A Biological Assessment of the Potential Effects of the Wildfire Hazard Reduction Project on Federally Listed Threatened and Endangered Species

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Prepared By: Samuel R. Loftin

Primary Assessment Leader: Timothy K. Haarmann

ESH-20, Ecology Group

Los Alamos National Laboratory

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LIST OF ACRONYMS

AEI	area of environmental interest
AOC	area of concern
dBA	A-weighted decibels
dbh	diameter at breast height
DOE	Department of Energy
DU	depleted uranium
ESA	Endangered Species Act
ESH-20	Ecology Group
GIS	geographic information system
HE	high explosives
HMP	Habitat Management Plan
ISM	Integrated Safety Management
LANL	Los Alamos National Laboratory
LIR	Laboratory Implementation Requirement
NCB	NEPA, Cultural Resources, and Biological Resources
NEPA	National Environmental Policy Act
NMAC	New Mexico Administrative Code 2.60
PRS	potential release site
RCRA	Resource Conservation and Recovery Act
SWMU	solid waste management unit
TA	Technical Area
T&E	threatened and endangered
USFWS	United States Fish and Wildlife Service
WHRP	Wildfire Hazard Reduction Project

SUMMARY

The proposed action for the Wildfire Hazard Reduction Plan (WHRP) is to (1) reduce the risk of damage and injury to property, human life and health, and natural and cultural resources from high-intensity wildfires at Los Alamos National Laboratory (LANL) and (2) enhance forest health at LANL. These objectives would be implemented through a series of forest and woodland thinning projects. In order to minimize impact to federally listed threatened and endangered (T&E) species, all activities will follow the guidelines of the LANL Habitat Management Plan (HMP).

This biological assessment accounts for the direct, indirect, and cumulative effects of the proposed action on T&E species. An HMP screening evaluation revealed that there was no habitat at LANL for the whooping crane (*Grus americana*) and the black-footed ferret (*Mustela nigripes*); therefore, this project should have no effect on these two species. There is habitat for the southwestern willow flycatcher (*Empidonax trailii extimus*) on LANL. However, because WHRP activities will not affect this habitat, this project should have no effect on this species. WHRP treatments are likely to alter bald eagle (*Haliaeetus leucocephalus*) and Mexican spotted owl (*Strix occidentalis lucida*) habitat on LANL property. The treatments are designed to reduce the wildfire hazard while improving or not reducing habitat values to these species. If HMP guidelines are followed and environmental protection measures (Section 3.6) are followed, the WHRP may affect but is not likely to adversely affect these species.

1.0 PROPOSED ACTION

The focus of the WHRP is to (1) reduce the risk of damage and injury to property, human life and health, and biological resources from high-intensity wildfires at LANL and (2) enhance forest health at LANL. This program would initially be composed of a series of individual, relatively small-scale projects that would be conducted over approximately the next three years with ongoing, long-term maintenance projects conducted thereafter. These initial projects would be conducted to bring the forests at LANL to the desired end-state for wildfire risk followed by an ongoing maintenance program to maintain the forests in this desired state with enhancements to improve overall forest health. An estimated 35 percent, approximately 10,000 acres (4,000 ha), of LANL would be treated under this program, including portions of LANL burned during the Cerro Grande Fire. Individual initial and maintenance projects would be separately tailored to the specific needs and conditions of each forested area and would be composed of any or all of several different measures. Individual projects would employ mechanical or manual thinning

methods. No use of fire as an initial treatment measure would be employed. Each project would incorporate all of the below listed planning measures, along with the implementation of any or all of several different environmental protection measures, forest treatment measures, wood products and waste disposal methods, and long-term maintenance measures for the identified project area. Additionally, each project may also include one or more of the post-treatment assessment measures.

All program projects and their related activities would be conducted in compliance with the LANL HMP, site permit requirements, and all applicable local, state, and national laws and regulations. The planning and implementation of individual projects would be coordinated with adjacent land managers and owners to maximize consistency of forest resource end-state conditions across the Pajarito Plateau.

2.0 ENVIRONMENTAL BASELINE

2.1 Regional Description

2.1.1 Location within the State

LANL and the associated residential areas of Los Alamos and White Rock are located in Los Alamos County, north-central New Mexico, approximately 60 mi (100 km) north-northeast of Albuquerque and 25 mi (40 km) northwest of Santa Fe (Figure 1). The 28,654-acre (11,596-ha) LANL site is situated on the Pajarito Plateau. This plateau is a series of finger-like mesas separated by deep east-to-west oriented canyons cut by intermittent streams. Mesa tops range in elevation from approximately 7,800 ft (2,400 m) on the flanks of the Jemez Mountains to about 6,200 ft (1,900 m) at their eastern termination above the Rio Grande.

Most LANL and community developments are confined to mesa tops. The surrounding land is largely undeveloped. Large tracts of land north, west, and south of the LANL site are held by the Santa Fe National Forest, Bureau of Land Management, Bandelier National Monument, General Services Administration, and Los Alamos County. The Pueblo of San Ildefonso borders LANL to the east.

2.1.2 Geologic Setting

Most of the finger-like mesas in the Los Alamos area are formed from Bandelier Tuff, which is composed of ash fall, ash fall pumice, and rhyolite tuff. The tuff, ranging from nonwelded to welded, is more than 1,000 ft (300 m) thick in the western part of the plateau and

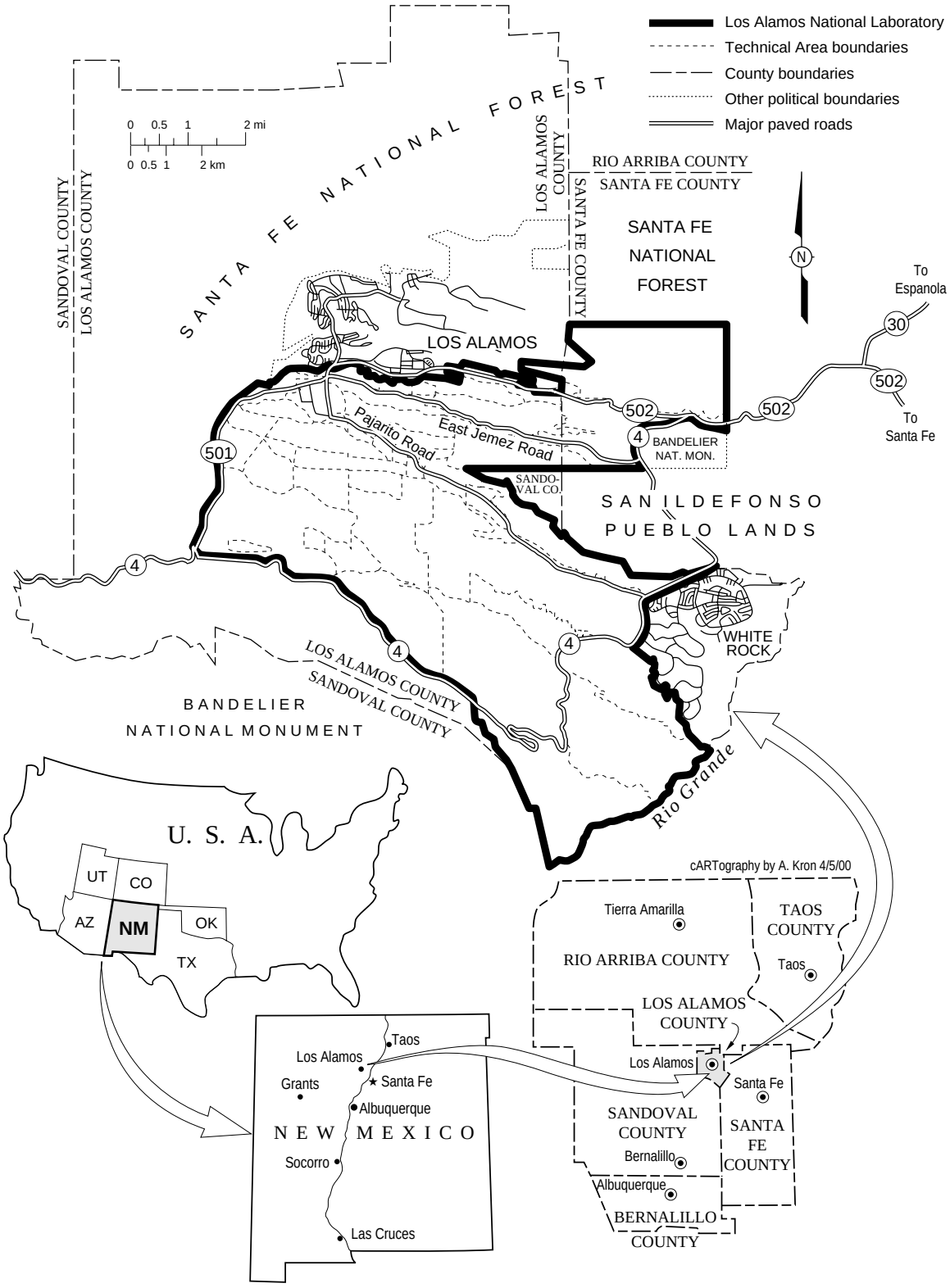

Figure 1. Location of Los Alamos National Laboratory.

thins to about 260 ft (80 m) eastward above the Rio Grande. It was deposited after major eruptions in the Jemez Mountains' volcanic center about 1.2 to 1.6 million years ago. On the western part of the Pajarito Plateau, the Bandelier Tuff overlaps onto the Tschicoma Formation, which consists of older volcanics that form the Jemez Mountains. The tuff is underlain by the conglomerate of the Puye Formation in the central plateau and near the Rio Grande. Chino Mesa basalts interfinger with the conglomerate along the river. These formations overlay the sediments of the Santa Fe Group, which extend across the Rio Grande Valley and are more than 3,300 ft (1,000 m) thick. LANL is bordered on the east by the Rio Grande, within the Rio Grande rift. Because the rift is slowly widening, the area experiences frequent minor seismic disturbances.

Surface water in the Los Alamos area occurs primarily as short-lived or intermittent reaches of streams. Perennial springs on the flanks of the Jemez Mountains supply base flow into the upper reaches of some canyons, but the volume is insufficient to maintain surface flows across the LANL site before they are depleted by evaporation, transpiration, and infiltration. Runoff from heavy thunderstorms or heavy snowmelt reaches the Rio Grande several times a year in some drainages. Effluents from sanitary sewage, industrial waste treatment plants, and cooling-tower blowdown enter some canyons at rates sufficient to maintain surface flows for varying distances.

Groundwater in the Los Alamos area occurs in three forms: (1) water in shallow alluvium in canyons, (2) perched water (a body of groundwater above a less permeable layer that is separated from the underlying main body of groundwater by an unsaturated zone), and (3) the main aquifer of the Los Alamos area. Ephemeral and interrupted streams have filled some parts of canyon bottoms with alluvium that ranges from less than 3 ft (1 m) to as much as 100 ft (30 m) in thickness. Runoff in canyon streams percolates through the alluvium until its downward movement is impeded by layers of weathered tuff and volcanic sediment that are less permeable than the alluvium. This process creates shallow bodies of perched groundwater that move downgradient within the alluvium. As water in the alluvium moves down the canyon, it is depleted by evapotranspiration and movement into underlying volcanics (Purtymun et al., 1977). The chemical quality of the perched alluvial groundwaters shows the effects of discharges from LANL.

In portions of Pueblo, Los Alamos, and Sandia canyons, perched groundwater occurs beneath the alluvium at intermediate depths within the lower part of the Bandelier Tuff and within the underlying conglomerates and basalts. Perched groundwater has been found at depths of about 120 ft (37 m) in the midreach of Pueblo Canyon to about 450 ft (137 m) in Sandia

Canyon near the eastern boundary of LANL. This intermediate-depth perched water discharges at several springs in the area of Basalt Spring in Los Alamos Canyon. These intermediate-depth groundwaters are formed in part by recharge from the overlying perched alluvial groundwaters and show evidence of radioactive and inorganic contamination from LANL operations.

Perched water may also occur within the Bandelier Tuff in the western portion of LANL, just east of the Jemez Mountains. The source of this perched water might be infiltration from streams discharging from the mouths of canyons along the mountain front and underflow of recharge from the Jemez Mountains. Industrial discharges from LANL operations may also contribute to perched groundwater in the western portion of LANL. Perched groundwater in the Tschicoma Formation is the source of water supply for the ski area located just west of the LANL boundary in the Jemez Mountains.

The main aquifer of the Los Alamos area is the only aquifer in the area capable of serving as a municipal water supply. The surface of the aquifer rises westward from the Rio Grande within the Tesuque Formation (part of the Santa Fe Group) into the lower part of the Puye Formation beneath the central and western part of the plateau. Depth to the main aquifer is about 1,000 ft (300 m) beneath the mesa tops in the central part of the plateau. The main aquifer is separated from alluvial and perched waters by about 350 to 620 ft (110 to 190 m) of tuff and volcanic sediments with low (less than 10 percent) moisture content.

Water in the main aquifer is under artesian conditions under the eastern part of the Pajarito Plateau near the Rio Grande (Purtymun and Johnson 1974). The source of recharge to the aquifer is presently uncertain. Early research studies concluded that major recharge to the main aquifer is probably from the Jemez Mountains to the west because the piezometric surface slopes downward to the east, suggesting easterly groundwater flow beneath the Pajarito Plateau. However, the small amount of recharge available from the Jemez Mountains relative to water supply pumping quantities, along with differences in isotopic and trace element composition, appear to rule this out. Further, isotopic and chemical composition of some waters from wells near the Rio Grande suggest that the source of water underlying the eastern part of the Pajarito Plateau may be the Sangre de Cristo Mountains (Blake et al., 1995).

Groundwater flow along the Rio Grande rift from the north is another possible recharge source. The main aquifer discharges into the Rio Grande through springs in White Rock Canyon. The 11.5-mi (18.5-km) reach of the river in White Rock Canyon between Otowi Bridge and the mouth of Rito de los Frijoles receives an estimated 4,300 to 5,500 acre-ft (5.3 to $6.8 \cdot 10^6$ m^3) annually from the aquifer.

2.1.3 Topographic Setting

LANL and its surrounding environments encompass a wide range of environmental conditions. This is due in part to the prominent elevational gradient in the east-west direction. This is also attributable to the complex, local topography that is found throughout much of the region.

The spectacular scenery that is a trademark of the Los Alamos area is largely a result of the prominent elevational gradient of the region. The difference between its lowest elevation in the eastern extremities and its highest elevation on the western boundaries represents a change of approximately 5,146 vertical feet (1,568 m). At the lowest point along the Rio Grande, the elevation is approximately 5,350 ft (1,631 m) above mean sea level. At the opposite elevational extreme, the Sierra de los Valles, which is part of the more extensive Jemez Mountains, form a continuous backdrop to the landscapes of the study region. The tallest mountain peaks in the Sierra include Pajarito Mountain at 10,441 ft (3,182 m), Cerro Rubio at 10,449 ft (3,185 m), and Caballo Mountain at 10,496 ft (3,199 m).

In addition to the prominent elevational gradient, the Los Alamos region is also topographically complex. Within Los Alamos County, there are three main physiographic systems (Nyhan et al., 1978). From east to west, these systems are the White Rock Canyon, the Pajarito Plateau, and the Sierra de los Valles. White Rock Canyon is 6,200 ft (1,890 m) above mean sea level. This rugged canyon is approximately 1 mi (1.6 km) wide and extends to a depth of nearly 900 ft (275 m). White Rock Canyon occupies about 5 percent of Los Alamos County. The Pajarito Plateau is the largest of the three physiographic systems, occupying nearly 65 percent of Los Alamos County. The Pajarito Plateau is a broad piedmont that slopes gently to the east and southeast. At a more localized scale, the Pajarito Plateau is also topographically complex. The surface of the plateau is dissected into narrow mesas by a series of east-west-trending canyons. Above 7,800 ft (2,377 m), the Sierra de los Valles rises to the western extremity of the study region. These mountains occupy approximately 30 percent of Los Alamos County. The Sierra is also dissected into regularly spaced erosional features, although these canyons in the mountains are not so prominent as the canyons on the Pajarito Plateau.

2.1.4 Weather and Climate

Los Alamos has a temperate, semiarid mountain climate. However, its climate is strongly influenced by elevation, and large temperature and precipitation differences are observed in the area because of the topography.

Los Alamos has four distinct seasons. Winters are generally mild, but occasionally winter storms produce large amounts of snow and below-freezing temperatures. Spring is the windiest season of the year. Summer is the rainy season in Los Alamos, when afternoon thunderstorms and associated hail and lightning are common. Fall marks the end of the rainy season and a return to drier, cooler, and calmer weather. The climate statistics discussed below summarize analyses given in Bowen (1990 and 1992).

Several factors influence the temperature in Los Alamos. An elevation of 7,400 ft (2,256 m) helps to counter its southerly location, making for milder summers than nearby locations with lower elevations. The sloping nature of the Pajarito Plateau causes cold-air drainage, making the coolest air settle into the valley. The Sangre de Cristo Mountains to the east act as a barrier to arctic air masses affecting the central and eastern United States. The temperature does occasionally drop well below freezing, however. Another factor affecting the temperature in Los Alamos is the lack of moisture in the atmosphere. With less moisture, there is less cloud cover, which allows a significant amount of solar heating during the daytime and radiative cooling during the nighttime. This heating and cooling often causes a wide range of daily temperature.

Winter temperatures range from 30°F to 50°F (-1°C to 10°C) during the daytime to 15°F to 25°F (-9°C to -4°C) during the nighttime. The record low temperature recorded in Los Alamos (as of 1992) is -18°F (-28°C). Winter is usually not particularly windy, so extreme wind chills are uncommon at Los Alamos. Summer temperatures range from 70°F to 88°F (21°C to 31°C) during the daytime to 50°F to 59°F (10°C to 15°C) during the nighttime. Temperatures occasionally will break 90°F (32°C). The highest temperature ever recorded (as of 1992) in Los Alamos is 95°F (35°C).

The average annual precipitation in Los Alamos is 18.73 in. (47.57 cm). The average snowfall for a year is 58.9 in. (149.6 cm). Freezing rain and sleet are rare at Los Alamos. Winter precipitation in Los Alamos is often caused by storms entering the United States from the Pacific Ocean, or by cyclones forming or intensifying in the lee of the Rocky Mountains. When these storms cause upslope flow over Los Alamos, large snowfalls can occur. The snow is usually a dry, fluffy powder, with an average equivalent water-to-snowfall ratio of 1:20.

The summer rainy season accounts for 48 percent of the annual precipitation. During the July–September period, orographic thunderstorms form when moist air from the Gulf of Mexico and the Pacific Ocean moves up the sides of the Jemez Mountains. These thunderstorms can bring large downpours, but sometimes they only cause strong winds and lightning. Hail frequently occurs from these rainy-season thunderstorms.

Winds in Los Alamos are also affected by the complex topography, particularly in the absence of a large-scale disturbance. There is often a distinct daily cycle of the winds around Los Alamos. During the daytime, upslope flow can produce a southeasterly wind on the plateau. In the evening, as the mountain slopes and plateau cool, the flow moves downslope, causing light westerly and northwesterly flow. Cyclones moving through the area disturb and override the cycle. Flow within the canyons of the Pajarito Plateau can be quite varied and complex.

2.1.5 Plant Communities

The Pajarito Plateau, including the Los Alamos area, is biologically diverse. This diversity of ecosystems is due partly to the dramatic 5,000-ft (1,500-m) elevation gradient from the Rio Grande on the east to the Jemez Mountains 12 mi (20 km) to the west, and partly to the many steep canyons that dissect the area. Five major vegetative cover types are found in Los Alamos County: juniper (*Juniperus monosperma* [Engelm.] Sarg.)-savanna, piñon (*Pinus edulis* Engelm.)-juniper, ponderosa pine (*Pinus ponderosa* P. & C. Lawson), mixed conifer, and spruce-fir. The juniper-savanna community is found along the Rio Grande on the eastern border of the plateau and extends upward on the south-facing sides of canyons at elevations between 5,600 to 6,200 ft (1,700 to 1,900 m). The piñon-juniper cover type, generally in the 6,200- to 6,900-ft (1,900- to 2,100-m) elevation range, covers large portions of the mesa tops and north-facing slopes at the lower elevations. Ponderosa pines are found in the western portion of the plateau in the 6,900- to 7,500-ft (2,100- to 2,300-m) elevation range. These three cover types predominate, each occupying roughly one-third of the LANL site. The mixed conifer cover type, at an elevation of 7,500 to 9,500 ft (2,300 to 2,900 m), overlaps the ponderosa pine community in the deeper canyons and on north-facing slopes and extends from the higher mesas onto the slopes of the Jemez Mountains. Subalpine grassland is at higher elevations of 9,500 to 10,500 ft (2,900 to 3,200 m). Twenty-seven wetlands and several riparian areas enrich the diversity of plants and animals found on LANL lands.

2.1.6 Postfire Plant Communities

In May 2000, the Cerro Grande Fire burned over 43,000 acres of forest on and around LANL. Most of the habitat damage occurred on Forest Service property to the west and north of LANL. An assessment of fire-induced vegetation mortality (Table 1) was made by the Burned Area Emergency Rehabilitation Team (BAER 2000). Vegetation mortality was broken into four classes, 0−10%, 10−40%, 40−70%, and 70−100%. Although the vegetation will recover, the amount of time for recovery, the ultimate composition and distribution of vegetation types, and the effect on T&E species is unknown.

Table 1. Summary of the Effects of the Cerro Grande Fire on Vegetation Mortality (acres/hectares).

Plant Associations	0−10%	10−40%	40−70%	70−100%	Totals
Aspen	349/141	297/120	128/52	550/223	1,324/536
Grass	215/87	1,392/563	293/119	153/62	2,063/831
Grass-Shrub Complex	133/54	622/251	140/57	32/13	927/375
Meadow	25/10	13/5	0	0	38/15
Mixed Conifer	1,605/649	2,209/894	938/380	4,989/2,019	9,741/3,942
Oak	7/3	220/89	84/34	462/187	773/313
Piñon-Juniper	109/44	2,213/896	1,117/452	1,608/651	5,0472,043
Ponderosa Pine	805/326	6,872/2,781	5,252/2,125	8,886/3,596	21,815/8,828
Riparian/Evergreen	0	50/20	0	0	50/20
White Fir	0	18/7	280/113	379/153	677/273
Totals	3,248/1,314	13,906/5,628	8,232/3,331	17,059/6,904	42,445/17,177

3.0 PROJECT DESCRIPTION

3.1 Goals and Objectives of the WHRP Plan

On August 10, 2000, the DOE Los Alamos Area Office Manager issued a Finding of No Significant Impact for the Wildfire Hazard Reduction and Forest Health Improvement Program Environmental Assessment (DOE 2000). As part of this determination, DOE requested that a Project Plan be completed before initiating any further activities. The resultant WHRP plan identifies and prioritizes planning areas and projects on a three-phase implementation schedule. Treatments have been developed for facility infrastructure protection and for fuel reduction and forest health purposes. This plan has been prepared to provide the basis for directing programmatic and project-specific actions to reduce the risk of catastrophic wildfire at Los Alamos National Laboratory (LANL). It also provides the basis for consultation with the US Fish and Wildlife Service (USFWS) and the New Mexico State Historic Preservation Office as needed.

The overall goals of the WHRP Plan are to

1) Protect the public, LANL workers, facilities, and the environment from catastrophic wildfire.
2) Prevent interruptions of LANL operations from wildfire.
3) Minimize impacts to cultural and natural resources while conducting fire management activities.
4) Improve forest health and wildlife habitat.

The most important goal of wildfire management at LANL is to enhance the safety of human life and the protection of LANL facilities. This will be accomplished by reducing the fire hazard in the environments that are adjacent to developed and populated sections of LANL. Three additional priorities will be addressed by wildfire management activities at LANL. First, interruptions of LANL operations will be lessened through the proactive coordination of management efforts so that the threat of uncontrolled wildland fires is minimized or eliminated. Second, new hazards associated with the effects of the Cerro Grande Fire will be addressed in coordination with other regional recovery efforts. Cultural and natural resources will be protected by altering vegetation structures, by implementing appropriate fire management activities, and by reducing the need for active fire suppression measures. Third, forest health will be improved by managing for more open, uneven aged forests, and removing diseased, malformed, or weakened trees. Some large-diameter trees will remain to form snags for wildlife.

The above goals will be accomplished through the following specific objectives:

1) Reduce fuel loads within LANL forests to reduce wildfire hazards.
2) Reduce the risk of wildfire escapes at LANL-designated firing sites by treating fuels.
3) Improve wildland fire suppression capability through fire road improvements.
4) Monitor the effectiveness of wildfire hazards reduction actions and modify management techniques as appropriate.
5) Conduct fire management activities in a manner that will comply with all applicable regulatory requirements.
6) Integrate the WHRP Plan with other resource management plans including the HMP and the Biological Resources Management Plan.

3.2 End-State Conditions

A key planning objective is to establish desired conditions as the end-state of the fuels-reduction and maintenance projects initiated under the WHRP. There are multiple end-state conditions, depending on the location and use of the area. High-risk sites require lower fuel loadings and more intensive management than remote forests and woodlands. The majority of LANL will be managed for forest health. General end-state conditions would be a spatial mosaic of tree sizes, age classes, and densities with an herbaceous plant understory that is resistant to high-intensity wildfires and that can be maintained with selective cutting and underburning. This condition would more closely emulate conditions that would exist under a natural fire regime in which higher-frequency, low-intensity surface fires kept the fuel load and tree density low. The

treated areas would appear more park-like with an increase in the diversity of shrubs, herbs, and grasses in the understory. Conditions have been modified for special designations.

Defensible Space around Buildings

Protection measures will be based on "Urban-Wildland Interface Code 2000" (UWIC 2000). In extreme fire hazard areas, the first 50 ft (15 m) from a building would be cleared of combustible trees and brush. The next 50 ft (15 m) would be thinned to a fuel break specification. In high fire hazard areas, the first 25 ft (7.5 m) would be cleared of combustible trees and brush. The next 25 ft (7.5 m) would be thinned to a fuel break specification. In moderate fire hazard areas, the first 10 ft (3 m) and 20 ft (6 m) will be cleared and thinned respectively. Low fire hazard areas are cleared out to 10 ft (3 m) as a standard practice.

Fuel Breaks

LANL fuel breaks will be comprised of open forests and low surface fuel loads and can vary from 100 to 700 ft (30 to 213 m) in width. Tree crowns should be 10 to 25 ft (3 to 8 m) apart, tree density should be about 50 trees/acre (124 trees/ha) or have a basal area of about 60 ft^2/acre (14 m^2/ha). Limbs could be removed from the lower 6 to 8 ft (2-2.5 m) on residual trees.

Firing Sites

LANL Firing Sites will be treated as fuel breaks as mentioned above except Firing Sites are treated out to 1200 ft (365 m).

Utility Corridors

All aboveground utilities would be cleared of trees within the easement corridor that potentially could interfere with the transmission of the utility. Power lines will be prioritized from most important to least important and cleared accordingly. Power line corridors are usually cleared of trees depending on the size of the power line (13.8-kv lines have a 50-ft (15-m) easement; 115-kv lines have a 100-ft (30-m) easement, and corridors are cleared out at a 45 degree angle from the edge.

Piñon-Juniper Woodland Health

Proposed end-state conditions for piñon-juniper woodlands on LANL property would be a mix of open, savanna-like conditions with interspersed closed canopy (untreated) woodland. Where appropriate, slash generated during the thinning treatment will be left on-site to help

reduce soil erosion and promote herbaceous plant response. This would increase surface fuel loads; consequently, these areas would be isolated from adjoining woodlands to reduce the risk of wildfire carrying from one area to another. The desired end-state conditions for thinned piñon-juniper woodlands would fall within the following parameters:

- Individual tree crowns would be separated by a distance of no less than 25 ft (7.6 m).
- The crowns from a high-density cluster of trees will be isolated by at least 40 ft (12 m).
- Diseased, malformed, or weakened trees will be preferentially removed.
- The remaining trees should represent a mix of sizes and ages.

Thinning treatments should promote herbaceous plant response, reduce surface runoff of precipitation, and increase wildlife habitat quality. Areas appropriate for thinning would have the following characteristics:

- Woodland with less than 25 ft (7.6 m) between tree crowns.
- Relatively low slope (<40 percent).

Ponderosa Pine Forest Health

The desired end-state conditions for thinned ponderosa pine forests would fall within the following parameters:

- Individual tree crowns (or in some cases, groups of trees) would be separated by a distance of about 10 to 25 ft (3 to 7.5 m).
- The crowns from a group of trees would be separated by a distance of about 40 ft (12 m) from each other.
- Tree density would be about 50 to 150 trees per acre (124 to 370 trees per ha).
- Canopy cover range from 40 percent to 60 percent of the project area.
- "Ladder" fuels that would allow fire to move from the ground into the tree crowns would be removed.
- The majority of trees to be removed would be approximately 9 in. (22.5 cm) in diameter breast height (dbh) or less.
- Some trees 12 to 16 in. (30 to 40 cm) dbh may be removed to achieve the desired spacings.
- Diseased, malformed, or weakened trees would be preferentially removed during thinning treatments.

Mixed Conifer Forest Health

The desired end-state conditions for thinned mixed conifer forests would fall within the following parameters:

- No more than 30 percent of mixed conifer habitat within a planning area would be treated in a 10-year period either manually or mechanically. This does not apply to prescribed burning.
- Retain all hardwoods and shrubs within the treatment area.
- Retain all large logs (12-in. diameter) for small mammal habitat.
- "Ladder" fuels that would allow fire to move from the ground into the tree crowns would be removed.
- The majority of trees to be removed would be approximately 9 in. (22.5 cm) dbh or less.
- Some trees 12 to 16 in. (30 to 40 cm) dbh may be removed to achieve the desired spacing.
- Diseased, malformed, or weakened trees would be preferentially removed during thinning treatments with the exception of a few wildlife snags.
- Treatment areas should be small (1 to 20 acre [0.40 to 8 ha]), irregularly shaped, and designed in a mosaic pattern with untreated areas.

T&E Species Habitat

Every effort will be made to protect or improve T&E species habitat on LANL. T&E species habitat is found in mixed conifer, ponderosa pine and piñon-juniper vegetation types. The HMP provides guidelines for thinning activities (methods and timing). Applicable T&E species-specific activities are described in Section 6.0.

3.3 Treatments

Fuels-reduction and maintenance treatment measures will be identified for each project based on individual site conditions and the desired end-state results. Common to all projects would be the equipment, the use of qualified personnel, and the job performance involved.

Tree Thinning

In general, thinning would consist of mechanically and manually reducing the density of trees by selective cutting. Understory thinning removes select woody vegetation, fallen trees and limbs, and low-growing tree limbs that could act as so called "ladder fuel" that can carry a surface fire upwards into the tree crowns. Tree thinning removes select trees to interrupt the continuity of

the forest canopy and, consequently, the potential for a crown fire to spread. Trees selected for thinning would be marked at least 6 in. (15 cm) above the ground and on the side away from trails or potential public viewing areas. Remaining tree stumps would be 6 in. (15 cm) or less. Large, fire-resistant species of trees, e.g., ponderosa pines, would be retained.

A typical project would use from 6 to 20 qualified personnel, axes, chainsaws, chipping machines, one or two front-end loaders, one watering truck, one or two dump trucks, and possibly a small farm tractor. One or two logging trucks per project may also be required. Areas with greater than 30 percent slopes would not be treated using vehicular equipment, but hand-held equipment could be used to cut tree limbs or small-diameter trees on areas with slopes as great as 40 percent.

Construction or Reclamation of Access (Fire) Roads

New access roads may have to be constructed as a part of the treatment measures and for improved access to facilitate fire suppression efforts in the event of a wildfire (as in the case of the recent Cerro Grande Fire). If required, these roads would be constructed by blading an approximately 16-ft (4.8-m) wide swath. Bar ditches and turnouts would be integral to road construction as needed. Existing access roads may require improvement by such measures as grading and ditching. The planning process may demonstrate that some existing access roads as well as firebreaks are no longer necessary. In this case, existing access roads would be disced and revegetated with native plant species.

Surface Fuels

When the Department of Energy (DOE) finalizes its policy on prescribed fire, pile, and broadcast burns will be considered as a means to reduce surface fuels. Forest treatment areas (excluding fuel breaks, firing sites, and defensible space) will contain a few slash piles and logs at least 12 in. in diameter for small mammal habitat purposes and will be arranged so as not to create a fire hazard to surrounding trees.

Maintenance

Long-term maintenance projects would follow each fuels reduction project to maintain the desired end-state conditions. Project areas would be reviewed about every five years. Periodic mowing and grading of access roads are potential treatments for long-term maintenance of project areas.

3.4 Implementation

This program would be composed of a series of strategically planned projects conducted over approximately the next three years. These projects would bring the forests at LANL to the desired end-state for wildfire risk and hazard reduction. An ongoing maintenance program would maintain the forests in this desired state with enhancements to improve overall forest health. An estimated 35 percent, approximately 10,000 acres (4,000 ha), of LANL would be treated under this program, including some portions of LANL burned during the Cerro Grande Fire.

Three phases of implementation have been developed according to wildfire hazard reduction priorities. They are

1) Phase 1: High priority strategic projects, primarily fuel breaks, and defensible space in heavily forested urban interface areas to reduce the wildfire hazard to the public, LANL employees, and key facilities and infrastructure. Also included are firing site treatments to reduce the risk of wildfire ignition and escape. These projects are planned for FY01–FY02.
2) Phase 2: Moderate priority, larger forest fuels reduction projects in heavily forested areas to reduce the general wildfire hazard and improve forest health. These projects are planned for FY02–FY03.
3) Phase 3: Lower priority, larger forest fuels reduction projects in more moderately forested and remote areas to reduce wildfire hazards in general and to improve forest health. These projects are planned for FY03.

Phase I treatments (not including defensible space or utility corridors) are displayed in Figure 2. Fuels reduction and maintenance projects will be separately tailored to the specific needs and conditions of each forested area. Table 2 lists Planning Area objectives, acres to be treated, primary end-state, and phase of treatment for all Planning Areas (Figure 3). All program projects and their related activities would be conducted in compliance with the Wildfire Hazard Reduction and Forest Health Improvement Program Environmental Assessment (DOE 2000b) and the WHRP Plan (LANL 2001) guidelines.

The WHRP actions will be conducted in a manner that complies with the LANL Integrated Safety Management (ISM) system. Under the ISM system, all planning, construction and operational activities must comply with the institutional process established under Laboratory Implementation Requirement (LIR) 404-30-02.0 – also known as the National Environmental Policy Act (NEPA), Cultural Resources, and Biological Resources (NCB) LIR. The NCB LIR establishes the institutional requirements that are implemented to ensure that contractual work

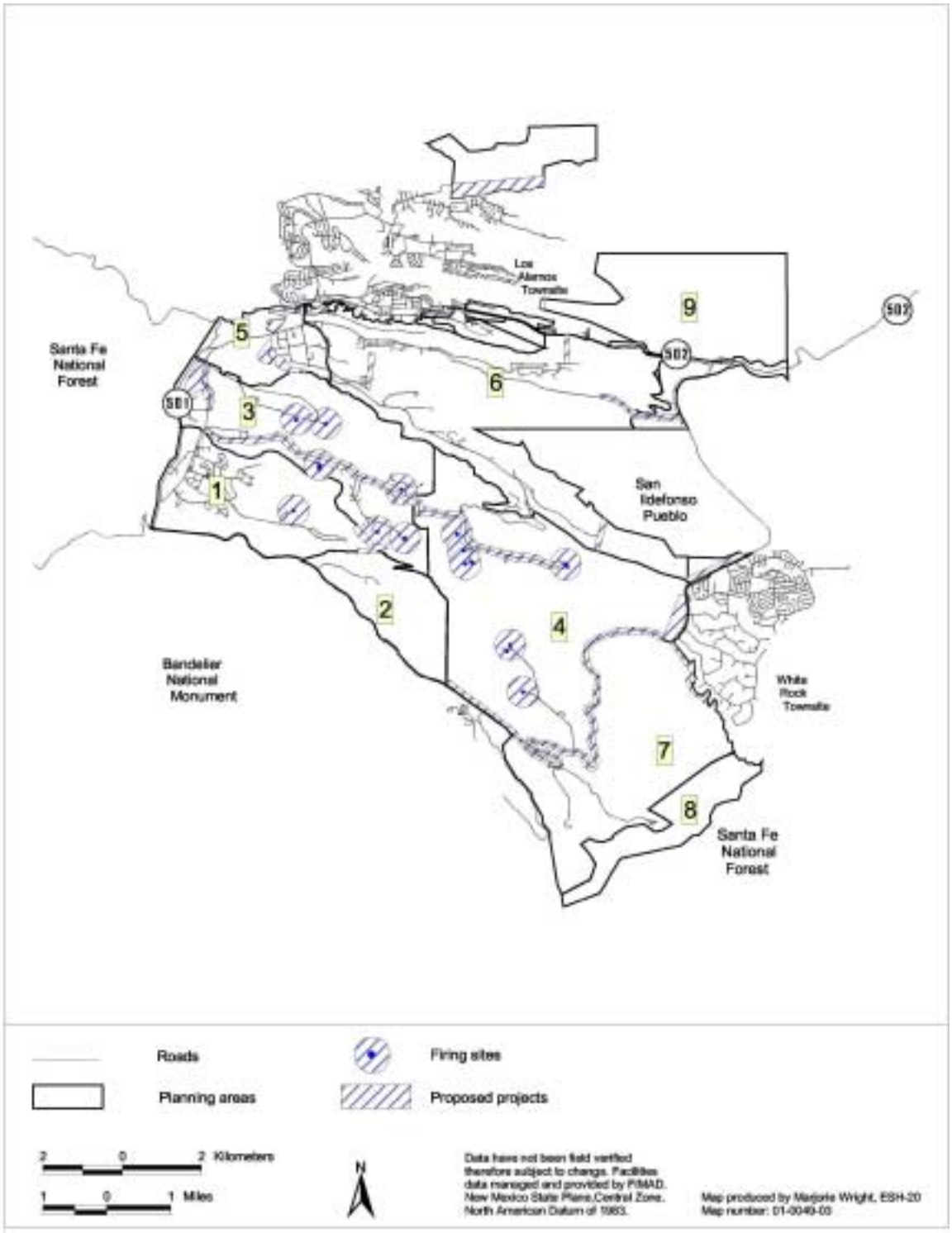

Figure 2. Phase I Treatments.

Table 2. Wildfire Hazard Reduction Area Plans

Planning Area	Acres (Total/Planned for Treatment)	Primary Prescriptions	Phase	Other Issues
1	2,300/1,200	Defensible Space Ponderosa Pine Mixed Conifer	1,2	HMP core habitat Cerro Grande (CG) Fire impacts
2	1,200/100	Ponderosa Pine Mixed Conifer Grassland P-J	2	HMP core habitat CG Fire impacts
3	5,700/3,000	Defensible Space Firing Sites Ponderosa Pine Mixed Conifer	1,2	Firing sites, powerlines, and access roads Winter habitat for wildlife
4	3,300/1,500	Firing Sites Defensible Space Piñon-Juniper	1,3	Firing sites, powerlines, and access roads Habitat for wildlife CG Fire impacts
5	1,000/500	Defensible Space Ponderosa Pine Mixed Conifer	1,2	LANL personnel Powerlines and utilities HMP core habitat CG Fire impacts Key interface area with the townsite
6	5,500/2,000	Defensible Space Ponderosa Pine Mixed Conifer Piñon-Juniper	1,3	LANL personnel Powerlines and utilities HMP core habitat CG Fire impacts Key interface area with White Rock and San Ildefonso Pueblo
7	3,700 total (about 1,200 planned for treatment)	Piñon-Juniper	3	Powerlines HMP core habitat Winter habitat for deer and elk
8	1,000 total (about 200 planned for treatment)	Piñon-Juniper	3	Powerlines HMP core areas, Hiking trails Winter habitat for deer,elk, and bald eagles
9	4,700 total (about 300 planned for treatment)	Ponderosa Pine Mixed Conifer Piñon-Juniper	3	Powerlines and utilities Airport Urban interface Winter habitat for deer and elk Cultural sites

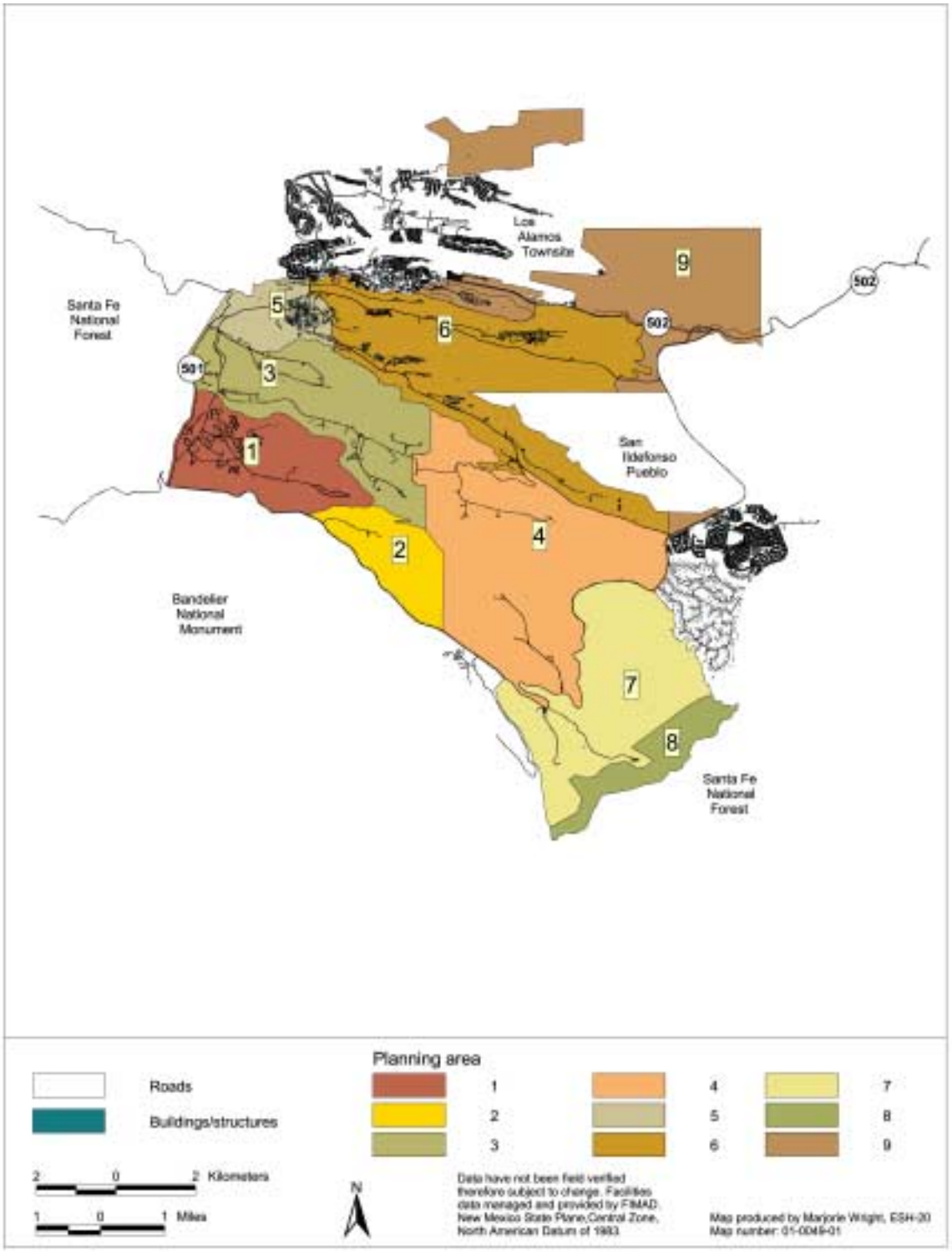

Figure 3. WHRP Planning Areas.

smart standards for NCB Resources are consistently met. These standards are measured by performance criteria contained in the Laboratory Performance Requirement 404-00-00, Appendix 3 (Environmental Protection – Ecological and Cultural Resources) and are the basis for all environmental protection measures implemented as part of this plan.

3.5 Removal of Generated Wood Materials and Disposal of Waste

Thinning treatments produce logs, piles of cut small branches, and brush. Some of this material could be donated or salvaged for use by the surrounding communities. However, some of the smaller logs, branches, and brush (slash) would require disposal as waste. The presence or absence of contamination and type of contamination within the waste would dictate the method(s) of disposal. Proposed methods of removal of wood materials and waste disposal are described in the following paragraphs. One, all, or a combination of measures may be used.

Timber Salvage

Commercial size timber (typically at least 9 in. [22.5 cm] in diameter) that is free of contamination may be salvaged to offset the costs of treatment operations. Logs would be removed by truck either directly to off-site facilities or to on-site temporary storage locations within the project area.

Contaminant-Free Wastes

Slash and other wood wastes could be mechanically reduced (chipped). Wood chips produced during cleanup activities from slash could be used as mulch in selected areas at LANL to foster soil stability and establishment of grasses and shrubs. The depth of wood chip mulch would not exceed 2 in. (5 cm). If slash were used for erosion control at LANL in an unchipped state, it would be used in such a manner so as not to pose a fire hazard.

Potentially Contaminated Wood Materials

Wood materials produced in an identified Potential Release Site (PRS) or other suspect site such as canyon focus areas would be managed according to the respective LANL Division Standard Operating Procedure for Waste Management. LANL has begun a wood sampling program to ensure that contaminants in wood do not pose a risk to human health or to the environment. If wood materials contain high explosives (HE) or depleted uranium (DU) or both, they could be burned at any of the Resource Conservation and Recovery Act (RCRA)- or New Mexico Administrative Code 2.60 (NMAC)-permitted burning facilities within LANL Technical Areas (TAs) 14, 15, 36, 39, and 40. HE contamination is consumed during burning and DU does

not aerosolize at typical wood burning temperatures. In general, the quantities of wastes disposed of in this manner are small. LANL has recently acquired several burn units for wood disposal. These will be used in conformance with regulations and permit requirements.

3.6 Environmental Protection Measures

Integral to fuels mitigation and maintenance actions would be complementary measures to protect public health and natural resources. For any single project it would be unlikely that all the measures would be employed at the same time, but a single project may well use multiple protective measures to complement the chosen treatment measure(s). Measures to protect Federally listed T&E species will be discussed later.

Air Quality Protection Measures

Environmental protection measures for maintaining air quality would include the following:

- Unpaved access roads would be treated to minimize dust generation during the treatment period by the use of standard dust suppression measures.

Water Quality Protection Measures

Environmental protection measures for avoiding potential adverse consequences to water quality are as follows:

- Areas severely disturbed or denuded would be revegetated.
- Water control structures would be constructed as needed.
- Channel stabilization measures would be employed as needed.
- Buffer zones along stream courses may be established for water quality and wildlife habitat purposes.
- Areas with slopes of greater than 30 percent would not be treated using vehicular equipment because of their high erosion potential; areas with slopes of less than about 40 percent may be treated using hand-held equipment.
- Machinery would not be used during saturated soil conditions.
- New fire roads would be constructed on grades of less than 10 percent with bar ditches and turnouts, as appropriate.
- Slash/wood chips will not be placed in a watercourse.

3.7 Proposed Project Location

Planning Areas have been identified for general planning purposes (Figure 2). However, locations for specific actions, other than Phase 1 activities, have not been determined. For the purposes of this assessment, we assume that WHRP activities will occur throughout Lab property.

4.0 CURRENT LEVELS OF ENVIRONMENTAL INFLUENCE

4.1 Land Use and Traffic Volumes

LANL is a 28,654-acre (11,596-ha) national nuclear research facility. Land use is associated with LANL operations and support. LANL is divided into TAs that are used for building sites, experimental areas, waste disposal locations, roads, and utility rights-of-way. However, these uses account for only a small part of the total land area. Most land provides buffer areas for security and safety and is held in reserve for future use. Development and road density on LANL are relatively low except for a few locations. Most of the development is confined to mesa tops. Traffic volume is relatively low and associated with commuter traffic and LANL support activities.

4.2 Environmental Restoration and Contaminants

The Planning Areas contain numerous PRSs. The term PRS is inclusive of solid waste management units (SWMUs) and areas of concern (AOCs). A SWMU is any discernable unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at or around a facility at which solid wastes have been routinely and systematically released. An AOC is any suspected release of a hazardous waste or hazardous waste constituent, which is not directly associated with a SWMU. PRSs do not necessarily have levels of constituents that qualify the site as contaminated.

Potential nesting and foraging habitat for bald eagle and southwestern willow flycatcher habitat is present, although limited, on LANL property. Mexican spotted owl potential nesting and foraging habitat is found throughout the project area. Preliminary (pre Cerro Grande Fire) risk assessments of potential contaminant impacts to these species have been completed (Gallegos et al., 1997; Gonzalez et al. 1998a; Gonzales et al. 1998b). In general, results indicate under prefire conditions, potential contaminants should have no appreciable impact on any of these species. Postfire risk assessments have not been completed at this time.

4.3 Air Quality

LANL maintains an air quality monitoring program run through the Air Quality Group (ESH-17). LANL operations emit radioactive and nonradioactive air pollutants. However, the ambient air quality in and around LANL meets all Environmental Protection Agency and DOE standards for protecting the public and workers (LANL 1999).

4.4 Surface Water and Wetlands

Designated uses for surface drainage water on the Pajarito Plateau, under New Mexico Stream Standards include domestic water supply, high quality coldwater fishery, irrigation, livestock and wildlife watering, wildlife habitat, municipal and industrial water supply, secondary contact, and primary contact.

There are a number of jurisdictional wetlands on LANL property. All are maintained by outflow discharge related to facility operations. Outflow discharge from LANL facilities meets State of New Mexico water quality standards for livestock watering and wildlife habitat.

4.5 Noise

Current noise levels throughout the project area are associated primarily with vehicular traffic. Areas adjacent to developed areas or paved roads are likely to have daytime average background noise levels between 40 and 63 A-weighted decibels (dBA). Noise surveys taken on July 8-9, 1999, recorded average background levels of 58 dBA and 52 dBA at approximately 55 and 165 ft (17 and 50 m) north, respectively, of an existing road.

4.6 Light

The primary source of artificial light in the project area is vehicle traffic on adjacent roads and highways, from existing buildings and security lighting.

5.0 POTENTIAL EFFECTS OF THE WILDFIRE HAZARD REDUCTION PROJECT

5.1 Land Use and Traffic Volumes

No new land uses will result from this project. There will be no significant increase in traffic volume because of the operation of this project.

5.2 Environmental Restoration and Contaminants

Effects on waste management and PRSs would be minimal under the Proposed Action. Project planning assessments would identify PRSs and other potential contamination within treatment areas. In terms of acreage, most of the treatment areas are uncontaminated. Trees

removed from uncontaminated areas would not become waste. Wood suitable for sawlogs or firewood would be salvaged. Limbs and small trees would be chipped and left in place to control erosion and to recycle the nutrients or moved to other locations at LANL to provide the same benefits.

There are some contaminated areas within the boundaries at LANL that may need to undergo treatment. If the project area contains a PRS, then the trees would be cut but left in place on the PRS (either whole or after chipping), or removed and disposed of at an appropriate permitted disposal facility. If the contaminated area was not a PRS and the contamination was HE and/or DU, the trees could be burned at a RCRA- or NMAC-permitted burning facility at LANL or chipped and left on-site. Burning is the standard and acceptable disposal method for trees contaminated with HE and DU because the HE is consumed during burning yet the DU would not become aerosolized. Ashes produced from burning would be collected and disposed of under standard LANL waste management procedures. Wood contaminated with DU could also be disposed of on-site at Area G.

In certain canyons, there may be very low levels of HE or DU contamination (near or at instrument detection limit) widespread throughout the canyon bottoms with isolated pockets of higher levels of contamination. Most of the trees throughout the canyon would have little or no contamination uptake, but a few may have measurable amounts of contamination. Only wood that was determined safe for public use would be released to the public. Suspect wood would be chipped, left on-site, or burned at an appropriate permitted disposal facility.

Maintenance of treated areas that do not contain PRSs or other potential contamination would not produce hazardous or radioactive waste. Maintenance of a PRS or other potentially contaminated area would produce minimal waste, and it would be disposed of in the same manner as for the original treatment.

Fire roads would be sited to avoid PRSs and potentially contaminated areas. Therefore, there would be no waste generated from the construction of fire roads because trees suitable for firewood or sawlogs would be salvaged and slash would be chipped and scattered on-site to control erosion.

5.3 Air Quality

Effects of the WHRP on air quality would be minimal. Emissions of pollutants would come from equipment used to perform mechanical and manual treatments. The total amount of emissions would be minimal from these activities. In addition, no burning as a treatment measure would be conducted. Routine low-level emissions from mechanical treatment would occur more

often and on more days per year. Emissions from the burning of HE- or DU-contaminated wood material would be the same as under the current LANL waste management practices. Burn permits administered by the New Mexico Environment Department would be required; these would limit allowable emissions relative to National Ambient Air Quality Standards and New Mexico Ambient Air Quality Standards. Extensive modeling with site-specific data has been conducted at LANL to assess the air quality effects of burning HE- and DU- contaminated wood. Specific air pollutants considered included criteria pollutants such as carbon monoxide, nitrogen oxides, particulate matter, sulfur oxides, and DU. The modeled emissions of all regulated pollutants were shown to be well below the ambient standards at all affected locations.

5.4 Surface Water and Wetlands

Thinning activities would result in minimal disturbance of the surface forest litter layer and, therefore, no erosion is anticipated. Thinning activities reduce evapotranspiration and increase soil infiltration. This results in greater soil moisture availability for remaining plants and a general increase in ground cover and less soil erosion. Mixed conifer and ponderosa pine forests generally have an extensive surface litter layer that would not be removed in the thinning process. Piñon-juniper sites often have high erosion rates and would benefit from the thinning and slash-mulch or chip-mulch treatments. Road and firebreak building activities would be kept to a minimum and would adhere to construction specifications described in Section 3.3.

Floodplains would be treated by cutting. Protection for floodplains includes all of the previously listed environment protective measures. However, wetlands would not be treated. Workers would not stage equipment in wetland areas, nor drive through them to reach treatment areas nor allow cut trees to fall into wetlands. When planning a treatment, the DOE would consider potential effects to wetlands downslope of the treatment areas and take protective measures. Environmental protection measures would include, but are not be limited to 1) leaving groundcover vegetation in place, 2) scattering chips and slash on bare spots, 3) constructing berms, 4) driving only on established roads, 5) carrying felled trees rather than dragging them, and 6) using no heavy equipment in areas with slopes steeper than 30 percent.

Implementation of wildfire treatment techniques would reduce the potential for adverse flooding effects and sediment transport that could result from a catastrophic wildfire. The potential for an uncontrolled wildfire to degrade water quality or increase soil erosion would be reduced under this proposal.

5.5 Noise

Noise generated during the operation of heavy equipment such as would be used in this project could exceed limits set in the HMP. The HMP prohibits noise levels greater than 6 dBA above background during breeding seasons for bald eagle (November 1 to March 31), Mexican spotted owl (March 1 to August 31), and southwestern willow flycatcher (May 15 to September 15) in core habitats. WHRP activities will not be conducted in T&E species habitat during breeding seasons unless the areas have been confirmed unoccupied.

5.6 Light

WHRP operations would take place during daylight hours. No additional lighting would be used during this project.

6.0 FEDERALLY THREATENED AND ENDANGERED SPECIES

6.1 Habitat Management Plan Screening

The LANL HMP (LANL 1998) is a document prepared by Ecology Group (ESH-20) personnel as part of the Dual-Axis Radiographic Hydrodynamic Test Facility Mitigation Action Plan. The purpose of the HMP is to provide for the protection of T&E species and their habitats on LANL. The HMP is designed to be a comprehensive landscape-scale management plan that will balance the current operations and future development needs of LANL with the habitat requirements of T&E species. It will also facilitate DOE compliance with the Endangered Species Act (ESA) and related federal regulations.

The HMP defines site plans and monitoring plans for T&E species that occur or may occur on LANL. Currently, there are site plans for bald eagle, southwestern willow flycatcher, and Mexican spotted owl. These species are listed as federally threatened or endangered species occurring or potentially occurring at LANL.

The purpose of site plans is to provide guidelines that ensure that LANL operations do not adversely affect these species or their habitats. Suitable habitats for these species, along with a protective buffer area surrounding the habitats, have been designated as Areas of Environmental Interest (AEIs). Site plans provide information on the location of AEIs and guidelines for their management. AEIs are areas within LANL that are being managed and protected because of their significance to biological or other resources. In general, a T&E species AEI consists of a core area that contains important breeding or wintering habitat for a specific species and a buffer area around the core area. The buffer protects the core area from disturbances that would degrade the value of the core area to the species. AEI core areas were defined geographically based on the

habitat requirements of the T&E species. Defining AEIs was a multistep process that included a literature review, development of a land cover map, species surveys, data and technical reviews from regional species experts, guidance from state and federal regulatory agencies, and output from habitat suitability models. Buffer zones were established around each core zone based on regulatory guidance and literature information on species' reactions to disturbance.

Site plans identify the particular areas of LANL where operations might impact T&E species. They also provide a broad list of activities, which, if they are conducted in accordance with the guidelines in the site plan, will not adversely affect T&E species. By providing this information in site plans, the HMP reduces the number of projects and activities that need to be individually reviewed for compliance with the ESA. If an activity or project is occurring outside of all LANL AEIs and will not impact habitat within the AEI, it does not have to be reviewed for ESA compliance unless it is a large project. Projects over 5 acres (2 ha) in size or costing more than $5 million require an individual ESA compliance review even if they are not located in an AEI. Before the existence of the HMP, all LANL projects and activities required individual review for compliance with the ESA. Projects and activities that had the potential to affect T&E species or their habitats required biological assessments and concurrence from the US Fish and Wildlife Service before they could proceed.

6.2 ArcView© Database Review

ESH-20 biologists have developed a screening tool that is operated through the desktop geographic information system (GIS), ArcView© (Foxx et al., 1996). Information on AEIs, plant cover types, disturbed/developed areas, and the WHRP is accessible in the ArcView© program. The visual and spatial format of the data allows ESH-20 personnel to identify potential T&E species habitat and to evaluate the potential impact of the proposed action. With this program, we determined the land cover types, a list of federally protected species that use those land cover types, and known locations of federally listed species within the project area and associated zones of influence. In addition, we obtained information from previous studies or surveys conducted in the same area. Maps and tables from databases were generated from the GIS application. All data used for screening are maintained in an ARC-INFO© GIS database.

6.3 Regional Lists

Table 3 presents the list of T&E species potentially occurring on the Pajarito Plateau.

6.4 Status of Species

Table 4 lists the population trends of the T&E species potentially occurring on or near LANL. Three of the species (bald eagle, southwestern willow flycatcher, and Mexican spotted owl) are recognized by the HMP as occurring on LANL and require an assessment relative to the potential effects of the project. The remaining species (whooping crane and black-footed ferret) were determined not to have suitable habitat on LANL property and will not require detailed evaluation. Habitat requirements and survey methods for all species will be discussed in the following sections.

Table 3. T&E Wildlife Species Potentially Occurring on or near the Project Area.

Scientific Name	Common Name	Status*	Habitat	Potential To Occur⊗
Grus americana	Whooping crane	FE (Ex)	Rivers, marshes, and swamps.	Low
Mustela nigripes	Black-footed ferret	FE	Prairie dog towns greater than 80 acres (32 ha).	Low
Haliaeetus leucocephalus	Bald eagle	FT	Permanent rivers, lakes, and large streams; cliffs or large trees.	High
Empidonax trailii extimus	Southwestern willow flycatcher	FE	Riparian areas with stands of willow, buttonbush, or tamarisk.	Low
Strix occidentalis lucida	Mexican spotted owl	FT	Forested mountains and canyons. Generally uneven-aged, multistoried forest with closed canopy.	High

*CODES FOR LEGAL STATUS
FE = federally endangered.
FT = federally threatened.
FE (Ex) = federally endangered, but New Mexico population is an experimental nonessential population.

⊗POTENTIAL TO OCCUR
High = species is known to occur in this area.
Low = the area does not have species habitat components.

6.5 Species not included in the HMP

The whooping crane and black-footed ferret are listed by the U.S. Fish and Wildlife Service as threatened and endangered in the State of New Mexico but have no potential suitable habitat on or near LANL. These species have not been included in the HMP site plans and did not receive a detailed assessment.

6.5.1 Whooping Crane

Table 4. Population Trends of Federally Listed T&E Species.

Species	Current Legal Status	Regional Trends	State Trends	Local Trends
Whooping crane *Grus americana*	Federally Endangered	Historically entire populations numbered only 1,300 to 1,400 individuals. In 1941, only 21 birds were known. In 1987-1988 wintering wild populations stood at 153 birds.	The experimental Rocky Mountains flock that winters in New Mexico peaked at 33 birds but has since dwindled to fewer than five (NMDGF 2000).	Whooping cranes and sandhill cranes follow the Rio Grande during migration. However, there are no reports of cranes using LANL property.
Black-footed ferret *Mustela nigripes*	Federally Endangered	In 1992, the black-footed ferret was listed as the rarest mammal in North America. In 1981, a remnant population in northwest Wyoming was removed for captive breeding and reintroduction. Reintroduction has begun in Wyoming, Montana, and South Dakota (Finch 1992).	Last reported in New Mexico in 1934 (Frey and Yates 1996). If any animals survive, the northwestern part of the state is the most likely area (Findley et al., 1975).	No reported sightings of black-footed ferrets in Los Alamos County for at least the last 50 years. In addition, no large prairie dog towns have been observed on LANL lands.
Southwestern willow flycatcher *Empidonax trailii extimus*	Federally Endangered	300 to 500 breeding pairs remain (USFWS 1995a),	1993−95 surveys found 100 breeding pairs and 75% occurred in a local area. Surveys and data gathered in 1987, 1991, and 1994 suggest the population is declining (NMDGF 1994).	Willow flycatcher surveys have been conducted at LANL and Bandelier National Monument since 1995. Willow flycatchers have been detected, but no nesting flycatchers have been found. Willow flycatchers have been found nesting along the Rio Grande in Española (Keller et al., 1996).
Mexican spotted owl *Strix occidentalis lucida*	Federally Threatened	In 1993, 2,160 owls existed and now 20% of owl habitat has been rendered no longer suitable (Federal Register 1993).	In 1994, 250 to 300 territories occupied (NMDGF 1994).	Surveys for Mexican spotted owls have been conducted on LANL property since 1994. In 1995, a pair of Mexican spotted owls was located as well as a nest. Each year the nest has been occupied and resulted in two young fledged per year (Keller et al., 1996).

6.5.1.1 Habitat Description

The whooping crane nests along the marshy areas among bulrushes, cattails, and sedges that provide food and protection from predators. Cranes eat snails, larval insects, leeches, frogs, minnows, small rodents, and berries. They may scavenge dead ducks, marsh birds, or muskrats.

During migration, they stop to eat aquatic animals, roots of plants, and waste grain in stubble fields.

In late April, cranes arrive at their breeding area in Wood Buffalo National Park, which extends into northeast Alberta Canada from the Northwest Territory. By the end of September, the cranes leave for the 2,485-mi (4,000-km) flight south to the Aransas National Wildlife Refuge in Texas. The whooping crane is an internationally recognized symbol of wildlife conservation, classified as an endangered species in both Canada and the US. Currently, the only wild breeding population of whooping cranes migrates between Wood Buffalo National Park in the Northwest Territories and Aransas National Wildlife Refuge in Texas (NMDGF 2000).

An effort to create a wild flock with an alternate migratory route was initiated in 1975, using sandhill cranes as "foster parents." Whooping crane eggs were placed in the nests of sandhill cranes (*Grus canadensis tabida*) on their nesting grounds at the Grays Lake National Wildlife Refuge in Idaho. The sandhill cranes reared the chicks as their own, teaching them feeding habitats and showing them a new 850-mi (1,368-km) migratory path to the Bosqué del Apache National Wildlife Refuge in New Mexico. Unfortunately, these whooping cranes became so accustomed to their sandhill parents that they would not mate with other whooping cranes. The birds from this unsuccessful experiment are expected to be the only occurrences of this species in New Mexico.

6.5.1.2 Survey Methods

Whooping cranes are surveyed at the beginning and end of their migrational routes in Idaho and New Mexico. Cranes are monitored on projects in suitable habitat if that project occurs during the fall or spring migration.

6.5.1.3 Results

Most of the suitable whooping crane habitat in Los Alamos and Santa Fe counties occurs along the Rio Grande. There is no suitable nesting, wintering, or foraging habitat for the whooping crane within any of the proposed fuels reduction areas. The proposed action should have no effect on the whooping crane.

6.5.2 Black-footed Ferret

6.5.2.1 Habitat Description

The black-footed ferret has a historical range that includes 12 states (Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming) and the Canadian provinces of Alberta and Saskatchewan. There is prehistoric

evidence of this ferret occurring from the Yukon Territory in Canada south to New Mexico and Texas (Anderson et al., 1986). Black-footed ferrets depend almost exclusively on prairie dogs for food and shelter (NMDGF 2000). Ferret range is coincident with that of prairie dogs (Anderson et al., 1986), with no documentation of black-footed ferrets breeding outside of prairie dog colonies. There are specimen records of black-footed ferrets from ranges of three species of prairie dogs: the black-tailed prairie dog (*Cynomys ludovicianus*), white-tailed prairie dog (*Cynomys leucurus*), and Gunnison's prairie dog (*Cynomys gunnisoni*) (Anderson et al., 1986). Only prairie dog colonies with a combined area greater than 80 ac (32 ha) are large enough to support black-footed ferrets.

6.5.2.2 Survey Methods

The black-footed ferret is surveyed by spotlighting prairie dog towns at night. The perimeters of the prairie dog town are marked with wooden stakes with reflective tape. The researcher spotlights the prairie dog town for 20 minutes, turns the light off for 20 minutes, then repeats the light survey. Spotlighting has been carried out from both stationary locations and from moving vehicles. Where possible ferret sign was sighted, cameras were used for verification. In general, camera systems include an infrared movie camera with a trip-release tied to bait (chicken or prairie dog) and several time-lapse movie cameras with a bait wired to a nearby stake.

6.5.2.3 Results

There are no prairie dog colonies of the appropriate size in Los Alamos County, and there are no prairie dog colonies within any of the proposed fuels reduction areas. The proposed action should have no effect on the black-footed ferret.

6.6 Species included in the HMP

The bald eagle, southwestern willow flycatcher and Mexican spotted owl have potential suitable habitat on or near LANL. These species require a HMP screening assessment and impact assessment decision.

6.6.1 Bald Eagle

6.6.1.1 Habitat Description

Bald eagles occur casually to occasionally in summer and during migration in New Mexico. Bald eagles winter almost statewide. Main wintering areas in New Mexico include the San Juan, upper Rio Grande, upper and middle Pecos, Canadian, San Francisco, Gila, and Estancia valleys (Hubbard 1978). At LANL, bald eagles winter along White Rock Canyon of the Rio Grande.

Bald eagles are carnivores (mainly piscivores) and scavengers. They winter beside rivers and lakes or where carrion is available (Isaacs et al., 1993). The birds typically roost at night in trees that offer weather protection, security from predators, and accessibility to foraging areas. At LANL, they may roost overnight in ponderosa pine trees located in the lower portions of the tributary canyons near the Rio Grande (Johnson 1996), particularly near the mouths of Water, Ancho, Potrillo, and Chaquehui canyons. Bald eagles also use snags close to foraging areas as lookout posts and hunting/hawking perches (Maser et al., 1988).

Overall, the major food items of bald eagles in New Mexico appear to be waterfowl, fish, and carrion (NMDGF 1988). Mammals such as jackrabbits (*Lepus* spp.) are also taken. Eagles occurring around LANL will forage on the Rio Grande, Cochiti Lake, and the Pajarito Plateau (Johnson 1996). Diet analysis of eagles wintering along White Rock Canyon include fish, waterfowl, deer (*Odocoileus hemionus*), and elk (*Cervus elaphus*). The wetland habitat above Cochiti Lake has expanded since 1979, providing suitable habitat for fish, wintering waterfowl, and bald eagles (Allen et al., 1993).

6.6.1.2 Survey Methods

Roosting counts are conducted by trained personnel along the Rio Grande portions of LANL during late winter months. Roosting counts provide the most effective way to census wintering bald eagles, which tend to congregate at regular roosts (Johnson 1996). Collection of castings and other prey remains under roost trees provides the most comprehensive picture of diet, but under-represent the absolute proportion of fish in the diet. These late winter surveys of suitable roost trees for accumulated castings, feathers, and droppings have proven to be the most efficient method of documenting occasional use of trees for roosting and perching.

6.6.1.3 Results

The bald eagle AEI is located primarily in Planning Areas 7 and 8 (Figure 4). The WHRP objective for these Planning Areas is piñon-juniper forest health (Table 2). Trees that are located in this AEI, primarily along the Rio Grande and at the mouths of certain drainages,

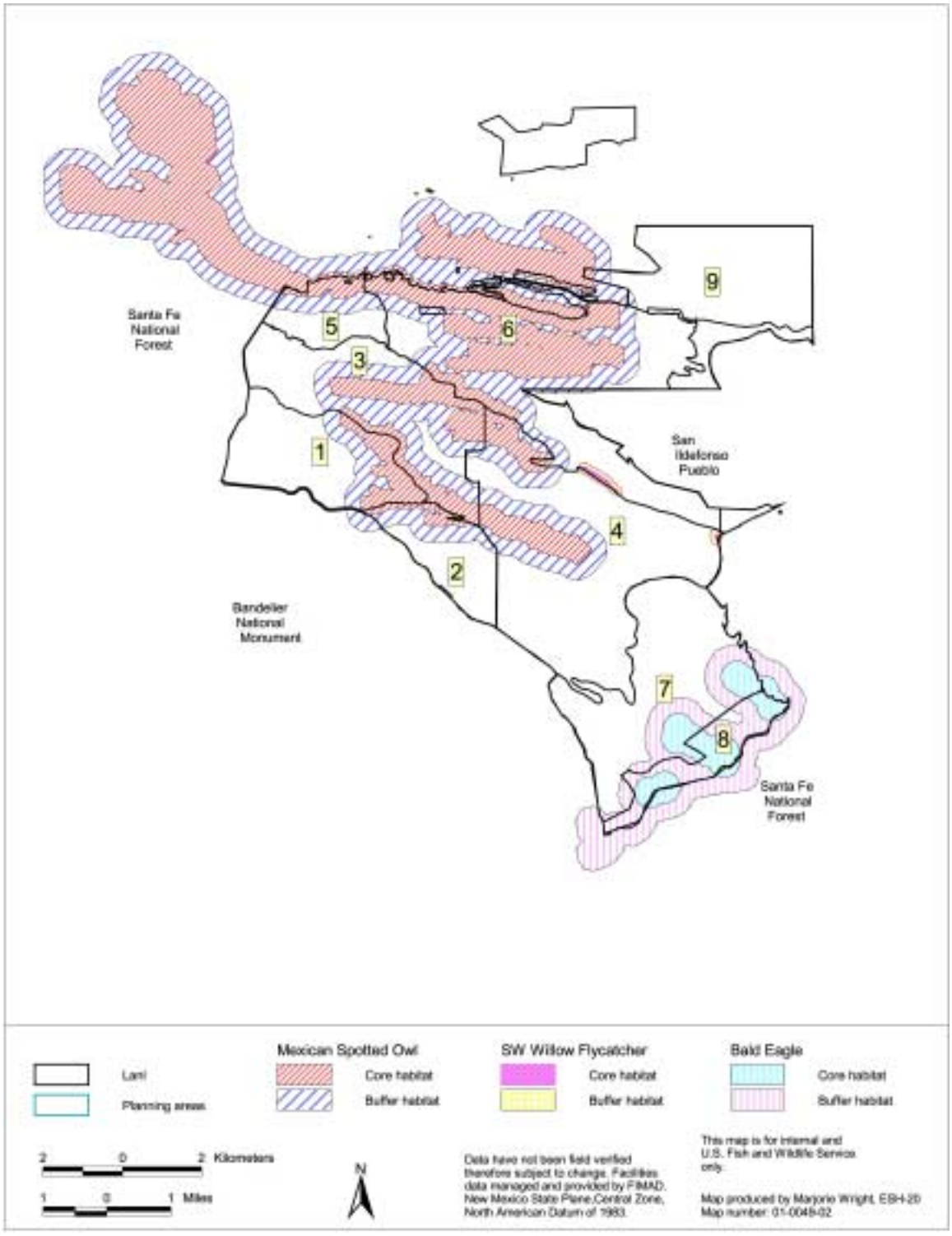

Figure 4. WHRP Planning Areas and AEIs.

provide roosting and perching habitat. Consequently, no live or dead trees would be cut in core and buffer areas. An exception to this provision is the thinning of ponderosa pines growing within 100 ft (30 m) of structures. Juniper and piñon trees and associated understory in the AEI buffer zone may be treated. Screening vegetation would be maintained at the edge of core areas. For human health and safety reasons, any trees growing within 100 ft (30 m) of buildings but outside of a developed area would be thinned to achieve a 25-ft (7.5-m) spacing between tree crowns. The HMP does not restrict habitat alteration, including thinning, in developed areas. Nevertheless, live and dead trees along canyon rims would be retained if the rim were in a developed area. Any tree over 9 in. (22.5 cm) dbh that is within 1,200 ft (365 m) of an explosives testing firing site or a waste treatment area permitted under the RCRA or NMAC for burning explosives wastes would be delimbed to a height of 6 ft (1.8 m).

Implementation of forest health objectives should improve habitat quality for all species, including bald eagle. However, the Environmental Protection Measures described in Section 3.6 should be followed to protect habitat from detrimental cumulative effects during treatment implementation.

6.6.1.4 Cumulative Effects

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation. The watersheds containing the Bald Eagle AEI are almost entirely federally owned (U.S. Forest Service, National Park Service, DOE). The portions not in Federal ownership (White Rock Townsite) are being used for residential purposes and this land use is unlikely to change. The greater Rio Grande watershed extends into Colorado and incorporates multiple ownerships and land uses. Changes in water levels are likely to have the greatest impact on bald eagle winter habitat quality. Because there is little agricultural demand for water resources at this time of year, water levels are primarily a function of past water use (reservoir depletion) and

current and past precipitation in the watershed. Water levels in Cochiti Reservoir are regulated by the U.S. Corps of Engineers whose actions are beyond the scope of this assessment.

6.6.1.5 Assessment Decision

If HMP guidelines are followed and the Environmental Protection Measures are implemented, the WHRP may affect but is not likely to adversely affect the bald eagle.

6.6.2 Southwestern Willow Flycatcher

6.6.2.1 Habitat Description

The southwestern willow flycatcher is one of four subspecies of the willow flycatcher. The historic range of the southwestern willow flycatcher included Arizona, California, Colorado, New Mexico, Texas, Utah, and Mexico. Currently, this flycatcher breeds in riparian habitats from southern California to Arizona and New Mexico, plus southern Utah and Nevada. It winters in southern Mexico, Central America, and northern South America.

Willow flycatchers are present in New Mexico from early May through mid-September, and breed from late May through late July. The flycatcher's nesting cycle is approximately 28 days. Three or four eggs are laid at one-day intervals, and incubation begins when the clutch is complete (Walkinshaw 1966). The female incubates eggs for approximately 12 days, and the young fledge about 13 days after hatching (King 1955). Southwestern willow flycatchers typically raise one brood per year.

The southwestern willow flycatcher only nests along rivers, streams, and other wetlands. It is found in close association with dense stands of willows (*Salix* spp.), arrowweed (*Pluchea* spp.), buttonbush (*Cephalanthus* spp.), tamarisk (*Tamarix* spp.), Russian olive (*Elaeagnus angustifolia* L.), and other riparian vegetation, often with a scattered overstory of cottonwood (*Populus* spp.)(Phillips 1948, King 1955, Zimmerman 1970, Hubbard 1987, Unitt 1987, Brown and Trosset 1989, Finch 1992, USFWS 1995a). The size of vegetation patches or habitat mosaics used by southwestern willow flycatchers varies considerably and ranges from as small as 2 acres (0.8 ha) to hundreds of acres. The southwestern willow flycatcher nests in thickets of trees and shrubs approximately 6.5 to 50 ft (2 to 15 m) tall, with a high percentage of canopy cover and dense foliage from 0 to 13 ft (0 to 4 m) above ground. Regardless of the plant species composition or height, occupied sites always have dense vegetation in the patch interior (Sogge et al., 1997).

The southwestern willow flycatcher is an insectivore. It forages within and occasionally above dense riparian vegetation, taking insects on the wing and gleaning them from foliage (USFWS 1993). The flycatcher's prey includes flies, bees, wasps, ants, beetles, moths, butterflies, grasshoppers, crickets, dragonflies, damselflies, and spiders (NMDGF 2000).

6.6.2.2 Survey Methods

Surveys are conducted in the core areas of the Southwestern Willow Flycatcher AEI. A minimum of one survey is conducted during each of the following survey periods: May 15 to

May 31, June 1 to June 21, and June 22 to July 10. Surveys must be at least five days apart. The surveys start at first light and continue until the entire AEI has been surveyed.

This protocol is primarily a tape-playback survey. At each site, surveyors broadcast recorded vocalizations of southwestern willow flycatchers. Sogge et al. (1997) describes the survey methods in detail. If a flycatcher is found, its behavior is observed and recorded in order to determine if the individual is nesting in the area.

6.6.2.3 Results

No WHRP activities are proposed within or immediately upstream of the southwestern willow flycatcher AEI (Figure 4). Precautions will be taken to prevent disturbance to wetlands throughout LANL (Section 5.4). WHRP activities in the watershed above the AEI should reduce the fire hazard and subsequent postfire flooding hazards. Adherence to the Environmental Protections Measures described in Section 3.6 should protect downstream habitats during treatment implementation.

6.6.2.4 Cumulative Effects

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation. The watersheds containing the southwestern willow flycatcher AEI are almost entirely federally owned (U.S. Forest Service, National Park Service, DOE). The portions not in Federal ownership (White Rock Townsite) are being used for residential purposes and this land use is unlikely to change. Future State or private activities should have no effect on this species.

6.6.2.5 Assessment Decision

There is no habitat loss and no potential for habitat degradation associated with the WHRP. The WHRP may affect but is unlikely to adversely affect the southwestern willow flycatcher.

6.6.3 Mexican Spotted Owl

6.6.3.1 Habitat Description

The Mexican spotted owl is found in northern Arizona, southeastern Utah, and southwestern Colorado south through New Mexico, west Texas, and into Mexico. It is the only subspecies of spotted owl recognized in New Mexico (USFWS 1995b). The Mexican spotted owl generally inhabits mixed conifer and ponderosa pine-Gambel oak forests in mountains and canyons. High canopy closure, high stand diversity, multilayered canopy resulting from an uneven-aged stand, large mature trees, downed logs, snags, and stand decadence as indicated by

the presence of mistletoe are characteristic of Mexican spotted owl habitat. Some spotted owls have been found in second growth, i.e., younger forests that have been logged; however, these areas were found to contain characteristics typical of old-growth forests. No spotted owls were found in forests less than 36 years of age (USFWS 1995b). Mexican spotted owls in the Jemez Mountains seem to prefer cliff faces in canyons for their nest sites (Johnson and Johnson 1988). The recovery plan for the Mexican spotted owl recommends that mixed conifer and pine-oak woodland types on slopes greater than 40 percent be protected for the conservation of this owl (USFWS 1995b).

A mated pair of adult spotted owls may use the same home range and general nesting areas throughout their lives. A pair of owls require approximately 1,976 acres (800 ha) of suitable nesting and foraging habitat to ensure reproductive success. Incubation is carried out by the female. The incubation period is approximately 30 days, and most eggs hatch by the end of May. Most owlets fledge in June, 34 to 36 days after hatching (USFWS 1995b). The owlets are "semi-independent" by late August or early September, although juvenile begging calls have been heard as late as September 30 (Ganey 1992). Young are fully independent by early October. The nonbreeding season runs from September 1 through February 28 (Ganey 1992). Although seasonal movements vary among owls, most adults remain within their summer home ranges throughout the year.

The diet of the Mexican spotted owl consists primarily of small rodents and rabbits with lesser amounts of reptiles, birds, and insects. A majority of the prey consumed by the Mexican spotted owl during the nesting season probably comes from a relatively small area surrounding the nest site. Ganey and Balda (1994) found core areas of individuals (i.e., where owls spent 60 percent of their time) averaged 331 acres (134 ha), and core areas for pairs averaged 395 acres (160 ha). High-use areas tended to correspond to steep slopes.

6.6.3.2 Survey Methods

There are three primary techniques that can be used to survey for the Mexican spotted owl. The choice of calling technique should be based on the best way to cover all suitable habitat. The three calling techniques are point, continuous, and leapfrog calling.

In point calling, an electronic recording of an owl call is played at a fixed point. The observer will spend at least 15 minutes at a point and alternate between playing the recording of the owl and listening for a response. The primary four-note location call of the Mexican spotted owl should be the major call played during surveys. However, the surveyor should occasionally use other types of calls to elicit a response. The time and location of all responding owls is recorded. Compass triangulation may be required to locate owls. Points are approximately 0.5

mi (0.8 km) apart and cover all suitable habitat to within 0.5 mi (0.8 km). Point calling is usually done from points along a road in suitable habitat.

In continuous calling, a surveyor walks a route (e.g., the edge of a canyon), stops and plays the tape, and waits for a response. The distance between points is much shorter than in point calling and much less time is spent at each point. All owl responses are noted.

In leapfrog calling, two people do a continuous calling route with one vehicle. The first person alternates between calling and listening as the second person drives approximately 0.5 mi (0.8 km) up the road and begins their calling route. Once the first person reaches the vehicle they drive another 0.5 mi (0.8 km) down the road to begin the process over again. This technique will cover more area more quickly. All owl responses should be noted.

Surveys are conducted annually in the Mexican spotted owl AEI core areas. At least four surveys are conducted in each field season between April 1 and August 31 of any given year. No more than one survey can be conducted before April 16 of any given year for any particular survey location. The first survey must be completed before July 1 of any given year for any given area of habitat. At least three surveys must be completed before August 1 of any given year for any given area of habitat. A survey of one area of habitat must be completed within seven days. The next complete survey cannot happen for at least five days and must be started before 21 days have elapsed (e.g., if a survey is completed on May 5, the next complete survey can not begin before May 11 and must begin before May 26). At least two surveys must be completed when owls are detected in an area. The best time to perform calls is before sunrise and the two hours after dark. However, the time of calling and the route through the habitat should be varied to cover the habitat.

Surveys can only be conducted when the survey is likely to be effectively completed. Field surveys are not conducted during existing or predicted wind (>15 mph) or during stormy weather. Surveys are not conducted when there are access problems because of snow or poor road conditions.

6.6.3.3 Results

Mexican spotted owl AEIs are located in all Planning Areas with major canyons that contain ponderosa pine and mixed conifer forest (Figure 4). Wildfire poses a serious threat to these forest types. The USFWS recovery plan for the Mexican spotted owl (USFWS 1995b) lists high-intensity wildfires as a primary threat to spotted owl habitat and encourages land managers to reduce fuel levels and abate fire risks in ways compatible with spotted owl presence on the landscape.

WHRP thinning treatments will be implemented in Mexican spotted owl AEI core and buffer areas throughout the Laboratory. HMP guidelines will be followed at all times. The HMP restricts activities in core areas in the breeding season (March 1 to August 31) unless current surveys show that no owls are present. In historically occupied core areas, fuels treatments may not exceed 10 percent of the undeveloped core area and would not be allowed within 1,335 ft (400 m) of previously occupied nesting areas. In recently occupied core areas, forest management activities must occur during the nonbreeding season, which is from September 1 to the end of February (USFWS 1995b).

In unoccupied, undeveloped core areas, on slopes greater than 40 percent, in the bottoms of steep canyons, and within 100 ft (30 m) of a canyon rim, thinning of trees less than 9 in. (22.5 cm) dbh and removal of fuels could be allowed. Exceptions allowing trees greater than 9 in. (22.5 cm) dbh to be thinned within 100 ft (30 m) of buildings would be made to protect facilities. Large logs (>12-in/30-cm diameter) and snags (large standing trees that are dead or diseased) will be retained to provide prey species habitat. Thinning in unoccupied core areas not meeting the characteristics listed above and in buffer areas may include trees of any size to achieve a 25-ft (7.5-m) spacing between tree crowns.

For human health and safety reasons, any trees growing within 100 ft (30 m) of buildings but outside of a developed area may be thinned to achieve a 25-ft (7.5-m) spacing between crowns. Habitat alterations, including thinning, would not be restricted in developed areas. However, trees and snags along canyon rims would be retained in developed areas. Because of the extreme fire danger associated with firing sites and the potential effect of a fire on Mexican spotted owl habitat (as in the Cerro Grande Fire), explosives testing and firing sites and waste treatment areas would be treated separately for the purpose of fuels management. Trees within 1,200 ft (365 m) of firing sites and burn areas in both core and buffer AEI areas may be thinned to a 50-ft (15-m) spacing between trees everywhere except on slopes greater than 40 percent or in the bottoms of steep canyons. Any tree over 9 in. (22.5 cm) dbh within 1,200 ft (365 m) of a firing site may have its lower limbs removed up to a height of 6 ft (1.8 m) above the ground to help prevent crown fires.

Environmental Protection Measures described in Section 3.6 will be followed to prevent environmental degradation during treatment implementation.

6.6.3.4 Cumulative Effects

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the

Federal action subject to consultation. Most of the watersheds containing Mexican spotted owl AEIs are federally owned (U.S. Forest Service and DOE). Significant portions of the Pueblo Canyon Mexican Spotted Owl AEI is within the jurisdiction of the County of Los Alamos. No spotted owls have been recorded in this AEI in eight years of surveys. Some urban-interface tree thinning could occur in this area. Prescriptions would be similar to those outlined in this document and should reduce the threat of catastrophic wildfire to this habitat.

6.6.3.5 Assessment Decision

Significant alteration of Mexican spotted owl habitat will occur as a result of WHRP activities. These activities are designed to protect and improve owl habitat as well as protect LANL personnel and property. If HMP guidelines are adhered to and Environmental Protection Measures (Section 3.6) are implemented, the WHRP may affect, but is unlikely to adversely affect, the Mexican spotted owl.

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