help determine use of other species. Additional mitigation measures include:

- Avoid unnecessary disturbance, parking areas, equipment storage areas, off road travel to surrounding vegetation during sampling and travel to sampling sites.
- Avoid removal of vegetation along riparian and wetland areas as well as along drainage and stream channels.
- Avoid disturbance to vegetation along canyon slopes and to especially existing drainage along these slopes.

Mitigation provided for wetlands and floodplains will also help reduce potential impacts to vegetation.

9.1.2 Wildlife

If hand drilling is used, most potential affects to wildlife species should be not be adverse and will result only in a temporary avoidance of the sampling sites during the actual period of disturbance. However, if heavy machinery is used, then the following mitigation measures should reduce the potential for adverse impact:

- Avoid crossing any drainage with existing water; utilize existing roads or cross drainage at level areas which are dry or less vegetated.
- When possible, avoid sampling from March 1 to August 1.
- Disturbance to wintering species should be relatively minor, and mitigation provided for vegetation, and wetlands and floodplains will help to further reduce impact to wildlife species

9.2 Threatened, Endangered, and Sensitive Species

9.2.1 Vegetation

9.2.1.1 Wood Lily

Although the wood lily was not found during vegetation surveys it has been previously sighted in the upper Pajarito Canyon area. Qualified personnel from BRET must conduct a walk-through of any area where heavy equipment or vehicles will be taken off established or existing roadways (paved or dirt).

9.2.1.2 Helleborine Orchid

The Helleborine orchid was not found during vegetation surveys. However, potential habitat exists within the upper Pajarito Canyon areas where seeps, springs and streams are present. Qualified personnel from BRET must conduct a walk-through of any area where heavy equipment or vehicles will be taken off established or existing roadways (paved or dirt).

9.2.2 Wildlife

9.2.2.1 Northern Goshawk

The upper Pajarito canyon area is expected to be used by the northern goshawk as hunting grounds. To provide protection to the goshawk habitat, the following mitigation measures are required:

- Machine sampling scheduled between March 1 and October 1 must be cleared through BRET. BRET must be contacted 60 days prior to sampling to evaluate possible nest sites in and around the sampling area. When possible avoid sampling between March 1 and October 1.
- If sampling will disturb an area larger than one-tenth acre, BRET must be contacted for a presampling site-specific survey.
- Tree removal (live or snag) must be approved by BRET.

9.2.2.2 Spotted Bat

To date, no spotted bats have been reported from mist netting. However, potential habitat exists within this OU for the spotted bat. To provide protection to potential bat habitat, the following mitigation measures are required:

- BRET must conduct a survey of rock crevices if sampling is conducted on canyon slopes with heavy equipment.
- If any evidence of bats is found, all sampling with heavy equipment will be canceled.
- Sampling that may alter existing water sources must be approved by ESH-8 BRET personnel.

9.2.2.3 Meadow Jumping Mouse

Meadow jumping mouse may occur along stream side areas of Pajarito Canyon. To provide protection to potential jumping mouse habitat, the following mitigation measures are required:

- BRET must be contacted 60 days prior to sampling within riparian areas to evaluate the need for a site specific-survey.
- If a survey is necessary, sampling cannot proceed until a survey for the mouse has been completed.
- The optimal time for a meadow jumping mouse survey is in July during the rainy season.

9.2.2.4 Mexican Spotted Owl

No studies have been completed to indicate that the Mexican spotted owl is present within OU-1111. However, the spotted owl uses the same habitat as the northern goshawk. Therefore this OU could potentially support the spotted owl. To provide protection to the spotted owl the following mitigation measures are required:

- Machine sampling scheduled between March 1 and October 1 must be cleared through BRET. BRET must be contacted 60 days prior to sampling to evaluate possible nest sites in and around the sampling area. When possible avoid sampling between March 1 and Oct. 1.
- If sampling will disturb an area larger than one-tenth acre, BRET must be contacted for a presampling site specific survey.
- Tree removal (live or snag) must be approved by BRET.

9.2.2.5 Jemez Mountains Salamander

No studies have been completed that may indicate that the Jemez Mountains salamander is present within OU-1111. However, potential habitat exists in canyon bottoms and on slopes in this OU. To provide protection for this potential salamander habitat the following mitigation measures are required:

- Activity will not be permitted on canyon slopes or bottoms when soil moisture is high.
- Vehicular traffic and activities causing increased topsoil disturbance and removal of forest litter should be avoided in potential salamander habitat.
- Downed trees are to remain in place.
- BRET must be notified 60 days prior to sampling in canyons or on slopes to evaluate the need for a salamander survey. NOTE: Due to strict state survey protocols, if a survey is deemed necessary it can only be conducted in the summer months after several days of heavy rain (July or August).

9.3 Wetlands and Floodplains:

Sampling for site characterization could range from surface sampling and core drilling to sampling while excavating. Sampling with heavy equipment shall remain outside designated wetlands. Delineation of the wetland boundary will be completed just prior to the time of sampling. This will allow for greater accuracy to ensure that sampling occurs outside of areas that have designated wetland criteria. These delineations should be done within two years of the sampling. After two years the delineation is no longer valid and must be repeated.

Sampling and subsequent corrective actions could require mitigation of a site by revegetation. For revegetation a list of plant species can be compiled from Foxx and Tierney (1982) and Foxx and Pierce (1991). Personnel from BRET should be contacted for assistance with a species list for revegetation. Best management practices should be followed while sampling and include:

- Avoid unnecessary disturbance, parking areas, equipment storage areas, off road travel to surrounding vegetation during sampling and travel to sampling sites.
- Avoid removal of vegetation along riparian and wetland areas as well as along drainage and stream channels.
- Avoid disturbance to vegetation along canyon slopes and especially in existing drainage along slopes.

10. CONCLUSIONS

Biological field surveys, reports and database information was summarized to provide background information on OU 1111. These summaries provide inventory information that may be used in future ecological risk assessments and pathway analyses.

Level 1 and 2 field surveys were conducted within OU 1111. In addition, the TES database was searched for a listing of potential species that could occur within the habitats associated with OU. As a result, a number of species on the state and federal protection list were shown as potentially occurring in the habitats described for Los Alamos County and surrounding areas.

A Level 2 habitat evaluation survey was conducted to determine if the specific requirements of a listed species could be met in the sampling locations. Level 3 species-specific surveys of areas outside OU 1111 were used to determine the status of the northern goshawk, spotted bat, meadow jumping mouse, Mexican spotted owl, wood lily and the Helleborine orchid within the sampling area.

Pat Kennedy of the Dept. of Fishery and Wildlife Biology, CSU was subcontracted in 1987 and 1993, to determine the status of the northern goshawk within Laboratory land. A goshawk nesting site was located within Los Alamos County west of this OU. The goshawk will utilize the canyon areas of this OU as a feeding ground. Mitigation measures to reduce potential impact include minimizing the destruction of vegetation, and avoiding any machine sampling between March 1 and October 1. BRET must be contacted for approval before any tree removal

Although the spotted bat has not been recorded within OU 1111, it cannot be ruled out as utilizing habitat within this area. Avoid the use of heavy equipment on or near cliffs with caves and rock crevices, and avoid altering water sources to reduce impact to potential bat habitat.

Although the meadow jumping mouse was not found, there is a potential for the species to exist within riparian areas such as permanent streams and wet meadows. If sampling is to be conducted within riparian area, BRET must be contacted 60 days prior to sampling to evaluate the need for a site specific survey. A survey must be performed during the rainy season, optimally July. If a survey is required sampling can not proceed until the survey is completed.

Terrel Johnson has been subcontracted to determine the status of the Mexican spotted owl. Although the spotted owl has been found within Los Alamos County, it is unknown whether the spotted owl exists within this OU. The spotted owl is known to utilize the same habitat as the northern goshawk. Mitigation measures to reduce potential impact include minimizing the destruction of vegetation, and

avoiding any machine sampling between March 1 and October 1. BRET must be contacted for approval before any tree removal

Potential habitat exists for the Jemez Mountain salamander within this OU. Mitigation measures to reduce potential impact include notifying BRET 60 days prior to sampling in the canyons or slopes to evaluate the need for a salamander survey. Due to strict state survey protocols, a survey can only be conducted in the summer months after several days of heavy rain (July or August). Activity will not be permitted on canyon slopes or bottoms when soil moisture is high. Activities causing increased topsoil disturbance and removal of forest litter should be avoided in potential salamander habitat. Downed trees are to remain in place.

The wood lily has been found within Los Alamos County in the past and is listed as potentially occurring within the upper Pajarito Canyon area. Mitigation measures to reduce impact include a BRET walk-through of any riparian sample areas before sampling takes place.

Although the Helleborine orchid was not found during vegetation surveys, there is a potential for this species to occur within this OU. Mitigation measures to reduce impact include a BRET walk-through of any riparian sample areas before sampling takes place.

The National Wetlands Inventory maps, combined with field surveys, were used to locate wetlands and floodplains within this OU. Characteristics of wetlands, floodplains and riparian areas were noted by using criteria outlined in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Dunke, 1989). Due to continual changes of wetland systems, delineation of wetland boundaries was not made during these surveys. Boundary delineation will be conducted just prior to sampling.

Mitigation measures (or best management practices) to reduce the potential for impacts to non-sensitive wildlife and plant species are primarily timing of sampling and preventative measures.

11. DEFINITIONS

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

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

Facultative: Plants that are equally likely to occur in wetlands or non wetlands (estimated probability 34-66%).

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

Facultative Wetland: Plants that usually occur in wetlands (estimated probability 67-99%), but are occasionally found in non wetland

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

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

Federally Endangered Species: Any species that is in danger of extinction throughout all or a significant portion of its range.

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

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

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

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

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

Level 1 Survey: A reconnaissance survey to determine if a proposed project is in a developed technical area of the Laboratory or a disturbed. Non quantitative data about the area is obtained.

Level 2 Survey: A detailed quantitative vegetation survey used to evaluate critical habitat requirements for threatened and endangered species that may be present at the proposed project area.

Level 3 Survey: A survey to obtain information on specific threatened or endangered species, floodplain or wetland.

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

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

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

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

Riparian: Green-belts along streams, lakes, or other wet areas. These areas are only marginally protected by state and federal law, but concern is increasing.

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

Species Area Curve: When the graph of newly encountered species within each quadrat entered flattens to 95% of all species entered.

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

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

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

State Endangered Plant (1): The species 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): The species is a rare plant across its entire range and of such limited distribution and population size that unregulated collection could adversely impact it and jeopardize its survival in New Mexico.

State Endangered Plant (3): The species may be widespread in its distribution and may occur in adjacent states or 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 threatened, endangered and sensitive species in Los Alamos County and surrounding counties.

Wetlands: Lowland areas that when inundated by surface or ground water can support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflow, mud flats, and natural ponds.

12. SUMMARY OF PERTINENT REGULATIONS

Executive Order 11990: Protection of Wetlands. In furtherance of the National Environmental Policy Act of 1969 this EO calls for avoidance, "to any extent possible, the long and short term adverse impacts associated with the destruction or modification of wetlands...avoid direct or indirect support of new construction in wetlands.."

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

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

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

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

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APPENDIX A: ACRONYMS

List of Acronyms

BRET	Biological Resource Evaluation Team
CFR	Code of Federal Register
COE	Corp. of Engineers
CSU	Colorado State University
DBH	Diameter Breast Height
DOE	Department of Energy
EM	Environmental Management
EPA	Environmental Protection Agency
EO	Executive Orders
ER	Environmental Restoration
ESA	Endangered Species Act
HSWA	Hazardous and Solid Waste Act
LANL	Los Alamos National Laboratory
MDA	Material Disposal Area
NEPA	National Environmental Policy Act
NMU	New Mexico University
NPDES	National Pollution Discharge Elimination System
OU	Operable Unite
RCRA	Resource Conservation and Recovery Act
SWMUs	Solid Waste Management Units
TES	Threatened Endangered and Sensitive
USFWS	United States Fish and Wildlife Service
WAC	Wildlife Conservation Act

APPENDIX B: Checklist of Plants

APPENDIX B: CHECKLIST OF PLANTS FOUND IN OU 1111

FAMILY	SCIENTIFIC NAME	COMMON NAME	INDICATOR
ACERACEAE	<i>Acer glabrum</i>	Rocky Mountain Maple	NW, FACU
ACERACEAE	<i>Acer negundo</i>	Boxelder Maple	NW, FACW, FAC
ANACARDIACEAE	<i>Rhus trilobata</i>	Skunkbush (Squawbush)	NW, FAC
ANACARDIACEAE	<i>Rhus radicans</i>	Poison Ivy	
BERBERIDACEAE	<i>Berberis fendleri</i>	Fendler Barberry	NW
BETULACEAE	<i>Alnus tenuifolia</i>	Thinleaf Alder	NW
BETULACEAE	<i>Betula occidentalis</i>	Water-Birch	NW, FAC, FACW
BORAGINACEAE	<i>Lithospermum Multiflorum</i>	Puccoon	NW
BORAGINACEAE	<i>Mertensia lanceolata</i>	Chiming Bells	NW
CACTACEAE	<i>Opuntia spp.</i>	Cactus	
CAPRIFOLIACEAE	<i>Symphoricarpos oreophilus</i>	Snowberry	NW
CARYOPHYLLACEAE	<i>Cerastium arvense</i>	Chickweed	NW, FACU, FACW
CARYOPHYLLACEAE	<i>Cerastium spp.</i>	Mouse-Ear Chickweed	NW
CELASTRACEAE	<i>Pachystima myrsinites</i>	Mountain Lover	NW
CHENOPODIACEAE	<i>Kochia scoparia</i>	Summer Cypress	ECO, FACU, FAC
CHENOPODIACEAE	<i>Amaranthus albus</i>	Tumbleweed	
COMPOSITAE	<i>Hymenopappus filifolius</i>	Yellow Cut-Leaf	NW
COMPOSITAE	<i>Artemisia dracunculus</i>	False Tarragon	NW
COMPOSITAE	<i>Anaphalis margaritacea</i>	Pearly-Everlasting	NW
COMPOSITAE	<i>Cichorium intybus</i>	Chicory	
COMPOSITAE	<i>Antennaria parvifolia</i>	Pussytoes	NW
COMPOSITAE	<i>Senecio fendleri</i>	Notchleaf Butterweed	NW
COMPOSITAE	<i>Hymenoxys argentea</i>	Perky Sue	
COMPOSITAE	<i>Taraxacum officinale</i>	Dandelion	ECO, FACU, FAC
COMPOSITAE	<i>Tragopogon spp.</i>	Goatsbeard	ECO
COMPOSITAE	<i>Brickellia grandiflora</i>	Bricklebush	NWO
COMPOSITAE	<i>Gutierrezia sarothrae</i>	Snakeweed	ECO
COMPOSITAE	<i>Hymenoxys richardsonii</i>	Bitterweed	NW
COMPOSITAE	<i>Solidago spp.</i>	Goldenrod	NW
COMPOSITAE	<i>Achillea lanulosa</i>	Yarrow	ECO
COMPOSITAE	<i>Rudbeckia laciniata</i>	Cutleaf Coneflower	NW, FACU, FACW
COMPOSITAE	<i>Smilacina spp.</i>	Solomon's Plume	
COMPOSITAE	<i>Machaeranthera spp.</i>	Aster	
COMPOSITAE	<i>Townsendia incana</i>	Townsend's Aster	NW
COMPOSITAE	<i>Chrysopsis villosa</i>	Hairy Golden Aster	
COMPOSITAE	<i>Chrysopsis foliosa</i>	Leafy Golden Aster	
COMPOSITAE	<i>Erigeron flagellaris</i>	Trailing Fleabane	WN, FACU, FAC
COMPOSITAE	<i>Bahia dissecta</i>	Wild Chrysanthemum	NW
COMPOSITAE	<i>Cirsium spp.</i>	Thistle	
COMPOSITAE	<i>Artemisia carruthii</i>	Carruth Sage (Wormwood)	NW
COMPOSITAE	<i>Artemisia ludoviciana</i>	Lousiana Wormwood	COL
COMPOSITAE	<i>Erigeron divergens</i>	Spreading Fleabane	NW
COMPOSITAE	<i>Comyza canadensis</i>	Horseweed	ECO, FACU, FAC
COMPOSITAE	<i>Helianthus annuus</i>	Common Sunflower	ECO, FACU, FAC
COMPOSITAE	<i>Liatris punctata</i>	Dotted Gayfeather	NW

APPENDIX B: LIST OF PLANTS FOUND IN OU 1111

FAMILY	SCIENTIFIC NAME	COMMON NAME	INDICATOR
COMPOSITAE	<i>Senecio Bigelovii</i>	Bigelow Groundsel	NW
COMPOSITAE	<i>Thelesperma trifidum</i>	Greenthread	
CRUCIFERAE	<i>Lepidium medium</i>	Peppergrass	
CUPRESSACEAE	<i>Juniperus monosperma</i>	One-Seeded Juniper	NW
CYPERACEAE	<i>Carex spp.</i>	Sedge	
ERICACEAE	<i>Arctostaphylos uva-ursi</i>	Bearberry	NW
ERICACEAE	<i>Pterospora andromedea</i>	Pine drops	NW
EUPHORBIACEAE	<i>Chamaesyce parryi</i>	Parry Spurge	
EQUISETACEAE	<i>Equisetum spp.</i>	Horsetail	
FAGACEAE	<i>Quercus gambelii</i>	Gamble Oak	NW
FAGACEAE	<i>Quercus undulata</i>	Wavyleaf Oak	
GERANIACEAE	<i>Geranium caespitosum</i>	James Geranium	
GERANIACEAE	<i>Geranium spp.</i>	Geranium	NW
GRAMINEAE	<i>Bromus anomalus</i>	Nodding Brome	NW
GRAMINEAE	<i>Bromus inermis</i>	Smooth Brome	NW
GRAMINEAE	<i>Agrostis</i>	Agrostis	COL
GRAMINEAE	<i>Andropogon gerardii</i>	Big Bluestem	NW, FAC, FACU
GRAMINEAE	<i>Andropogon scoparius</i>	Little Bluestem	NW
GRAMINEAE	<i>Bouteloua gracilis</i>	Blue Grama	NW
GRAMINEAE	<i>Sitanion hystrix</i>	Bottlebrush Squirreltail	
GRAMINEAE	<i>Blepharoneuron tricholepis</i>	Pine Dropseed	NW
GRAMINEAE	<i>Bromus spp.</i>	Brome grass	NW
GRAMINEAE	<i>Agrostis alba</i>	Red Top	FACW, OBL
GRAMINEAE	<i>Phleum pratense</i>	Timothy	COL, FACU
GRAMINEAE	<i>Agropyron smithii</i>	Western Wheatgrass	NW, FAC, UPL
GRAMINEAE	<i>Koeleria cristata</i>	Junegrass	NW
GRAMINEAE	<i>Muhlenbergia montana</i>	Mountain Muhly	NW
GRAMINEAE	<i>Stipa spp.</i>	Needle Grass	
GRAMINEAE	<i>Poa fendleriana</i>	Mutton Grass	NW
GRAMINEAE	<i>Poa spp.</i>	Bluegrass	
GRAMINEAE	<i>Festuca octoflora</i>	Six-weeks Fescue	
GRAMINEAE	<i>Bromus tectorum</i>	Downy Chess	ECO
JUNCACEAE	<i>Juncus interior</i>	Inland Rush	NW, FACU
LABIATAE	<i>Monarda menthaefolia</i>	Horse-mint	
LEGUMINOSAE	<i>Medicago sativa</i>	Alfalfa	NW
LEGUMINOSAE	<i>Robinia neomexicana</i>	New Mexico Locust	NW
LEGUMINOSAE	<i>Thermopsis pinetorum</i>	Big Golden Pea	NW
LEGUMINOSAE	<i>Lupinus caudatus</i>	Tall Lupine	NW
LEGUMINOSAE	<i>Vicia leucophaea</i>	Mogollon Vetch	
LEGUMINOSAE	<i>Vicia americana</i>	American Vetch	NW, FAC
LEGUMINOSAE	<i>Lotus wrightii</i>	Deervetch	NW
LEGUMINOSAE	<i>Melilotus albus</i>	White Sweet Clover	COL, FACU, FAC
LEGUMINOSAE	<i>Trifolium repens</i>	White Clover	
LEGUMINOSAE	<i>Melilotus spp.</i>	Sweet Clover	
LILIACEAE	<i>Yucca angustifolia</i>	Narrowleaf Yucca	NW
LILIACEAE	<i>Yucca baccata</i>	Banana Yucca	ECO

APPENDIX B: LIST OF PLANTS FOUND IN OU 1111

FAMILY	SCIENTIFIC NAME	COMMON NAME	INDICATOR
LILIACEAE	<i>Allium cernuum</i>	Nodding Onion	ECO
LINACEAE	<i>Linum neomexicana</i>	New Mexico Yellow Flax	
LINACEAE	<i>Linaceae</i>	Flax	
LORANTHACEAE	<i>Arceuthobium vaginatum</i>	Dwarf Mistletoe	NW
NYCTAGINACEAE	<i>Oxybaphus linearis</i>	Desert Four-O Clock	NW
ONAGRACEAE	<i>Gaura coccinea</i>	Gaura	NW
ONAGRACEAE	<i>Epilobium spp.</i>	Epilobium	
ONAGRACEAE	<i>Oenothera spp.</i>	Evening Primrose	NW
ONAGRACEAE	<i>Oenothera caespitosa</i>	White Stemless Evening Primrose	NW
ORCHIDACEAE	<i>Corallorhiza striata</i>	Striped Coralroot	NW
PINACEAE	<i>Pinus flexilis</i>	Limber Pine	NW
PINACEAE	<i>Abies concolor</i>	White Fir	NW
PINACEAE	<i>Pinus edulis</i>	Piñon Pine	NW
PINACEAE	<i>Pseudotsuga menziesii</i>	Douglas Fir	NW
PINACEAE	<i>Pinus ponderosa</i>	Ponderosa Pine	NW, UPL, FACU
PLANTAGINACEAE	<i>Plantago major</i>	Rippleseed Plantation	ECO, FACU, FACW
PLANTAGINACEAE	<i>Plantago purshii</i>	Woolly Indian-wheat	
POLEMONIACEAE	<i>Ipomopsis aggregata</i>	Desert Trumpet	NW
POLYGONACEAE	<i>Rumex spp.</i>	Dock/Sorrel	
POLYGONACEAE	<i>Rumex crispus</i>	Curlyleaf Dock	FACU, FACW
POLYGONACEAE	<i>Eriogonum spp.</i>	Wild buckwheat	
POLYGONACEAE	<i>Eriogonum jamesii</i>	Antelope Sage	NW
RANUNCULACEAE	<i>Thalictrum fendleri</i>	Fendler Meadow rue	NW, UPL, FAC, FACU
RANUNCULACEAE	<i>Clematis pseudoalpina</i>	Rocky Mountain Clematis	
RANUNCULACEAE	<i>Clematis</i>	Buttercup	
RANUNCULACEAE	<i>Clematis ligusticifolia</i>	Western Virgin's Bower	NW, FACU, FACW, FAC
ROSACEAE	<i>Prunus virginiana</i>	Chokecherry	NW, FACU, FAC
ROSACEAE	<i>Fallugia paradoxa</i>	Apache plume	NW
ROSACEAE	<i>Cercocarpus montanus</i>	Mountain Mahogany	NW
ROSACEAE	<i>Rosa</i>	Wild Rose	
ROSACEAE	<i>Rosa woodsii</i>	Fendler's Rose	NW, UPL, FAC, FACU
ROSACEAE	<i>Rubus stingosus</i>	Wild Raspberry	FACU, FACW, FAC
ROSACEAE	<i>Fragaria americana</i>	Wild Strawberry	
ROSACEAE	<i>Potentilla arguta</i>	Tall Cinquefoil	NW, UPL, FACU
ROSACEAE	<i>Potentilla spp.</i>	Cinquefoil	
RUBIACEAE	<i>Galium boreale</i>	Northern Bedstraw	NW, FACU, FAC
RUBIACEAE	<i>Galium aparine</i>	Goosegrass	NW, FACU, FAC
RUBIACEAE	<i>Galium spp.</i>	Galium	
RUTACEAE	<i>Ptelea trifoliata</i>	Narrowleaf hoptree	UPL, FAC, FACU
SALICACEAE	<i>Populus tremuloides</i>	Aspen	NW, FACU, FAC
SALICACEAE	<i>Salix spp.</i>	Willow	
SAXIFRAGACEAE	<i>Ribes inerme</i>	Gooseberry	NW, FAC, FACU
SAXIFRAGACEAE	<i>Ribes cereum</i>	Wax Current	NW, FACU
SAXIFRAGACEAE	<i>Ribes spp.</i>	Current	
SAXIFRAGACEAE	<i>Jonesia americana</i>	Cliffbush	NW, UPL, FACU
SCROPHULARIACEAE	<i>Verbascum thapsus</i>	Mullein	ECO

APPENDIX B: LIST OF PLANTS FOUND IN OU 1111

FAMILY	SCIENTIFIC NAME	COMMON NAME	INDICATOR
SCROPHULARIACEAE	<i>Scirpus schaffneri</i>	Indian Paintbrush	
SCROPHULARIACEAE	<i>Orthocarpus purpureo-albus</i>	Purple-white Owl-clover	NW
SCROPHULARIACEAE	<i>Penstemon vargatus</i>	Variegated Beardtongue	NW, FAC
SCROPHULARIACEAE	<i>Castilleja integra</i>	Foothills Paintbrush	NW
SCROPHULARIACEAE	<i>Penstemon spp.</i>	Beardtongue	
TYPHACEAE	<i>Typha latifolia</i>	Cattail	NW, OBL
UMBELLIFERAE	<i>Pseudocymopterus montanus</i>	Mountain Parsley	NW
URTICACEAE	<i>Urtica gracilis</i>	Stinging Nettle	
VALERIANACEAE	<i>Valeriana acutiloba rydb.</i>	Gray Valerian	
VALERIANACEAE	<i>Valeriana capitata</i>	Tobacco Root	FACU, FAC
VIOLACEAE	<i>Viola adunca</i>	Western Dog Violet	NW, FACU, FAC
VIOLACEAE	<i>Viola spp</i>	Violet	
VIOLACEAE	<i>Viola Canadensis</i>	Canada Violet	NW
VITACEAE	<i>Parthenocissus inserta</i>	Virginia Creeper	
LICHEN	<i>Usnea spp.</i>	Old Man's Beard	
LICHEN	<i>Xanthroparmelia spp.</i>	Green rock Lichen	

* INDICATOR CODES

- NW = Non-weedy
- COL = Colonizing
- ECO = Economic
- FAC = Faculatative plants and equally likely to occur in wetlands or nonwetlands
- FACW = Faculatative wetland plants usually occur in wetlands
- FACU = Faculatative upland plants usually occur in nonwetlands
- OBL = Obligate wetland plants occur almost always in wetlands
- UPL = Obligate upland plants occur almost always in nonwetlands

APPENDIX C.: Wildlife Species Checklists

APPENDIX C: Checklist of Mammals

FAMILY	SCIENTIFIC NAME	COMMON NAME	SOURCE
CANIDAE	<i>Canis latrans</i>	Coyote	1,2
CANIDAE	<i>Vulpes Fulva</i>	Red Fox	2
CERVIDAE	<i>Cervus canadensis</i>	Elk	2
CERVIDAE	<i>Odocoileus hemionus</i>	Mule Deer	1
COATI	<i>Procyon lotor</i>	Raccoon	1
CRICETIDAE	<i>Peromyscus maniculatus</i>	Deer Mouse	1
FELIDAE	<i>Felis rufus</i>	Bobcat	1
GEOMYDAE	<i>Thomomys</i>	Gopher	1,2
SCIURIDAE	<i>Sciurus aberti</i>	Albert Squirrel	1,2
SCIURIDAE	<i>Eutamias spp.</i>	Chipmunk	2
SCIURIDAE	<i>Citellus variegatus</i>	Rock Squirrel	2

1= Edeskuty, Foxx, Raymer 1992, Wildlife associated with outfalls

2= Wildlife observation Reports

APPENDIX C: Checklist of Small Mammals Trapped

CODE	SCIENTIFIC NAME	COMMON NAME
MILO	<i>Microtus longicaudus</i>	Long-tailed Vole
MIMO	<i>Microtus montanus</i>	Montane Vole
MICX	<i>Microtus</i>	Vole
PEBO	<i>Peromyscus boylei</i>	Brush Mouse
PELE	<i>Peromyscus leucopus</i>	White-footed Mouse
PEMA	<i>Peromyscus maniculatus</i>	Deer Mouse
PERX	<i>Peromyscus</i>	Dear Mouse
REME	<i>Reithrodontomys megalotis</i>	Western Harvest Mouse
EUQU	<i>Eutamias quadrivittatus</i>	Colorado Chipmunk
SOLA	<i>Sorex cinereus</i>	Vagrant Shrew

APPENDIX C: Checklist of Bats Species Mist Net Near OU 1111

SCIENTIFIC NAME	COMMON NAME
<i>Eptesicus fuscus</i>	Big Brown Bat
<i>Lasionycteris noctivagans</i>	Silver-haired Bat
<i>Lasiurus cinereus</i>	Hoary Bat
<i>Myotis californicus</i>	California Myotis
<i>Myotis evotis</i>	Long-eared Myotis
<i>Myotis leibii</i>	Small-footed Myotis
<i>Myotis thysanodes</i>	Fringed Myotis
<i>Myotis volans</i>	Long-legged Myotis
<i>Myotis yumanensis</i>	Yuma Myotis
<i>Tadarida brasiliensis</i>	Mexican Freetail Bat

APPENDIX C: Checklist of Birds in OU 1111

FAMILY	SCIENTIFIC NAME	COMMON NAME	SOURCE
ACCIPITER	<i>Accipiter Cooperii</i>	Cooper's Hawk	1
ACCIPITER	<i>Accipiter striatus</i>	Sharp-shinned Hawk	1
ACCIPITRIDAE	<i>Buteo jamaicensis</i>	Red-tailed Hawk	1
APODIDAE	<i>Aeronautes saxatalis</i>	White-throated Swift	1
CAPRIMULGIDAE	<i>Chordeiles minor</i>	Common Nighthawk	1
CAPRIMULGIDAE	<i>Phalaenoptilus nuttallii</i>	Common Poorwill	1
CARTHARTIDAE	<i>Cathartes aura</i>	Turkey Vulture	1,2
COLUMBIDAE	<i>Zenaida macroura</i>	Mourning Dove	1
CORVIDAE	<i>Spizella passerina</i>	Chipping Sparrow	1
CORVIDAE	<i>Corvus corax</i>	Common Raven	1,2
CORVIDAE	<i>Aphelocoma coerulescens</i>	Scrub Jay	1
CORVIDAE	<i>Pooecetes gramineus</i>	Vesper Sparrow	1
CORVIDAE	<i>Cyanocitta stelleri</i>	Steller's Jay	1,2
CORVIDAE	<i>Nucifraga columbiana</i>	Clark's Nutcracker	1,2
EMBERIZIDAE	<i>Melospiza lincolni</i>	Lincoln's Sparrow	1
EMBERIZIDAE	<i>Molothrus ater</i>	Brown-headed Cowbird	1
EMBERIZIDAE	<i>Euphagus cyanocephalus</i>	Brewer's Blackbird	1
EMBERIZIDAE	<i>Junco hyemalis</i>	Dark-eyed Junco	1,2
EMBERIZIDAE	<i>Pheucticus melanocephalus</i>	Black-headed Grosbeak	1
EMBERIZIDAE	<i>Dendroica graciae</i>	Grace's Warbler	1,2
EMBERIZIDAE	<i>Pipilo chorurus</i>	Green-tailed Towhee	1
EMBERIZIDAE	<i>Piranga flava</i>	Hepatic Tanager	1
EMBERIZIDAE	<i>Piranga ludoviciana</i>	Western Tanager	1
EMBERIZIDAE	<i>Pipilo erythrophthalmus</i>	Rufous-sided Towhee	1,2
EMBERIZIDAE	<i>Oporornis tolmiei</i>	MacGillivray's Warbler	1
EMBERIZIDAE	<i>Vermivora celata</i>	Orange-crowned Warbler	1
EMBERIZIDAE	<i>Dendroica coronata</i>	Yellow-Rumped Warbler	1,2
EMBERIZIDAE	<i>Vermivora virginiae</i>	Virginia's Warbler	1
EMBERIZIDAE	<i>Sturnella neglecta</i>	Western Meadowlark	1
EMBERIZIDAE	<i>Agelaius phoeniceus</i>	Red-winged Blackbird	1
FALCONIDAE	<i>Falco sparverius</i>	American Kestrel	1
FRINGILLIDAE	<i>Coccothraustes vespertinus</i>	Evening Grosbeak	1,2
FRINGILLIDAE	<i>Carpodacus mexicanus</i>	House Finch	1,2
FRINGILLIDAE	<i>Carpodacus cassinii</i>	Cassin's Finch	1
FRINGILLIDAE	<i>Carduelis psaltria</i>	Lesser Goldfinch	1
FRINGILLIDAE	<i>Carduelis pinus</i>	Pine Siskin	1
FRINGILLIDAE	<i>Loxia curvirostra</i>	Red Crossbill	1,2
HIRUNDINIDAE	<i>Tachycineta thalassina</i>	Violet-green Swallow	2
MIMIDAE	<i>Catharus guttatus</i>	Herruit Thrush	2
MUSCICAPIDAE	<i>Sialia mexicana</i>	Western Bluebird	1,2
MUSCICAPIDAE	<i>Myadestes townsendi</i>	Townsend's Solitaire	1
MUSCICAPIDAE	<i>Sialia currucoides</i>	Mountain Bluebird	1
MUSCICAPIDAE	<i>Turdus migratorius</i>	American Robin	1,2
MUSCICAPIDAE	<i>Regulus calendula</i>	Ruby-crowned Kinglet	1
PARIDAE	<i>Parus gambeli</i>	Mountain Chickadee	1,2

APPENDIX C: Checklist of Birds in OU 1111 (CONTINUED)

FAMILY	SCIENTIFIC NAME	COMMON NAME	SOURCE
PASSERIDAE	<i>Passer domesticus</i>	House Sparrow	1
PHASIANIDAE	<i>Meleagris gallopavo</i>	Wild Turkey	1
PICIDAE	<i>Sphyrapicus nuchalis</i>	Red-naped Sapsucker	1
PICIDAE	<i>Sphyrapicus thyroideus</i>	Williamson's Sapsucker	1
PICIDAE	<i>Picoides villosus</i>	Hairy Woodpecker	1
PICIDAE	<i>Colaptes auratus</i>	Northern Flicker	1,2
PICIDAE	<i>Picoides pubescens</i>	Downy Woodpecker	1,2
PICIDAE	<i>Picoides tridactylus</i>	Three-toed Woodpecker	1
PICIDAE	<i>Melanerpes formicivorus</i>	Acorn Woodpecker	2
SITTIDAE	<i>Sitta pygmaea</i>	Pygmy Nuthatch	1,2
SITTIDAE	<i>Sitta canadensis</i>	Red-breasted Nuthatch	1
SITTIDAE	<i>Sitta carolinensis</i>	White-breasted Nuthatch	1,2
STURNIDAE	<i>Sturnus vulgaris</i>	European Starling	1
TYRANNIDAE	<i>Contopus borealis</i>	Olive-sided Flycatcher	1
TYRANNIDAE	<i>Empidonax occidentalis</i>	Cordilleran Flycatcher	1
TYRANNIDAE	<i>Contopus sordidulus</i>	Western Wood-Pewee	1,2
TYRANNIDAE	<i>Sayornis saya</i>	Say's Phoebe	1
TYRANNIDAE	<i>Empidonax hammondi</i>	Hammond's Flycatcher	1
TYRANNIDAE	<i>Empidonax oberholseri</i>	Dusky Flycatcher	1
TYRANNIDAE	<i>Tyrannus vociferans</i>	Cassin's Kingbird	1
TYRANNIDAE	<i>Myiarchus cinerascens</i>	Ash-throated Flycatcher	1
TROCHILIDAE	<i>Selasphorus platycercus</i>	Broad-tailed Hummingbird	1,2
TROGLODYTIDAE	<i>Troglodytes troglodytes</i>	Winter Wren	1
TROGLODYTIDAE	<i>Troglodytes aedon</i>	House Wren	2
COLUMBIDAE	<i>Columba fasciata</i>	Band-tailed Pigeon	1
TYTONIDAE	<i>Bubo virginianus</i>	Great Horned Owl	1
TYTONIDAE	<i>Glaucidium gnoma</i>	Northern Pygmy-Owl	1
VIREONIDAE	<i>Vireo solitarius</i>	Solitary Vireo	1,2
VIREONIDAE	<i>Vireo gilvus</i>	Warbling Vireo	1,2

1= Atlas of Breeding Birds of Los Alamos County, New Mexico

2= Wildlife observation Reports

APPENDIX C: Checklist of Possible Insects in OU 1111 per MacKay et al. (1986)

FAMILY	SCIENTIFIC NAME	HABITAT TYPE
DOLICHODERINAE	<i>Liometopum apiculatum</i>	Ponderosa pine-riparian
DOLICHODERINAE	<i>Liometopum luctuosum</i>	Ponderosa pine-riparian
DOLICHODERINAE	<i>Tapinoma sessile</i>	Ponderosa pine-riparian
FORMICINAE	<i>Acanthomyops interjectus</i>	Ponderosa pine
FORMICINAE	<i>Acanthomyops latipes</i>	Ponderosa pine-riparian
FORMICINAE	<i>Campotonus herculeanus</i>	Spruce, riparian
FORMICINAE	<i>Campotonus laevigatus</i>	Ponderosa pine-riparian
FORMICINAE	<i>Campotonus sansabeanus</i>	Ponderosa pine
FORMICINAE	<i>Campotonus vicinus</i>	pond, pine-riparian,
FORMICINAE	<i>Formica argentea</i>	pond, pine-riparian, disturbed sites
FORMICINAE	<i>Formica densiventris</i>	Ponderosa pine-riparian
FORMICINAE	<i>Formica fusca</i>	Ponderosa pine-riparian
FORMICINAE	<i>Formica hewlitti</i>	pond, pine-riparian, grassy areas next to ponderosa pine, riparian
FORMICINAE	<i>Formica lasioides</i>	Ponderosa pine-riparian
FORMICINAE	<i>Formica limata</i>	Ponderosa pine-riparian
FORMICINAE	<i>Formica neogogates</i>	Highly disturbed areas
FORMICINAE	<i>Formica neorufibarbis</i>	Riparian
FORMICINAE	<i>Formica obscuripes obscuripes</i>	Ponderosa pine-riparian
FORMICINAE	<i>Formica obscuriventris clivia</i>	Ponderosa pine-riparian
FORMICINAE	<i>Formica occulta</i>	Ponderosa pine-riparian
FORMICINAE	<i>Formica pergandei</i>	Disturbed area
FORMICINAE	<i>Formica planipilis</i>	Ponderosa pine-riparian
FORMICINAE	<i>Formica podzolica</i>	Ponderosa pine-riparian
FORMICINAE	<i>Formica subnuda</i>	Ponderosa pine
FORMICINAE	<i>Lasius alienus</i>	Ponderosa pine-riparian
FORMICINAE	<i>Lasius crypticus</i>	Ponderosa pine-riparian
FORMICINAE	<i>Lasius flavus</i>	Ponderosa pine-riparian
FORMICINAE	<i>Lasius neoniger</i>	Ponderosa pine-riparian
FORMICINAE	<i>Lasius pallitarsis</i>	Pond, pine-riparian, pond, pine
FORMICINAE	<i>Lasius siliens</i>	Ponderosa pine
FORMICINAE	<i>Lasius subumbratus</i>	Ponderosa pine-riparian
MYRMICINEA	<i>Crematogaster cerasi</i>	Ponderosa pine, riparian
MYRMICINEA	<i>Lepotothorax crassipilis</i>	Ponderosa pine-riparian
MYRMICINEA	<i>Lepotothorax muscorum</i>	Pond, pine-riparian, Pond, pine
MYRMICINEA	<i>Lepotothorax nitens</i>	Pond, pine-riparian, disturbed areas
MYRMICINEA	<i>Lepotothorax oligicanthus</i>	Highly disturbed areas
MYRMICINEA	<i>Lepotothorax probancheri</i>	Riparian
MYRMICINEA	<i>Lepotothorax texanus texanus</i>	Ponderosa pine-riparian
MYRMICINEA	<i>Lepotothorax tricarinatus</i>	Ponderosa pine-riparian
MYRMICINEA	<i>Monomorium cyaneum</i>	Juniper, disturbed areas
MYRMICINEA	<i>Monomorium minimum</i>	Ponderosa pine-riparian
MYRMICINEA	<i>Myrmecino americana</i>	Ponderosa pine-riparian
MYRMICINEA	<i>Myrmica bravispinosa</i>	Riparian
MYRMICINEA	<i>Myrmica emervana</i>	Riparian-Ponderosa pine
MYRMICINEA	<i>Myrmica hamulata</i>	Ponderosa pine-riparian

APPENDIX C: Continued: Checklist of Insects in OU 1111

FAMILY	SCIENTIFIC NAME	HABITAT TYPE
MYRMICINEA	<i>Polyergus breviceps</i>	Ponderosa pine
MYRMICINEA	<i>Pheidole ceres</i>	Pond.pine, Pond.pine-riparian, disturbed areas
MYRMICINEA	<i>Pheidole hyatti hyatti</i>	Riparian
MYRMICINEA	<i>Pheidole sitarches soritis</i>	Disturbed areas
MYRMICINEA	<i>Pheidole wheelerorum</i>	Pond. pine-riparian, disturbed sites
MYRMICINEA	<i>Pogonomyrmex occidentalis</i>	Pond. pine-riparian, Pond.pine, disturbed areas
MYRMICINEA	<i>Solenopsis molesta</i>	Riparian, Pond.pine-riparian
MYRMICINEA	<i>Stenamma occidentale</i>	Ponderosa pine-riparian
PONERINAE	<i>Hypoponera opaciceps</i>	Riparian

APPENDIX C: Checklist of Reptiles and Amphibians sited in OU 1111

FAMILY	SCIENTIFIC NAME	COMMON NAME
AMBYSTOMATIDE	<i>Ambystoma tigrinum</i>	Tigar Salamander
COLUBRIDAE	<i>Thamnophis sirtalis</i>	Common Garter Snake
HYLIDAE	<i>Pseudacris triseriate</i>	Striped Chorus Frog
HYLIDAE	<i>Hyla arenicolor</i>	Canyon Treefrog

APPENDIX D.: Threatened, Endangered and Sensitive Species List

ENDANGERED SPECIES PRINTOUT FOR OU 1111

HABITATS: PONDEROSA-PINON, PONDEROSA PINE, MIXED-CONIFER
WETLANDS AND RIPARIAN

ANIMALS

BIRD

FAMILY ACCIPITRIDAE

SCIENTIFIC NAME: *Accipiter gentilis*

COMMON NAME: NORTHERN GOSHAWK

STATUS: CANDIDATE FOR FEDERAL REGISTER

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

DISTRIBUTION:

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

HABITAT: PONDEROSA

BREEDING HABITAT: PONDEROSA

MINIMUM ELEVATION: 0

MAXIMUM ELEVATION: 0

THREATS TO TAXON: LOGGING

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

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

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

GENERAL MAP LOCATION:

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

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

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, in cottonwoods and other
woodlands along permanent streams.

HABITAT: RIPARIAN ZONES BREEDING HABITAT: RIPARIAN ZONES

MINIMUM ELEVATION: 0 MAXIMUM ELEVATION: 0

THREATS TO TAXON: DESTRUCTION OF RIPARIAN HABITAT AND SHOOTING HAWK.

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

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

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS:

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

ANIMALS

BIRD

FAMILY ACCIPITRIDAE

SCIENTIFIC NAME: *Haliaeetus leucocephalus*

COMMON NAME: BALD EAGLE

STATUS: FEDERALLY-ENDANGERED

FEDERAL/STATE REFERENCE: New Mexico endangered (group 2). First listed 1/24/75 (NMGF Reg. 563). Federally protected since 03/11/67.

DISTRIBUTION: Migrates and winters from the northern border, southward regularly to Gila, Lower Rio Grande, Middle Pecos and Candian Valleys, Rio Arriba and Sandoval Co.

SPECIFIC REQUIREMENTS: Found near streams, lakes and sometimes dry land. Also found in riparian areas.

HABITAT: RIPARIAN ZONES BREEDING HABITAT: RIPARIAN ZONES

MINIMUM ELEVATION: 0 MAXIMUM ELEVATION: 0

THREATS TO TAXON: PESTICIDES AND STREAM DEGRADATION.

BRIEF KEY DESCRIPTION: Huge wingspan 2-2.4 m, white head and tail, iris, cere, bill and legs yellow. Immature resemble golden eagles.

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

LA REFERENCE OF OCCURRENCE: FIELD SIGHTINGS, 1991-1992

GENERAL MAP LOCATION: NEAR ANCHO CANYON IN WHITE ROCK CANYON

COMMENTS: Winter roost at Cochiti Lake and in Montoso Canyon. Mortandad Canyon appears to have some suitable roosting areas, but no confirmed roost. Suitable roost sites consist of protection from wind and large trees.

Potential roosting area has been found on LANL property near the Rio Grande River. A bald eagle was seen in the area in February 1992. Survey efforts are underway to confirm.

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

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| ANIMALS |
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BIRD

FAMILY ACCIPITRIDE

SCIENTIFIC NAME: *Ictinia mississippiensis*

COMMON NAME: MISSISSIPPI KITE

STATUS: STATE-ENDANGERED

FEDERAL/STATE REFERENCE: New Mexico Endangered (Group 2). First listed in
Jan. 24, 1975 (NMGF Reg. 563).

DISTRIBUTION: In New Mexico summers regularly and breeds in the
Covis region, Portales, and Hobbs. Small numbers
occur in middle and lower Rio Grande and lower
Pecos valleys.

SPECIFIC REQUIREMENTS: Riparian zones, shelterbelts and golf courses.

HABITAT: RIPARIAN ZONES BREEDING HABITAT: RIPARIAN ZONES

MINIMUM ELEVATION: 0 MAXIMUM ELEVATION: 0

THREATS TO TAXON: DESTRUCTION OF RIPARIAN ZONES.

BRIEF KEY DESCRIPTION: Small raptor with length 335 mm and wingspan 1 m,
long. Has long pointed and notched wings. Has
whitish to black plumage.

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

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS:

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

ANIMALS

BIRD

FAMILY FALCONIDAE

SCIENTIFIC NAME: Falco Peregrinus

COMMON NAME: PEREGRINE FALCON

STATUS: FEDERALLY-ENDANGERED

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

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

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

HABITAT: PONDEROSA-PINON BREEDING HABITAT: PONDEROSA-PINON

MINIMUM ELEVATION: 0 MAXIMUM ELEVATION: 0

THREATS TO TAXON: DDT, DESTRUCTION OF HABITAT

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

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

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

GENERAL MAP LOCATION: PUEBLO CANYON

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: FEDERALLY-THREATENED

FEDERAL/STATE REFERENCE: Currently listed as federaly threatened, 50 CFR PART 17, Vol. 58, No. 49, March 16, 1993, "Endangered and Threatened Wildlife and Plants: Final Rule to list Mexican Spotted Owl as Threatened Species, pp.14248-14271.

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

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

HABITAT: MIXED-CONIFER

BREEDING HABITAT: MIXED-CONIFER

MINIMUM ELEVATION: 0

MAXIMUM ELEVATION: 0

THREATS TO TAXON: LUMBERING

BRIEF KEY DESCRIPTION:

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

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS:

REFERENCE: FEDERAL REGISTER 50 CFR PARTT 17, VOL.55, NO.60, 3/28/90.

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| ANIMALS |
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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 co.),
Vagrants near Los Alamos, Bandelier National
Monument, Las Vegas, Truth of Consequences, Las
Cruces and Carlsbad Caverns.

SPECIFIC REQUIREMENTS: Riparian woodlands, low to moderate elevations.

HABITAT: RIPARIAN ZONES

BREEDING HABITAT: RIPARIAN ZONES

MINIMUM ELEVATION: 0

MAXIMUM ELEVATION: 0

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. Upperparts of the hummingbird are greenish, the wings are blackish, and feet and eyes are dark. The tail is slightly forked.

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

LA REFERENCE OF OCCURRENCE: NM DEPT. OF GAME AND FISH, HANDBOOK OF ENDANGERED
GENERAL MAP LOCATION:

COMMENTS:

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

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| ANIMALS |
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BIRD

FAMILY TYRANNIDAE

SCIENTIFIC NAME: Empidonax traillii

COMMON NAME: WILLOW FLYCATCHER

STATUS: CANDIDATE FOR FEDERAL REGISTER

FEDERAL/STATE REFERENCE: New Mexico: "Southwestern", E.T. extimus, only.
Endangered , Group 2, 01/09/88 (NMGF reg 657).
Federal: Notice of Review as
Endangered/Threatened. Listed as a C1 species

DISTRIBUTION: Breeds through central New Mexico. Species occurs
statewide in spring and autumn migration. E.t.
extimus breeds in Chama, Rio Grande, Zuni, Gila,
San Francisco.

SPECIFIC REQUIREMENTS: Confined to riparian woodlands in breeding
seasons. Riparian areas are dominated by
cottonwoods.

HABITAT: RIPARIAN ZONES BREEDING HABITAT: RIPARIAN ZONES

MINIMUM ELEVATION: 3700 MAXIMUM ELEVATION: 8900

THREATS TO TAXON: LOSS OF RIPARIAN HABITAT

BRIEF KEY DESCRIPTION: Small, double wingbars and eyering. Upperparts
are dark olive-brown, crown paler and more grayish
or brownish. Breast is light grayish-olive and
post. is pale yellow.

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

COMMENTS:

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

ANIMALS

MAMMAL

FAMILY VESPERTILIONIDAE

SCIENTIFIC NAME: *Euderma maculatum*

COMMON NAME: SPOTTED BAT

STATUS: STATE-ENDANGERED

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

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

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

HABITAT: MULTIPLE

BREEDING HABITAT: MULTIPLE

MINIMUM ELEVATION: 0

MAXIMUM ELEVATION: 0

THREATS TO TAXON: POSSIBLY PESTICIDES

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

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

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

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

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

+-----+
| ANIMALS |
+-----+

MAMMAL

FAMILY ZAPODIDAE

SCIENTIFIC NAME: *Zapus hudsonius*

COMMON NAME: MEADOW JUMPING MOUSE

STATUS: STATE-ENDANGERED

FEDERAL/STATE REFERENCE: New Mexico: Endangered (Group 2), 07/22/83 (NMGF Reg. 624). Federal (Subspecies "New Mexico" *Z.H. luteus*) notice of review as endangered/threatened.

DISTRIBUTION: Localities in San Juan, Jemez and Sacramento Mountains in central-northern and 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: WETLAND

BREEDING HABITAT: WETLANDS

MINIMUM ELEVATION: 0 MAXIMUM ELEVATION: 0

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

LA REFERENCE OF OCCURRENCE: NM DEPT. OF GAME AND FISH, HANDBOOK OF SPECIES ENDANGERED
GENERAL MAP LOCATION:

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

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

ANIMALS

MOLLUSK

FAMILY LYMNAEIDAE

SCIENTIFIC NAME: *Lymnaea caperata*

COMMON NAME: SAY'S POND SNAIL

STATUS: STATE-ENDANGERED

FEDERAL/STATE REFERENCE: New Mexico: Endangered (Group 1), first listed
07/22/83 (NMGF Reg. 624).

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

SPECIFIC REQUIREMENTS:

HABITAT: WETLAND

BREEDING HABITAT: WETLANDS

MINIMUM ELEVATION: 3700

MAXIMUM ELEVATION: 8600

THREATS TO TAXON: OVERGRAZING, POLLUTION, DEVELOPMENT AND DEATERING

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

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

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS:

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

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

ORB

FAMILY LILIACEAE

SCIENTIFIC NAME: *Fritillaria atropurpurea*

COMMON NAME: CHECKER LILY

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE:

DISTRIBUTION: Los Alamos county??

SPECIFIC REQUIREMENTS:

HABITAT: MIXED-CONIFER

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 0

MAXIMUM ELEVATION: 0

THREATS TO TAXON:

BRIEF KEY DESCRIPTION:

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

LA REFERENCE OF OCCURRENCE: TIERNERY, G.D., 1987

GENERAL MAP LOCATION:

COMMENTS:

REFERENCE: TIERNERY, G.D., 1987

PLANTS

FORB

FAMILY LILIACEAE

SCIENTIFIC NAME: *Lilium philadelphicum* var. *andium*

COMMON NAME: WOOD LILY

STATUS: STATE-ENDANGERED

FEDERAL/STATE REFERENCE:

DISTRIBUTION: OT, RA, SA, SF, SM

SPECIFIC REQUIREMENTS:

HABITAT: MIXED-CONIFER

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 6000 MAXIMUM ELEVATION: 10000

THREATS TO TAXON: COLLECTION AND HABITAT DESTRUCTION.

BRIEF KEY DESCRIPTION: Stems to 2 ft, leaves linear to lance-shaped, margin smooth, lower leaves alternate. flowers large, showy red or orange-red with purplish-black spots at base.

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

LA REFERENCE OF OCCURRENCE: KOELLE, A., 1978; FOXX, T., 1979; KOSIEWICZ

GENERAL MAP LOCATION: UPPER PAJARITO, WATER AND FRIJOLE CANYON

COMMENTS: can be found in ponderosa to mixed-conifer.

REFERENCE: FOXX & HOARD, 1984; NRIS, 1986; HARRINGTON, 1964

PLANTS

FORB

FAMILY ORCHIDACEAE

SCIENTIFIC NAME: *Epipactis gigantea*

COMMON NAME: HELLEBORINE ORCHID

STATUS: STATE-ENDANGERED

FEDERAL/STATE REFERENCE:

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

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

HABITAT: RIPARIAN ZONES BREEDING HABITAT: N/A

MINIMUM ELEVATION: 6000 MAXIMUM ELEVATION: 8500

THREATS TO TAXON:

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

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

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

GENERAL MAP LOCATION: SPRING IN WHITE ROCK CANYON

COMMENTS:

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

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

FORB

FAMILY POLEMONIACEAE

SCIENTIFIC NAME: Phlox caryophylla, Wherry

COMMON NAME: PAGOSA PHLOX

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE:

DISTRIBUTION: Rio Arriba County, New Mexico.

SPECIFIC REQUIREMENTS: Open slopes in open woods in mountains.

HABITAT: PONDEROSA-PINON BREEDING HABITAT: N/A

MINIMUM ELEVATION: 6500 MAXIMUM ELEVATION: 7500

FEEDS TO TAXON: NONE KNOWN

BRIEF KEY DESCRIPTION: Erect perennial, leaves narrow, 50 mm long;
flowers in loose clusters, bright pink or purple,
flower parts united in a tube. Flowers from late
May to July.

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

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS:

REFERENCE: NM NATIVE PLANTS PROTECTION ADVISORY COMMITTEE, 1984.

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

ORB

FAMILY SAXIFRAGACEAE

SCIENTIFIC NAME: *Heuchera pulchella*, Woot. and Standl.

COMMON NAME: SANDIA ALUMROOT

STATUS: STATE-SENSITIVE

FEDERAL/STATE REFERENCE:

DISTRIBUTION: Bernalillo, Sandoval, San Miguel, Sierra, Socorro,
and Torrance Counties, New Mexico.

SPECIFIC REQUIREMENTS: Cliff-loving plant, endemic to the Mountains of
Central New Mexico.

HABITAT: MIXED-CONIFER

BREEDING HABITAT: N/A

MINIMUM ELEVATION: 8000

MAXIMUM ELEVATION: 12000

THREATS TO TAXON: NONE KNOWN

BRIEF KEY DESCRIPTION: Perennial herb with leaves clustered at the base;
leaf blades wide, toothed, upper surface with
hairs; low glandular flowers crowded along one
side. Flowers from July through September.

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

LA REFERENCE OF OCCURRENCE: N/A

GENERAL MAP LOCATION: N/A

COMMENTS:

REFERENCE: NM NATIVE PLANTS PROTECTION ADVISORY COMMITTEE, 1984.

APPENDIX E.: Vegetation Hierarchical Classification System

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 *et al.* (1982).

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

APPENDIX D. Vegetation Hierarchical Classification System (continued)

Upland Vegetation**Formation**

Climatic Zone

Community

Series

Habitat Type (HT)

Phase

Forest and Woodland Formation

Boreal Forests and Woodlands Climatic Zone

Rocky Mountain Subalpine Conifer Forest and Woodland Community

Picea engelmannii Series

Picea engelmannii (Pien)/Moss HT

Pien/Vaccinium scoparium/Polemonium HT

Picea engelmannii Phase

Abies lasiocarpa Phase

Pien/Erigeron eximius HT

Pien/Geum rosii HT

Pien/Ribes montigenum HT

Pien/Elymus sp. HT

Pien/Acer glabrum HT

Abies lasiocarpa Series

Abies lasiocarpa (Abla)/Acer glabrum HT

Abla/Erigeron eximius HT

Abla/Vaccinium HT

Typic Phase

Linnaea borealis Phase

Rubus parviflora Phase

Abla/Vaccinium/Linnaea borealis HT

Abla/Rubus parviflorus HT

Vaccinium Phase

Acer glabrum Phase

Abla/Erigeron superbus HT

Abla/Juniperus communis HT

Abla/Sanjuisorboides HT

Abla/Lathyrus arizonicus HT

Abla/Mertensia ciliata HT

Abla/Moss HT

Cold Temperate Forests and Woodlands Climatic Zone

Rocky Mountain Montane Conifer-Forest Community

Picea pungens Series

Picea pungens (Pipu)/Carex foenea HT

Pipu/Cornus stolonifera HT

Pipu/Arctostaphylos uva-ursi HT

Pipu/Erigeron eximius HT

Typic Phase

Pinus ponderosa Phase

Pipu/Festuca arizonica HT

Pipu/Linnaea borealis HT

Pipu/Poa pratensis HT

APPENDIX D. Vegetation Hierarchical Classification System (continued)

- Abies concolor Series
 - Abies concolor (Abco)/Acer glabrum HT
 - Abco/Quercus gambelii HT
 - Quercus gambelii Phase
 - Festuca arizonica Phase
 - Abco/Arctostaphylos uva-ursi HT
 - 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 myrtilus 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

APPENDIX D. Vegetation Hierarchical Classification System (continued)

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
 Muhlenbergia montana Phase
Pipo/*Quercus undulata* HT
Pipo/Rockland HT
Pipo/*Juniperus* HT
Great Basin Conifer-Woodland Community
 Pinyon (Pied)-Juniper (Jumo) Series
 Pied/*Andropogon hallii* HT
 Pied/*Arctostaphylos pungens* HT
 Pied/*Artemisia tridentata* HT
 Juniperus osteosperma Phase
 Juniperus monosperma Phase
 Juniperus scopulorum Phase
Pied/*Bouteloua gracilis* HT
 Hill slope Phase
 Juniperus osteosperma Phase
 Juniperus monosperma Phase
Pied/*Cowania mexicana* HT
 Cowania mexicana Phase
 Artemisia tridentata Phase
Pied/*Chrysothamnus nauseosus*-*Fallugia paradoxa* HT
Pied/*Cercocarpus montanus* HT
 Quercus undulata Phase
 Quercus gambelii Phase
Pied/*Festuca arizonica* HT
Pied/*Poa fendleriana* HT
Pied/*Purshia tridentata* HT
Pied/*Quercus gambelii* HT
Pied/*Quercus undulata* HT
Pied/*Stipa columbiana* HT
Pied/Jumo/*Bouteloua gracilis* HT
Pied/Jumo/*Muhlenbergia montanus* HT
Jumo/*Andropogon hallii* HT
Jumo/*Artemisia tridentata* HT
Jumo/*Bouteloua curtipendula* HT
Jumo/*Bouteloua gracilis* HT
Jumo/*Ceratoides lanata* HT
Jumo/*Chrysothamnus nauseosus*-*Fallugia paradoxa* HT
Jumo/*Quercus undulata*

APPENDIX D. Vegetation Hierarchical Classification System (continued)

Scrubland Formation

Arctic-Boreal Scrubland Climatic Zone

Rocky Mountain Alpine and Subalpine Scrub Community

Willow Series Spruce elfinwood Series

Bristle cone pine elfinwood Series

Cold Temperate Scrubland Climatic Zone

Great Basin Montane Scrub Community

Oak scrub Series

Mountain mahogany Series

Maple scrub Series

Serviceberry Series

Bitterbrush Series

Mixed Deciduous Series

Plains Deciduous Scrub Community

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

Sidecoats grama (Bocu)/Bluestem/Jumo HT

Bocu/Bogr HT Bocu/Black grama HT

Bocu/Curlly 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

APPENDIX D. Vegetation Hierarchical Classification System (continued)

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

Series

Habitat Type

Phase

Forest Formation

Cold Temperate Swamp and Riparian Forest Climatic Zone

Plains and Great Basin Riparian-Deciduous Forest Community

Cottonwood/Willow Series

Fraxinus pennsylvanicus (Frpe) Series

Juglans major/Platanus wrightii Series

Platanus wrightii Series

Platanus wrightii/Frpe Series

Populus fremontii Series

Populus fremontii/Salix goodingii Series

Salix bonplandiana Series

Sapindus saponaria/Juglans major Series

Rocky Mountain Riparian-Deciduous Forest Community

Cottonwood/Willow Series

Mixed broadleaf Series

Acer negundo Series (? HT)

Acer negundo/Mixed deciduous Series (? HT)

Alnus oblongifolia Series (? HT)

Juglans major Series (? HT)

Acer grandidentatum/Abies concolor Series (? HT)

Picea pungens Series (? HT)

Populus angustifolia Series (? HT)

APPENDIX D. Vegetation Hierarchical Classification System (continued)

Swamp-Scrub Formation**Arctic-Boreal Swamp-Scrub Climatic Zone****Rocky Mountain Alpine and Subalpine Swamp and Riparian-Scrub Community****Alnus tenuifolia Series****Alnus tenuifolia/Mixed deciduous Series****Salix bebbiana Series****Salix exigua Series****Salix irrorata Series****Salix scouleriana Series****Plains and Great Basin Riparian-Scrub Community****Willow Series****Hymenoclea monogyra Series****Juglans microcarpa Series****Salt cedar disclimax Series****Rocky Mountain Riparian-Scrub Community****Willow/Dogwood Series****Marshland Formation****Arctic-Boreal Marshland Climatic Zone****Rocky Mountain Alpine and Subalpine Marshland Community****Rush Series****Manna Grass Series****Plains Interior Marshland Community****Rush Series****Bur-reed Series****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 F.: OU-1111 Raw Data Summaries

TA-22 Spring Overstory

Date: May 6, 1992

Reader/Recorder:

950 Feet Transect

File: 1111221C.WK1

Species	#Trees	#Trees Per Acre	Rel Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Import Index
Trees									
JUMO	1.00	1.54	0.53	0.10	0.10	0.09	0.10	3.13	1.25
PSME	13.10	20.15	6.92	5.76	9.10	8.57	0.60	18.75	11.41
PIPO	11.00	16.92	5.81	13.58	20.00	18.84	0.70	21.87	15.51
PIFL	1.00	1.54	0.53	30.70	30.00	28.25	0.10	3.13	10.64
ABCO	83.10	127.85	43.90	311.10	19.11	17.99	1.00	31.25	31.05
BEOC	71.10	109.38	37.56	159.00	16.88	15.89	0.40	12.50	21.98
POTR	9.00	13.85	4.75	45.40	11.00	10.36	0.30	9.38	8.16
QUGAT	17.00	26.15	8.98	84.60	13.33	12.56	0.50	15.63	12.39
TOTAL:	189.30	291.23	100.00	565.64	106.18	100.00	3.20	100.00	100.00

Species	#Stems	#Stems Per Acre	Rel Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Import Index
Shrubs								
SYOR	1.00	1.54	0.06	0.10	0.37	0.10	2.44	0.95
QUGA	60.10	92.46	3.64	7.19	26.29	0.90	21.95	17.29
RJIN	111.00	170.77	6.71	3.60	13.16	0.60	14.63	11.50
RICE	10.00	15.38	0.60	0.10	0.37	0.10	2.44	1.14
ROWO	1.00	1.54	0.06	0.10	0.37	0.10	2.44	0.95
PRVI	49.00	75.38	2.96	3.77	13.80	0.30	7.32	8.03
CEMO	7.00	10.77	0.42	0.01	0.05	0.10	2.44	0.97
BEFE	213.00	327.69	12.88	3.61	13.21	0.70	17.07	14.39
ROSK	3.00	4.62	0.18	0.07	0.24	0.20	4.88	1.77
JAAM	1196.10	1840.15	72.35	8.70	31.80	0.90	21.95	42.03
RUST	2.00	3.08	0.12	0.10	0.37	0.10	2.44	0.98
Total =	1653.20	2543.38	100.00	27.36	100.00	4.10	100.00	100.00

TA-22 Spring Understory

Date: May 6, 1992

Reader/Recorder: Terry Fox/Mary Salisbury

1000 feet transect

File: 1111221U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	1.23					
Rock	1.25					
Litter	72.49					
STREAM		13.90	55.52	0.14	6.80	31.16
MOSS		1.35	5.39	0.10	4.85	5.12
BROX		0.18	0.71	0.12	5.83	3.27
POFE		0.55	2.21	0.10	4.85	3.53
JUNX		2.15	8.59	0.18	8.74	8.66
ACLA		0.14	0.54	0.11	5.34	2.94
GECA		0.06	0.24	0.02	0.97	0.61
RULA		0.10	0.40	0.01	0.49	0.44
TRAX		0.11	0.46	0.08	3.88	2.17
EPIX		0.05	0.20	0.02	0.97	0.59
CIRX		0.05	0.20	0.01	0.49	0.34
CARX		0.96	3.83	0.14	6.80	5.32
GALX		0.05	0.21	0.03	1.46	0.83
RUST		0.05	0.20	0.02	0.97	0.59
VIAD		0.02	0.08	0.03	1.46	0.77
TRDU		0.06	0.24	0.02	0.97	0.61
THFE		0.10	0.40	0.03	1.46	0.93
TRIX		0.11	0.44	0.03	1.46	0.95
MELA		0.05	0.20	0.01	0.49	0.34
VICA		0.10	0.41	0.04	1.94	1.17
CLPS		0.00	0.00	0.01	0.49	0.24
BEFE		0.10	0.40	0.06	2.91	1.66
MUMO		0.61	2.44	0.07	3.40	2.92
ARLU		0.01	0.04	0.01	0.49	0.26
EQUX		0.10	0.40	0.03	1.46	0.93
ROSA		0.00	0.00	0.00	0.00	0.00
ANPA		0.21	0.84	0.04	1.94	1.39
FRAM		0.26	1.04	0.07	3.40	2.22
UNK FORB		0.10	0.40	0.01	0.49	0.44
UNKGRASS		3.50	13.97	0.52	25.24	19.60
Total:	74.97	25.03	100.00	2.06	100.00	100.00

Location: TA-22 South facing slope Overstory Line Transect
 Date: May 6, 1992
 Reader/Recorder: Dan Dunham, James Biggs/Kathy Bennett
 650 Feet Transect File: 1111223C.WK1

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Trees									
JUMO	7.00	25.41	9.09	2.19	1.80	3.11	0.33	16.67	9.62
PIPO	57.00	206.91	74.05	8.80	54.23	93.80	1.00	50.00	72.62
PSME	3.00	10.89	3.90	6.63	0.75	1.30	0.25	12.50	5.90
ABCO	2.00	7.24	2.59	3.40	1.03	1.79	0.08	4.17	2.85
QUGAT	8.00	28.97	10.37	4.71	0.00	0.00	0.33	16.67	9.01
TOTAL:	77.00	279.43	100.00	25.73	57.82	100.00	2.00	100.00	100.00

Species	#Stems	#Stems Per Acre	Rel. Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Shrubs								
QUGA	173.00	627.99	100.00	13.55	100.00	0.92	100.00	100.00
Total =	173.00	627.99	100.00	13.55	100.00	0.92	100.00	100.00

TA-40 South Facing Slope Above Spring Understory
 Date: May 6, 1992
 Reader/Recorder: James Biggs, Dan Dunham/Kathy Bennett
 600 Feet Transect File: 1111223U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	0.92					
Rock	23.33					
Litter	70.90					
MUMO		3.18	65.48	0.40	57.14	61.31
POAX		0.00	0.03	0.03	4.76	2.40
QUGA		0.50	10.34	0.10	14.29	12.31
ANSC		0.50	10.31	0.03	4.76	7.53
CARX		0.33	6.87	0.07	9.52	8.20
BEFE		0.00	0.03	0.02	2.38	1.21
ANGE		0.33	6.87	0.02	2.38	4.63
JUMO		0.00	0.03	0.02	2.38	1.21
ROSX		0.00	0.00	0.00	0.00	0.00
UNKNOWN 1		0.00	0.03	0.02	2.38	1.21
UNKNOWN 2		0.00	0.00	0.00	0.00	0.00
Total =	95.15	4.85	100.00	0.70	100.00	100.00

TA-22 Mesa Above Spring Overstory Line Transect

Date: May 6-7, 1992

Reader/Recorder: Dan Dunham/Kathy Bennett

700 Feet Transect

File: 1111225C.WK1

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Trees									
JUMO	4.00	12.45	7.41	0.72	0.00	0.00	0.14	12.50	6.64
PIPO	49.00	152.46	90.74	4.98	27.03	100.00	0.93	81.25	90.66
ABCO	1.00	3.10	1.85	7.30	0.00	0.00	0.07	0.07	0.64
TOTAL:	54.00	168.01	100.00	13.00	27.03	100.00	1.14	93.82	97.94

Species	#Stems	#Stems Per Acre	Rel. Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Shrubs								
QUGA	31.00	96.45	17.03	0.00	0.00	0.21	50.00	22.34
RIIN	131.00	407.60	71.98	1.14	100.00	0.14	33.33	68.44
BEFE	20.00	62.23	10.99	0.00	0.00	0.07	16.67	9.22
Total =	182.00	566.28	100.00	1.14	100.00	0.43	100.00	100.00

TA-22 Mesa Above Spring Understory Line Transect
 Date: May 6-7, 1992
 Reader/Recorder: Dan Dunham/Kathy Bennett
 700 Feet Transect File: 1111225U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	6.15					
Rock	8.36					
Litter	66.13					
AGAB		0.01	0.06	0.01	0.95	0.51
AGSM		0.06	0.32	0.01	0.95	0.64
SCSC		1.13	5.75	0.07	5.71	5.73
BOGR		4.95	25.29	0.24	18.10	21.69
BROX		0.05	0.26	0.05	3.81	2.03
MUMO		11.90	60.79	0.55	41.90	51.35
POAX		0.06	0.32	0.01	0.95	0.64
CARX		0.07	0.38	0.03	1.90	1.14
JUIN		0.44	2.23	0.01	0.95	1.59
ARCA		0.17	0.89	0.07	5.71	3.30
ARDR		0.10	0.51	0.05	3.81	2.16
GECA		0.01	0.06	0.01	0.95	0.51
MESA		0.14	0.70	0.03	1.90	1.30
POTX		0.29	1.47	0.07	5.71	3.59
TAOF		0.01	0.06	0.01	0.95	0.51
PENX		0.09	0.45	0.04	2.86	1.65
PIED		0.01	0.06	0.01	0.95	0.51
LUPX		0.06	0.32	0.01	0.95	0.64
CHFO		0.01	0.06	0.01	0.95	0.51
ANGE		0.00	0.00	0.00	0.00	0.00
ARIX		0.00	0.00	0.00	0.00	0.00
ANPA		0.00	0.00	0.00	0.00	0.00
BEFE		0.00	0.00	0.00	0.00	0.00
CIRX		0.00	0.00	0.00	0.00	0.00
ERDI		0.00	0.00	0.00	0.00	0.00
ERFL		0.00	0.00	0.00	0.00	0.00
HYRI		0.00	0.00	0.00	0.00	0.00
MEAL		0.00	0.00	0.00	0.00	0.00
ROSX		0.00	0.00	0.00	0.00	0.00
VETH		0.00	0.00	0.00	0.00	0.00
Total =	80.64	19.58	100	1.31	100	100

TA-3 Two-Mile Canyon Circular Plot

Date: 9/23/92

Reader/Recorder: Alethea Banar/Delia Raymer

550 Feet Transect

File Name: TA31C

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Import Index
Trees									
PIPO	29.00	74.36	30.85	6.94	8.78	17.55	1.00	23.08	23.83
PIFL	6.00	15.38	6.38	5.15	8.02	16.03	0.67	15.38	12.60
PSME	39.00	100.00	41.49	4.62	13.15	26.29	0.83	19.23	29.00
ALTE	2.00	5.13	2.13	0.55	2.55	5.10	0.17	3.85	3.69
ACGL	0.00	0.00	0.00	0.00	5.00	9.99	0.17	3.85	4.61
ABCO	11.00	28.21	11.70	3.94	7.53	15.04	0.83	19.23	15.32
QUGAT	7.00	17.95	7.45	4.54	5.00	9.99	0.67	15.38	10.94
TOTAL:	94.00	241.03	100.00	25.73	50.03	100.00	4.33	100.00	100.00

Species	#Shrubs	#Shrubs Per Acre	Rel. Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Import Index
Shrubs								
QUGA	167.00	428.21	18.03	21.40	29.94	1.00	11.76	19.91
COST	71.00	182.05	7.67	17.50	24.48	0.17	1.96	11.37
RICE	84.00	215.38	9.07	3.53	4.94	4.83	56.86	23.63
ROWO	24.00	61.54	2.59	1.08	1.51	0.67	7.84	3.98
RONE	3.00	7.69	0.32	0.10	0.14	0.33	3.92	1.46
BEFE	66.00	169.23	7.13	1.94	2.71	0.50	5.88	5.24
JAAM	410.00	1051.28	44.28	9.17	12.82	0.67	7.84	21.65
RUST	100.00	256.41	10.80	16.67	23.32	0.17	1.96	12.03
SHRUB1	1.00	2.56	0.11	0.10	0.14	0.17	1.96	0.74
Total =	926.00	2374.36	100.00	71.48	100.00	8.50	100.00	100.00

TA-3 Two-Mile Canyon Understory

Date: 9/23/92

Reader/Recorder: Dan Dunham/Mary Salisbury

650 Feet Transect

File Name: TA31U

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	21.83					
ROCK	0.92					
LITTER	47.27					
MOSS/LICHEN		2.31	7.69	0.11	4.27	5.98
SOIL CRUST		0.00	0.00	0.00	0.00	0.00
RUCR		0.08	0.26	0.02	0.61	0.43
GECA		0.08	0.26	0.02	0.61	0.43
VETH		0.54	1.80	0.05	1.83	1.82
FRAM		0.55	1.84	0.22	8.54	5.19
MEAL		0.70	2.35	0.14	5.49	3.92
CIRX		0.15	0.51	0.02	0.61	0.56
QUGA		1.85	6.16	0.15	6.10	6.13
RICE		0.15	0.51	0.02	0.61	0.56
PHPR		0.15	0.51	0.02	0.61	0.56
CLLI		0.46	1.54	0.03	1.22	1.38
THPI		0.62	2.05	0.03	1.22	1.64
RONE		0.00	0.01	0.02	0.61	0.31
AGRX		0.08	0.26	0.03	1.22	0.74
AGAL		10.31	34.38	0.37	14.63	24.51
LEPX		0.39	1.29	0.03	1.22	1.25
BRAN		1.85	6.16	0.12	4.88	5.52
PLMA		0.08	0.26	0.03	1.22	0.74
ACLA		0.23	0.77	0.03	1.22	0.99
ARLU		0.08	0.26	0.03	1.22	0.74
RUST		0.62	2.06	0.05	1.83	1.94
PENX		0.70	2.32	0.09	3.66	2.99
ERIX		0.08	0.26	0.03	1.22	0.74
POAX		2.54	8.49	0.18	7.32	7.90
ERFL		0.23	0.77	0.03	1.22	0.99
ANPA		0.08	0.26	0.02	0.61	0.43
TRAX		0.08	0.26	0.03	1.22	0.74
TRRE		0.00	0.01	0.02	0.61	0.31
BRGR		0.08	0.26	0.02	0.61	0.43
VICA		1.08	3.60	0.15	6.10	4.85
MACX		0.23	0.77	0.02	0.61	0.69
POAR		0.08	0.26	0.02	0.61	0.43
COST		0.85	2.83	0.05	1.83	2.33
BEFE		0.23	0.77	0.03	1.22	1.00
PSME		0.23	0.77	0.03	1.22	1.00
ROWO		0.08	0.26	0.02	0.61	0.43
PAMY		0.54	1.80	0.08	3.05	2.42

Continued:

TA-3 Two-Mile Canyon Understory

Date: 9/23/92

Reader/Recorder: Dan Dunham/Mary Salisbury

650 Feet Transect

File Name: TA31U

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
GAAP		0.31	1.03	0.03	1.22	1.13
MUMO		0.31	1.03	0.03	1.22	1.12
ANSC		0.08	0.26	0.02	0.61	0.43
KOCR		0.31	1.03	0.03	1.22	1.12
PIPO		0.08	0.26	0.02	0.61	0.43
MOME		0.15	0.51	0.03	1.22	0.87
SIHY		0.08	0.26	0.02	0.61	0.43
SPCR		0.15	0.51	0.02	0.61	0.56
CARX		0.15	0.51	0.03	1.22	0.87
AMRE		0.00	0.00	0.00	0.00	0.00
ANMA		0.00	0.00	0.00	0.00	0.00
JAAM		0.00	0.00	0.00	0.00	0.00
Total =	70.02	29.98	100.00	2.52	100.00	100.00

TA-40 Drainage South of Main Bldg Circular Plot Overstory

Date: May 11, 1992

Reader/Recorder: James Biggs/Dan Dunham

950 Feet Transect

File: 1111401C.WK1

Species	#Stems	#Stems Per Acre	Rel Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Import Index
Trees									
JUMO	7.00	10.77	4.43	0.57	1.73	3.65	0.30	12.00	6.69
PSME	14.00	21.54	8.86	3.42	10.01	21.05	0.60	24.00	17.97
SNAGPIPO	2.00	3.08	1.27	14.25	0.00	0.00	0.20	8.00	3.09
PIPO	120.00	184.62	75.95	5.30	23.29	49.00	1.00	40.00	54.98
QUGAT	7.00	10.77	4.43	4.41	7.50	15.78	0.30	12.00	10.74
POTR	8.00	12.31	5.06	0.10	5.00	10.52	0.10	4.00	6.53
TOTAL:	158.00	243.08	100.00	28.05	47.53	100.00	2.50	100.00	100.00

Species	#Stems	#Stems Per Acre	Rel Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Import Index
Shrubs								
QUGA	337.00	518.46	60.61	12.15	43.40	1.00	33.33	45.78
ROWO	12.00	18.46	2.16	1.73	6.19	0.20	6.67	5.01
RONE	27.00	41.54	4.86	1.18	4.21	0.60	20.00	9.69
CEMO	28.00	43.08	5.04	3.37	12.03	0.50	16.67	11.24
BEFE	132.00	203.08	23.74	4.47	15.96	0.50	16.67	18.79
JAAM	10.00	15.38	1.80	0.10	0.36	0.10	3.33	1.83
RIBE	10.00	15.38	1.80	5.00	17.86	0.10	3.33	7.66
Total =	556.00	855.38	100.00	27.99	100.00	3.00	100.00	100.00

TA-40 Drainage South of Main Bldg Understory

Date: May 11, 1992

Reader/Recorder: Terry Foxx

1000 Feet Transect

File: 1111401U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	9.10					
Rock	23.00					
Litter	53.86					
MOSS		0.35	2.49	0.03	2.33	2.41
THPI		0.85	6.05	0.07	5.43	5.74
POAX		1.15	8.19	0.10	7.75	7.97
RUMX		0.06	0.44	0.04	3.10	1.77
TAOF		0.16	1.15	0.06	4.65	2.90
ARLU		0.01	0.08	0.02	1.55	0.81
POTX		0.25	1.79	0.07	5.43	3.61
ANPA		0.10	0.73	0.04	3.10	1.91
ACLA		0.05	0.36	0.02	1.55	0.96
MELX		0.00	0.01	0.01	0.78	0.39
MUMO		1.90	13.53	0.15	11.63	12.58
JUIN		0.60	4.27	0.06	4.65	4.46
CARX		3.45	24.56	0.22	17.05	20.81
AGAL		0.15	1.07	0.04	3.10	2.09
ANSC		0.90	6.41	0.06	4.65	5.53
BROX		0.00	0.01	0.01	0.78	0.39
FRAM		0.25	1.79	0.02	1.55	1.67
TYPHA		0.05	0.36	0.01	0.78	0.57
BEFE		0.30	2.14	0.02	1.55	1.84
GECA		0.00	0.01	0.01	0.78	0.39
UNK Grass		3.45	24.57	0.23	17.83	21.20
Total =	85.95	14.05	100	1.29	100	100

TA-40 Drainage South of Main Bldg Understory

Date: May 11, 1992

Reader/Recorder: Terry Foxx

1000 Feet Transect

File: 1111401U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	9.10					
Rock	23.00					
Litter	53.86					
MOSS		0.35	2.49	0.03	2.33	2.41
THPI		0.85	6.05	0.07	5.43	5.74
POAX		1.15	8.19	0.10	7.75	7.97
RUMX		0.06	0.44	0.04	3.10	1.77
TAOF		0.16	1.15	0.06	4.65	2.90
ARLU		0.01	0.08	0.02	1.55	0.81
POTX		0.25	1.79	0.07	5.43	3.61
ANPA		0.10	0.73	0.04	3.10	1.91
ACLA		0.05	0.36	0.02	1.55	0.96
MELX		0.00	0.01	0.01	0.78	0.39
MUMO		1.90	13.53	0.15	11.63	12.58
JUN		0.60	4.27	0.06	4.65	4.46
CARX		3.45	24.56	0.22	17.05	20.81
AGAL		0.15	1.07	0.04	3.10	2.09
ANSC		0.90	6.41	0.06	4.65	5.53
BROX		0.00	0.01	0.01	0.78	0.39
FRAM		0.25	1.79	0.02	1.55	1.67
TYPHA		0.05	0.36	0.01	0.78	0.57
BEFE		0.30	2.14	0.02	1.55	1.84
GECA		0.00	0.01	0.01	0.78	0.39
UNK Grass		3.45	24.57	0.23	17.83	21.20
Total =	85.95	14.05	100	1.29	100	100

TA-40 Mesa Above Drainage Line Transect

Date: May 11, 1992

Reader/Recorder: Delia Raymer/Mary Salisbury

500 Feet Transect

File: 1111402C.WK1

Species	No. Trees	Trees/Acre	Rel Density	Avg. DBH	Cover	Rel Cover	Freq.	Rel Freq.	Importance Index
Trees									
JUMO	2.00	8.71	2.78	0.10	0.00	0.00	0.2	7.41	3.40
PIPO	66.00	287.50	91.67	7.37	66.04	92.47	2	74.07	86.07
PIFL	1.00	4.36	1.39	7.00	1.88	2.63	0.1	3.70	2.57
PSME	3.00	13.07	4.17	6.83	3.50	4.90	0.4	14.81	7.96
TOTAL:	72	313.63	100.00	21.31	71.42	100	2.7	100	100

Species	No. Stems	Stems/Acre	Rel Density	Cover	Rel Cover	Freq.	Rel Freq.	Importance Index
Shrubs								
QUGA	250.00	444.31	73.91	3.58	71.89	1.4	40.00	61.93
FAPA	231.00	69.70	11.59	1.40	28.11	0.6	17.14	18.95
RICE	26.00	21.78	3.62	0.00	0.00	0.4	11.43	5.02
CEMO	36.00	56.63	9.42	0.00	0.00	0.9	25.71	11.71
ROSX	6.00	8.71	1.45	0.00	0.00	0.2	5.71	2.39
Total =	549	601.13	100.00	4.98	100	3.5	100	100

TA-40 Mesa Above Drainage Understory Line Transect
 Date: May 11, 1992
 Reader/Recorder: Kathy Bennett
 1000 Feet Transect File: 1111402U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	11.60					
Rock	16.60					
Litter	54.05					
MUMO		9.15	51.54	0.09	56.25	53.89
ANSC		5.30	29.85	0.03	18.75	24.30
CHFL		0.25	1.41	0.02	12.50	6.96
SEFE		0.10	0.56	0.01	6.25	3.41
CARX		0.40	2.25	0.01	6.25	4.25
OPUx		0.05	0.28	0.00	0.00	0.14
FAPA		0.10	0.56	0.00	0.00	0.28
PENX		0.10	0.57	0.00	0.00	0.28
POAX		0.20	1.13	0.00	0.00	0.56
GECA		0.05	0.28	0.00	0.00	0.14
BLTR		1.55	8.73	0.00	0.00	4.36
FORB2		0.05	0.28	0.00	0.00	0.14
CIRX		0.05	0.28	0.00	0.00	0.14
ARCA		0.00	0.01	0.00	0.00	0.01
ARLU		0.40	2.26	0.00	0.00	1.13
Total =	82.24	17.76	100.00	0.16	100.00	100.00

TA-40 Stream in Pajarito Canyon Circular Plot Overstory

Date: May 12, 1992

Reader/Recorder: Dan Dunham/Mary Salisbury

650 Feet Transect

File: 1111403C.WK1

Species	#Stems	#Stems Per Acre	Rel Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Import Index
Trees									
ACGL	3.00	6.59	1.92	0.10	5.00	6.67	0.14	9.09	5.89
PSME	44.00	96.70	28.21	2.79	20.01	26.68	0.57	36.36	30.41
PIPO	2.00	4.40	1.28	7.85	7.50	10.00	0.14	9.09	6.79
PIFL	1.00	2.20	0.64	5.40	5.00	6.67	0.14	9.09	5.47
ABCO	7.00	15.38	4.49	5.36	13.33	17.78	0.14	9.09	10.45
BEOC	99.00	217.58	63.46	1.16	24.17	32.22	0.43	27.27	40.98
TOTAL:	156.00	342.86	100.00	22.65	75.01	100.00	1.57	100.00	100.00

Species	#Stems	#Stems Per Acre	Rel Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Import Index
Shrubs								
QUGA	81.00	178.02	18.82	13.65	22.98	0.57	26.67	22.82
SALX	163.50	359.34	37.98	33.75	56.85	0.29	13.33	36.05
PRVI	31.00	68.13	7.20	3.77	6.36	0.57	26.67	13.41
BEFE	2.00	4.40	0.46	0.10	0.17	0.14	6.67	2.43
ROSX	1.00	2.20	0.23	0.10	0.17	0.14	6.67	2.36
JAAM	152.00	334.07	35.31	8.00	13.47	0.43	20.00	22.93
Total =	430.50	946.15	100.00	59.37	100.00	2.14	100.00	100.00

TA-40 Stream in Pajarito Canyon Circular Plot Understory

Date: May 12, 1992

Reader/Recorder: Dan Dunham/Mary Salisbury

600 Feet Transect

File: 1111403U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	2.75					
Rock	15.00					
Litter	61.58					
Stream	8.33					
MOSS		5.75	46.60	0.12	12.73	29.66
VICA		0.27	2.16	0.05	5.45	3.81
AGAL		0.18	1.49	0.03	3.64	2.56
SYMX		0.10	0.81	0.03	3.64	2.22
CLPS		0.17	1.35	0.03	3.64	2.49
FRAM		0.17	1.35	0.03	3.64	2.49
MUMO		1.67	13.51	0.08	9.09	11.30
VACA		0.10	0.81	0.03	3.64	2.22
RICE		0.50	4.05	0.03	3.64	3.84
ANSC		0.08	0.68	0.02	1.82	1.25
GALX		0.10	0.82	0.05	5.45	3.14
THFE		0.08	0.68	0.02	1.82	1.25
VAAC		0.42	3.38	0.05	5.45	4.42
EQUX		0.34	2.73	0.10	10.91	6.82
RIBX		0.33	2.70	0.03	3.64	3.17
GRASS 1		2.08	16.90	0.20	21.82	19.36
Total =	87.66	12.34	100	0.92	100	100

TA-40 Pajarito Canyon South Facing Slope Line Transect Overstory

Date: May 12, 1992

Reader/Recorder: Delia Raymer

500 Feet Transect

File: 1111404C.WK1

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Trees									
JUMO	1.00	4.36	2.78	0.10	0.00	0.00	0.10	7.69	3.49
PIPO	31.00	135.04	86.11	7.29	37.76	99.53	0.90	69.23	84.96
PSME	4.00	17.42	11.11	0.10	0.18	0.47	0.30	23.08	11.55
TOTAL:	36.00	156.82	100.00	7.49	37.94	100.00	1.30	100.00	100.00

Species	#Stems	#Stems Per Acre	Rel. Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Shrubs								
QUGA	45.00	196.02	14.33	1.42	40.11	0.50	41.67	32.04
PRVI	6.00	26.14	1.91	0.12	3.39	0.10	8.33	4.54
ROSX	2.00	8.71	0.64	1.00	28.25	0.20	16.67	15.18
JAAM	261.00	1136.92	83.12	1.00	28.25	0.40	33.33	48.23
Total =	314.00	1367.78	100.00	3.54	100.00	1.20	100.00	100.00

TA-40 Pajarito Canyon South Facing Slope Line Transect

Date: May 12, 1992

Reader/Recorder: Kathy Bennett/Delia Raymer

500 Feet Transect

File: 1111404U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	6.50					
Rock	17.99					
Litter	67.37					
CHFL		0.20	2.46	0.04	4.26	3.36
ANSC		5.70	70.19	0.40	42.55	56.37
MUMO		1.50	18.51	0.18	19.15	18.83
POAX		0.00	0.02	0.02	2.13	1.08
CARX		0.40	4.92	0.06	6.38	5.65
FRAM		0.00	0.02	0.02	2.13	1.08
ARLU		0.01	0.07	0.06	6.38	3.23
ANPA		0.30	3.72	0.08	8.51	6.11
SEFE		0.00	0.05	0.06	6.38	3.22
GECA		0.00	0.02	0.02	2.13	1.08
Total =	91.86	8.12	100.00	0.94	100.00	100.00

TA-40 Along Road, Mesa Top Line Transect Overstory

Date: May 11, 1992

Reader/Recorder: James Biggs

1000 Feet Transect File: 1111405C.WK1

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Trees									
JUMO	29.00	63.16	38.67	1.82	0.73	2.56	0.25	23.81	21.68
PIPO	46.00	100.19	61.33	8.55	27.83	97.44	0.80	76.19	78.32
TOTAL:	75.00	163.35	100.00	10.37	28.56	100.00	1.05	100.00	100.00

Species	#Stems	#Stems Per Acre	Rel. Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Shrubs								
QUGA	108.00	235.22	100.00	1.51	100.00	0.25	100.00	100.00
Total =	108.00	235.22	100.00	1.51	100.00	0.25	100.00	100.00

TA-40 Along Road, Mesa Top Line Transect Understory

Date: May 11, 1992

Reader/Recorder: Dan Dunham/Mary Salisbury

1000 Feet Transect File: 1111405U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	20.74					
Rock	0.70					
Litter	48.46					
MUMO		16.45	54.74	0.62	28.18	41.46
AGSM		0.10	0.34	0.05	2.27	1.31
CARX		0.15	0.50	0.03	1.36	0.93
ARLU		0.05	0.17	0.02	0.91	0.54
HYAR		0.08	0.27	0.06	2.73	1.50
ARCA		0.79	2.61	0.29	13.18	7.90
CHFO		0.18	0.59	0.13	5.91	3.25
BOGR		6.80	22.63	0.29	13.18	17.90
HYRI		0.15	0.50	0.03	1.36	0.93
BADI		0.06	0.20	0.03	1.36	0.78
HYFI		0.00	0.00	0.01	0.45	0.23
ARDR		0.25	0.84	0.06	2.73	1.78
PENX		0.01	0.03	0.01	0.45	0.24
POTX		1.00	3.34	0.09	4.09	3.71
UNK 1		0.00	0.00	0.01	0.45	0.23
UNK 2		0.05	0.17	0.03	1.36	0.77
LINX		0.00	0.00	0.02	0.91	0.46
UNK 3		0.16	0.55	0.09	4.09	2.32
ERDI		0.25	0.84	0.08	3.64	2.24
OENX		0.00	0.00	0.01	0.45	0.23
TARX		0.00	0.01	0.02	0.91	0.46
VIAM		0.00	0.00	0.01	0.45	0.23
POAX		3.50	11.65	0.21	9.55	10.60
Total =	69.90	30.05	100.00	2.20	100.00	100.00

TA-40 Mesa Across Road From Building 1 Line Transect Overstory

Date: May 13, 1992

Reader/Recorder: Kathy Bennett/Mary Salisbury

1000 Feet Transect File: 1111406C.WK1

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Trees									
JUMO	9.00	19.60	6.92	0.79	0.00	0.00	0.20	13.79	6.91
PIPO	116.00	252.65	89.23	5.92	33.10	100.00	1.00	68.97	86.07
PSME	2.00	4.36	1.54	0.10	0.00	0.00	0.10	6.90	2.81
PIPO SNAG	3.00	6.53	2.31	12.47	0.00	0.00	0.15	10.34	4.22
TOTAL:	130.00	283.14	100.00	19.28	33.10	100.00	1.45	100.00	100.00

Species	#Stems	#Stems Per Acre	Rel. Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Shrubs								
QUGA	56.00	121.97	43.75	0.00	0.00	0.55	61.11	34.95
FAPA	63.00	137.21	49.22	0.00	0.00	0.25	27.78	25.67
RONE	1.00	2.18	0.78	0.00	0.00	0.05	5.56	2.11
CEMO	8.00	17.42	6.25	0.00	0.00	0.05	5.56	3.94
Total =	128.00	278.78	100.00	0.00	0.00	0.90	100.00	66.67

TA-40 Mesa Across Road From Building 1 Line Transect Understory

Date: May 13, 1992

Reader/Recorder: James Biggs

1000 Feet Transect File: 1111406U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
Bare Soil	10.95					
Rock	18.35					
Litter	62.42					
ARLU		0.05	0.63	0.03	2.94	1.78
MUMO		5.25	63.43	0.44	43.14	53.28
CARX		0.45	5.45	0.06	5.88	5.66
CHVI		0.56	6.70	0.14	13.73	10.21
LUCA		0.05	0.64	0.04	3.92	2.28
AGRX		0.06	0.69	0.08	7.84	4.27
SCSC		0.90	10.88	0.08	7.84	9.36
SEFE		0.00	0.02	0.02	1.96	0.99
ANPA		0.10	1.21	0.01	0.98	1.09
POAX		0.00	0.02	0.02	1.96	0.99
PIPO(seedling)		0.00	0.02	0.02	1.96	0.99
UNK(cicoricae)		0.00	0.02	0.02	1.96	0.99
IPAG		0.05	0.62	0.02	1.96	1.29
UNK(cupallone)		0.00	0.01	0.01	0.98	0.50
QUGA(seedling ANGE		0.05	0.60	0.01	0.98	0.79
		0.75	9.06	0.02	1.96	5.51
Total =	91.72	8.28	100.00	1.02	100.00	1.78

TA-59 Stream Channel Two-Mile Canyon Circular Plot Overstory

Date: 9/22/92

Reader/Recorder: James Biggs/Mary Salisbury, Saul Cross/Delia Raymer

650 Feet Transect

File: TA592C.WK1

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Import Index
Trees									
QUGAT	6.00	13.19	5.17	4.57	5.50	8.50	0.43	12.50	8.72
PIPO	8.00	17.58	6.90	6.04	13.20	20.39	0.57	16.67	14.65
PIFL	7.00	15.38	6.03	8.06	12.20	18.85	0.43	12.50	12.46
PSME	30.00	65.93	25.86	5.72	15.13	23.36	1.00	29.17	26.13
ACGL	30.00	65.93	25.86	0.75	3.60	5.56	0.00	0.00	10.47
ABCO	35.00	76.92	30.17	6.03	15.11	23.34	1.00	29.17	27.56
TOTAL:	116.00	254.95	100.00	31.17	64.74	100.00	3.43	100.00	100

Species	#Shrubs	#Shrubs Per Acre	Rel. Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Import Index
Shrubs								
UNK1	30.00	65.93	2.75	5.83	7.46	0.57	5.00	5.07
QUGA	77.00	169.23	7.06	12.13	15.51	1.00	8.75	10.44
VILE	17.00	37.36	1.56	0.10	0.13	0.29	2.50	1.40
RHTR	3.00	6.59	0.27	0.10	0.13	0.29	2.50	0.97
RICE	134.00	294.51	12.28	4.73	6.05	5.14	45.00	21.11
SALX	307.00	674.73	28.14	17.34	22.17	1.00	8.75	19.69
ROWO	6.00	13.19	0.55	0.33	0.42	0.43	3.75	1.57
RONE	2.00	4.40	0.18	3.00	3.84	0.14	1.25	1.76
PRVI	71.00	156.04	6.51	3.87	4.95	0.86	7.50	6.32
BEFE	6.00	13.19	0.55	0.10	0.13	0.29	2.50	1.06
JAAM	386.00	848.35	35.38	10.68	13.66	1.00	8.75	19.26
COST	43.00	94.51	3.94	12.50	15.98	0.14	1.25	7.06
AMAL	9.00	19.78	0.82	7.50	9.59	0.29	2.50	4.30
Total =	1091.00	2397.80	100.00	78.21	100.00	11.43	100.00	100.00

TA-59 Stream Channel Two-Mile Canyon Understory

Date: 9/22/92

Reader/Recorder: Dan Dunham/Alethea Banar

700 Feet Transect

File: TA592U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	25.70					
ROCK	8.21					
LITTER	49.66					
MOSS/LICHEN		2.50	15.24	0.21	10.64	12.94
SOIL CRUST		0.00	0.00	0.00	0.00	0.00
THFE		1.15	7.00	0.16	7.80	7.40
PAMY		0.79	4.80	0.14	7.09	5.95
BEFE		0.14	0.88	0.04	2.13	1.50
QUGA		0.29	1.74	0.03	1.42	1.58
ACLA		0.14	0.87	0.03	1.42	1.14
GAAP		0.01	0.05	0.09	4.26	2.15
AGAL		2.07	12.62	0.20	9.93	11.27
BROMUS		3.50	21.31	0.14	7.09	14.20
FRAM		0.08	0.47	0.07	3.55	2.01
ANSC		0.00	0.01	0.01	0.71	0.36
CARX		0.01	0.03	0.06	2.84	1.44
SHRUB1		0.36	2.17	0.01	0.71	1.44
PAIN		0.29	1.77	0.06	2.84	2.30
FORB1		0.72	4.36	0.10	4.96	4.66
RIIN		0.00	0.02	0.03	1.42	0.72
PRVI		0.00	0.02	0.03	1.42	0.72
PSME		0.00	0.02	0.03	1.42	0.72
TRRE		0.15	0.90	0.07	3.55	2.22
JAAM		0.21	1.30	0.03	1.42	1.36
GRASS1		1.43	8.73	0.14	7.09	7.91
BRAN		0.14	0.87	0.01	0.71	0.79
RHRA		0.22	1.31	0.04	2.13	1.72
ERIX		0.07	0.45	0.04	2.13	1.29
BRIN		0.79	4.78	0.01	0.71	2.75
GABO		0.07	0.43	0.01	0.71	0.57
JUNX		0.14	0.87	0.01	0.71	0.79
ANPA		0.14	0.87	0.01	0.71	0.79
POAX		0.29	1.76	0.07	3.55	2.65
ROWO		0.00	0.01	0.01	0.71	0.36
RUST		0.57	3.48	0.06	2.84	3.16
TARX		0.07	0.43	0.01	0.71	0.57
COST		0.07	0.43	0.01	0.71	0.57
MOME		0.00	0.00	0.00	0.00	0.00
SMIX		0.00	0.00	0.00	0.00	0.00
BRGR		0.00	0.00	0.00	0.00	0.00
Total =	83.57	16.43	100.00	2.01	100.00	100.00

TA-59 Two-Mile Canyon Line Transect Overstory

DATE: 09/22/92

Reader/Recorder: Saul Cross/Delia Raymer, James Biggs/Mary Salisbury

700 Feet Transect

File: TA593C.WK1

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Trees									
PIPO	21.00	65.34	14.40	6.44	9.23	14.09	0.93	27.66	18.71
PIFL	10.00	31.11	6.86	5.86	4.99	7.61	0.43	12.77	9.08
PSME	58.00	180.46	39.76	2.99	21.19	32.34	1.00	29.79	33.96
SNAG	1.00	3.11	0.69	7.60	0.00	0.00	0.07	2.13	0.94
ABCO	56.00	173.84	38.30	5.55	30.11	45.97	0.93	27.66	37.31
Total:	146.00	453.87	100.00	28.44	65.51	100.00	3.36	100.00	100.00

Species	#Stems	#Stems Per Acre	Rel. Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Shrubs								
AMAL	2.00	6.22	0.77	0.00	0.00	0.07	2.94	1.24
QUGA	160.00	497.83	61.54	7.47	97.76	1.00	41.18	66.82
RICE	29.00	90.23	11.15	0.11	1.50	0.29	11.76	8.14
CEMO	19.00	59.12	7.31	0.00	0.00	0.43	17.65	8.32
SYMX	1.00	3.11	0.38	0.00	0.00	0.07	2.94	1.11
BEFE	45.00	140.01	17.31	0.06	0.75	0.50	20.59	12.88
JAAM	4.00	12.45	1.54	0.00	0.00	0.07	2.94	1.49
Total =	260.00	808.97	100.00	7.64	100.00	2.43	100.00	100.00

TA-59 Two-Mile Canyon North Facing Slope Understory

DATE: 09/22/92

Reader/Recorder: Dan Dunham/Alethea Banar

700 Feet Transect

File: TA593U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	16.13					
ROCK	5.07					
LITTER	64.39					
MOSS/LICHEN		4.29	29.77	0.30	16.94	23.35
SOIL CRUST		0.00	0.00	0.00	0.00	0.00
ANSC		0.79	5.45	0.03	1.61	3.53
MUMO		0.94	6.51	0.24	13.71	10.11
BLTR		0.36	2.48	0.03	1.61	2.05
PENX		0.08	0.54	0.07	4.03	2.28
FAGR		0.29	2.00	0.07	4.03	3.02
QUGA		1.86	12.91	0.16	8.87	10.89
CEMO		0.21	1.49	0.01	0.81	1.15
CAREX		0.72	4.98	0.14	8.06	6.52
ACLA		0.22	1.50	0.06	3.23	2.36
ANPA		0.72	5.00	0.11	6.45	5.72
ARUV		1.29	8.92	0.09	4.84	6.88
PSME		0.22	1.50	0.04	2.42	1.96
PAMY		0.58	4.00	0.13	7.26	5.63
BEFE		0.15	1.01	0.06	3.23	2.12
GABO		0.00	0.01	0.01	0.81	0.41
GAAP		0.00	0.01	0.01	0.81	0.41
RICE		1.14	7.94	0.09	4.84	6.39
PIFL		0.14	0.99	0.01	0.81	0.90
BADI		0.07	0.50	0.01	0.81	0.65
BRAN		0.00	0.02	0.03	1.61	0.82
THFE		0.14	0.99	0.01	0.81	0.90
ABCO		0.07	0.50	0.01	0.81	0.65
VICA		0.14	0.99	0.03	1.61	1.30
CLEX		0.00	0.00	0.00	0.00	0.00
GECA		0.00	0.00	0.00	0.00	0.00
FORB2		0.00	0.00	0.00	0.00	0.00
ERIX		0.00	0.00	0.00	0.00	0.00
IPAG		0.00	0.00	0.00	0.00	0.00
ANGE		0.00	0.00	0.00	0.00	0.00
Total =	85.59	14.41	100.00	1.77	100.00	100.00

TA-6 West of MDAF Line Transect Overstory

Date: 8/17/92

Reader/Recorder: Dan Dunham/Greg Gray, Mary Salisbury/Alethea Banar

700 Feet Transect

File: 111161C.WK1

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Trees									
JUMO	1.00	3.11	0.41	3.70	0.60	2.21	0.07	6.25	2.95
PIPO	243.00	756.08	99.18	5.59	26.61	97.79	1.00	87.50	94.83
PSME	1.00	3.11	0.41	5.50	0.00	0.00	0.07	6.25	2.22
TOTAL:	245.00	762.30	100.00	14.79	27.21	100.00	1.14	100.00	100.00

Species	#Stems	#Stems Per Acre	Rel. Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Shrubs								
NO SHRUBS IN THIS TRANSECT								
Total =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TA-6 West of MDAF Understory

Date: 8/17/92

Reader/Recorder: Kathy Bennett

700 Feet Transect

File: 111161U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	0.00					
ROCK	0.36					
LITTER	67.14					
MOSS/LICH		4.50	40.09	0.11	14.81	27.45
CARX		0.00	0.01	0.01	1.85	0.93
POAX		0.22	1.92	0.04	5.56	3.74
BROX		0.07	0.65	0.03	3.70	2.18
MUMO		3.86	34.37	0.27	35.19	34.78
ALCE		0.29	2.55	0.03	3.70	3.12
ARCA		0.07	0.65	0.03	3.70	2.18
TOIN		0.57	5.09	0.06	7.41	6.25
ANSC		1.29	11.46	0.11	14.81	13.14
SIHY		0.07	0.65	0.03	3.70	2.18
GUSA		0.14	1.27	0.01	1.85	1.56
HYRI		0.00	0.01	0.01	1.85	0.93
ERJA		0.14	1.27	0.01	1.85	1.56
ARLU		0.00	0.00	0.00	0.00	0.00
PENX		0.00	0.00	0.00	0.00	0.00
Total =	67.49	11.22	100.00	0.77	100.00	100.00

TA-6 Drainage North of Road Circular Plot Overstory

Date: 8/17/92

Reader/Recorder: Mary Salisbury/Greg Gray, Dan Dunham/Alethea Banar

650 Feet Transect

FILE: 111162C.WK1

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Trees									
PIPO	5.00	10.99	2.87	6.62	2.55	3.54	0.43	9.68	5.36
PIFL	4.00	8.79	2.30	7.38	8.75	12.15	0.29	6.45	6.97
PSME	39.00	85.71	22.41	4.91	11.86	16.47	0.86	19.35	19.41
ALTE	3.00	6.59	1.72	0.10	0.10	0.14	0.14	3.23	1.70
POTR	105.00	230.77	60.34	4.63	18.68	25.95	0.86	19.35	35.22
ABCO	11.00	24.18	6.32	6.23	14.43	20.04	0.86	19.35	15.24
QUGA	7.00	15.38	4.02	4.54	15.64	21.72	1.00	22.58	16.11
Total:	174.00	382.42	100.00	34.41	72.01	100.00	4.43	100.00	100.00

Species	#Shrubs	#Shrubs Per Acre	Rel. Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Shrubs								
QUGA	109.00	239.56	6.92	15.64	24.49	1.00	25.00	18.80
RONE	20.00	43.96	1.27	8.78	13.74	0.29	7.14	7.39
PRVI	136.00	298.90	8.63	7.52	11.77	0.71	17.86	12.75
BEFE	147.00	323.08	9.33	6.02	9.43	0.57	14.29	11.01
ROSX	4.00	8.79	0.25	0.10	0.16	0.29	7.14	2.52
JAAM	1151.00	2529.67	73.03	20.80	32.58	1.00	25.00	43.54
JUMO	9.00	19.78	0.57	5.00	7.83	0.14	3.57	3.99
Total =	1576.00	3463.74	100.00	63.85	100.00	4.00	100.00	100.00

TA-6 Drainage North of Road Understory

Date: 8/18/92

Reader/Recorder: Kathy Bennett

700 Feet Transect

FILE: 111162U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	13.71					
ROCK	8.64					
LITTER	42.42					
MOSS/LICHEN		3.79	10.75	0.13	5.20	7.97
BROX		6.43	18.26	0.50	20.23	19.24
MUMO		1.71	4.87	0.10	4.05	4.46
KOSC		0.21	0.61	0.01	0.58	0.59
ANSC		1.29	3.65	0.06	2.31	2.98
AGAB		3.00	8.52	0.09	3.47	5.99
STLX		1.00	2.84	0.10	4.05	3.44
POAX		1.79	5.07	0.17	6.94	6.01
CARX		0.14	0.41	0.01	0.58	0.49
JUNX		4.64	13.18	0.09	3.47	8.32
TYLA		0.21	0.61	0.03	1.16	0.88
CIRX		0.29	0.81	0.04	1.73	1.27
URGR		0.07	0.20	0.01	0.58	0.39
GALX		0.50	1.42	0.07	2.89	2.15
PLMA		0.07	0.20	0.01	0.58	0.39
THPI		0.93	2.64	0.11	4.62	3.63
TOIN		0.29	0.81	0.01	0.58	0.69
BEFE		2.15	6.10	0.20	8.09	7.09
RONE		0.07	0.20	0.01	0.58	0.39
FRAM		1.14	3.24	0.17	6.94	5.09
CLEX		0.71	2.03	0.06	2.31	2.17
ANPA		0.21	0.61	0.03	1.16	0.88
GERX		0.21	0.61	0.03	1.16	0.88
ROSX		0.36	1.01	0.06	2.31	1.66
ARUV		0.14	0.41	0.01	0.58	0.49
PRVI		0.57	1.62	0.06	2.31	1.97
ACLA		0.72	2.03	0.10	4.05	3.04
RUST		1.07	3.04	0.07	2.89	2.97
TARX		0.07	0.20	0.01	0.58	0.39
EUPX		0.14	0.41	0.03	1.16	0.78
THFE		0.14	0.41	0.01	0.58	0.49
QUGA		0.14	0.41	0.01	0.58	0.49
PSME		0.14	0.41	0.01	0.58	0.49
UNGRASS1		0.86	2.43	0.03	1.16	1.79
PONX		0.00	0.00	0.00	0.00	0.00
Total:	64.78	35.22	100.00	2.47	100.00	100.00

Pajarito Canyon Circular Plot Overstory

Date: 8/92

Reader/Recorder: Lee Pierce/Mary Salisbury, Dan Dunham/Angela

550 Feet Transect

FILE: RCRA10C.WK1

Species	#Trees	#Trees Per Acre	Rel. Density	Avg. DBH	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Trees									
QUGAT	4.00	10.26	2.03	4.28	0.00	0.00	0.17	4.76	2.26
PIED	1.00	2.56	0.51	0.10	0.10	0.28	0.17	4.76	1.85
PIPO	44.00	112.82	22.34	11.84	12.56	35.25	1.00	28.57	28.72
PSME	14.00	35.90	7.11	0.94	2.60	7.29	0.33	9.52	7.97
ABCO	15.00	38.46	7.61	2.66	8.59	24.10	0.83	23.81	18.51
ACNE	119.00	305.13	60.41	1.28	11.79	33.08	1.00	28.57	40.69
Total:	197.00	505.13	100.00	21.10	35.65	100.00	3.50	100.00	100.00

Species	#Shrubs	#Shrubs Per Acre	Rel. Density	Cover	Rel. Cover	Freq.	Rel. Freq.	Importance Index
Shrubs								
QUGA	14.00	35.90	2.68	8.22	10.78	0.50	7.32	6.93
QUE.	8.00	20.51	1.53	11.02	14.46	0.50	7.32	7.77
CLLI	1.00	2.56	0.19	0.10	0.13	0.17	2.44	0.92
BETX	21.00	53.85	4.02	40.00	52.47	0.17	2.44	19.65
PAIN	0.00	0.00	0.00	0.10	0.13	0.17	2.44	0.86
RICE	16.00	41.03	3.07	0.10	0.13	3.33	48.78	17.33
SALX	307.00	787.18	58.81	11.67	15.32	1.00	14.63	29.59
ROWO	2.00	5.13	0.38	0.10	0.13	0.17	2.44	0.98
RONE	1.00	2.56	0.19	1.00	1.31	0.17	2.44	1.31
BEFE	152.00	389.74	29.12	3.91	5.13	0.67	9.76	14.67
Total =	522.00	1338.46	100.00	76.23	100.00	6.83	100.00	100.00

Pajarito Canyon Circular Plot Overstory

Date: 8/92

Reader/Recorder: Lee Pierce/Mary Salisbury/Dan Dunham/Angela

600 Feet Transect

FILE: RCRA10U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	6.32					
ROCK	0.00					
LITTER	79.88					
MOSS/LICHEN		0.83	6.04	0.02	1.08	3.56
BROX		0.83	6.04	0.10	6.45	6.25
AGAL		5.58	40.46	0.43	27.96	34.21
POAX		1.42	10.27	0.15	9.68	9.97
BEFE		0.02	0.12	0.02	1.08	0.60
FRAM		0.10	0.72	0.03	2.15	1.44
THFE		2.27	16.43	0.22	13.98	15.20
GALX		1.22	8.82	0.27	17.20	13.01
VETH		0.08	0.60	0.02	1.08	0.84
VIOLA		0.27	1.93	0.07	4.30	3.12
CLPS		0.13	0.97	0.07	4.30	2.63
THPI		0.35	2.54	0.07	4.30	3.42
TRAX		0.03	0.24	0.03	2.15	1.20
RHRA		0.58	4.23	0.05	3.23	3.73
JUNCUS		0.08	0.60	0.02	1.08	0.84
SALX		0.00	0.00	0.00	0.00	0.00
ORFA		0.00	0.00	0.00	0.00	0.00
IPAG		0.00	0.00	0.00	0.00	0.00
ROSA		0.00	0.00	0.00	0.00	0.00
CAAQ		0.00	0.00	0.00	0.00	0.00
CARX		0.00	0.00	0.00	0.00	0.00
HOJU		0.00	0.00	0.00	0.00	0.00
APCA		0.00	0.00	0.00	0.00	0.00
CARO		0.00	0.00	0.00	0.00	0.00
ACLA		0.00	0.00	0.00	0.00	0.00
ANPA		0.00	0.00	0.00	0.00	0.00
ERIX		0.00	0.00	0.00	0.00	0.00
ASTU		0.00	0.00	0.00	0.00	0.00
AGSM		0.00	0.00	0.00	0.00	0.00
GECA		0.00	0.00	0.00	0.00	0.00
ARLU		0.00	0.00	0.00	0.00	0.00
TRDU		0.00	0.00	0.00	0.00	0.00
HYRI		0.00	0.00	0.00	0.00	0.00
CRJA		0.00	0.00	0.00	0.00	0.00
LUCA		0.00	0.00	0.00	0.00	0.00
HEPE		0.00	0.00	0.00	0.00	0.00
GRAP		0.00	0.00	0.00	0.00	0.00
ROSA		0.00	0.00	0.00	0.00	0.00
Total =	86.2	13.8	100	1.55	100	100

Pajarito Canyon Circular Plot Overstory

Date: 8/92

Reader/Recorder: Lee Pierce/Mary Salisbury/Dan Dunham/Angela

600 Feet Transect

FILE: RCRA10U.WK1

Species	Cover	Plant Cover	Rel. Plant Cover	Freq.	Rel. Freq.	Importance Index
BARE SOIL	6.32					
ROCK	0.00					
LITTER	79.88					
MOSS/LICHEN		0.83	6.04	0.02	1.08	3.56
BROX		0.83	6.04	0.10	6.45	6.25
AGAL		5.58	40.46	0.43	27.96	34.21
POAX		1.42	10.27	0.15	9.68	9.97
BEFE		0.02	0.12	0.02	1.08	0.60
FRAM		0.10	0.72	0.03	2.15	1.44
THFE		2.27	16.43	0.22	13.98	15.20
GALX		1.22	8.82	0.27	17.20	13.01
VETH		0.08	0.60	0.02	1.08	0.84
VIOLA		0.27	1.93	0.07	4.30	3.12
CLPS		0.13	0.97	0.07	4.30	2.63
THPI		0.35	2.54	0.07	4.30	3.42
TRAX		0.03	0.24	0.03	2.15	1.20
RHRA		0.58	4.23	0.05	3.23	3.73
JUNCUS		0.08	0.60	0.02	1.08	0.84
SALX		0.00	0.00	0.00	0.00	0.00
ORFA		0.00	0.00	0.00	0.00	0.00
IPAG		0.00	0.00	0.00	0.00	0.00
ROSA		0.00	0.00	0.00	0.00	0.00
CAAQ		0.00	0.00	0.00	0.00	0.00
CARX		0.00	0.00	0.00	0.00	0.00
HOJU		0.00	0.00	0.00	0.00	0.00
APCA		0.00	0.00	0.00	0.00	0.00
CARO		0.00	0.00	0.00	0.00	0.00
ACLA		0.00	0.00	0.00	0.00	0.00
ANPA		0.00	0.00	0.00	0.00	0.00
ERIX		0.00	0.00	0.00	0.00	0.00
ASTU		0.00	0.00	0.00	0.00	0.00
AGSM		0.00	0.00	0.00	0.00	0.00
GECA		0.00	0.00	0.00	0.00	0.00
ARLU		0.00	0.00	0.00	0.00	0.00
TRDU		0.00	0.00	0.00	0.00	0.00
HYRI		0.00	0.00	0.00	0.00	0.00
CRJA		0.00	0.00	0.00	0.00	0.00
LUCA		0.00	0.00	0.00	0.00	0.00
HEPE		0.00	0.00	0.00	0.00	0.00
GRAP		0.00	0.00	0.00	0.00	0.00
ROSA		0.00	0.00	0.00	0.00	0.00
Total =	86.2	13.8	100	1.55	100	100

LOS ALAMOS NAT'L LAB,
18-4 REPORT SECTION
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