Schainer

LA-UR-01-3643

A Floodplains and Wetlands Assessment for the Potential Effects of the Wildfire Hazard Reduction Project

Prepared By: Laura K. Marsh
ESH-20, Ecology Group
Los Alamos National Laboratory

July 13, 2001

Contents

Figures

Tables

List of Acronyms

BA	Biological Assessment
BMPs	Best Management Practices
CFR	Code of Federal Regulations
CGF	Cerro Grande Fire
CGF SEA	Cerro Grande Fire Supplemental Environmental Analysis
ESA	Endangered Species Act
EPA	Environmental Protection Agency
HMP	Habitat Management Plan
LANL	Los Alamos National Laboratory
NPDES	National Pollutant Discharge Elimination System
PRS	potential release sites
SMZ	Streamside Management Zones
SWPP	Storm Water Protection Plan
T&E	Threatened and Endangered
TPA	Trees Per Area
WHRP	Wildfire Hazard Reduction Project Plan

EXPONENTIAL NOTATION: Many values in the text and tables of this document are expressed in exponential notation. An exponent is the power to which the expression, or number, is raised. This form of notation is used to conserve space and to focus attention on comparisons of the order of magnitude of the numbers (Examples):

1×10^4	=	10,000
1×10^2	=	100
1×10^0	=	1
1×10^{-2}	=	0.01
1×10^{-4}	=	0.0001

Metric Conversions Used in this Document

Multiply	By	To Obtain
Length		
inch (in.)	2.50	centimeters (cm)
feet (ft)	0.30	meters (m)
yards (yd)	0.91	meters (m)
miles (mi)	1.61	kilometers (km)
Area		
acres (ac)	0.40	hectares (ha)
square feet (ft^2)	0.09	square meters (m^2)
square yards (yd^2)	0.84	square meters (m^2)
square miles (mi^2)	2.59	square kilometers (km^2)
Volume		
gallons (gal.)	3.79	liters (L)
cubic feet (ft^3)	0.03	cubic meters (m^3)
cubic yards (yd^3)	0.76	cubic meters (m^3)
Weight		
ounces (oz)	29.60	milliliters (ml)
pounds (lb)	0.45	kilograms (kg)
short ton (ton)	0.91	metric ton (t)

Executive Summary

All canyons that are within Los Alamos National Laboratory (LANL) boundaries may be subject to tree thinning under the current Wildfire Hazard Reduction Project Plan (WHRP). The Department of Energy (DOE) Compliance with Floodplain/Wetlands Environmental Review Requirements (10 Code of Federal Regulations (CFR) 1022), provides guidance to reduce the hazard and risk of flooding to human safety, health and welfare and to restore and preserve natural and beneficial values of floodplains and wetlands. Floodplains as defined in 10 Code of Federal Regulations (CFR) 1022 are present in 15 canyons: Bayo, Pueblo, Los Alamos, Sandia, Mortandad, Two Mile, Pajarito, Cañada del Buey, Three Mile, Cañon de Valle, Water, Potrillo, Fence, Ancho, and Chaquehui. Wetlands as defined in 10 CFR 1022 are present in 5 of the 15 canyons: Bayo, Los Alamos, Sandia, Mortandad, and Pajarito. There are a few additional wetlands associated with outfall areas that are not in canyons or floodplains. WHRP activities have the potential to impact floodplains or wetlands by increasing stormwater flows from mesa top areas into canyon areas or from soil disturbance to canyon bottoms or edges. The extent and duration of the potential impact is dependent on the amount of disturbance during treatment and the amount of time for the vegetation to recover (approx. 1-3 years). Mitigations are described that reduce treatment disturbance and time to recovery, thereby protecting floodplain values, wetland values, and potential contaminant migration. These mitigations will significantly reduce the hazard and risks of flooding associated with WHRP activities to human safety, health, property, and welfare and to restore and preserve natural and beneficial values of floodplains and wetlands.

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 preserve 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. The treatment would thin approximately 250 acres (100 ha) of mixed conifer, 6,150 acres (2,490 ha) of ponderosa pine, and 3,600 acres (1,457 ha) of piñon-juniper habitat type. Areas to be thinned include canyons and floodplains.

No use of fire as an initial treatment measure would be employed. Each project would incorporate the planning measures, environmental protection measures, forest treatment measures, wood products and waste disposal methods, and long-term maintenance measures described in Section 3.0, Project Description. A typical project could use from 6 to 20 qualified personnel, axes, chainsaws, and multiple forms of heavy equipment. 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. Additionally, each project may include one or more of the posttreatment assessment measures.

All program projects and their related activities would be conducted in compliance with the LANL Threatened and Endangered (T&E) Species Habitat Management Plan (HMP) (LANL 1998), 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.

(This page intentionally left blank.)

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 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 conglomerate of the Puye Formation underlies the tuff 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

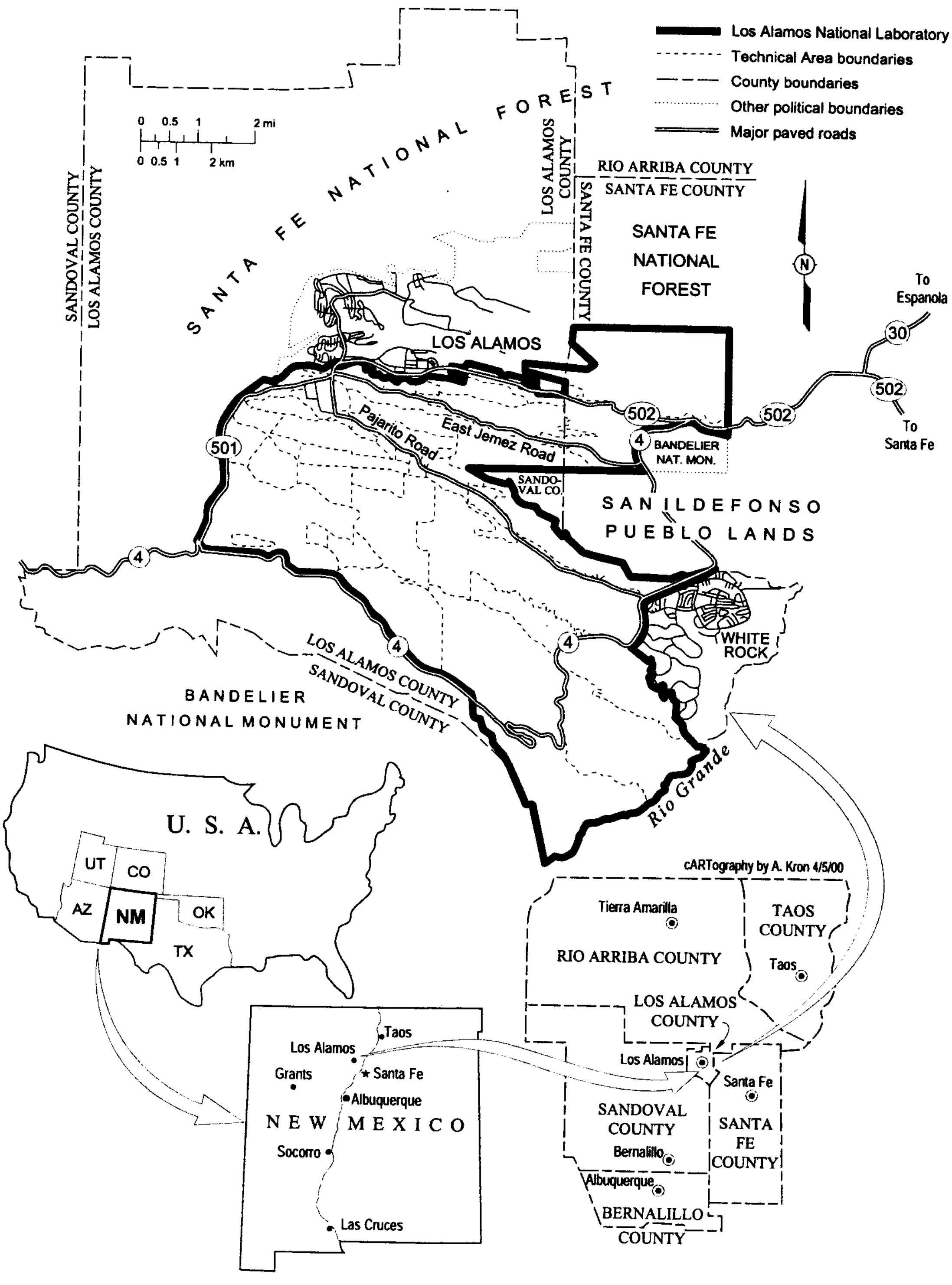

Figure 1. Location of Los Alamos National Laboratory.

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 Rio de los Frijoles receives an estimated 4,300 to 5,500 acre-ft (5.3 to 6.8=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, forms a continuous backdrop to the landscapes of the region being studied. 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 radioactive 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 was made by the Burned Area Emergency Rehabilitation Team (BAER 2000), and is discussed for Threatened and Endangered species in the WHRP Biological Assessment (Loftin 2001). Some vegetation was burned in floodplains, but not in wetlands.

2.1.7 Pre- and Postfire Hydrology

McLin (1992) modeled all major 100-year floodplains for LANL using U.S. Army Corps of Engineers Hydrologic Engineering Center Hec-1 and Hec-2 computer based models. These data represent prefire flow rates for all of the floodplains on LANL. Postfire maps and modeling are being created and will be completed by September 2001 (McLin, pers. com). However, an estimate of the flows for every canyon postfire is roughly a magnitude of ten greater than the prefire model data (McLin, pers. com.). Best available information estimates the postfire 100-year, 6-hour flood event to cover the canyon bottom at least one foot high, canyon wall to canyon wall.

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 was made by the Burned Area Emergency Rehabilitation Team (BAER 2000), and is discussed for Threatened and Endangered species in the WHRP Biological Assessment (Loftin 2001). Some vegetation was burned in floodplains, but not in wetlands.

2.1.7 Pre- and Postfire Hydrology

McLin (1992) modeled all major 100-year floodplains for LANL using U.S. Army Corps of Engineers Hydrologic Engineering Center Hec-1 and Hec-2 computer based models. These data represent prefire flow rates for all of the floodplains on LANL. Postfire maps and modeling are being created and will be completed by September 2001 (McLin, pers. com). However, an estimate of the flows for every canyon postfire is roughly a magnitude of ten greater than the prefire model data (McLin, pers. com.). Best available information estimates the postfire 100-year, 6-hour flood event to cover the canyon bottom at least one foot high, canyon wall to canyon wall.

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, the DOE requested that a project plan be completed before initiating any further activities. The resultant WHRP plan (LANL 2001) 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 LANL. It also provides the basis for consultation with the U.S. Fish and Wildlife Service (USFWS) and the New Mexico State Historic Preservation Office as needed. LANL was divided into Planning Areas (Figure 2) to facilitate site-specific project planning.

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, and
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

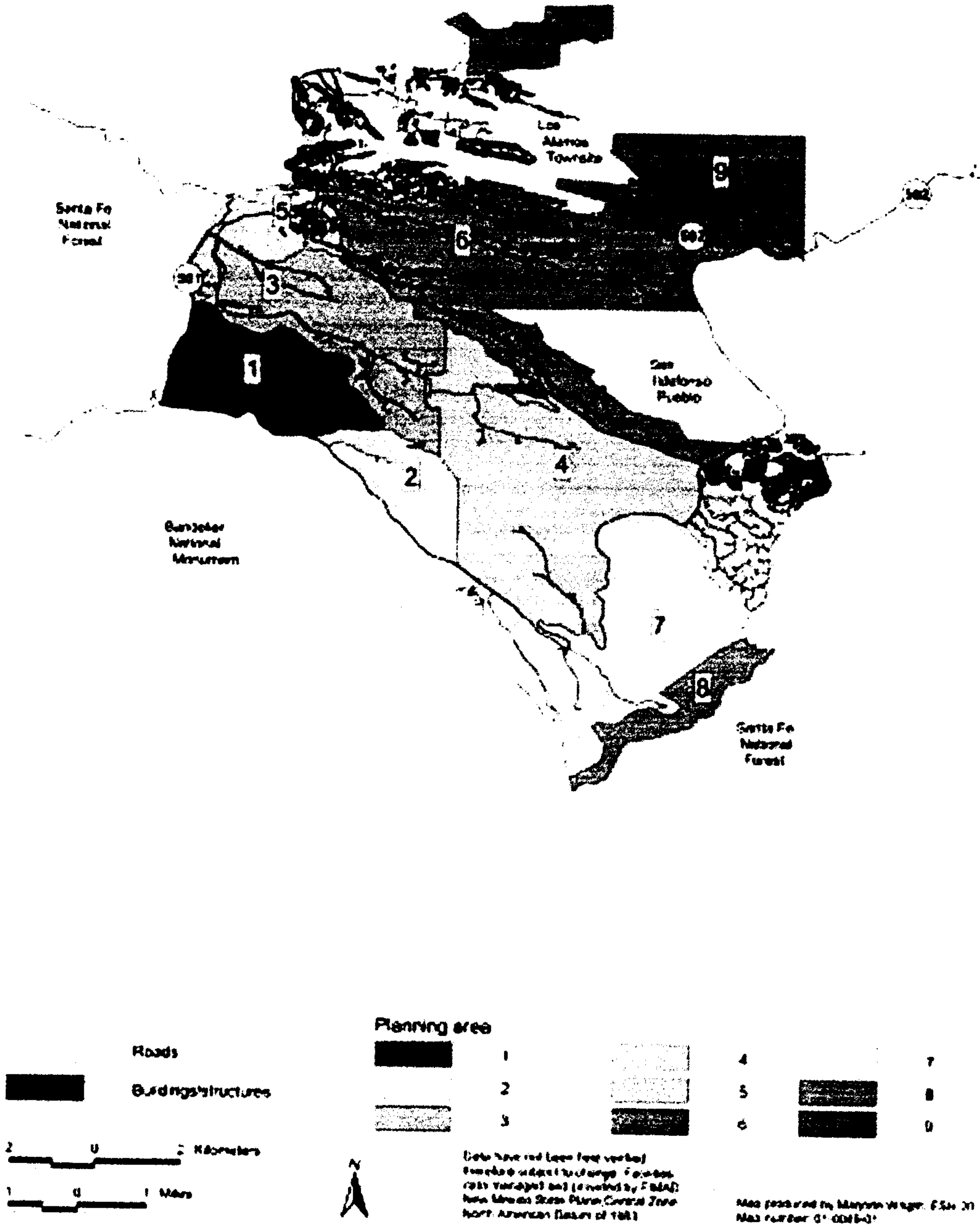

Figure 2. WHRP Planning Areas.

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. Large-diameter trees will remain, as well as some scattered dense clusters of trees of various ages and diameters. Snags will be left for wildlife use. 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, and
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. Table 1 shows total acreages and acreages to be thinned in each of the major vegetation types. General end-state conditions would be a spatial mosaic of tree sizes, age classes, and densities with a 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

Table 1. Estimated Treatment Acreages/Ha by Habitat Type and Planning Area. Habitat Types Include Mixed Conifer (MC), Ponderosa Pine (Pipo), and Piñon-Juniper (PJ).

Planning Area	Total MC	Treated MC	Total Pipo	Treated Pipo	Total PJ	Treated PJ
1	100/40	30/12	1,500/607	1,500/607	300/121	0/0
2	0/0	0/0	300/121	0/0	400/162	100/40
3	300/121	90/36	2,200/890	2,000/809	400/162	200/80
4	0/0	0/0	1,200/486	500/202	4,300/1,740	1,500/607
5	100/40	30/12	600/243	600/243	0/0	0/0
6	300/121	90/36	1,900/769	1,500/607	2,300/931	800/324
7	0/0	0/0	100/40	0/0	2,900/1,174	700/283
8	0/0	0/0	0/0	0/0	400/162	0/0
9	50/20	10/4	500/202	50/20	2,200/890	300/121
Total	850/342	250/100	8,300/3,358	6,150/2,488	13,200/5,342	3,600/1,455
Percent	100	29	100	74	100	27

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 that 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, and
- 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, and
- Relatively low slope (<40 percent).

<u>Ponderosa Pine Forest Health</u>

The desired end-state conditions for thinned ponderosa pine forests would f all 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, and
- Diseased, malformed, or weakened trees would be preferentially removed during thinning treatments.

<u>Mixed Conifer Forest Health</u>

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 LANL would be treated in a 3-year period,
- 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, and
- 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.

3.3 Summary of Canyons in Areas 1, 3, and 5

In Planning Areas 1, 3, and 5, there are approximately 1,175 acres of canyons. Best available information suggests that the postfire hydrology in the canyons on a 100-year floodplain is canyon wall to canyon wall. Throughout these canyons there is a mix of tree species. The north-facing slopes of the canyons are predominantly comprised of mixed conifer. The south-facing slopes are generally comprised of ponderosa pine, Douglas-fir, and Gambel oak. Table 2 summarizes the data from the canyon sampling.

Not all of the acreage listed in Table 2 will be treated immediately. The amount of trees that can be removed dependent upon tree species, spotted owl core habitat, and riparian area buffers. The treatments for canyon areas will be site specific, and field marking of trees will take into account tree species, slope, habitat, and erosion issues.

Table 2. Canyon Sampling Data Summary for Planning Areas 1, 3, and 5. TPA= Trees per Acre

Total Acreage	**1175**
Avg. TPA	347
Avg. TPA Removed	**122**
Removed basal area (ft^2/acre)	14
Avg. TPA Residual	**226**
Residual basal area (ft^2/acre)	80

Total canyon acreage in Planning Areas 1, 3, and 5 is approximately 1,175 acres. These areas will be treated in order of importance for fire hazard reduction to ensure the safety of property. The average TPA in these areas is 347. In spotted owl core habitat, treatments will fully comply with actions agreed upon during Section 7 consultation compliance for the Endangered Species Act (ESA) with the USFWS. Sufficient, declining trees will be retained for snag recruitment in areas where few snags are present. The majority of trees that will be removed are suppressed, small-diameter trees in the understory. These trees will be removed to reduce fuel ladders that are present in the canyons. Remaining trees will be pruned up to 10 ft from the base of the tree to further reduce fuels. In core area habitat, trees will be pruned to 6 ft from the base.

All canyon treatments will be site specific and marked according to tree species composition basal area, erosion, and habitat requirements. The number of trees removed will be dependent upon site conditions and will range from about 53—180 (TPA) removed.

3.4 Silvilcultural Prescription for Canyon Area Thinning

- Thinning and heavy pruning in canyons will be based on a site-to-site and tree species composition basis because of the sensitivity of the areas. These areas will be thinned from below; residual trees will be pruned from the base up to 10 feet to reduce fuel ladders and spread of wildfires.
- Pruning of trees in spotted-owl core habitat will not exceed 6 feet from the base of the tree.
- Canyon benches may be thinned to reduce possibility of wildfire spread onto the plateau.
- All shrub-like species will be retained.
- It is recommended that riparian areas contain a buffer where little to no thinning activities occur.
- Based on seasonal bark beetle flight, fuels will be removed from site before mid July or piled and burned before February if thinning is being done after the mid-July flight.
- T&E species habitat buffer will be thinned to comply with the LANL T&E Species Habitat Management Plan (LANL 1998) and the actions agreed upon during Section 7 consultation compliance for the ESA with the USFWS.

- All prescriptions may be modified on an area-specific basis, depending upon a consensus of the management team regarding fire hazard reduction, wildlife habitat, and watershed requirements (c.f., LANL 2001).

(This page intentionally left blank.)

4.0 Description and Effects on Floodplains and Wetlands

Pursuant to Executive Order 11988, Floodplain Management, each Federal agency is required, when conducting activities in a floodplain, to take actions to reduce the risk of flood damage; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. DOE's 10 CFR Part 1022.4 defines a flood or flooding as "...a temporary condition of partial or complete inundation of normally dry land areas from....the unusual and rapid accumulation of runoff of surface waters...". DOE's 10 CFR Part 1022.4 identifies floodplains that must be considered in a floodplain assessment as the base floodplain and the critical-action floodplain. The base floodplain is the area inundated by a flood having a 1.0 percent chance of occurrence in any given year (referred to as the 100-year floodplain). The critical-action floodplain is the area inundated by a flood having a 0.2 percent chance of occurrence in any given year (referred to as the 500-year floodplain). Critical action is defined as any activity for which even a slight chance of flooding would be too great. Such actions could include the storage of highly volatile, toxic, or water-reactive materials.

Pursuant to Executive Order 11990, Protection of Wetlands, each Federal agency is to avoid, to the extent practicable, the destruction or modification of wetlands, and to avoid direct or indirect support of new construction in wetlands if a practicable alternative exists. DOE 10 CFR Section 1022.4(v): Wetlands means those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflow, mudflats, and natural ponds.

According to 10 CFR 1022.12(a)(2), a floodplain/wetland assessment is required to discuss the positive and negative, direct and indirect, and long- and short-term effects of the proposed action on the floodplain and/or wetlands. In addition, the effects on lives and property, and on natural and beneficial values of floodplains must be evaluated. For actions taken in wetlands, the assessment should evaluate the effects of the proposed action on the survival, quality, and natural and beneficial values of the wetlands. If DOE finds no practicable alternative to locating activities in floodplains or wetlands, DOE will design or modify its actions to minimize potential harm to or in the floodplains and wetlands. The floodplains and wetlands that are assessed herein are those areas in canyons or drainages that are seasonally inundated with perennial or intermittent streams from runoff during 100-year floods.

4.1 General

Wetland functions are naturally occurring characteristics of wetlands such as food web production; general, nesting, resting, or spawning habitat; sediment retention; erosion prevention; flood and runoff storage; retention and future release; groundwater discharge, or recharge; land-nutrient retention and removal. Wetland values are ascribed by society based on the perception of significance and include water-quality improvement, aesthetic or scenic value, experiential value, and educational or training value. These values often reflect concerns regarding economic values; strategic locations; and in arid regions, the location relative to other landscape features. Thus, two wetlands with similar size and shape could serve the same function but have different values to society. For example, a wetland that retains or changes flood flow timing of a flood high in the mountains might not be considered as valuable as one of similar size that retains or changes flood-flow timing of a flood near a developed community. Wetlands were addressed in the LANL Site-Wide Environmental Impact Statement as follows (DOE 1999):

> "Wetlands in the general LANL region provide habitat for reptiles, amphibians, and invertebrates and potentially contribute to the overall habitat requirements of the peregrine falcon, Mexican spotted owl, southwestern willow flycatcher, and spotted bat. Wetlands also provide habitat, food, and water for many common species such as deer, elk, small mammals, and many migratory birds and bats. The majority of the wetlands in the LANL region are associated with canyon stream channels or are present on mountains or mesas as isolated meadows containing ponds or marshes, often in association with springs (DOE 1998)."

Proposed uses for each of the canyons being evaluated for WHRP are discussed, and specific information on floodplains, canyon wetlands, and adjoining or nearby wetlands is provided. Tree thinning boundaries presented in this report are approximate. All areas will be surveyed and boundary lines defined prior to work done in each area. These changes, if relevant to floodplain or wetlands concerns, will be addressed in revisions to the information presented in this report, as appropriate. Each of the canyons are discussed below in the context of the WHRP.

Locations of floodplains and wetlands associated with, or in close proximity to, the proposed WHRP appear with the discussion of the individual canyons, in section 5.0. Figure 3 represents prefire floodplains on LANL. Figure 4 shows the watersheds and canyons on LANL. Wetlands within LANL have been broadly mapped by the USFWS. This information is available in the NWI in a GIS-based format. This hierarchical system follows Cowardin et al., 1979, and is based entirely on aerial photography. Small wetlands, or those in steep canyons, may not be detected using this method. Additional on-site surveys and internal UC databases were also used to gather information regarding these resources. Figure 5 shows the location of wetlands on LANL. Within each canyon section there is discussion of the direct and indirect (both primary and secondary) effects of the WHRP on floodplain and wetlands resources located in the canyons. The effect of proposed floodplain actions on lives and property, and on natural and beneficial floodplain values is evaluated.

4.2 Canyon Area Issues and Concerns

The canyon areas on LANL land are comprised primarily of mixed conifer and ponderosa pine. The majority of these canyons, especially in the northern region of LANL property, have been identified as core habitat for the Mexican Spotted Owl. Planning Areas 1, 2, 3, 4, 5, 6 and a small region of 9 all have identified core habitat. The treatment of stands in the core habitat areas will be restricted by the guidelines that were established in formal consultation with the USFWS.

Treatments in floodplains not within the core habitat, such as Mexican Spotted Owl buffer zones, will follow the WHRP Plan and the actions agreed upon during formal consultation with USFWS. Areas outside of HMP areas will be treated according to the prescription detailed within this document, and the WHRP Plan. In all cases, erosion, sediment transfer, and movement of contaminants are a concern, from work on mesa tops as well as within floodplains, particularly during rain events and the monsoon season.

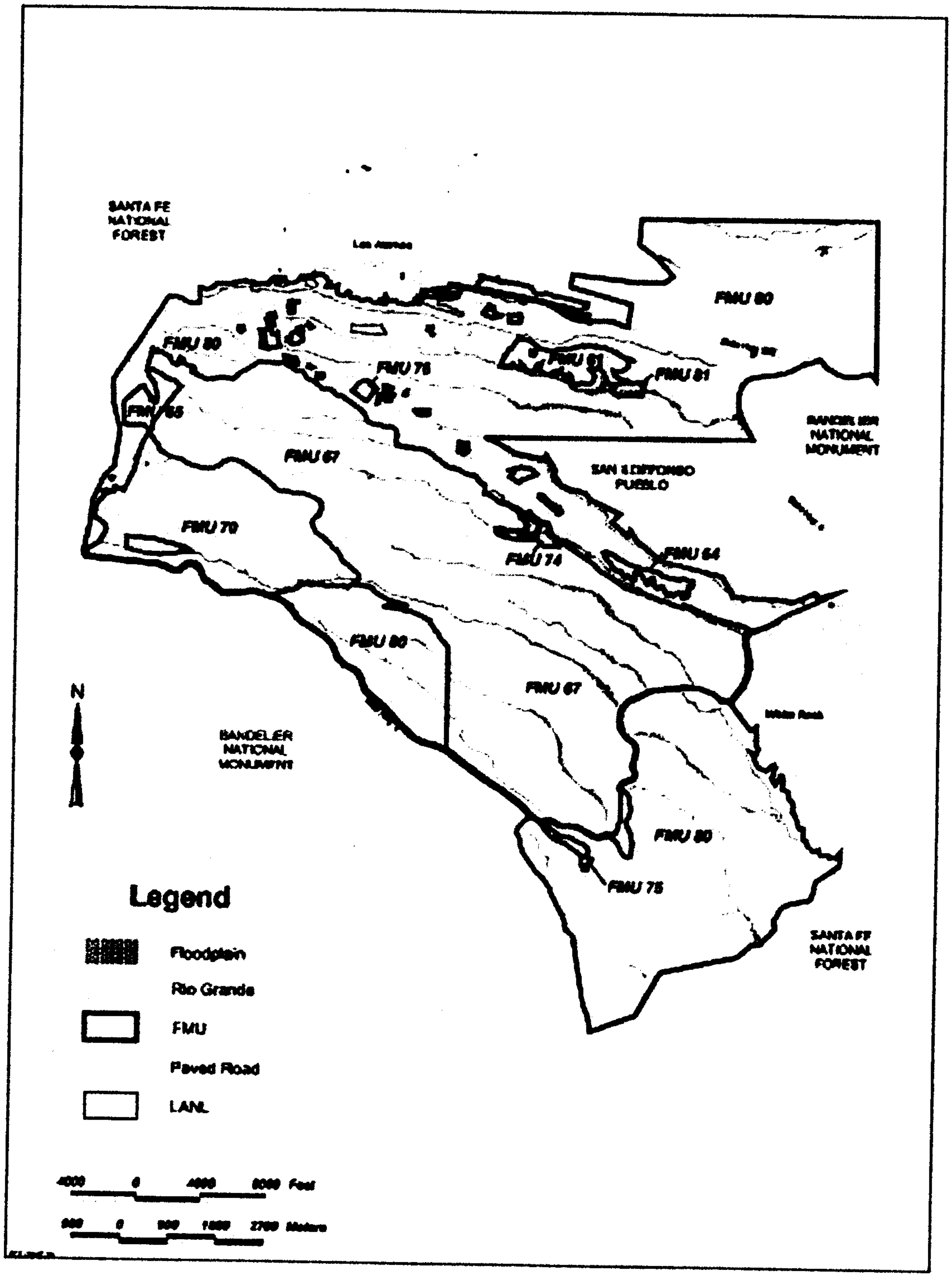

Figure 3. Prefire floodplains on LANL.

Figure 4. Watersheds and canyons on LANL.

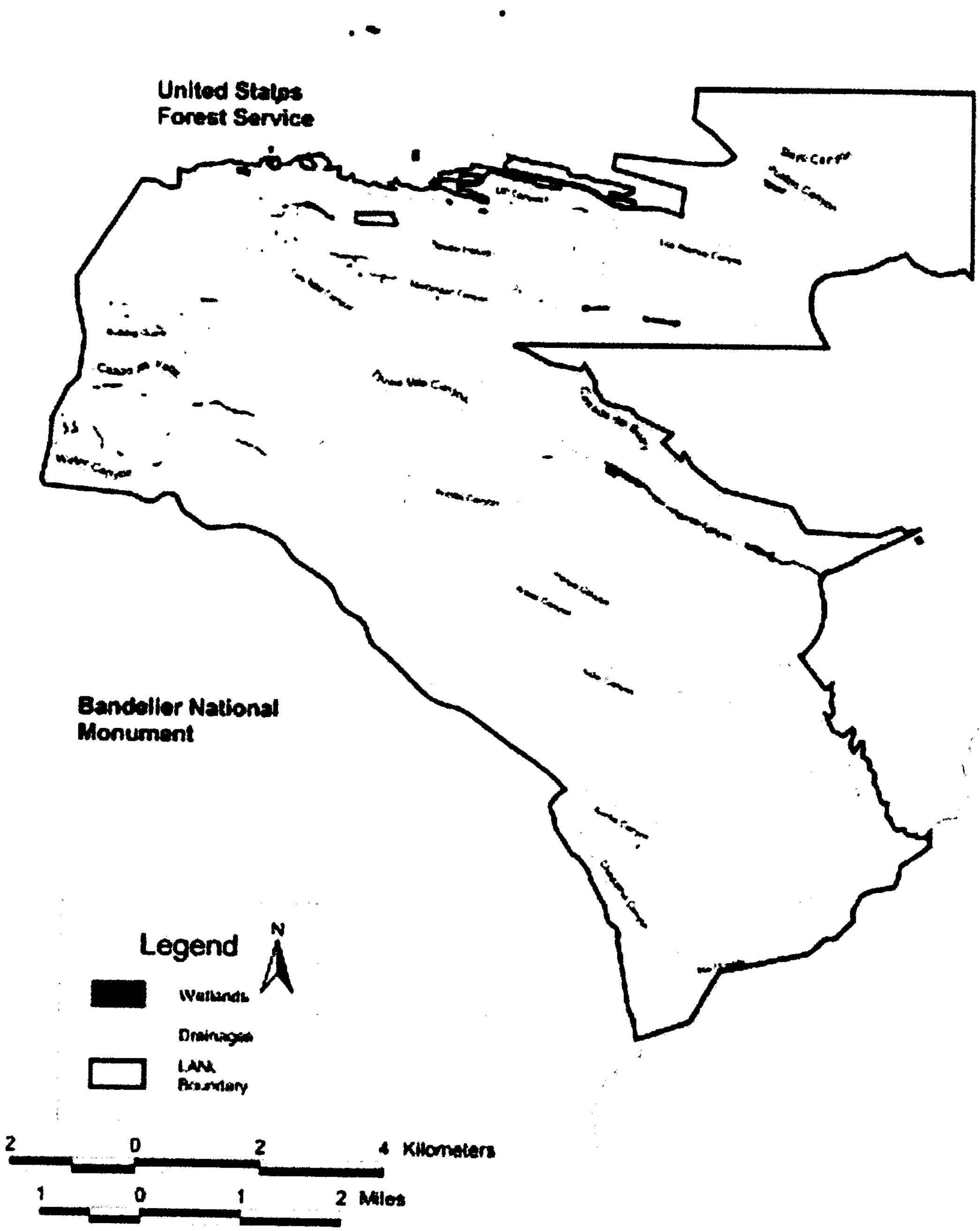

Fig 5. Wetlands on LANL

Figure 5. Location of wetlands on LANL.

Cumulative erosion, where ash and soils from severely burned headlands above project site areas is also a potential concern. The potential for downstream floodplain/wetland values to be impacted by the WHRP exist for all canyons. Although some canyons would not contribute alone to a potential impact, all canyons are part of a cumulative watershed that feeds the Rio Grande (Figure 4). Because of this, potential downstream impacts are discussed for each canyon.

A qualitative evaluation of potential tree thinning on mesa tops identified increased stormwater flows off mesas into canyons as a concern. These concerns include a potential for impacts to floodplain and wetland values, and contaminant-plume movement. Potential effects are based on areas of impervious surface during and following the development of roads and fire breaks. Stormwater flows have been modeled to be up to ten times greater in areas that have been severely burned.

In canyons where conifers will be removed, there is a potential for marked increases in the water table, cold-air ponding, and grass/shrub competition. All of these factors can inhibit conifer regeneration. Floodplains and wetlands may respond differently than at present to these conditions if they occur due to tree thinning.

(This page intentionally left blank.)

5.0 Canyon Specific Assessments

5.1 Bayo Canyon

5.1.1 Description

Bayo canyon is predominantly comprised of ponderosa pine and piñon-juniper. There are no wetlands in this canyon. The 100-year floodplain covers the entire canyon bottom. There was little or no fire damage from the Cerro Grande Fire (CGF). There is an established road in the lower end of the canyon. It falls in Planning Area 9 (Figure 2).

5.1.2 Proposed Treatment

The treatment for this canyon will follow the prescription for Planning Area 9 (Table 3). This primarily includes ponderosa pine and piñon-juniper prescriptions.

5.1.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplain

The 100-year floodplain as described for the purpose of this project covers the length and breadth of the canyon bottom.

Wetlands

There are no wetlands in this canyon; however, there are wetlands at the confluence with Pueblo canyon.

Summary of Impacts

No potential for loss of life or property have been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree thinning efforts are the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning area 9).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Bayo canyon contributed to increased sediment movement, there may be some retention of those

Table 3. Wildfire Hazard Reduction Area Plans

Planning Area	Acres (Total/Planned for Treatment)	Primary Prescriptions	Phase	Other Issues
1	2,300/1,530	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 piñon-juniper	2	HMP core habitat CG Fire impacts
3	3,300/2,290	defensible space firing sites ponderosa pine mixed conifer	1,2	Firing sites, powerlines, and access roads, HMP core habitat Winter habitat for wildlife CG Fire impacts
4	5,700/2,000	firing sites defensible space piñon-juniper	1,3	Firing sites, powerlines, and access roads, HMP core habitat Habitat for wildlife
5	1,000/630	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	5,500/2,390	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	3,700/700	piñon-juniper	3	Powerlines HMP core habitat Winter habitat for deer and elk
8	1,000/0	piñon-juniper	3	Powerlines HMP core areas, Hiking trails Winter habitat for deer, elk, and bald eagles
9	4,700/360	ponderosa pine mixed conifer piñon-juniper	3	Powerlines and utilities Airport Urban interface Winter habitat for deer and elk Cultural sites

sediments by the wetlands at the confluence of Bayo and Pueblo canyons. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best management practices (BMPs) for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree-thinning process (c.f., Section 6.0). These BMPs would incorporate considerations of the National pollutant Discharge Elimination System (NPDES) permit program and Environmental Protection Agency (EPA) requirements for a Storm Water Protection Plan (SWPP) Plan.

5.2 Pueblo Canyon

5.2.1 Description

Pueblo canyon is predominantly comprised of ponderosa pine and piñon-juniper. There are some wetlands in the lower end of the canyon. The headlands of this canyon were severely burned in the CGF. There is an established road in the lower end of the canyon. It falls in Planning Area 9 (Figure 2).

5.2.2 Proposed Treatment

The treatment for this canyon will follow the prescription for Planning Area 9 (Table 3), which includes a small portion of the HMP area for the Mexican Spotted Owl. BMPs for work within an HMP core, buffer, and non-HMP areas will be employed according to the WHRP Plan. The primary prescriptions are for ponderosa pine and piñon-juniper.

5.2.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are wetlands in this canyon.

Summary of Impacts

No potential for loss of life or property have been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree-thinning efforts are the potential for increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Area 9).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Pueblo canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands at the confluence of Bayo and Pueblo canyons. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree thinning process (c.f., Section 6.0). These BMPs would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.3 Los Alamos Canyon

5.3.1 Description

The primary tree cover for Los Alamos canyon is mixed conifer in the upper sections, ponderosa pine for much of the length down to the lower elevations where it blends with Piñon-Juniper. There are wetlands associated with the canyon, and the floodplain extends for the entire length. The headlands were severely burned, but the canyon nest to LANL experienced little to no burn. There is an established road running the entire length of the canyon. This canyon falls into Planning Areas 5, 6, and 9. The remaining buildings and unused reactor from Omega Site are in the canyon bottom.

5.3.2 Proposed Treatment

The treatment prescription will follow those in Table 3 for Planning Areas 5, 6, and 9. This includes the HMP core, buffer, and non-HMP areas. The primary prescriptions for this area include defensible space, mixed conifer, ponderosa pine, and piñon-juniper.

5.3.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are wetlands associated with this canyon.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon, as long as previously approved best-management practices are considered for the Omega site. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree thinning efforts are the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Areas 5, 6 and 9).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Los Alamos canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree thinning process (c.f., Section 6.0). These best-management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.4 Sandia Canyon

5.4.1 Description

The primary tree species in this canyon is ponderosa pine, with some mixed conifer in the higher elevations. The canyon drains into piñon-juniper. There are wetlands associated with this canyon, and the floodplain extends the length of the canyon. The canyon experienced a low-to-moderate burn from the CGF. There is no maintained road in the upper portion of this canyon. This site falls within Planning Area 6.

5.4.2 Proposed Treatment

The treatment will follow the prescriptions for Planning Area 6. This area includes the HMP core habitat, buffer, and non-HMP areas. The primary prescription for this canyon are defensible space, mixed conifer, ponderosa pine, and piñon-juniper.

5.4.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are wetlands in this canyon.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree-thinning efforts are the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Area 6).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Sandia canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree-thinning process (c.f., Section 6.0). These best-management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.5 Mortandad Canyon

5.5.1 Description

The primary tree species in this canyon are ponderosa pine with areas of mixed conifer in the upper region and piñon-juniper in the lower. There are wetlands associated with this canyon, and the floodplain extends the entire length. There are areas of moderate-to-high burn within the canyon. It falls in Planning Area 6.

5.5.2 Proposed Treatment

The treatment will follow the prescriptions for Planning Area 6. This area includes the HMP core habitat, buffer, and non-HMP areas. The primary prescription for this canyon is defensible space, mixed conifer, ponderosa pine, and piñon-juniper.

5.5.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are wetlands in this canyon.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree-thinning effort is the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Area 6).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Sandia canyon contribute to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree-thinning process (c.f., Section 6.0). These best-management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.6 Two Mile Canyon

5.6.1 Description

The primary trees in this canyon are mixed conifer and ponderosa pine. There are no wetlands in this canyon, and the floodplain extends the entire length. The headlands were severely burned and areas of moderate to high burn are within the canyon. There is no established road in this canyon. It falls within Planning Area 5.

5.6.2 Proposed Treatment

The treatment will follow the prescription for Planning Area 5, including the HMP core area, buffer, and non-HMP areas. The primary prescription for this site is defensible space, ponderosa pine, and mixed conifer.

5.6.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are no wetlands in this canyon.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree thinning effort is the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Area 5).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Two Mile canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree-thinning process (c.f., Section 6.0). These best-management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.7 Pajarito Canyon

5.7.1 Description

Pajarito canyon above TA-18 is primarily mixed conifer and ponderosa pine. Lower Pajarito canyon is ponderosa pine and piñon-juniper. There are wetlands in the canyon, and the floodplain extends for the entire length. There is a new stormwater retention structure (as of Fall 2000) above TA-18. The headlands for the canyon were severely burned, and there was moderate burning in other parts of the canyon. There is a road in the lower part of the canyon, but no roads above the retention structure. The canyon falls in Planning Areas 3, 4, and 6.

5.7.2 Proposed Treatment

The treatment will follow the prescription for Planning Areas 3, 4, and 6, including the HMP core area, buffer, and non-HMP areas. The primary prescription for this site is defensible space, firing sites, ponderosa pine, mixed conifer, and piñon-juniper.

5.7.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are wetlands in this canyon.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree-thinning effort is the potential for increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Areas 3, 4, and 6).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Pajarito canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree-thinning process (c.f., Section 6.0). These best-management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.8 Cañada del Buey

5.8.1 Description

The primary trees in this canyon are ponderosa pine and piñon-juniper. There are no wetlands associated with this canyon. The floodplains extend for the entire length. The canyon had moderate-to-high burning from the CGF. There is a road in the canyon. The canyon falls within Planning Area 6.

5.8.2 Proposed Treatment

The treatment will follow the prescription for Planning Area 6 including HMP core area, buffer, and non-HMP areas. The primary prescription for this site is defensible space, ponderosa pine, and piñon-juniper.

5.8.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are no wetlands in this canyon.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree-thinning effort are the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Area 6).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Cañada del Buey canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree-thinning process (c.f., Section 6.0). These best-management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.9 Three-Mile Canyon

5.9.1 Description

The tree composition for this canyon is primarily mixed conifer and ponderosa pine. There are no wetlands, and the floodplain extends for the entire length of the canyon. The canyon was moderately burned. There is no road within the canyon. This area is within Planning Areas 3 and 4.

5.9.2 Proposed Treatment

The treatment will follow the prescription for Planning Area 6, including the HMP core area, buffer, and non-HMP areas. The primary prescription for this site is defensible space, firing sites, ponderosa pine, and mixed conifer.

5.9.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are no wetlands in this canyon.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree thinning efforts are the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Area 3 and 4).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Three-Mile canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree-thinning process (c.f., Section 6.0). These best-management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.10 Cañon de Valle

5.10.1 Description

The primary trees in this canyon are mixed conifer and ponderosa pine. There are wetland areas associated with natural springs in the canyon, but they are not necessarily on the canyon bottom. The floodplain extends the entire length of the canyon. The headlands were severely burned, with low-to-moderate burning within the canyon. There is no road in the canyon. The canyon is within Planning Areas 1 and 3.

5.10.2 Proposed Treatment

The treatment will follow the prescription for Planning Areas 1 and 3 including the HMP core area, buffer, and non-HMP areas. The primary prescription for this site is defensible space, firing sites, ponderosa pine, and mixed conifer.

5.10.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are wetland areas associated with natural springs, some of which are above the canyon floor.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree thinning efforts are the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Areas 1 and 3).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Cañon de Valle e canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree thinning process (c.f., Section 6.0). These best-management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.11 Water Canyon

5.11.1 Description

The primary trees in this canyon are mixed conifer and ponderosa pine in the upper region, and in the lower areas, ponderosa pine and piñon-juniper. There are no wetlands, and the floodplain covers the entire length of the canyon. The headlands were severely burned, and the upper areas received high-to-moderate burns, and the lower areas light-to-moderate burns. There is a road within the canyon. This long canyon is within Planning Areas 1, 2, 3, 4, and 7.

5.11.2 Proposed Treatment

The treatment will follow the prescription for Planning Areas 1, 2, 3, 4, and 7, including the HMP core area, buffer, and non-HMP areas. The primary prescription for this site is defensible space, firing sites, ponderosa pine, mixed conifer, and piñon-juniper.

5.11.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are no wetlands associated with this canyon.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree thinning efforts are the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Areas 1, 2, 3, 4, and 7).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Water canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree-thinning process (c.f., Section 6.0). These best-management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.12 Potrillo Canyon

5.12.1 Description

The primary tree species in this canyon are ponderosa pine and piñon-juniper. There are no wetlands, and the floodplains extend for the entire length of the canyon. There was no burning associated with this canyon. There is a road within the canyon. The Planning Area is 4.

5.12.2 Proposed Treatment

The treatment will follow the prescription for Planning Areas 1, 2, 3, 4, and 7, including the HMP core area, buffer, and non-HMP areas. The primary prescription for this site is ponderosa pine and piñon-juniper.

5.12.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are no wetlands associated with this area.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree thinning efforts are the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Areas 4).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Potrillo canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree-thinning process (c.f., Section 6.0). These best-management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.13 Fence Canyon

5.13.1 Description

The primary tree species in this canyon are ponderosa pine and piñon-juniper. There are no wetlands, and the floodplains extend for the entire length of the canyon. There was no burning associated with this canyon. There is a road within the canyon. The Planning Area is 4.

5.13.2 Proposed Treatment

The treatment will follow the prescription for Planning Areas 1, 2, 3, 4, and 7, including the HMP core area, buffer, and non-HMP areas. The primary prescription for this site is defensible space, firing sites, ponderosa pine, mixed conifer, and piñon-juniper.

5.13.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are no wetlands in this canyon.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree thinning efforts are the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Areas 4).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Fence canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree-thinning process (c.f., Section 6.0). These best-management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.14 Ancho Canyon

5.14.1 Description

The primary trees found in this canyon are ponderosa pine and piñon-juniper. There are no wetlands, and the floodplain extends for the entire length of the canyon. There was no burning within the canyon. There is a road in the southern fork of the canyon, but not the northern. The canyon is within Planning Areas 2, 4, and 7.

5.14.2 Proposed Treatment

The treatment will follow the prescription for Planning Areas 2, 4, and 7, including the HMP core area, buffer, and non-HMP areas. The primary prescription for this site is firing sites, ponderosa pine, and piñon-juniper.

5.14.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are no wetlands in this canyon.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree thinning efforts are the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Areas 2, 4, and 7).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Ancho canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree- thinning process (c.f., Section 6.0). These best-management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

5.15 Chaquehui Canyon

5.15.1 Description

The primary trees in this canyon are ponderosa pine. There are no wetlands, and the floodplain extends for the entire length of the canyon. There was no burning in the canyon. There is no road within the canyon. This canyon is within Planning Area 7.

5.15.2 Proposed Treatment

The treatment will follow the prescription for Planning Areas 2, 4, and 7, including the HMP core area, buffer, and non-HMP areas. The primary prescription for this site is firing sites, ponderosa pine and piñon-juniper.

5.15.3 Floodplains and Wetlands Description and Impacts from Proposed WHRP

Floodplains

The 100-year floodplain as described for the purposes of this project covers the length and breadth of the canyon bottom.

Wetlands

There are no wetlands associated with this canyon.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon. Possible direct effects of the WHRP are a reduction in vegetation cover and exposure of mineral soils. Possible indirect effects of the tree thinning efforts are the potential for the increase of erosion and stormwater runoff (c.f., Table 3 for issues involved in Planning Area 7).

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the WHRP effort have not been identified. If work conducted in Chaquehui canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

Secondary indirect impacts (outside of the project area) resulting from the WHRP would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Downstream floodplain/wetland values potentially impacted by the project include the alteration of flood-flow retention times, downstream food production, nesting, foraging or resting habitat, redistribution of sediments, stream channel migration, sediment-retention time changes, and the loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation would be installed to minimize these impacts (c.f., Section 6.0).

At a minimum, best-management practices for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during the tree-thinning process (c.f., Section 6.0). These best management practices would incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan.

(This page intentionally left blank.)

6.0 Mitigations to the Proposed WHRP

In all cases, BMPs would be followed according to the WHRP Plan, the Cerro Grande Fire Special Environmental Analysis (CGF SEA), and any and all DOE and LANL BMPs for wetlands and floodplains. All sites will be evaluated and improvements installed as needed. There may be some additional useful mitigations that are discussed below.

All work conducted for the proposed WHRP that involves the disturbance of soils through road building, the continuous use of roads, off-road vehicle use, and dragging of debris potentially contributes to an increase in sediment movement during a 100-year storm event. This in turn can possibly increase the amount of contaminants being removed to downstream areas, particularly if soils are disturbed in canyons. Mitigation actions associated with activities in floodplains will in part depend upon best-management practices already in place for potential release sites (PRSs), erosion control, and post-project mitigations found in the WHRP Plan, and the CGF SEA Mitigation Plan.

In general, no debris would be left in the floodplains (e.g., canyon wall to canyon wall). This includes all downed trees, prunings, and chipped material. When a tree is felled, care would be taken to keep it from landing in a water course. Leaving debris of any kind in a drainage, stream channel, or water course, even if it only runs seasonally, may invoke a penalty under Sections 401 and/or 404 of the Clean Water Act. Limbs of trees and shrubs may be pruned above any noticeable high water marks. Enough trees should remain along channel edges to stabilize the banks. Best-management practices' suggestions from the Colorado Forest Stewardship Guidelines (Colorado State Forest Service 1998) include maintaining Streamside Management Zones (SMZ) that are 50-foot buffers on all sides of a perennial streambed, spring, seep, wetland, or any riparian-like area where no disturbance would occur. This enhances stability of any potential water course.

BMPs would be employed when working in canyon bottoms as a planned part of the projects since these areas are considered potentially contaminated until proven otherwise through extensive further contaminant testing. Minimizing soil disturbance and contaminant movement is desired. Following the already prescribed method of using established roads only in canyon bottoms will help with this issue.

In addition, there are mitigation measures employed by the U.S. Forest Service that aid in the prevention of increased erosion, contaminant movement, and stormwater runoff that might be considered. These suggestions are for both canyon and noncanyon areas, because the increase in potential erosion and movement of sedimentation into the floodplains increases with compound thinning, even on mesas. The potential for erosion is particularly high for Piñon-Juniper habitats if they border a canyon or fall within the floodplain. These methods include decreasing the compounding effects of vehicle use and the removal of downed trees and debris. A possible method for reducing erosion is by spreading out the jobs in several planning areas at once. For instance, instead of working in a single planning area with three crews working on simultaneous jobs, crews would be encouraged to work in two or more different planning areas at the same time. This method, coupled with reducing the number of adjacent acres being cut simultaneously is optimal at any time of year, but particularly during the monsoon months (late June-early September). These methods will minimize the connectivity of tree thinning across the project area.

In the course of working within canyons, it may be useful to work in those canyons that do not have headlands that were burned in the CGF. The longer that burned watersheds have to recover postfire, the more likely it will be that compounding erosion effects will be kept to a minimum. Canyons without severely burned headlands include Bayo, Sandia, Mortandad, Three-Mile, Potrillo, Fence, Ancho, and Chaquehui. However, those canyons that do not have burned headlands, but do contain wetlands, may be sensitive to sedimentation during the monsoon season in particular. Those canyons include Bayo, Sandia, and Mortandad.

7.0 Conclusion

No potential loss of life or property have been identified with respect to the floodplains and wetlands for any of the proposed canyons in the WHRP. Concerns about siltation, erosion, and excessive stormwater runoff will be addressed with specific mitigations implemented as part of individual treatment projects after careful project planning. Monitoring during the conduct of the initial thinning treatment project and post-treatment followup studies and maintenance actions will provide DOE with the opportunity to access the BMPs success and then to make any changes, improvements or to take additional actions as necessary. Although there may be some effect to floodplains and wetlands, the potential impacts from the WHRP are expected to be minor.

(This page intentionally left blank.)

8.0 References

BAER. 2000. Cerro Grande Fire Burned Area Emergency Rehabilitation Plan. Interagency Burned Area Emergency Rehabilitation Team, Los Alamos, NM.

Blake, W.D., F. Goff, A. Adams, and D. Counce. 1995. Environmental geochemistry for surface and subsurface waters in the Pajarito Plateau and outlying areas, New Mexico. Los Alamos National Laboratory Report LA-12912-MS.

Bowen, B.M. 1990. Los Alamos Climatology. Los Alamos National Laboratory Report LA-11735-MS.

Bowen, B.M. 1992. Los Alamos Climatology Summary. Los Alamos National Laboratory Report LA-12232-MS.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. Performed for the U.S. Department of the Interior, Fish and Wildlife Service, Washington, D. C. USFWS/OBS-79-31. U.S. Government Printing Office.

Colorado State Forest Service 1998. Colorado Forest Stewardship Guidelines: Best Management Practices for Colorado; Pp. 1-33.

Department of Housing and Urban Development (DHUD). Federal Insurance Administration. 1987. Flood Hazard Boundary Map, Los Alamos County. Community Map Panels 350035 0001, 350035 0002, 350035 0004.

DOE 1979. 10 CFR Part 1022 - Compliance with Floodplain-Wetlands Environmental Review Requirements. Authority: E.O. 11988 (May 24, 1977); and E.O. 11990 (May 24, 1977) 44 FR 12596, March 7, 1979.

DOE 1999. Final Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory. U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. DOE/EIS - 0238. February 1999.

DOE 2000. Special Environmental Analysis. DOE/SEA-03.

DOE, 2000. U.S. Department of Energy, Environmental Assessment for the Wildfire Hazard Reduction and Forest Health Improvement Program at LANL, DOE-EA-1329, Los Alamos Area Office, Los Alamos, New Mexico, September 2000.

LANL 1998. Threatened and Endangered Species Habitat Management Plan, Los Alamos National Laboratory document LALP-98-112.

LANL 1998. Appendix D. Floodplain and Wetlands Assessments for the Proposed Conveyance and Transfer Tracts at Los Alamos National Laboratory, Los Alamos and Santa Fe Counties, New Mexico.

LANL. 1999. Environmental Surveillance at Los Alamos during 1998. LA-13633-ENV. Los Alamos National Laboratory, Los Alamos, New Mxico.

LANL. 2001. Wildfire Hazard Reduction Project Plan. LA-UR-01-2017. Los Alamos National Laboratory, Los Alamos, New Mexico.

Loftin, S. R. 2001. A Biological Assessment of the Potential Effects of the Wildfire Hazard Reduction Project on Federally Listed Threatened and Endangered Species. LA-UR-01-2253. Los Alamos National Laboratory, Los Alamos, New Mexico.

McLin, S.G. 1992. Determination of 100-Year Floodplain Elevations at Los Alamos National Laboratory. LA-12195-MS. Los Alamos National Laboratory. Los Alamos, New Mexico.

Nyhan, J.W., L.W. Hacker, T.E. Calhoun, and D.L. Young. 1978. Soil survey of Los Alamos County, New Mexico. Los Alamos Scientific Laboratory Report LA-6779-MS.

Purtymun, W.D., J.R. Buchholtz, and T.E. Hakonson. 1977. Chemical quality of effluents and the influence on water quality in a shallow aquifer. Journal of Environmental Quality 6 (1):29-32.

Purtymun, W.D., and S. Johnson. 1974. General Geohydrology of the Pajarito Plateau. New Mexico Geological Society Guidebook, 25th Field Conference, Ghost Ranch, New Mexico.

UWIC. 2000. Urban-Wildland Interface Code, International Fire Code Institute. Whittier, California. January 2000.